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FRAMEWORK OF GMO RISK ASSESSMENT IN LATVIA AND CONSUMERS' TRUST IN REGULATORY BODIES INVOLVED IN GMO RISK ASSESSMENT AND DECISION MAKING PROCESS

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Abstract. The purpose of this research is to analyse consumers' attitude towards regulatory bodies involved in genetically modified organisms (GMO) risk assessment and decision making process towards a better understanding of its impacts on consumers' trust in GMO safety and their support for GMO products. The paper provides a review of previous research results relevant to the problem analyzed. This paper also evaluates risk assessment of GMO in Latvia, provides an analysis of the existing problems and offers recommendations for the improvement of Latvian GMO risk assessment system. This paper has been designed as a descriptive and relational model. The analysis of the GMO risk assessment in Latvia has been performed taking into account the author's own experience. As a result a number of recommendations have been offered to improve the GMO risk assessment procedure in Latvia with the aim of facilitating consumers' trust in regulatory bodies and in the risk assessment procedure itself.

Key words: *consumer attitude; decision making; GMO; Latvia; risks assessment*

Jel code: D81; D91; I18; O31; Q18.

INTRODUCTION

To better comprehend how consumers make purchase preferences, it is necessary to determine the role of risk assessment and benefit perceptions in the stage of decision making (Kayabası A. and Mucan. B., 2011). In the EU, GMO risk assessment is one of the most important and sensitive steps in the decision making process regarding the circulation of GMO. Consumers' attitude is an important determinant of the long-term role of genetic modification and its applications in society. According to Miles et al. (2005) consumer negativity towards genetically modified (GM) foods has already had an impact on commercialisation; therefore it is important to examine these attitudes and to understand the basis of consumer concerns, in order to introduce a regulatory

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framework which satisfies consumer needs, and facilitates the development of appropriate commercialisation framework for products resulting from genetic modification (Miles S. Et al., 2005).

Public opinion towards risk assessment of new technologies focuses on the institutional context of scientific research, including trust in regulatory actors and stakeholders. Trust in institutional actors is important, it being a primary source of information about new technologies. In all walks of life, individuals often look to others to help them make decisions, in particularly, when they admit a personal lack of knowledge in that area. However, if these institutional actors are not trusted, their claims are likely to fall on deaf ears, or be consciously rejected. A lack of trust in public officials in this regard is likely to further erode public support for new technologies. (Weldon S. and Laycock D., 2009).

Previous research, for example, of Durant and Legge (2005) also confirms the importance of trust in institutional actors for support of new technologies.

At the EU level the issue of permission (including risk assessment) for contained use (scientific work at laboratory) of genetically modified micro-organisms (GMM) is prescribed in Council Directive 90/219/EEC. The products that are, contain, or are produced from GMO must also have an authorisation prior to entering the market. In the EU, a legal framework for the authorization of GMO has been adopted and implemented. There are two main regulatory legal acts (including risk assessment of GMO): Directive 2001/18 and Regulation 1829/2003 (Paoletti C., 2008). The objective of Directive 2001/18 is to set out principles for a deliberate release into the environment of GMOs (field trials, placing on the market), while the objective of Regulation 1829/2003 is to ensure a high level of protection of human and animal health and environment as well as introducing the 'one-key-one-door' approach (one authorization to cover food and feed uses and cultivation).

At present, the risk assessment process is a very sensitive issue taking into account the mistrust expressed by the public and a number of nongovernmental organization towards the European Food Safety Authority (EFSA) – the principal risk assessment body in the EU. The antagonists of GMOs highlight the poor management of the environmental risk of GM crops such as out crossing to wild relatives, the contamination of conventional and organic crops, the emergence of volunteer crop plants with multiple herbicide resistance, the erosion of biodiversity, etc. (Bonny S., 2003). What is more, people express concerns regarding their exclusion from the decision making process and insist on public consultation on biotechnology (Marris C. et al., 2001; Miles S. and Frewer L.J., 2001; Miles S. and Frewer L.J., 2002).

The EFSA was set up in 2002, following a series of food crises in the EU, to provide an independent source of scientific advice, risk assessment and risk communication on risks associated to food chain, animal health and plant health (Regulation No 178/2002).

In Latvia the competent authority responsible for ensuring the GMO risk assessment is the Food and Veterinary Service (FVS). A Scientific Expert Committee (SEC) was established within the service and is responsible for providing scientifically-based opinion on GMO risk assessment.

RESEARCH RESULTS

The main principles of GMO risk assessment have been incorporated into Latvian legislation, namely, Law on Circulation of Genetically Modified Organisms (hereinafter – the Law).

According to the Law, the FVS is a competent authority issuing permits for circulation of GMO, that is, the contained use and deliberate release into environment of GMOs.

The department within the FVS involved in GMO risk assessment is the Assessment and Registration Agency (ARA), established as the Food Centre at the end of 2005 and later renamed into ARA. Quite often, very specific types of food are offered for consumption, which requires evaluation before releasing them onto the market: those are food supplements, dietary food, GMO, new foods and others. The evaluation and approval of these products fall within the scope of the ARA competence (ARA, 2012).

The ARA cooperates with the risk evaluation agencies of similar profile in the EU, the EFSA, which performs the evaluation of food risk, evaluates food safety, ensures the exchange of information among the Member States (MS) concerning potentially harmful food products and does not permit them to reach the market.

In order to ensure modern and justified access to ensuring food safety, the ARA carries out research on topical issues in the food sector. The agency runs not only local, but also international and multinational research projects.

On 12 November 2009 a special expert group, the SEC, was established to ensure the GMO risk assessment measures in Latvia. The SEC is an advisory expert working group which examines risk assessment documents submitted by persons and prepares and submits to the FVS a scientifically substantiated opinion regarding the risk assessment of GMO and a monitoring program. The SEC prepares recommendations for the FVS regarding the issues related to the improvement of development strategy of the national system of biosafety and promotes involving of the public in the taking of decisions regarding GMO circulation.

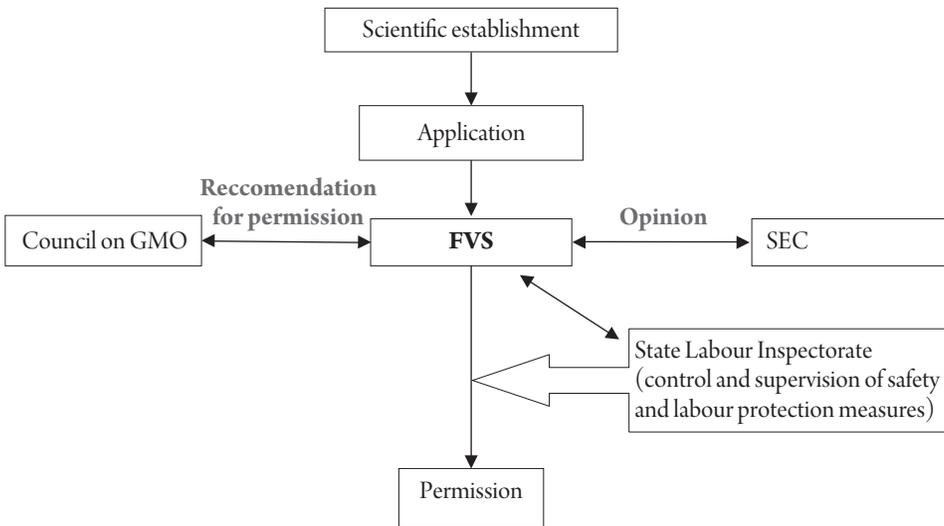
According to the Law, the SEC provides risks assessment for:

- a) contained use of GMM,
- b) release into the environment of GMO for testing, with the exception of a permit for the use in clinical trials of such medicinal products which contain GMO, consist of or are produced from them, and

- c) placing on the market of GMO, with the exception of a permit for activities specified in Regulation 1829/2003.

1. GMM RISK ASSESSMENT AND THE ISSUE OF PERMISSION IN THE FIELD OF CONTAINED USE

Contained use of GMM is any activity performed in relation to GMM that are controlled using specific containment measures which effectively limit the contact of such organisms with the environment and their impact on it. Figure 1 features the framework for the GMM risk assessment planned for contained use and the issue of permission in Latvia.



Source: the author's construction based on the Law

Fig. 1. GMM risks assessment and the issue of permission in Latvia

The activities related to the contained use of GMM may be performed by a scientific establishment which has been registered in the Register of Scientific Establishments.

The activities related to the contained use of GMM are divided into four safety classes:

- 1) activities, which do not cause any risk or cause an insignificant risk, shall comply with the first safety class. Such activities conform to the containment of the first level, which is determined in order to protect human health or the environment;
- 2) activities, which cause a small risk, shall comply with the second safety class. Such activities conform to the containment of the second

level, which is determined in order to protect human health or the environment;

- 3) activities, which cause a moderate risk, shall comply with the third safety class. Such activities conform to the containment of the third level, which is determined in order to protect human health or the environment; and
- 4) activities, which cause a huge risk, shall comply with the fourth safety class. Such activities conform to the containment of the fourth level, which is determined in order to protect human health or the environment.

In 2008, the Cabinet of Ministers adopted Regulations No.784, "Procedures for the Contained Use of Genetically Modified Organisms and Issuance of a Permit". The Regulations prescribe:

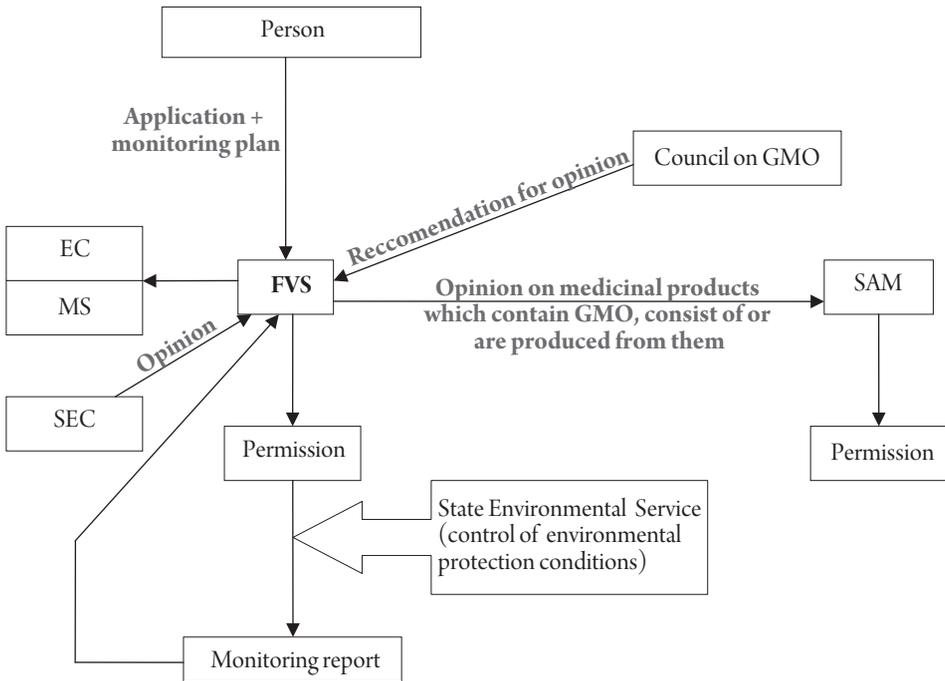
- 1) the notification procedures for the contained use of GMM;
- 2) the procedures for the issuance of a permit for contained use;
- 3) the duties and rights of supervisory and control authorities;
- 4) the duties, rights and liabilities of scientific establishments;
- 5) the risk assessment of contained use;
- 6) the safety criteria for GMM;
- 7) the general principles for work with GMM.

2. GMO RISK ASSESSMENT AND ISSUE OF PERMISSION FOR DELIBERATE RELEASE INTO THE ENVIRONMENT FOR TESTING

Deliberate release of GMO into the environment for testing is an experimental release of GMO related to their further utilisation in agriculture or in other sectors of the economy, or for any other specified purposes, not using specific containment measures to limit a direct contact of GMO with the environment, as well as the use in clinical trials of such medicinal products which contain GMO, consist of or are produced from them. Figure 2 shows the model of cooperation among Latvian competent authorities in the field of GMO risk assessment for the release into the environment of GMO for testing and issue of permission.

In order to release GMO into the environment for testing it is necessary for a person who has created a GMO, to receive a permit from the FVS or the State Agency of Medicines (SAM).

If medicinal products contain GMO, consist of or are produced from them, their distribution into the environment is permitted if a permit from the SAM, and an opinion of the Committee on Ethics has been received.



Source: the author's construction based on Regulations No.457 of the Cabinet of Ministers

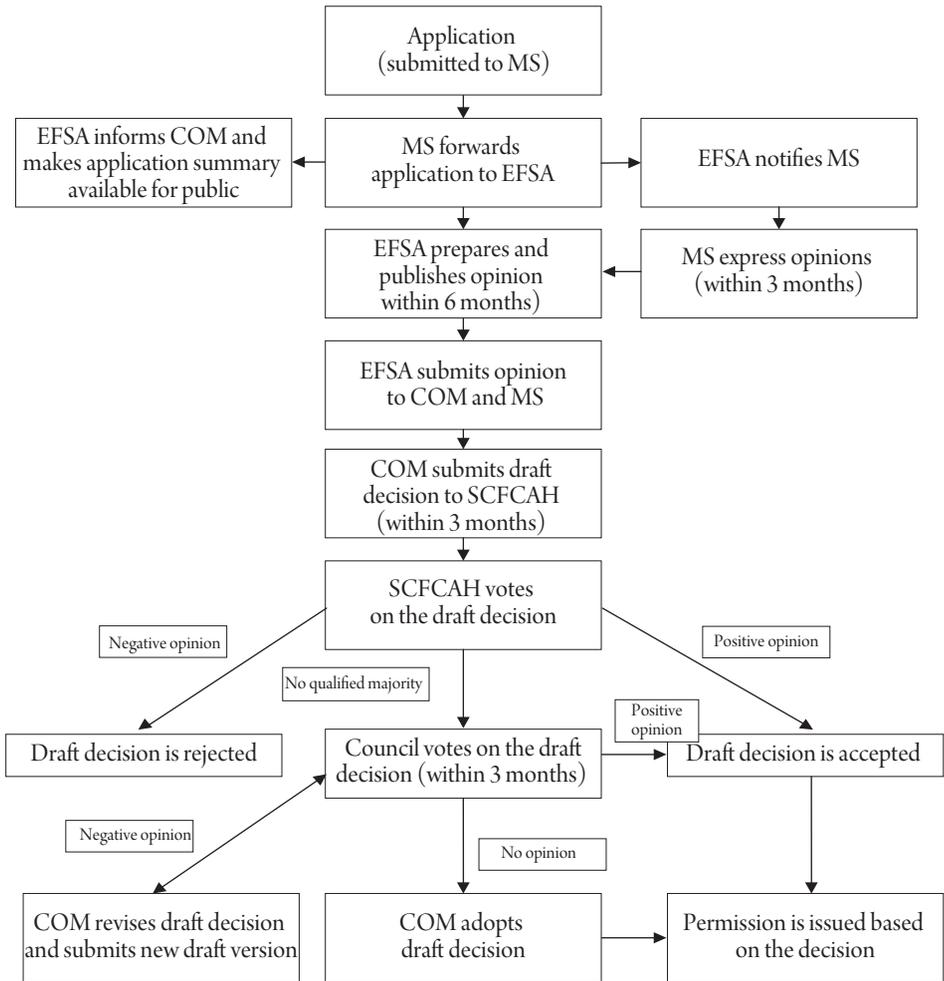
Fig. 2. GMO risk assessment and issue of permission for the deliberate release of GMO for testing in Latvia

3. GMO RISK ASSESSMENT AND THE ISSUE OF PERMISSION FOR PLACING ON THE MARKET

Food and feed made from GMO can only be allowed on the market once they have received authorisation. The authorisation process is carried out by the Europe commission (COM), and the resulting decision applies to all EU MS.

In order to place GMO on the market it is necessary for a person who has created a GMO to receive a permit of the FVS or a relevant permit of the competent authority of another EU MS or a permit specified in Regulation 1829/2003. The model of collaboration among MS, EFSA, COM and the Standing Committee of Food Chain and Animal Health (SCFCAH) represented by experts from EU MS regarding the risk assessment and issue of permission for placing on the market of GMO is shown in Figure 3.

A person registered in the Register of Growers of Genetically Modified Crops has the right to cultivate GM crops, if the appropriate permit for placing on the market has been issued to the creator of the relevant GMO. A grower of GM crops shall ensure the observation of co-existence provisions.



Source: the author's construction based on Regulation 1829/2003

Fig. 3. **GMO risks assessment and the issue of permission for placing GMO on the market (the EU level)**

4. ESTABLISHMENT OF THE GMO RISK ASSESSMENT FRAMEWORK IN LATVIA

At the moment, the regulatory base for GMO risk assessment in Latvia is well-organized, and competent authorities have been determined. As prescribed by the Law, the FVS, to be more exact, the ARA (one of the FVS departments) is the institution responsible for ensuring GMO risk assessment. In conformity with the Law, the ARA established the SEC on 12 November 2009. It consists of 8 experts from different fields responsible for science-based opinions on GMOs

and the examination of the opinions regarding the risk assessment related to the deliberate release into the environment or placing on the market of GMO, prepared by the EFSA, the European Medicines Agency (EMA) and other competent authorities of other EU MS in conformity with Regulation 1829/2003 and Regulation 726/2004¹.

Not all the food risk factors common for Europe are equally important for Latvia. It is also important to take into account the limited financial resources and the division of functions among other Latvian institutions operating in the field of risk assessment. The ARA does not need to take over the entire structure of the EFSA as laid down in Regulation 178/2002; however, it is necessary, at least partly, to perform the functions regarding the GMO risks assessment. The ARA should focus its work on:

- 1) evaluating main GMO risks and identifying potential ones;
- 2) engaging the local scientific potential and effectively using foreign experts specialized in the GMO risk assessment;
- 3) cooperating effectively with Latvian policy makers, legislators and the general public in order to inform, advise or provide scientifically based opinion.

To carry out risk assessment and ensure proper work of the SEC financial investments are needed. The necessary financing can be obtained from the below-mentioned sources:

- 1) the State budget;
- 2) public investment programs;
- 3) research projects financed by the Ministry of Agriculture;
- 4) the funds of the Latvian Council of Science through project tendering procedures or collaborative projects in the areas of food safety;
- 5) food industries;
- 6) EU funds.

5. CONSUMERS' TRUST IN REGULATORY BODIES INVOLVED IN GMO RISK ASSESSMENT AND DECISION MAKING PROCESS

The willingness to buy or to avoid GM products has been studied in a number of research papers taking into account the level of knowledge, socio-demographic variables, the perception of the risks and benefits linked to agricultural

¹ Regulation (EC) No. 726/2004 of the European Parliament and of the Council of 31 March 2004 laying down Community procedures for the authorisation and supervision of medicinal products for human and veterinary use and establishing a European Medicines Agency.

biotechnology, trust in regulatory bodies, in the information and/or the actions of certain actors, social and political values, etc.

One of the causes of European opposition to GMOs is that their advantages in food production are often considered to be weak or non-existent, while their risks are considered to be substantial (Bonny S., 2003). As of now, risk perception exerts a stronger influence than benefit perception (Moon W. and Balasubramanian S.K., 2001).

In surveys conducted in Italy and US it was found that consumer confidence in government agencies that control GM foods is important to Italian and US consumers' willingness to purchase GM foods. As confidence in the government's ability to control and monitor GMO increases, the consumer's willingness to purchase also increases. (Harrison R.W. et al., 2004).

Barnett. et al. (2007) look beyond trust in stakeholders and find that levels of trust in government rules and regulatory bodies in Great Britain are also much stronger predictors of support for gene therapy, human cloning, and genetic databases than attentiveness to genetics and education. In fact, when controlling for trust factors, the authors find that attentiveness and education are negatively correlated with support for these modern biotechnologies (Barnett J. et al., 2007).

According to Weldon and Laycock (2009) confidence in the safety and regulatory procedures is relatively low across the EU countries, and only 33.5% have expressed confidence in GMO regulators. Less confidence is registered in Greece (only 8%), Latvia (11.2%) and Estonia (18.8%). Data showed that confidence in regulatory procedures is strongly correlated with support for those technologies. Most supportive were Netherland (48%), Czech Republic (48.5%) Belgium (46.4%) followed by Malta, Sweden and Great Britain (Weldon S. and Laycock D., 2009).

CONCLUSIONS

1. Regarding the GMO risk assessment in Latvia:
 - 1.1. At the present moment Latvian legislation is in line with EU requirements. Law on Circulation of GMO has come into force, along with a number of Regulations of the Cabinet of Ministers.
 - 1.2. Despite the fact that the legal base has been established and competent authorities in the field of GMO risk assessment have been established the GMO risk assessment activities in Latvia are limited. The Latvian competent authority for issue of permission for the circulation of GMO, the FVS, has not received any application seeking authorization for the deliberate release of a GMO into the environment.
 - 1.3. Given the fact that since the establishment of the ARA the funding for the GMO risk assessment has not been allocated, the process of the

GMO risk assessment has not been launched. Even risks assessment reports from EFSA are not analysed and as a result Latvia is not able to fully participate in the decision making process regarding the circulation of GMOs.

- 1.4. It is of absolute importance that the GMO risk assessment activities be launched to ensure the defence of Latvia's interests in the EU and full participation in the EU decision making process, as well as the ability of providing a scientifically based opinion to defend national interests.
2. Regarding consumers' trust in regulatory bodies involved in the GMO risk assessment and decision making process:
 - 2.1. Potential benefits of GMO in food production are often considered to be weak or non-existent, while their risks are considered to be substantial;
 - 2.2. Confidence in regulatory authorities involved in decision making and control processes have impact on willingness to purchase GM food in a number of countries;
 - 2.3. Trust in government rules and regulatory bodies are a much stronger predictor of support for new technologies;
 - 2.4. Confidence in the safety and regulatory procedures is relatively low across the EU countries.

RECOMMENDATIONS

1. Regarding the GMO risk assessment in Latvia:
 - 1.1. It is advised to enhance cooperation with the competent authorities in other EU MS relating the GMO risk assessment, thereby facilitating exchange of information and promoting capacity building;
 - 1.2. Since Lithuania and Estonia have similar agro-climatic conditions, it would be appropriate that the ARA carry out discussions with the competent authorities in these countries to encourage coordination and cooperation with the aim of establishing a common Baltic research network in the field of GMO methodology, data and information;
 - 1.3. The Ministry of Agriculture should promote and support research projects in the field of GMOs and biosafety.
2. Regarding consumers' trust in regulatory bodies involved in the GMO risk assessment and decision making process:
 - 2.1. To increase consumers' trust in risk assessment procedures competent authorities need to reach out to the public to inform them about new scientific evidence, data other news in connection with GMO;
 - 2.2. It is important to involve the public in the decision making process not just formally but practically, and to ensure feedback explaining the reasons why the public opinion had been taken into account or not.

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HUMAN CAPITAL DEVELOPMENT IN PHYSICIANS' PROFESSION

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Abstract. Human capital is regarded as the skills, knowledge, and experience possessed by an individual or population, viewed in terms of their value or cost to an organization or country. In a specific group of professionals – physicians employed in large and complex health care organizations, another dimension of this capital is the potential to express and develop additional managerial competences for their acting role of owner of the main operational business process in organization. The emerging role of information technologies in health care could be regarded as a driving force behind the increase in the human capital of physicians through increasing efficiency in their managerial roles. Further research is needed in at least two domains investigating prerequisites for that. The first domain is the aspects of the professional training needed to develop more conceptual competences to see an organisation “as a whole”. The second domain is related to the development of physicians’ ability to independently extract full process-related knowledge from an increasing digital trace left in informational systems by patients experiencing present practices in clinical process. The author presents analytical pre-empiric research done in the first of the two domains believed to be crucial for hospitals to change along with the changing health care needs of society and the growing demand for cost effective services.

Key words: *human capital; managerial competence; physician's leadership; hospital; business process modelling; medical education.*

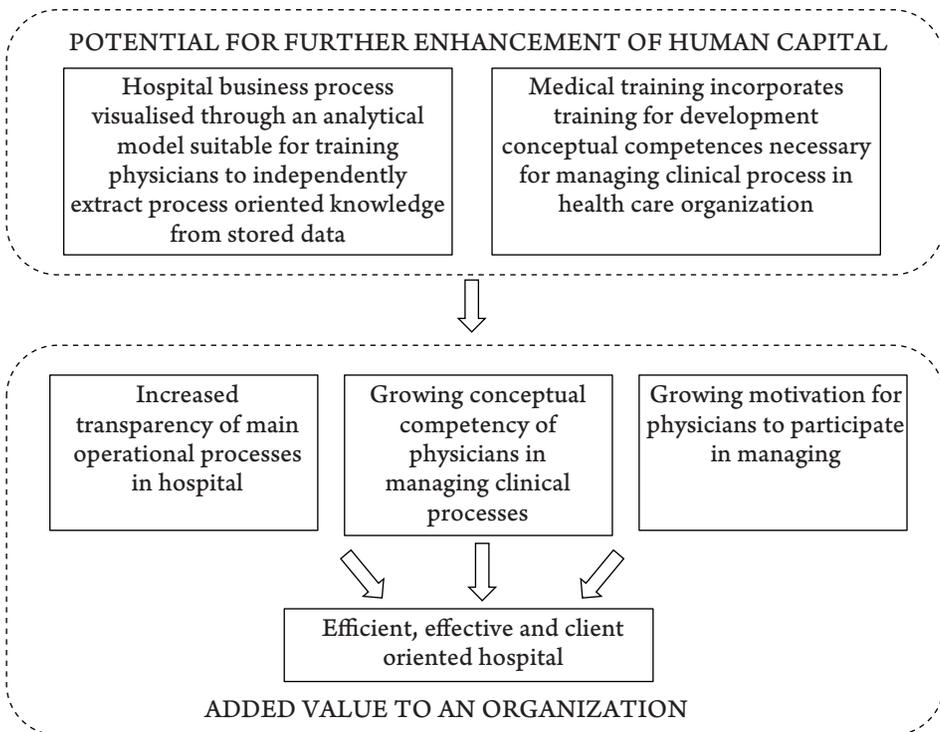
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INTRODUCTION

The analytical research presented on an aspect on human capital in one individual profession of a physician is based on the results of numerous previous studies and observations on tendencies in the health care industry and the development of human capital theory. Exploring further the concept of human capital as a value for the country or organization, and knowledge, skills and experiences possessed by individuals or groups – in a context of health care, we identified that physicians employed in large and complex health care organisations have influence beyond the direct scope of their professional duties – the potential which could be regarded as another dimension of their human capital. This potential is connected to the expression and development of

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additional managerial competences in physicians acting in the role of the owner of the main operational business process in the organisation. The emerging role of information technologies in health care could be regarded as a catalyst for increasing human capital of physicians by enhancing efficiency in their managerial roles. Further research is needed in at least two domains investigating prerequisites for that. The first of the domains is the aspects of professional training needed to develop more conceptual competences to see an organisation “as a whole”. The second domain is related to the development of physicians’ ability to independently extract the whole process-related knowledge from a growing digital trace left in informational systems by patients experiencing present practices in the clinical process. The author presents analytical pre-empiric research undertaken in the first of the two domains believed to be crucial for hospitals to change according to the changing health care needs of society and the growing demand for cost effective services. The overall concept of human capital development in physicians’ profession to be proved by further research has been visualized Figure 1.



Source: the author's construction

Fig. 1. The model of human capital development in physicians' profession

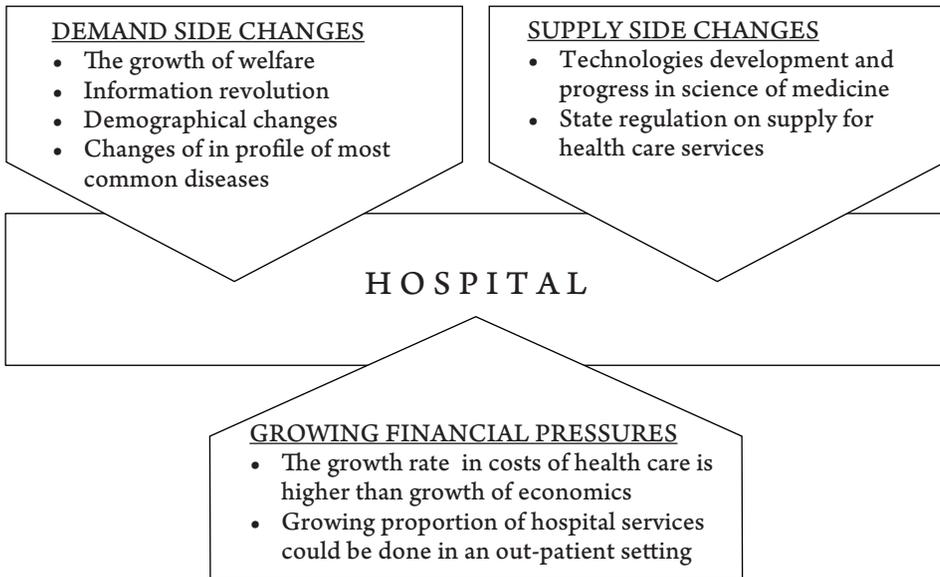
THE NOTION OF 'HUMAN CAPITAL' IN THE CONTEXT OF NEW ROLES IN PHYSICIANS' PROFESSION

The ability of an individual to bring a certain social benefit to society in a broad sense could be regarded as his or her capital. In economic literature human capital refers to the studies of investments, of individuals, organisations, or nations that accumulate stocks of productive skills and cognitive or technical knowledge (Dobbs et al. 2008). One of the founders of modern approach to human capital, T. Schultz, advised in 1960ies to regard investments in human capital as valuable as investments in such tangible assets as land, factories and equipment (Schultz 1961). Years later another founder of the human capital theory, G. Becker explained microeconomics behind the payback of such investments as those in education and health care (Becker 1975). In his works, Becker also made connection between human capital and the behavioral models of individuals, advocating for an opinion that individuals being guided by self-interests act rationally and tend to create value in the settings of a competitive market. With a further development of studies in the field of human capital, several other applications of this concept emerged. According to slightly different definitions of 'human capital' found in various academic and non-academic sources (Grēviņa 2000; Investopedia.com 2012; Dictionary.com 2012; Oxforddictionaries.com 2012), several notions of this type of capital seems to be in use. Besides traditional Schultz and Becker's notion of 'human capital' as an object to invest in, it is also regarded as part of the economic value of an organisation or country or as economic potential to be explored as deeply as possible. The latter notion of 'human capital' is used by the authors this paper has been investigating in pursuit of theoretical proof of the concept that physicians, besides value they bring as medical professionals, also have a potential to manage clinical process in the hospital.

CHANGES IN HEALTH CARE AND THE NEED FOR PHYSICIANS' NEW ROLE

The growing capabilities of medical science inevitably create new challenges for health care systems. Medical breakthroughs in the past decades have brought not only improved longevity and quality of life but have also led to significant changes in health care systems. While the narrow specialisation of the medical professionals has been essential in these improvements through the development of in-depth expertise and application of sophisticated technologies, this progress has come with its own problems in the form of growing complexity of the patient care processes, and, inevitably, also costs. Finding a way to address the high costs and cost growth without unreasonably reducing access to new and needed services is a significant challenge in many countries (Marmor et al. 2009). The factors directing hospitals to change could be identified in both supply and

demand sides of health care services (Figure 2). All those factors are studied in deep by several authors working for academic institutions or such international organizations as the World Health Organization or the International Monetary Fund (Przywara 2010; Dixon & Poteliakhoff 2012; Thomson et al. 2010; Rechel et al. 2009; M McKee et al. 2002; Mossialos et al. 2009; Hsiao & Heller 2007).



Source: the author's construction

Fig. 2. **The model of drivers for changes in hospital**

Consequently, there is a rising demand for the health care professionals not only to remain open to introduce new technologies which can potentially improve patient outcomes, but also to look where the use of these technologies allows to apply lessons learned from the management in other spheres of economy for more efficient patient care process. This demand is particularly prominent in larger enterprises like hospitals where due to the high cost of in-patient services, logistics intrinsically are more likely to dictate restructuring, with the goal to provide services in the more cost effective out-patient settings. These are circumstances where a natural organisational-professional conflict may arise between the managers bringing collective responsibility and providers valuing high their autonomy and focusing on solving problems of an individual patient (Kippist & Fitzgerald 2009). Often managers have few other options available in controlling resources of the enterprise besides limiting the professional autonomy of the physician. Under such circumstances nobody is happy, neither organizers, nor physicians. The former are under pressure, which limits their ability to make independent clinical decisions for which they normally are accountable only to other professionals, and the latter frequently have to succumb to the social

influence and veto power of the highly recognised medical professionals, which allows performing reforms only as far as compromise permits. This, along with profound difficulty to measure the exact impact that any intervention has on the outcomes, is perhaps the deepest (and often unspoken) reason why estimation that leadership in healthcare lags behind the other industries by 10-15 years (McAlearney 2006) is true and why here, unlike in other spheres of economy, innovation and new technologies generally lead to increasing cost for services, and not savings or increased access. According to the data of the World Bank, in the last fifteen years total health care expenditure expressed in PPP constant to international \$ in the high income countries has raised by 123% and more than tripled in the Baltic states (for example, in Latvia, per capita total expenditure on health increased by 243% in the period from 1995 till the 2010) (The World Bank 2012). Consequently, the pressure has grown for providers to be more cost effective. This is felt even more acutely nowadays, during the global economic crisis, as many countries are unable to sustain the previous pace of rise in healthcare costs, and the countries affected by the crisis most dramatically have actually needed to reduce such spending (for example, the public spending on health care in Latvia in 2010 returned to the level of 2005 (Barzdins 2012)). In this context of unsustainability of the previous medico-economic practices we need to prepare for a paradigm shift regarding competencies which future physicians will need to possess upon completion of their professional education. Training based on an individualistic orientation does not prepare physicians to function successfully as members of large, complex organisations (Edwards et al. 2002).

TRAINING FOR CONCEPTUAL COMPETENCIES – CURRENT STATUS

Summarising competency models created in several countries by the organisations of medicine professionals, one can see rather unambiguously that, along with the technical or purely professional and clinical competencies, as equally important are being noted the competencies which allow an individual to understand the context, the essence of changes, and to be able to participate in them actively, or even manage and lead them (Calhoun et al., 2003; Clark & Armit, 2010; McKenna, Gartland, & Pugno, 2004; NHS Institute for Innovation and Improvement and Academy of Medical Royal Colleges, 2010; The Royal Australasian College of Medical Administrators, 2011). For example, the physician-manager role as one of seven essential roles for physicians is highlighted in the model devised in Canada (Royal College of Physicians and Surgeons of Canada 2005). The author's analysis of nine European medicine graduate programs (all medicine programs in the Baltic states and selected universities in Europe) suggested insufficient training for this competency in most curricula (Barzdins 2012). This study demonstrated that total proportion of compulsory

non-technical skills courses between selected medicine programs varied from 1.9 to 7.2% and only in four cases in the structure of courses the issues related to economics, management, or organisation of health care were included. Only in three of the analysed cases, courses with focus on economics, management, and the organisation of health care were compulsory. It was noted that in Latvia, only one of the two universities offered a course for the development of managerial competences; moreover, it was offered as an elective subject.

In view of the fact that the entire concept of management competency training for physicians is still evolving, it is not at all surprising that such training is not yet omnipresent. In search for a unified opinion about the content, form and timing of such courses it is important to understand the perception in this regard also by medical students themselves. Several studies have already documented that postgraduate students wish they had received more training in the managerial knowledge and skills related topics (Stergiopoulos et al. 2010; Brouns et al. 2010; Daugird & D. C. Spencer 1990; Busari et al. 2011; Sockalingam et al. 2008).

SETTING THE DIRECTION FOR FURTHER RESEARCH

For the conceptual knowledge and skills defined as the “mental ability to visualize all the complex interrelationships that exist in a work place among people, departments, or units of an organization and the environment in which it exists – cognitive ability to see the organisation as a whole system (Katz 1955; Daft 2012)”, and in which physicians could possess the ability to understand, participate, manage and lead changes on the level of conscious and, ultimately, unconscious competence, the foundation needs to be built as early as reasonably possible. Based on the widely recognized competency development model proposed by Spencer and Spencer (L. M. Spencer & S. M. Spencer 1993), knowledge and skills are the visible top of the iceberg and are relatively easy to develop, while a fundamental component of competency comprised of values, attitudes and motives is deep and hidden, for which an early appropriate educational intervention should be considered. We were able to find only a few studies and case reports describing an early introduction of development of leadership and management competency training in the course of medical education. Two publications described the positive experience with the management training and leadership curriculum implemented in some of the medical schools in the United States (Padilla et al. 2011; O’Connell & Pascoe 2004). Another study compared the perception on management education by British and Portuguese medical students, hospital managers and clinical directors (Martins et al. 2005). In this study, participants described management education as an integral part of the undergraduate medical education and identified topics that ought to be covered, including people management, the structure of the national health services, the leadership role of doctors, and cost and resource management. A study performed in the United States by Varkey et al.,

investigated the student and faculty perspective on inclusion of leadership related education into the curriculum (Varkey et al. 2009). In this study communication, conflict resolution, time management, negotiation, delegation, teamwork and community service were the key skills identified by the participants as the necessary outcomes for leadership training. The further research is needed to establish whether undergraduate students perceive that they have knowledge gaps in management related areas and what factors influence this perception, and to assess the students' preferred type and timing of educational intervention to develop managerial competencies.

PROPOSAL FOR FURTHER STUDY

The subjects of this study will be medicine students of the University of Latvia. A web-based questionnaire is being developed in collaboration with a group of educators and already tested on 8 medicine students. Their feedback was used to revise the questionnaire. The finalized version consists of two sections. The first section assesses the profile of the respondents – their current year of studies, preferred settings of future professional activities, self-assessment of current leadership abilities and the perceived degree of rivalry in their chosen specialty. The second section consists of ten paired questions examining the students' perceived deficiencies and needs for conceptual management related knowledge and skills, and their preferences regarding the acquisition of those. Self-assessed perception in all domains will be measured on a seven-point Likert-type scale with two opposing statements, where the respondents have to indicate the area in which they fall on the scale. At the end of the questionnaire, there will be an open-ended section for comments on additional areas of conceptual knowledge and skills to be covered during the study process. We plan to use the 'Webanketa.com' web-application to send the link to the questionnaire to all of the medical students at the university by email to be completed anonymously. Students will have one month to respond to the questionnaire. During this time period they will receive two reminders. Data will be analysed using the Statistical Package for the Social Sciences (SPSS). Internal consistency and reliability of the questionnaire will be tested using Cronbach's alpha. The data analysis will include Simple Descriptive Statistics computed for each of the questionnaire's items. To calculate the gap between the students' perceived current level of knowledge or skill and the importance of acquiring those we plan to use the methodology recently applied in a similar study on post graduate trainees in Canada (Stergiopoulos et al. 2010). The gap in a specific domain is defined as the difference between the reported scores of perceived current knowledge or skill and the reported scores of perceived importance in acquiring them. For the correlation and comparison tests, the threshold of statistical significance will be fixed at 0.05. Chi-squared analyses will be performed to determine the representativeness of the sample to the population regarding the year of training. The mean knowledge gap in each of the separate domains and the summary mean

gap for all of the respondents were calculated. A hypothesis has been put forward that respondent characteristics, like the year of studies, preferred setting of future professional activities, self-assessment of leadership abilities and perceived presence of rivalry in the chosen specialty, might influence students' knowledge and skill gaps. To determine possible correlations, a liner regression analysis is to be undertaken.

CONCLUSIONS

1. The human capital concept could be applied to a potential to develop new competencies in professions.
2. There are two alternatives for hospitals to respond to pressures for change:
 - a) the decrease of the level of professional autonomy for physicians;
 - b) to develop potential of physicians to manage independently necessary profound changes in current clinical practice in hospital.
3. The two major obstacles for physicians to play their managerial roles in more efficient way could be identified:
 - a) physicians are trained to be focused on individuals' needs, but not to deal with a complexity of processes in organization;
 - b) complexity of operational processes in hospital is continuously growing and is a natural obstacle to see the "big picture".
4. Advance in usage of informational technologies in hospitals has a potential for physicians to gain systemic knowledge of operational processes in hospital.
5. In order to explore a human capital potential of physicians' profession the research is needed in two connected domains:
 - a) the feasibility of educational intervention in current practice of medical studies for developing conceptual competences necessary for their managerial roles;
 - b) the possibility to develop business process modeling tools necessary for building analytical models of hospital processes suitable for physicians to independently extract process related knowledge from digital data in hospital information system.

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INNOVATION FOR VOCATIONAL EDUCATION – THE NEW TASKS OF PUBLIC ADMINISTRATION IN TRAINING COMPETITIVE LABOUR FORCE

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Abstract. The role of innovation in the development of vocational education and training (VET) is increasingly being addressed in EU policy. This is also a new challenge for public administrations. Little research exists on that in Latvia. As innovation is part of modern economic development, the links between VET and innovation should be reconsidered and relevant studies carried out. The present research has been performed by means of literature analysis and expert survey. Conclusions have been drawn that traditional approaches to the training of labour force still prevail, and little emphasis is put on the need for closer links between the higher education and VET in the development of innovative modern labour force.

Key words: *innovation; vocational training; public administration.*

JEL code: I25; I28; O15; L38

INTRODUCTION

The importance of enhanced approaches towards the development of vocational education and training (VET), including the promotion of innovation, has been recognised at the European policy level. Primarily these new strategic approaches towards VET have been addressed by the so called “Copenhagen process” – the Copenhagen Declaration of 29–30 December, 2002, with a further definition of the strategic objectives for the next decades 2011–2020 in the Bruges Communiqué of 7 December, 2010. In the context of the EU member states these objectives present many new challenges, in the first place regarding the role and tasks of public administrations which are to secure the implementation of the respective strategic EU objectives at the national level.

One of the key issues to be addressed by public administrations is *the skills* of the future workforce, with reference to the fast-changing occupational environments, as “today’s pupils and students will be in the beginning of their career in 2020 with at least 30 years to go in their professional life, and some of them in occupations that do not exist today and others perhaps in occupations

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that are disappearing” (Bruges Communiqué 2011). This implies that the future workforce prepared within the VET system should be flexible and capable of innovative approaches and developments throughout their life and career. This also implies that public administrations should secure adequate conditions – VET systems – that are ready to train such an innovative and skilled labour force. Consequently, the VET system itself should be flexible and innovative, in order to perform this task effectively, as “in knowledge society vocational skills and competences are just as important as academic skills and competences” (Bruges Communiqué 2011).

The new role of public administration in implementing innovation in VET has also prompted the problem of our research: to what extent the public administrations are prepared to address the training of ‘innovation capable’ labour force, and to what extent the public administrations themselves are prepared to reconsider their *existing* approaches (or institutional mechanisms) for implementing innovative solutions in the VET system. The innovative capacity of the VET system should be enhanced, and public policies should seek approaches to encourage partnerships between VET schools and employers “to promote creativity, innovation and entrepreneurship” (European Centre for the Development of Vocational Training, 2012).

However, the respective EU policies imply that not only competitive VET should be strengthened but also links between the VET and higher education systems should be developed, especially regarding approaches to the training of labour force with necessary qualifications. According to the EU policy perspective, the national qualification framework in member states should be used as a catalyst for creating more permeability between VET and higher education, for developing or maintaining VET at post-secondary or higher European Qualification Framework levels (Bruges Communiqué 2011). This is a relatively new approach, still causing controversial attitudes, especially in the context of the concept of the ‘higher VET’. It should be noted that the term ‘higher VET’ is increasingly being used by EU policy makers – implying training of the labour force with sophisticated VET qualifications, primarily related to the European Qualification Framework qualification Level 5. It should also be noted that the issue still presents a challenge for EU countries, since this also involves transferability of credit points between the VET and higher education systems, which in itself is a challenge not only in terms of technicalities and necessary institutional mechanisms, but also in terms of differences in philosophies represented by stakeholders in VET and higher education and the relatively weak links between the two systems. The public administrations should play a role in strengthening this link. At the same time, our research shows that this is not an easy task for the public administrations, and there are several reasons for that. Some of the identified reasons will be discussed further on.

By tradition the issue of innovation is primarily being linked to the system of higher education and research, and this implies not only a different set of

‘actors’ but also a different overall approach or rather ‘philosophy’ inherent to each of the both systems, as shown in previous studies by the authors of the paper (Buligina and Sloka, 2012). Numerous definitions and interpretation exist for the term ‘innovation’. However, it is generally agreed that innovation represents doing something new or doing existing things in a new way. An innovation contains new ideas which influence the behaviour of economic agents in a previously unknown way (Hashi and Stojčić 2012). The EU policy makers are also aware of the complicated nature of the challenges related to VET and innovation: the EU policy documents mention fostering innovation, creativity and entrepreneurship among its strategic objectives, referring innovation to both the initial VET (I-VET) and the continuing VET (C-VET) (Bruges Communiqué 2011). Moreover, the need for closer links with the higher education system is being stressed, and new notions are introduced, e.g., ‘higher VET’ as equivalent to level 5 or higher in relation to the European Qualifications Framework (EQF). In our opinion, this is a matter of great importance, since the training of modern labour force should be viewed in the context of the overall labour market developments, where the skills need to be continuously revised in the course of an individual’s professional life. The problem is also closely related to the notion of National Innovation Systems (NIS), and this will be discussed in greater detail in the subsequent parts of the paper. The NIS concept will be presented as a relevant component in the understanding of the role of innovation in national economies, and the importance of various stakeholders, the public administrations including, will be analysed in this regard. We will attempt to show that the very genesis and the interpretation of the term represents a shift of paradigm in the perception of innovation itself.

Consequently, the task of the present research is to study the approaches by various stakeholders in the implementation of innovation in VET – through the analysis of respective academic and policy discourse and through a survey-based empirical study – with the involvement of public administrators and experts from the VET and higher education and research systems. As mentioned before, the particular focus of the study will be on the issue of the training of modern and ‘innovation capable’ labour force. Since innovation in Latvia has traditionally been viewed in the context of higher education and research, with little connection so far with the VET system, the novelty of the research is manifested in the attempt to ascertain and analyse the opinions of public administrators concerning a more uniform approach to the training of modern and ‘innovation capable’ labour force. To our knowledge, this aspect of the implementation of innovation in VET in Latvia has not been studied before. In the theoretical part, within literature research, the analysis of the policy and academic discourse will be performed. This will set a background for a more comprehensive understanding of the results of our empirical survey analysis.

THEORETICAL BACKGROUND

The rising political, social and economic priority of VET has been responsible for the major developments in VET research over the past 60 years, and VET research has become interdisciplinary beyond the confines of educational studies alone, as pointed out by Winch (Winch, 2012, p. 53). This is particularly true today, in the context of latest socio-political and economic developments when not only the role of VET in the training of modern labour force needs to be reconsidered, but particularly the role of various stakeholders outside the educational system. At a strategic level – co-operation in VET refers to VET policy design, organization, governance and funding, with the involvement of business and/or sector organization representatives, social partners and other stakeholders (European Centre for the Development of Vocational Training, 2012), according to the European Centre for the Development of Vocational Training (CEDEFOP). Based on the commonly acknowledged view that economic development depends on innovation, it is evident that the training of ‘innovation capable’ labour force is a high priority for any economy. This is needed at all levels – not only the highly skilled workforce prepared by the higher education and research domain, but also, and increasingly even more, at the ‘lower’ and ‘medium’ VET level – the share of people with medium-level qualifications will continue to account for about half of the workforce (Europe’s Skill Challenge, Lagging Skill Demand Increases Risks of Skills Mismatch, 2012). For this reason linking innovation with the VET system is of particular importance, and this new challenge often goes beyond the traditionally accepted approaches by relevant stakeholders. Besides, in the context of policy making and activities of public administrations this demands a revision of general approaches towards the implementation of innovation. Broadening the current boundaries, breaking the stereotypes and introducing more flexibility is a new task of public administrations regarding the VET developments. Innovation policy must in practice identify and address key factors that limit the ability of actors in the system to respond effectively (Dodgson et al. 2011, p. 1154). There is an ongoing wide academic discussion about the building of new approaches to thinking about VET and development, on policy, theory and evidence, and on better application of experience (McGrath, 2012). The role of VET curricula in economic development to compete on global stage (Mouzakitis, 2010) is also extensively discussed in academic research.

With this in mind, we are now referring to the notion of National Innovation Systems (NIS), which, as mentioned before, is relevant for our overall research (Buligina and Sloka, 2012 – Reconsidering). It is being argued that nowadays systems thinking and NIS approaches have become a striking feature of innovation policies nationally and internationally (Dodgson et al. 2011, p. 1145). The NIS interpretation favoured by the author of the present paper is to see innovation as part of a broader network of agents where the role of the

government is not only related to the funding of research (for further commercial developments in companies) – as represented by more traditional interpretations of the notion of innovation – but is seen also as governmental and stakeholder responsibility to train skilled workforce, as well as to promote links with the companies to secure more effective implementation of innovation (Sharif, 2006). As observed and pointed out by Sharif, it should be kept in mind that historically the key promoters of the NIS concept have occupied dual roles – being representatives of both the academia and the policy making domain (Sharif, 2006, p. 752). This has been a beneficial situation that has allowed for a flexible interpretation of NIS, given the fact that the NIS approach is in itself innovative, in a way ‘ambiguous’ and, therefore, challenging in character – as pointed out by Sharif in his historical outline of the development of the NIS concept (Sharif, 2006, p. 752).

The way the NIS concept developed, in our opinion, is also important for our research. The importance lies in the fact that this new theoretical approach was formed in the discourse of professionals who simultaneously represented both – the policy making domain (the OECD) and the academia (Sharif, 2006). We agree that this double position allowed for a much more comprehensive evaluation of the modern challenges in the implementation of innovation. As convincingly argued by Sharif, the development of the NIS term represents how two communities meet – that of policymakers and academia, adapting the local needs of these two communities while maintaining a common identity across them – where “actors ... are... able to negotiate seamlessly between theory and application” (Sharif, 2006, p. 752).

This example bears a symbolic significance for our research. The author of the paper herself has been working in public administration since 1994, and, when conducting the current research, can see in practice the benefits of occupying the double position of a researcher and policy maker in the field of VET. Thus, in our opinion, the modern policy making should be much better informed by academic research circles, whereas academia should adapt more realistic and practice-rooted approaches. This is important also regarding innovation which, according to generally accepted policy and academic discourse, lies at the basis of continuous economic development. The actual challenge, however, is how to make these two domains meet in a mutually enriching way. We see a potential in the promotion of good governance in public administration, where the national education systems are developed in close co-operation with relevant stakeholders, and where the educational process is integrated with the labour market developments. With such an approach the ‘broader society’ has an impact on the implementation of innovation – including the implementation of innovation in and through the VET system. With such an approach, also the traditional rigid approaches in training will be dissolved leaving more space for the development of an open system of VET. Last but not least, mechanisms for the interaction of policy domain and academia should be strengthened and ways for the utilization of the obtained results sought.

In this context, as argued by Courvisanos, loss of policy control takes place, as innovation “becomes distributed across society through the public institutions and public infrastructure that create national innovation systems” (Courvisanos, 2009, p. 1121). Bennett et al., with an emphasis on labour force, refer in this respect to ‘innovation capital’ stating that the resolution of challenges related to innovation requires efficient functioning of a co-operative network which includes the VET sector, the business sector and institutional components of the labour force (Bennett et al., 2004, p. 75). He uses the term ‘coalition’, stating that the demands on and interactions among the members of this coalition are complex, and can be expected to become even more so (Bennett et al., 2004, p. 75). Moreover, in relation to our research topic, he points out the new and changing role of VET in the innovation process. According to Bennett et al., “it is arguable that a major component, although certainly not the entirety of the creative aspects of innovation, is likely to arise within that part of the workforce having its human capital largely developed through the higher education system” (Bennett et al., 2004, p. 73) – thus also underlying the relevance of VET to implement innovation. In addition, according to Kearney, the VET system has to contribute to the education of a skilled workforce where a fundamental skill in a knowledge economy is the capacity to think and act creatively (Kearney, 2004, p. 66). In the “pursuit of competitive advantage through innovation” it will be needed for the members of the workforce “to be confident in their capacity to reach beyond the comfort zone of personal experience ... and it will require an education system which recognizes the inherent capacity of an individual”, as pointed out by Kearney (Kearney, 2004, p. 66). The issues of experience of training institutions and their learning from experience have also been widely explored in academic research (de Moura Castro, 2011), along with the positioning of teachers towards an educational innovation in the light of ownership, where significant differences have been found (Ketelar et al., 2012). At the same time, it also refers to public administrations who are in need of partnerships to “bring in new knowledge which derives further innovation, have leaders who are risk-tolerant, develop teams and cross-functional teams, create communities of practice which meet regularly to discuss common interests, and provide places to be innovative”. Consequently, “the knowledge globalization which means that the skills, the abilities and the competences represent the main source of economic development and also the main criteria of competition”, as claimed by Iatagana et al. (Iatagana et al. 2010, p. 5141) is an issue that clearly should be placed in the context of innovation policies with adequate support from public administration.

All the above considerations have stimulated our research interest regarding the innovation in the VET system as part of a comprehensive approach by public administration regarding the training of a competitive labour force. Our intention was to study the situation in Latvian public administration – against the background and in the context of policy and academic discourse in Europe and other parts of the world.

RESEARCH APPROACH

The research is aimed at studying the attitudes of relevant stakeholders towards the success of the training of ‘innovation capable’ labour force, and towards a possible change in approach to address challenges in the training of modern labour force. To carry out empirical research on the above indicated issues, apart from the textual analysis consisting of analysis of relevant policy documents and academic discourse regarding our research problem, an empirical study in the form of a survey has also been undertaken.

For conducting the empirical study, a questionnaire was developed and experts were asked relevant questions to evaluate the current situation. Before doing the survey the questionnaire was tested among proven professionals in the above-mentioned fields and corresponding amendments were made. The questionnaire was devised in such a way so as to enable a detailed analyses of the relevant opinions of stakeholders from several perspectives. As our research interest primarily lies in the training of competitive labour force at all levels and the role of the VET system for preparing such labour force, the questions were also formulated accordingly. Evaluations had to be made on a scale of 1 to 10, where 1 is ‘fully disagree’ and 10 is ‘fully agree’. Based on the material obtained from the questionnaires, a primary analysis of the various target group opinions has been conducted and the results compared.

By means of empirical study the opinions of relevant stakeholders regarding the respective research problems have been analysed. The target (sample) group for the empirical study were high and medium level public administrators in education and research, as well as experts from various research institutions (practically all the relevant experts were approached at the start of the survey). The approach to the selection of the target group was predetermined by the relatively controversial nature of our research questions, in the context of the currently predominant traditional opinions regarding innovation, VET, higher education and research, as will be shown below. Thus, the public administrators and experts exclusively selected were those who have a significant experience in education and research, and who, apart from their major field of competence, are highly aware of the priorities and processes in the overall education system and therefore would have an informed and well-considered opinion. The selected group also performed the initial expertise of the questionnaire devised (which will be described further on). Approximately 35 high and medium level administrators and experts were addressed (asked to participate) in the survey. Due to a number of reasons, some 15 experts could not finally participate (in some cases, due to business and non-availability during the time of the survey; however, in certain cases a possible reason for non-participation might have been the experts’ reluctance to give opinions on potentially controversial or politically sensitive issues; this is only our assumption, given the high administrative or political position (status) of the expert approached – regardless the explicit statement in the

questionnaire that the results will be analysed and applied anonymously and in a generalised way). Nevertheless, the representation included the following persons: the Ministry of Education and Science (MoES) civil servants from the Department for Policy Co-ordination, the Department of Vocational Training, the Department of Higher Education, the Department of Research, the Study and Research Administration; ex-officials currently implementing EU VET projects; and staff of the Latvia Technology Park. The survey was carried out at the beginning of 2012, and it should be noted that due to the reorganisation of MoES in the middle of 2012, the names of departments have changed. Such a concentrated choice of high level professionals, in our opinion, was a precondition for obtaining a well-considered professional opinion as a focal point for our overall research, given the fact that the overall intention in our subsequent research is to survey several other types of target groups and to compare the opinions between them.

The qualitative analysis has been complemented by quantitative analysis applying the indicators of central tendency or location (arithmetic mean, mode, median), the indicators of variability (variance, standard deviation, standard error of mean, range, etc.) and cross-tabulations. This has enabled us to draw conclusions regarding the research problem based on which further practical recommendations for possible steps in policy making could be prepared and taken.

EMPIRICAL DATA ANALYSIS

In the empirical study, the focus of the research has been on the analysis of the need for bolstering the VET system in terms of innovation, and also on strengthening links between VET and research. Besides, it was proposed that a comprehensive approach toward the training of modern labour force would be enhanced by better co-operation between the VET system and the higher education system. The analysis of answers has been presented regarding the following research specific questions/ statements: Statement 1. The VET system should be considerably strengthened in terms of the implementation of innovation; Statement 2. Closer links between the VET system and the research community would enhance the introduction of innovation in VET; Statement 3. Closer links between the higher education system (HES) and VET would offer a more comprehensive approach towards the training of competitive labour force.

It should be noted that the formulation of the research statements imply a possibility of viewing the same issue from a different but related perspective. As we will show in the subsequent analysis of the answers to the statements – this has allowed us to propose respective interpretation of the expert answers. The results of the analysis of the expert answers to Statements 1–3 are presented in Table 1.

Table 1

Main statistical indicators of expert evaluations on importance of innovations for VET in Latvia

Statistical indicators	Closer relations between science and the VET system would enhance the implementation of innovation in VET	Closer relations between science and professional education system could encourage a comprehensive preparation of qualified labour force	The innovation capacity of the VET system has to be strengthened
N Valid	20	20	20
Missing	1	1	1
Mean	6.15	7.10	7.55
Std. Error of Mean	0.549	0.688	0.484
Median	6.00	8.50	8.00
Mode	6 and 8	9	10
Std. Deviation	2.455	3.076	2.164
Variance	6.029	9.463	4.682
Range	9	9	7
Minimum	1	1	3
Maximum	10	10	10

Source: the author's calculations on expert survey (2011) results, Evaluation scale 1-10, where 1 – 'disagree'; 10 – 'agree'

Expert evaluations reveal that the experts have different views on the analysed issues (supported by the indicators of variability), but on the average the evaluations are relatively high: the values of arithmetic mean for the analysed statements are higher than 6, most of the experts (characterised by mode) gave high ratings: 6 and 8 points for the statement, “Closer relations between research and the VET system would enhance the introduction of innovation in VET”; the statement, “Closer relations between research and the VET system could encourage a comprehensive preparation of qualified labour force” earned 9 points from most of the experts (35%), but the statement “VET system has to be strengthened in the implementation of innovation” was rated 10th by the experts (25%): it implies that this issue is of great importance for many experts. A half of experts placed the statement “Closer relations between science and VET system would enhance the implementation of innovation in VET” at 6 or less, while the other half of experts gave the valuations of 6 or more (characterized by median). A half of the experts gave valuations below 8.5 to the statement “Closer relations between science and professional education system could encourage a comprehensive preparation of qualified labour force”, the other half half rated the statement over 8.5 (characterized by median). A half of the experts ranked the statement “The innovation capacity of the VET system has to be strengthened in

the 8th place or lower, a half of the experts valued the statement at 8 or higher (characterized by median). As the variability of expert evaluations is very high, the experts being recognised specialists in the field of education and science, as well as innovation, the expert evaluations were examined in greater detail, in order to identify reasons and propose potential explanations for the high rate of the variability. The results of distributions of expert evaluations are represented in tables 2 to 4 with subsequent interpretations of the data.

Data in Table 2 show that 30% of experts have attributed the evaluation of 4 or less: this is a relatively high percentage indicating that many experts do not see a particular reason for a closer co-operation between the research community and the VET system with a subsequent benefit in terms of more innovation in the VET system (and from the VET system). These experts possibly still relate innovation only to the higher education and research system. Moreover, it could also imply that there is no information at their disposal on positive experience (success stories) from other countries or they do not believe in the success of such co-operation. Alternatively, these experts might simply be consistently adhering to traditional approaches or may not be supportive to the very latest developments in the respective EU policies.

Table 2

Distribution of expert evaluations on the statement “Closer relations between research community and the VET system would enhance the introduction of innovation in VET”

	Evaluations	Frequency	Percent	Valid Percent
Valid	1	1	4.8	5.0
	3	3	14.3	15.0
	4	2	9.5	10.0
	6	5	23.8	25.0
	7	1	4.8	5.0
	8	5	23.8	25.0
	9	2	9.5	10.0
	10	1	4.8	5.0
	Total		20	95.2
Missing	System	1	4.8	
Total		21	100.0	

Source: the author's calculations on expert survey (2011) results, Evaluation scale 1-10, where 1 – ‘disagree’; 10 – ‘agree’

The data of Table 3 demonstrate that only 20% of experts have attributed the values of 3 or less, but 70% of experts have given the values of 8 or higher – which means that experts are very positive regarding closer relations between science and VET system towards a successful preparation of a qualified labour force. If we compare the results represented in Table 2 and those in

Table 3, it can be concluded that a certain amount of experts do not link the concept of innovation with the issue of the training of labour force. To put it more explicitly – if a certain number of experts do not see benefits of closer links between science and VET to enhance innovation (Table 2), while on the average the experts are much more positive about closer links between science and VET for a more successful training of labour force, this suggests that some experts may not be consciously linking innovation with the training of VET labour force. This is an important conclusion in the light of the NIS approach (as the favoured approach to innovation by the author of the paper), as in the NIS approach innovation and the labour force training are among the key components of the system.

Table 3

Distribution of expert evaluations on the statement “Closer relations between research and VET system could encourage a comprehensive preparation of qualified labour force”

	Evaluations	Frequency	Percent	Valid Percent
Valid	1	2	9.5	10.0
	2	1	4.8	5.0
	3	1	4.8	5.0
	5	2	9.5	10.0
	8	4	19.0	20.0
	9	7	33.3	35.0
	10	3	14.3	15.0
	Total	20	95.2	100.0
Missing	System	1	4.8	
Total		21	100.0	

Source: Author's calculations on expert survey (2011) results, Evaluation scale 1-10, where 1 – 'disagree'; 10 – 'agree'

The data of Table 4 indicates that experts have given very high scores to the statement that the innovation capacity of the VET system has to be strengthened: 25% of experts have given the highest score, and 55% of experts rated the statement at 8 or more. For this statement the lowest score was 3. The results confirm that experts see the importance and added value of additional support for innovations in the VET system. The conclusion can be drawn (making parallels to the conclusions from the data in Tables 2 and 3) that, on the whole, experts see the importance of strengthening the VET system in terms of innovation and the importance of a comprehensive training of innovative labour force (at all levels); at the same time, certain traditional stereotypes prevent some of the experts from linking research activities with the introduction of innovation directly into the VET system (or perhaps, from consciously acknowledging that there might be an important link between the research sector and the VET system).

Table 4

Distribution of expert evaluations on the statement “The innovation capacity of the VET system has to be strengthened”

	Evaluations	Frequency	Percent	Valid Percent
Valid	3	1	4.8	5.0
	4	1	4.8	5.0
	5	2	9.5	10.0
	6	2	9.5	10.0
	7	3	14.3	15.0
	8	3	14.3	15.0
	9	3	14.3	15.0
	10	5	23.8	25.0
	Total	20	95.2	100.0
Missing	System	1	4.8	
Total		21	100.0	

Source: Author's calculations on expert survey (2011) results, Evaluation scale 1-10, where 1 – ‘disagree’; 10 – ‘agree’

The synthesis of the analysis of the data in Tables 1 to 4 will be presented in the conclusions of the present paper. Based on this, proposals and recommendations will be developed.

CONCLUSIONS, PROPOSALS, RECOMMENDATIONS

As the research had been aimed at studying the attitudes of stakeholders towards the success of training ‘innovation capable’ labour force, and towards a possible change in approach to addressing challenges in the training of modern labour force, the analysis of the relevant literature and empirical survey results has been performed. As a result of the study the following conclusions can be drawn:

1. The present EU policy regarding the development of the VET system places much emphasis on the implementation of innovation in the VET system and on closer links between the higher education and research, and the VET system. Consequently, one of the key issues to be addressed by public administration is *the skills* of the future workforce; as the demand for certain skills is constantly changing, the existing institutional mechanisms should become more flexible to follow and respond to the process.
2. In Latvia on the average, experts in higher education and research and in the VET sector highly estimate the role of innovation in the VET system, and also the importance of closer links between the research community and the VET system in order to train innovative labour force in a complex way and at all levels. At the same time, the individual differences in expert views on the relevant research issues is relatively high, which requires a more detailed study

and interpretation of those differences, especially given the fact that all the selected experts are high level professionals visible at the national level.

3. As a result of the analysis of individual differences in expert views on our research issues, indications can be found of a tendency among experts not to see that a closer co-operation between the research sector and the VET system will yield future benefits in terms of more innovation in, and for the VET system. This suggests that the traditional approach of relating innovation only with the higher education and research system might be widespread enough among experts in Latvian public administration. Another implication, in our opinion, is that the examples of positive experience from other countries (for example, the Australian success story, as revealed by our literature analysis) and the awareness raising initiatives under EU policy have not yet reached the needed critical mass to effect a substantial change in routine attitudes among Latvian public administration and expert circles regarding the role of the connection between innovation and VET system.
4. There are certain indications that, in the perception of experts from public administration in Latvia, the concept of innovation is not yet being closely linked with the issue of the training of labour force. Since this linkage is a relevant component of the NIS approach favoured by the author of the paper, it can be concluded that, from the NIS perspective, the highly diverse opinions of public administrators regarding our research questions comply with the NIS principles only to some extent.
5. Somewhat paradoxically, as a result of empirical analysis, it can be concluded that most experts in Latvian public administration attach high importance to the need to strengthen the introduction of innovation into VET. A further conclusion can be drawn that on the whole, the experts see the importance of strengthening the VET system regarding innovation and the importance of a comprehensive training of innovative labour force (at all levels); at the same time, traditional stereotypes prevent a certain part of experts from clearly linking research with the application of innovation in the VET system. This suggests that with more awareness-raising at the national and EU level regarding the accumulated positive experience and potential benefits for future development, most of public administrators in Latvia would consciously adhere to the NIS principles regarding the need to bridge innovation and the training of competitive labour force at all levels. This also implies closer links between higher education and research and the VET system.
6. In order to foster an innovative approach in Latvian public administration, mechanisms should be sought to secure closer links between the policy and academic discourses. With such an approach, theory would be linked with practice in a reciprocally beneficial way. It is this model that lies at the origins of the NIS approach and allows us to draw parallels for fostering continuous innovation in public administration itself. The promotion of the systematic review method among public administration, in our opinion, could also be

an effective tool for implementing innovation in public administration. This would also enhance deliberation on the development of respective institutional mechanisms to address the new challenges in public administration.

7. Since innovation-capable labour force is at the basis of competitive national economies, the training of such labour force is needed at all levels. Consequently, the Latvian public administration should seek ways for advancing an innovative VET system and linking it with the higher education and research system in an appropriate way. To do this, a conceptual policy approach should be defined and respective institutional mechanisms put in place to implement the policy. Relevant EU policy initiatives should be analysed more extensively at all levels and best practice from other countries sought out. This process can reach its critical mass if a broad spectrum of stakeholders is being involved in the process.

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REGIONAL RETAIL BUSINESS LOCATION SIMULATION GAME

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Abstract: Business games can be used as a tool for imitation of spatial development of retail chains on a regional scale. The author offers a business game imitating development of several retail chains in several regions depending on the development of external factors and the managerial decisions by the participants of the game. The external factors used in the game are demographic and economic indicators and competition. The participants of the game influence the market by their decision. The rules of the business simulation game aid in helping the participants to study the theoretical topics of market concentration, growth, competition and other aspects of retail on a practical basis.

Key words: *retail; business game; market concentration; planning; forecasting; simulation.*

JEL code: L81, C53

INTRODUCTION

The described business simulation game is a practical activity depicting retail market. The decision-making process is related to the choice of geographical location of a retail store network. Geographical distribution of retail facilities can be planned at several levels. The wider international level is required to decide in which countries or regions to open new retail stores. It can be followed by choice at the district and town level. A city or other municipal level can decide on the neighborhoods of choice. The narrowest level of choice is the choice of location, in terms of a specific address. While there are possibilities of modeling store location, and a new store success rate in all of these levels, only the decision of choosing a city is imitated in this simulation game. At this level of analysis, the main indicators to be studied are demographics, economic indicators and market indicators. Theoretically, gravity models, such as of Reilly, Huff and others can be applied (Šķiltēre & Danusēvičs, 2005). These models will not be included in the simulation game proposed, but the addition could be feasible.

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THE ROLE OF BUSINESS SIMULATION GAMES IN RESEARCH OF ECONOMIC PROCESSES

The application of business simulation games has changed since their advent in the mid-twentieth century. Initially they were developed as a result of research, that is, business simulation games emerged as the result of economic research. Later on, the emphasis changed the direction, and the simulation games themselves became a source of analysis (Dickinson, et al., 2004). Simulation games can be used to analyse the behavior of market participants in various conceptual situations. There have been attempts at using simulation games to analyse possible behavior of the involved participants in real-world negotiations (Schilling, et al., 2006). Also, from the point of view of academic didactics in the process of studying business administration sciences, these simulation games have an even increasing importance. In modern study process the perspective is gradually changing from a lecturer-oriented to student-oriented process (Garris, et al., 2002). The business simulation games are perfectly suited for this new approach.

Business simulation games can be classified according to various characteristics. They can be computerized and non-computerized. Non-computerised simulation games do not have the level of complexity associated with the computerised games. In addition, they typically do not provide for integration (Keys & Biggs, 1990). The Store Location Game proposed by the author is a computerised simulation game, since it is necessary to use random number generators and perform calculations based on inputs from participants.

A simulation game can be a concept game focusing only on one aspect of each functional area of a business situation (Faria, 1987), also in that a game is oriented to specific problem solving tools, but makes no attempt at integrating several functions. Such games are easier to administrate and interpret, but do not facilitate the students to experience the possibility that a best solution for one situation or a model can have a worse result in a different situation (Keys & Biggs, 1990). A Total Enterprise Business Game (Washbush & Gosen, 2001), on the other hand, is a simulation game, that includes the majority of enterprises functions – marketing, production, finance, personal resources. Such kinds of simulation games make the participants appreciate the complexity of managerial decisions and the interaction of different branches of a company.

The use of business simulation games can act as a tool to understand the competition dynamics in specific situations. Business games have been likened to strategic management laboratories, acting as an environment for experiments and studies of business phenomena (Wolfe & Castrovanni, 2006).

The majority of business simulation games use economic development indicators with added seasonal and cyclic fluctuations. A simulation game can be based on a longer series, for example, years, to illustrate the effect of strategic decisions. Other games can use a shorter time series, weeks, months or even days, to illustrate the influence of tactical decisions on company performance.

Simulation games can include marketing mix elements, simulating all four, or some of them. Simulation games mostly differentiate by the use of the product (4P – product), facilitating the recognition and advertisement. The most simulation games are modeled by price effect (4P – price) on performance characteristics. In games including price elasticity, assuming other factors being equal, the price changes affect the sales volume. Sometimes this influence can be non-linear. Marketing mix element – the placement, is used less frequently in simulation games (4P – place), since it is usually not so easy to imitate. The promotion of products (4P – promotion) sometimes is used in the form of possibility to use different marketing campaigns to simulate the correlation between increased marketing costs and revenues. Simulation games are not usually defined with market variations. Simulation games are widely used in the management of other aspects, such as manufacturing, logistics, finance, research and development.

THE DESCRIPTION OF THE STORE LOCATION BUSINESS SIMULATION GAME

The proposed simulation game is designed for the simulation of regional retail location planning depicting the patterns that are observed in the retail market. Key elements of the market, which are focused upon in the simulation game, are market saturation, market development cycles, and demand forecasting.

The players of the simulation game are entering the game as a retail store chain. The game is designed for a small number of market participants: the desired number of players is between 3 and 5 teams. This constraint illustrates a typical situation in the retail sector with a moderate to high level of market concentration. Using a smaller number of players can realistically illustrate the individual market participants and the profound impact of market saturation.

The initial market situation represents a situation where there are several retail chains present in the market, positioning game dynamics closer to the market saturation point. In this case, new entrants can quite quickly lead to a sharp decline in the average store profits. The game includes several external factors influencing the retail market. All of the game factors are divided into three groups: the demographic group, the economic group and the retail group.

The demographic group represents the population of each modelled city. The game supports the simulation of several cities in one gaming session. The number of cities can be determined based on different factors – time, infrastructure and competence. If the available time for the game is limited, a smaller number of cities should be used. The simulation game has to be played in a computerized environment; if the infrastructure allows computers for all participants, a higher number of towns can be used. For players with less experience in business simulation games and retail, a one-city game would be recommended. Each city has a certain initial population determined by the administrator of the simulation

game. The initial population can be chosen randomly or, preferably, based on a real case situation, if the administrator wants to simulate a certain city or a country with several cities. From this period onwards, the population increase is determined by a combination of:

- 1) trigonometric function,
- 2) random initial cycle direction,
- 3) a-priori determined growth limitation,
- 4) fluctuation intensity, and
- 5) a-priori determined random noise level.

The administrator of the game can change the parameters for every city. This variation can be based on real case scenarios (Šķiltēre & Danusēvičs, 2009), or random situations. A certain scenario can be achieved to accomplish a desired teaching value. The population growth is determined by the equation:

$$\tau P_t^i = \sin\left(\frac{r_i^0}{f_i}\right) \cdot \left(\frac{gl_{\max} - gl_{\min}}{2}\right) \cdot rn_i \quad (1)$$

i – city number,

τP_t^i – population growth ratio in city i during year t ,

r_i^0 – random starting point of city i demographic cycle,

f_i – fluctuation level of city i ,

gl_{\max} , gl_{\min} – limitation of growth per year,

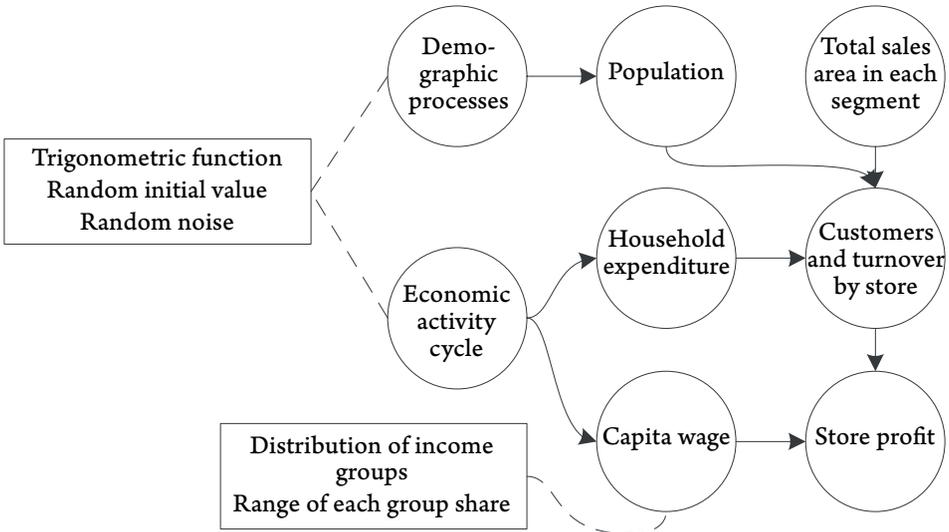
rn_i – random noise level for city i .

The economic group uses a simulated GDP as the main indicator; other indicators are derived from it, to maintain a coherent representation of economic activity cycles. Similar to the dynamics of population, GDP is also initially set up by the administrator or chosen at random. The further cyclic development of GDP is modelled in the same way as population. The fluctuations of demographic and economic groups are independent, since population and economic cycles are not directly linked. It is advised to use different levels of noise, growth limits and other indicators for these two groups.

Initially every simulated city has a number of retail stores already established. The simulation game models two types of retail stores – large and medium. The large retail store with a trade area of 50 000 square meters, has a preset maintenance cost and operational cost. The maintenance costs and operational costs are set up separately to allow a situation of an idle retail store. Such an approach can be used by players to reduce market saturation. The medium retail store has a trade area of 20 000 square meters. Additional parameters that can be set up by the administrator are the profit margin of each type of stores and the number of employees.

The GDP values of every year are used to determine the retail turnover in the city and average wages in the city. As a result an increase of economic

activity will trigger increased retail turnover and increased wages, balancing out additional expected profits. The proportion of retail turnover and wages has to be determined by the simulation game administrator to imitate a certain economy or a random case.

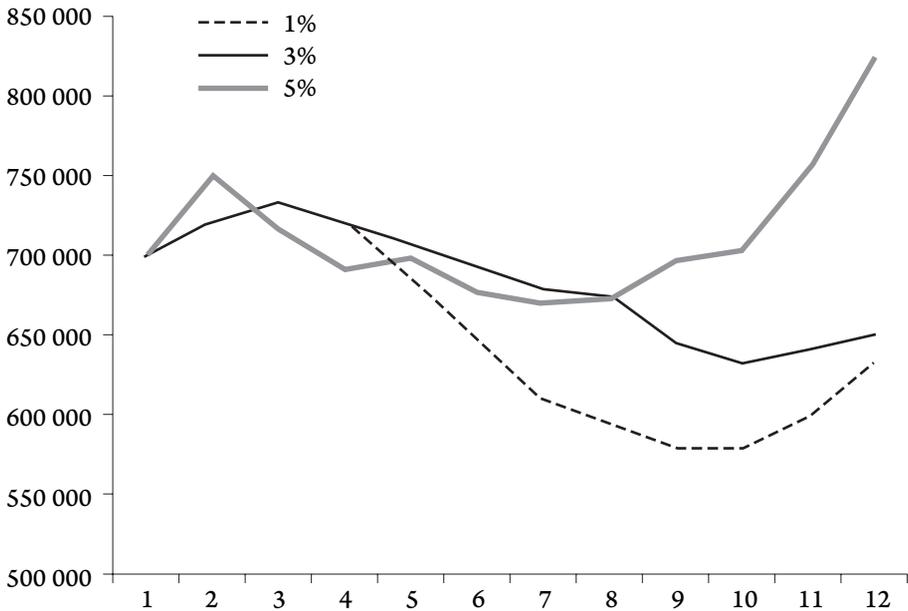


Source: author's construction

Fig. 1. Simulated external factors influencing the retail turnover and the random generation of their dynamics

The retail group (group of retail market indicators) simulating the retail market using available and occupied trade area, retail per square meter, store costs, store profit. Values of this group are influenced by both demographic and economic group and the decisions of retail market participants.

The participants of the simulation game enter the simulated retail market with the knowledge of market development during the past 5 years. This is an important aspect of the simulation game that allows for extended analysis. Game participants can use the available data set to work on it, analyse the dynamics of demographic, economic and retail tendencies and forecast the market using extrapolation and regression methods. If the output data is simulated without added noise, it could be very easy for participants to detect the underlying trends and causalities. The addition of noise to all data sets makes this task more difficult. The administrator of the game can vary the noise level according to the experience of the participants. A lower noise level can be set when the simulation game is played without data analysis based more on judgmental methods, a higher noise level would be necessary, if the participants receive the data beforehand and have several hours or even days to analyse the data preferable by means of econometric methods.



Source: author's construction based on simulated values

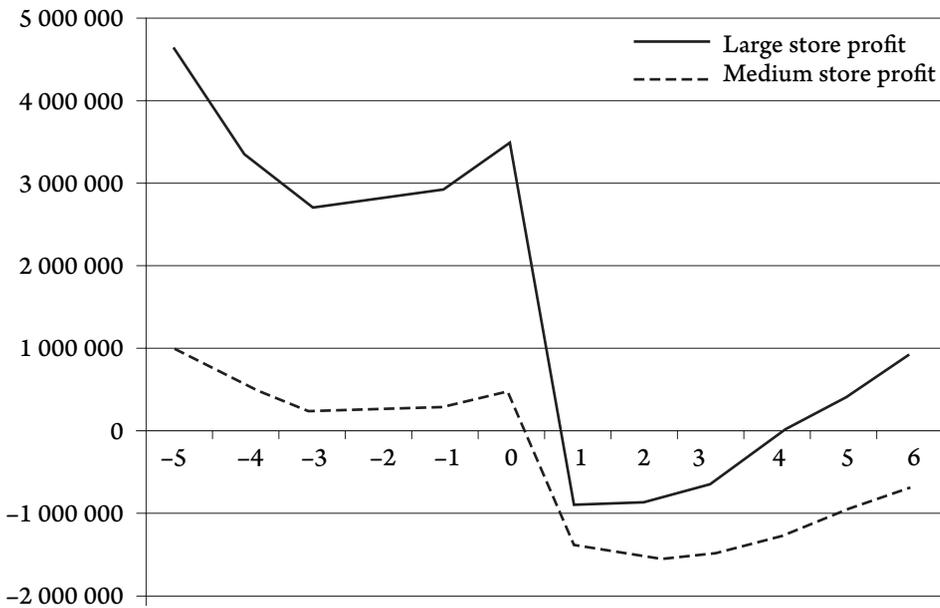
Fig. 2. Randomly generated population dynamics with limited range of 5% per year with fluctuations intensity level 2 and three different levels of noise.

During the gameplay the players are making their retail development decisions simultaneously, they do not know the decisions of other teams until made publicly known. All the teams start the game with a fixed amount on money. Since the expansion and maintenance of the retail chain is not possible with the available starting funds, loaning is possible at a fixed rate equal for all players. During every move (year) all the teams decide if they are going to build any retail stores, what will be the size of built retail stores, in which cities are these stores going to be built. The number of the retail stores built is made publicly known after all teams have made their moves. Starting from the second year players can perform new operations in their retail chain. Since some teams can run into financial problems due to oversaturation, they can make their active stores inactive, to reduce maintenance costs. The implications of an unsuccessful retail store portfolio have been analyzed in a study in the United Kingdom (Guy, 1999) and it shows the necessity for an exit-strategy. Later on during the game the stores can be made active again, if the team believes the market situation to be more favourable.

There are two options on selling an already built retail store. Teams can trade retail stores between them. These sales are organized with the mediation of the administrator of the game, who chooses a method for selling the stores – either at auction or via direct bargaining. The second option is to sell the retail store to the virtual immobility market played by the administrator of the game. The administrator can determine a price at which the retail store can be sold. This

price should not cover the costs of building the retail store. The administrator can use this option shortly before market recovery to provoke the teams.

The victory condition of the game consists of two monetary indicators: available cash on the bank account and the market value of retail stores.



Source: author's construction based on simulated values

Fig. 3. Possible outcome of the simulation game with different types of stores in a market with high initial market saturation.

The flow of the game can be very different. A typical situation (Fig. 3.) depicts a market with decreasing population and increasing GDP. As a result, the profit per store decreases as the population decreases but starts to increase again, once the economy starts to recover. Such a situation can mislead the participants, making believe that the market has potential. But, when the simulation game begins and the participants build their first stores in year 1, the market becomes too saturated and the average profit per store falls to negative numbers. So the participants have difficulties with accessing the market and the perspective of market recovery and, maybe, even collude with other market players to limit their retail activities to gain a limited profit in the mid-term.

The results of the game can lead to a complete bankruptcy of all the involved teams. This usually happens when all participants increase their retail area without taking the completion and market cycles into account. In other cases the bankruptcy can be prevented. A typical case of profit for all participants is based on collusion. If someone of the participants shows initiative and one team start

negotiation about regulated market growth, a win-win situation can be achieved, and all teams end the game with profit. To simulate a situation when colluding is prohibited by the law, the game administrator can play a probability event every year of regulatory institutions finding out about the deal.

Table 1

A simulated game based on medium market entry during year 1 and consecutive market oversaturation

Year	-5	-4	-3	-2	-1	0	1	2
Number of large stores	2	2	2	2	2	2	3	3
Number of medium stores	3	3	3	3	3	3	5	5
Total sales area	160	160	160	160	160	160	250	250
Turnover per sq.m.	2 625 000	2 755 482	3 139 808	3 487 287	3 400 637	3 264 856	1 964 080	1 860 157
Large store costs	8 510 000	9 532 654	11 109 015	12 699 857	12 622 175	12 062 536	11 378 924	10 074 006
Medium store costs	4 255 000	4 766 327	5 554 507	6 349 929	6 311 087	6 031 268	5 689 462	5 037 003
Large store profit	4 615 000	4 244 757	4 590 027	4 736 579	4 381 011	4 261 743	-1 558 525	-773 220
Medium store profit	995 000	744 638	725 109	624 646	490 187	498 443	-1 761 302	-1 316 689

Source: author's calculations based on simulated values.

CONCLUSIONS, PROPOSALS, RECOMMENDATIONS

1. Business simulation games have grown from being a tool for analysing real life situations to a instrument of analyzing possible development of the same real life situation. The developed simulation game on regional retail business location can be used in studying market behaviour in retail and also as a instrument for analysing possible market development in certain geographies under certain economic and demographic conditions.
2. The outcomes of the simulation game in regional retail business location are a possible source of forecasts to be discussed with retail chain leaders and members of retail associations to jointly find solution to possible market oversaturation and careful market growth to avoid retail bubbles.
3. The results of the simulation of retail market development for certain geographies can be compared with actual market development to access the disparity between simulated and empirical values.

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A STUDY ON FACTORS THAT INFLUENCE INNOVATION ACTIVITIES: THE CASE OF LATVIA AND LITHUANIA

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Abstract. Problem statement – According to Eurostat data innovation activities in Latvia and Lithuania are rather low (Eurostat, 2012). The situation called for examination in order to determine why innovation activities are underdeveloped, where the trigger is and what should be done in order to enhance innovation activities in Latvia and Lithuania. The divergence of the research results still puts the innovation concept into the question area. What is innovation and what factors determine innovation development? The paper presents the research framework which brings together a variety of factors related to the innovation process on the basis of a systemic review of theoretical and empirical studies. The results highlight a set of variables which would help entrepreneurs and policy makers to foster innovation through the choice of the best methods and benefit from studying the analyzed phenomenon.

Purpose – investigate the relations between human capital, R&D, the government policy; examine the interaction of companies with their external environment within the innovation sector; explore the connection between innovation-oriented organizational culture, and market orientation from one side and the introduced product innovation, process innovation, marketing innovation and organizational innovation from the other side in Latvian and Lithuanian innovative enterprises.

The principal **tasks** of the paper are as follows:

- to investigate of the main theoretical aspect of the concept of innovation;
- to analyze the innovation generation process in Latvian and Lithuanian innovative enterprises;
- to explore the relation between individual, organizational and external factors and introduced innovation;

Main research methods used. The monograph method –the collection and compilation of information regarding factors having influence on innovation creation. The method makes enables carrying out a detailed study of the object, based on scientific literature and research results. The grouping method – the

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process of creating, on the basis of statistical clustering, a homogenous group, or a research unit that merges particular entities, taking into account a constructive feature of the unit. Statistical analysis techniques: correlation analysis. The graphical method – illustration by graphic design and image building to elicit correlation of phenomena and the nature of relations and shapes. The content analysis – the systematic numeral processing, evaluation and interpretation of the form and content of the information source. A survey – empirical, economic, social, management research method applied in order to gather information from representatives of innovative enterprises in Latvia and Lithuania. The questionnaire type is the same for Latvian and Lithuanian enterprises.

Main results and conclusions of the paper. A theoretical scheme was created for the analysis of influential factors on innovation creation that reflects on the enterprise capacity to achieve competitive advantage. The impact of various factors on innovation in Lithuanian and Latvian innovative companies was empirically tested.

Methodology for the evaluation of influential factors on innovation creation was devised. The research estimated the impact of human capital, R&D, cooperation with scientific-research centers, universities, organizational culture, and market orientation on innovation capacity in Latvia and Lithuania. Recommendations for Latvian and Lithuanian enterprises for the introduction of the best innovative practices was prepared.

Keywords: *innovation; human capital; market orientation; R&D; culture; cooperation; state policy.*

JEL code: A11; A12; A13; H52; M21; O16; O31; O32; O34; O38; O52

INTRODUCTION

Innovation is regarded as the key source of additional revenues from new products or services. Actually, innovation offers high potential for competitive advantage and also helps to save costs as well as improve the quality of the existing process. Innovation has been acknowledged as a major contribution to the enterprise success. Creation and application of product innovation, process innovation, organizational and marketing innovation is a solid basis for sustainable growth and development in the context of modern socio-economic environment.

THEORETICAL FRAMEWORK

According to Schumpeter innovation is a vital driving force of economic development. Innovations that were made by capitalist entrepreneurs ensure cyclic prosperity changes that ensure economic expansion and development (Schumpeter, 1950). Nelson and Winter admitted that “any nontrivial change in a product or process, if there has been no prior experience, is an innovation” (Nelson and Winter, 1977). Robers argued that “innovation is composed of two parts: (1) the generation of an idea or invention, and (2) the conversion of

that invention into a business or other useful application” (Roberts, 2007). According to the latest Eurostat innovation definition, “the enterprise innovative performance implicates in itself: product innovation, process innovation, marketing innovation and organizational innovation” (Eurostat, 2012).

Human capital is a vital prerequisite for innovation creation (Dubra, 2012). Employees with their knowledge, expertise, and skills are a valuable resource of firms (Collins and Clark, 2003). Taking into account the process when firms create new products and improve management practices, it must be admitted that firms require the motivation and ability of human capital to produce creative ideas, develop innovative approaches, and exert new opportunities (Scarborough, 2003). Personal talent, experience, skills and company inheritance and knowledge endowments an employee brings to the new venture are expected to influence economic survival and success of the new venture (Klepper and Sleeper, 2005)

A firm’s own R&D department produces not only new knowledge in the sense of innovations but also contributes to the absorptive capacity of the firm by increasing the skills of the employees who have been involved in the R&D process (Cohen and Levinthal, 1990). Veuglers argues that R&D cooperation and, to a certain extent, R&D contracted out have a positive effect on the internal R&D, but only if the absorptive capacity takes the form of a full-time staffed R&D department (Veuglers, 1997).

Cooperation on innovation between a firm and academic society as representatives of scientific-research centers and universities is rather a vital prerequisite to innovation (Dubra, 2012). Joint collaboration on special projects fosters specific problem solution and reveals the ways for future development (Dubra, 2011). Thus, it is increasingly more important to set up agreements in order to collect and exchange resources and, ultimately, to coordinate the innovative activities and produce increasingly more sophisticated and knowledge- and technology-intensive products and services (Powell and Grodal, 2005)

In the context of organisational culture it is essential for a firm to create a broad and effective communication platform for innovation to appear through the constant process of experiment and failure (Dubra, 2011). The capability of an organisation to create value out of innovation heavily depends on a strong innovation culture (Terziovski, 2007). Von Stamm reconfirms that creating the right culture is key to innovation (Von Stamm, 2008).

In reality, innovative enterprises tend to develop constant learning practices through investigation of customers’ needs, examination of competitors’ actions, through market knowledge generation and integration (Dubra, 2011). Responsiveness to changing market needs often calls for the introduction of new products and services together with innovation capacity for a firm. Market orientation has also been described as the implementation of marketing activities designed to satisfy customer needs better than competitors are able to do the same (Martin and Grbac, 2003).

The government policy actions in support of innovation are treated as a vital tool for the creation, development and promotion of innovation. Innovation support needs to be grounded on a clear state policy and demonstrate the capability for making a real of difference. National governments need to identify which innovation support policies work best and could be made more effective to avoid failures in global competition (European Commission, 2009).

METHOD USED: THE AUTHORS' APPROACH

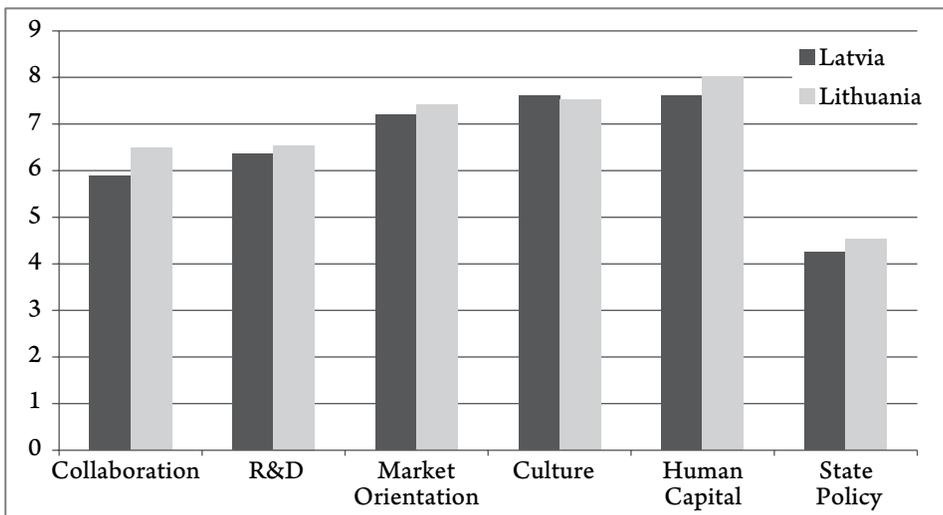
The authors developed specific methodology based on theory and empirically tested it in the evaluation of impact by different factors on innovation introduced in Latvian and Lithuanian innovative firms. In practice, sample questions were organized using a 10-point Likert scale. Namely, the authors asked the respondents to evaluate specific assumptions that represent an introduced product innovation, process innovation, marketing innovation and organizational innovation during the past 3 years on a scale from 1 till 10, where 1 means 'strongly disagree', and 10 – 'fully agree'. Innovative companies were also requested to evaluate different factors such as human capital, R&D, national innovation policy, cooperation with external entities in the context of innovation, innovation oriented organizational culture, and market orientation on a scale from 1 till 10. The respondents represented the middle and top level of enterprise management. The research was undertaken from 01.10.2011 till 01.09.2012, and 520 enterprises in Latvia and 281 enterprises in Lithuania were surveyed by email. The authors were returned 105 filled in questionnaires from Latvian innovative enterprises and 70 filled in questionnaires from Lithuanian innovative enterprises. The list of Latvian innovative enterprises had been compiled according to unpublished materials by the Central Statistical Office of the Republic of Latvia, "List of Enterprises with product innovation, and/or process innovation, and/or marketing innovation, and/or organizational innovation from 2006 till 2008", and a catalogue published by the Investment and Development Agency of Latvia, "Innovative Companies in Latvia 2011". The list of Lithuanian innovative enterprises was drawn up according to a catalogue, "Gateway to Innovation in Lithuania 2011", published by the Lithuanian Innovation Centre. Employees in the enterprises were asked to fill in a questionnaire and provide answers on six sets of factors, namely, human capital, national innovation policy, Research and Development, cooperation with external entities in the context of innovation, innovative organizational culture, market orientation, and four sets of questions on innovation, namely, product innovation, process innovation, marketing innovation, organizational innovation.

The data was calculated through SPSS, version 17.0.

EMPIRICAL RESEARCH: THE CASE OF LATVIA AND LITHUANIA

The authors calculated the mean value of the evaluated factors (see fig. 1.).

The highest mean figures were yielded in the factors such as human capital, where the values stood at 7.60 in Latvia and 8.01 in Lithuania. In this context, the authors are led to admit that a human individual is the most highly regarded asset both in Latvian and Lithuanian innovative companies. Namely, innovative companies highly evaluated the sufficiency of their employees' knowledge for performing daily work, and the employees' creativity, talent, and specialist knowledge needed for specific tasks. It was also admitted that employees generated new ideas and knowledge. In fact, it was recognized that employees are highly qualified performers and professionals with a rather high level of experience.



Source: the authors' compilation based on empirical analysis

Fig. 1. Mean value of the evaluated factors

Innovation-oriented organizational culture was also highly appreciated by Latvian and Lithuanian innovative companies, and the figures stood at 7.60 in Latvia and 7.53 in Lithuania. It is interesting to note that Latvian innovative companies evaluated innovation-oriented organizational culture as high as human capital. Namely, companies highly evaluated strategic objectives set by top management and the employees' ability to achieve those objectives. In this respect, it was noted that inter-disciplinary team collaboration in projects, formal procedures and control, and support for creativity and innovation was present, while the organization structure supported the flow of innovation. It

was admitted that possible conflicts were successfully solved and support for creativity and innovation was provided. Innovative proposals by the staff were evaluated and tolerance towards mistakes was shown.

Market orientation was also rated rather high by Latvian and Lithuanian innovative companies and the figures stood at 7.20 in Latvia and 7.42 in Lithuania. It was revealed that the companies had collected information about changes in the market, attracted innovative ideas from market research and applied market research information for business decisions during the past 3 years; it was even stated that the staff contacted customers in order to learn how to serve them in the best manner. It was recognised that the level of company knowledge of the market segments and competitors in industry had been extended. Various departments within companies shared information about market changes. Finally, it was announced that new products had been developed according to information about customers and competitors during the past 3 years.

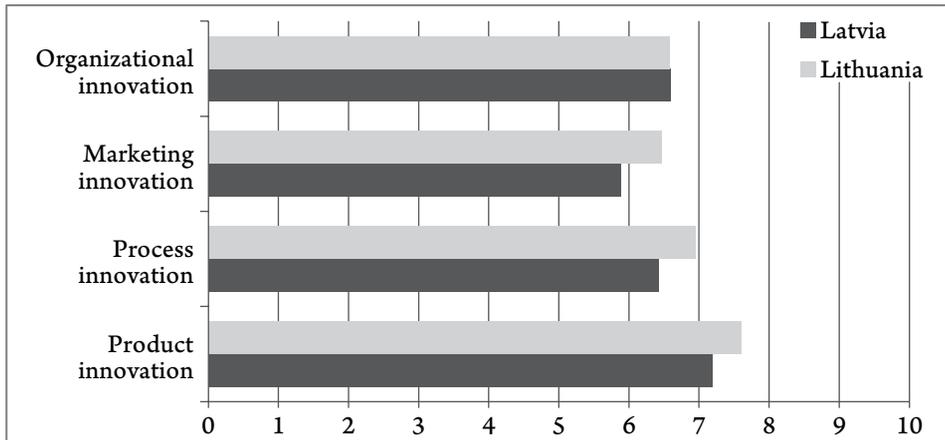
Research & Development activities were rated at 6.37 in Latvia and 6.54 in Lithuania. Innovative companies evaluated the following determinants: constant acquisition of knowledge from different sources; obtaining specialist machinery, software, technological equipment; sufficient scientific personal for innovative activities; commercialized results of scientific research; increased expenses on R&D activities (in comparison with the previous year); and an in-house R&D department.

Collaboration with external entities in the innovation sector was rated at 5.88 by Latvian innovative companies, and at 6.4, by Lithuanian innovative companies. It must be admitted that, on the whole, Lithuanian innovative companies, more than Latvian innovative companies, were inclined to collaborate with universities, research institutions, suppliers, customers, state institutions and other companies.

The lowest mean figures were allocated to national policy in the innovation sphere: 4.25 in Latvia and 4.54 in Lithuania. Latvian and Lithuanian innovative companies admitted that changes in national tax policy made no positive impact on innovation. Public financial support for project funding, networking and collaboration, staff training, engagement of new staff in the field of innovation is weak. Also, the State does not provide sufficient funding for the identification of innovative potential and the transformation of technology and knowledge in both the countries.

According to Figure 2, it should be recognized that, overall, in Latvian innovative companies, product innovation and organizational innovation prevail over process innovation and marketing innovation introduced in the past 3 years. Namely, the companies have introduced a new/improved product or a service through increased expenditures on product innovation from turnover; through the promotion of customer satisfaction by innovation in the existing product/service; through the creation of new product/service on the basis of improvements in software, in technological specifications, in components and

materials. The companies have introduced organizational innovation through the adoption of new organizational methods in business practices; in knowledge management; in workplace organization; in the formation of external relations; through novel approach to organizational culture; through in information systems and information-sharing practices; through increased expenditure on organizational innovation from turnover.



Source: the authors' compilation based on empirical analysis

Fig. 2. **Innovation in Latvia and Lithuania**

Meanwhile, in Lithuanian innovative companies, the process and product innovation prevails over marketing innovation and organizational innovation introduced in the past 3 years. Namely, companies had introduced product/service innovation through implementation of new or improved product or service; through increased expenditures on product innovation from turnover; through the promotion of customer satisfaction with the existing product/service innovation; through the creation of a new product/service on the basis of improvements in software, in technological specifications, in components and materials; the companies introduced process innovation through the use of new or improved production/delivery methods; increased expenditure on process innovation from turnover; the implementation of new or improved production/delivery methods through changes in technology, equipment, software; decreased unit cost of output; and increased unit quality of output.

Figure 3 reflects the correlation analysis of different factors and technological innovation, namely, product and process innovation. As the matter of fact, in the context of Latvian innovative enterprises, it should be recognized that there were strong correlations between specific technological equipment and improvements in production technology (.680); National collaboration and Implementation of a new or improved product/service (.659); specific software and improvements

in product software (.620) and Improvements in production software (.622). Weak correlations were detected between the implementation of a new or improved product/service and interdisciplinary team collaboration (.405); and the resolution of possible conflicts (.427); and evaluated innovative proposals (.420). Insufficient correlations were revealed between improvements in product components and materials and Achieved goals (.430); and support for innovation and creativity (.425); and resolution of possible conflicts (.407).

	Implementation of new or improved product / service	product/service innovation promote customer satisfaction	improvements in product software	improvements in product technological specification	improvements in product components and materials	Implementation of new or improved production / delivery methods	Increased expenditure on process innovation	improvements in production technology	improvements in production equipment	improvements in production software
Creative employees		.591		.580						
Talented employees										
Special knowledge	.527			.591						
High experience		.548		.538						
Achieved goals					.430					
Interdisciplinary team collaboration	.405									
Formal procedures for innovation	.479	.441								
Support for innovation and creativity					.425					
Resolution of possible conflicts	.427	.598		.450	.407					
Evaluated innovative proposals	.420	.463	.430	.453	.466					
Tolerance for mistakes	.474		.545							.497
Scientists meets clients							.518			
Wide information distribution through departments						.552				
Enterprise obtains specific machinery									.617	
Enterprise obtains specific software			.620							.622
Enterprise obtain specific technological equipment							.680			
National collaboration	.659									
Collaboration within EU		.526								
Collaboration out of EU							.507			

Source: the authors' compilation based on empirical analysis

Fig. 3. Correlation analysis: Latvian innovative enterprises (1)

Correlation analysis of various factors and non-technological innovation in the Latvian innovative enterprises sample is reflected in the Figure 4. There is a strong correlation between specific software and innovation in the formation of external relations (.650), innovation in business practices (.613), innovation in knowledge management (.614), innovation in workplace organization (.622), and innovation in organizational structure (.601). In addition, it must be recognized that there is a strong correlation between commercialization of research results and innovation in information systems (.616). A weak correlation was detected between state financial support for recruiting new staff in the innovation sphere and marketing of new product design (.312); and increased expenditure on marketing innovation (.309). Insufficient correlation was revealed between state financial support for the transformation of technology and Innovation

	New product design marketing	New product price marketing	Increased expenditure on marketing innovation	Innovation in business practices	Innovation in knowledge management	Innovation in workplace organization	Innovation in formation of external relations	Innovation in organizational structure	Innovation in information systems	Increased expenditure on organizational innovation
State financially supports engagement of new staff in innovation sphere	.312		.309							
State financially supports transformation of technology									.320	.300
State financially supports networking										.300
Creative employees							.525			
High experience					.569		.623	.575		
Strategic goals are set	.428									
Interdisciplinary team collaboration	.401	.440								
Formal procedures for innovation		.444								
Evaluated innovative proposals	.425				.437		.453			
Tolerance for mistakes	.421	.462		.441	.453		.502	.439		
Collection of info. about market changes							.509			
Wide information distribution through departments									.504	
Enterprise obtain specific software				.613	.614	.622	.650	.601		
Commercialization of research results									.616	

Source: the authors' compilation based on empirical analysis

Fig. 4. Correlation analysis: Latvian innovative enterprises (2)

in information systems (.320); and increased expenditure on organizational innovation (.300)

Figure 5 reflects the analysis of correlation between various factors and technological innovation, namely, the product and process innovation. As a matter of fact, in the context of Lithuanian innovative enterprises it should be recognized that there were strong correlations between tolerance for mistakes and

	Implementation of new or improved product/service	product/service innovation promote customer satisfaction	improvements in product software	improvements in product technological specification	Improvement in product components and materials	Implementation of new or improved production / delivery methods	Increased expenditure on process innovation	improvements in production equipment	improvements in production software	Increasing unit quality of output
State financially supports innovation projects			-.305						-.305	
Employees create new knowledge			.622							
Employees are best performers						.615				
Support for innovation and creativity			.624							
Resolution of possible conflicts			.616							
Tolerance for mistakes			.776							
Wide knowledge about competitors			.713							
Wide information distribution through departments			.746							
Enterprise obtain specific machinery							.738			
Enterprise obtains specific software			.660					.633		
Commercialization of research results										-.239
Collaboration with universities				.607						
Collaboration with clients	.616	.610								
Collaboration with state institutions					-.273		-.287			
Collaboration with other enterprises					-.277					

Source: authors' compilation based on empirical analysis

Fig. 5. Correlation analysis: Lithuanian innovative enterprises (1)

	New product promotion marketing	New product price marketing	Increased expenditure on marketing innovation	Innovation in business practices	Innovation in knowledge management	Innovation in workplace organization	Innovation in formation of external relations	Innovation in organizational structure	Innovation in information systems	Increased expenditure on organizational innovation
State financially supports innovation projects								-.358		-.247
State financially supports identification of innovation potential					.566		.523			
State financially supports engagement of new staff in innovation sphere					.522					
Talented employees							.694		.600	
Employees are best performers							.626		.650	
High experience						.603	.652			
Strategic goals are set						.613	.718			
Achieved strategic goals							.622			
Supported information flow						.698	.641			
Support for innovation and creativity						.702	.663			
Collection of info. about market changes							.751			
Wide knowledge about market segments							.729			
Wide knowledge about competitors				.730	.709					
Wide information distribution through departments							.779		.711	
Usage of market research information			.728							.720
Enterprise obtains specific software				.652			.663			
Sufficient amount of scientists		.612								
Commercialization of research results								.724	.618	.721
Collaboration with universities		.612				.672				
Collaboration with knowledge and research institutions	.648									
Collaboration with state institutions		-.265								-.259
Regional collaboration					.616	.601	.659			
National collaboration		.608								
Collaboration within EU		.625								

Source: the authors' compilation based on empirical analysis

Fig. 6. Correlation analysis: Lithuanian innovative enterprises (2)

improvements in product software (.776); specific machinery and improvements in production equipment (.738); wide knowledge about competitors and improvements in product software (.713); wide information distribution through departments and improvements in product software (.746).

There were negative correlations between public financial support for innovation projects and improvements in product software (-.305); and improvements in production software (-.305). Another negative correlation was revealed between improvement in product components, materials and collaboration with state institutions (-.273); and collaboration with other enterprises (-.277).

The analysis of correlation of various factors and non-technological innovation in the Lithuanian innovative enterprise sample is reflected in Figure 6. There is a strong correlation between wide information distribution through departments and Innovation in the formation of external relations (.779); Wide knowledge about competitors and Innovation in business practices (.730); Use of market research information and Increased expenditure on marketing innovation (.728) Increased expenditure on organizational innovation (.720); Wide knowledge about competitors and Innovation in knowledge management (.709); Support for innovation and creativity and Innovation in workplace organization (.702); Wide knowledge about market segments and Innovation in formation of external relations (.729); Commercialization of research results and Innovation in organizational structure (.724) Increased expenditure on organizational innovation (.721); and Wide information distribution through departments and innovation in information systems (.711). There was a negative correlation between public financial support for innovation projects and Innovation in organizational structure (-.358); and Increased expenditure on organizational innovation (-.247).

CONCLUSIONS

1. In the context of global economic downturn and social challenges the implementation of the effective innovation strategy would lead to the creation of competitive advantages for firms and growth in the wealth of nations. The increase of the innovation capacity is the main source of future economic growth and sustainable development.
2. Latvian and Lithuanian innovative enterprises evaluated human capital as the most valuable asset, and the figures stood at 7.60 in Latvia and 8.01 in Lithuania. Innovation oriented organizational culture was also highly appreciated by Latvian and Lithuanian innovative companies, and the figures stood at 7.60 in Latvia and 7.53 in Lithuania. The lowest mean figures were awarded to State Policy in the innovation sphere – 4.25 in Latvia and 4.54 in Lithuania.
3. In Latvian innovative companies, product and organizational innovations prevail over process innovation and marketing innovations introduced

over the past 3 years. In Lithuanian innovative companies, process and product innovations prevail over marketing innovations and organizational innovations introduced in the last 3 years.

4. There were strong correlations between specific technological equipment and improvements in production technology (.680); National collaboration and Introduction of new or improved product/service (.659); specific software and improvements in product software (.620) and improvements in production software (.622). Weak correlations were detected between introduction of new or improved product/service and interdisciplinary team collaboration (.405); and the resolution of possible conflicts (.427); and evaluated innovative proposals (.420) in the sample of Latvian innovative companies.
5. There were strong correlations between tolerance for mistakes and improvements in product software (.776); specific machinery and improvements in production equipment (.738); wide knowledge about competitors and improvements in product software (.713); wide information distribution through departments and improvements in product software (.746) in the sample of Lithuanian innovative companies. There were negative correlations between public financial support for innovation projects and improvements in product software (-.305); and improvements in production software (-.305). Another negative correlation was detected between improvement in product components, materials and collaboration with state institutions (-.273); and collaboration with other enterprises (-.277).
6. Lack of collaboration between industry and universities and weak networking is present in Latvia.
7. Latvian and Lithuanian enterprises cannot compete in the new highly changeable environment unless they become more innovative and respond more effectively to costumers' preferences and needs.
8. There is a profound lack of support actions on the part of the state and financial support for innovation development in Latvia and Lithuania.

RECOMMENDATIONS

1. Recommendations to Ministry of Economics of Republic of Latvia: work out "Latvia National Innovation System"; include it in all mid-term and long-term planning documents and implement it into practice.
2. Recommendations to government of Republic of Latvia: to increase R&D expenditure as per cent of GDP in order to increase R&D intensity in near future; increase total government budget appropriations or outlays on R&D.
3. Recommendations to Ministry of Education and Science of Republic of Latvia: to create education support programs for entrepreneurship starters and provide them with all necessary knowledge, skills and competences for entrepreneurship beginning.

4. Recommendations of authorities of Latvia and Lithuania: to develop the efforts in making Latvia and Lithuania more innovative in order to catch up with main competitors and recover the path of sustainable growth. Globalization not only set the new economic order but also brought new challenges and opportunities.
5. Recommendations for Latvian and Lithuanian enterprises: actively communicate and use collaboration opportunities with universities and academic society.

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RECYCLING POSSIBILITIES OF THE PACKAGING WASTE IN LATVIA

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Abstract. The problems connected with packaging management have been increasingly discussed in Latvia, namely, the introduction of the deposit system on beverage packaging, limited capacity for recycling packaging waste as well as challenges and possibilities for enterprises related to the fulfillment of requirements in the waste sector, including packaging waste management, set out in the EU Directives and transposed into the legislative acts of the Republic of Latvia.

The aim of this paper is to do research on the recycling possibilities for packaging waste in this country, to identify the main problems and positive aspects in this area, and, as a result, to provide recommendations for the improvement of the packaging waste recycling system in Latvia. The following issues have been considered: importance of the packaging waste management; legal framework for packaging waste in Latvia as a Member State of the European Union; the produced and recycled amount of packaging waste in Latvia; and packaging waste recycling enterprises.

The main research methods used in this paper are the review of legislative acts of the European Union and Latvia, research papers, literature and internet resources, statistical data analysis as well as an interview with Ruta Bendere, Chairman of the Board of the Waste Management Association of Latvia, on the topic of packaging waste management and telephone interviews with representatives from packaging recycling companies – “Paper mill “Līgatne”” Ltd. and “V.L.T.” Ltd. on the issue of packaging waste recycling capacity.

The authors conclude: The Europe 2020 Strategy sets the objective to ensure a resource-efficient Europe, for example, by turning waste into a resource. At present, Latvia has not achieved the necessary recycling and recovery rate of the total produced packaging volume required by the European Parliament and Council Directive 94/62/EC on packaging and packaging waste. Almost a half of the packaging waste produced in Latvia is exported abroad as a result of higher prices for the packaging waste materials offered by foreign companies as well as by limited recycling capacities for some packaging waste materials, e.g. glass, in Latvia. There is potential for business development by recycling companies in Latvia.

Key words: *sustainable development; packaging waste; packaging management; recycling enterprises.*

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INTRODUCTION

This paper is dedicated to a topical issue of the packaging waste management – the analysis of recycling possibilities for packaging waste in Latvia. Packaging waste management, being a part of the waste management, is regarded as a condition for sustainable development, which ensures healthy environment and resource efficiency. The Europe 2020 Strategy and its flagship initiative on “A Resource Efficient Europe” set the aim to ensure a resource efficient Europe. Referring to the above-mentioned initiative, the “Roadmap to a Resource Efficient Europe” was presented by the European Commission in 2011. According to the roadmap, one of the priorities of the European Union is turning waste into a resource. In 2013 and 2014 the European Commission will stimulate the secondary materials market and demand for recycled materials through economic incentives as well reviewing the existing prevention, re-use, recycling, recovery and landfill targets to move towards an economy based on re-use and recycling (European Commission, 2011).

Under the European Parliament and Council Directive 94/62/EC on packaging and packaging waste, by the end of 2015 Latvia has to recycle at least 55% and recover at least 60% of the total produced packaging amount. It must be emphasized that the 15 “old” EU Member States had to reach the above-mentioned goals as early as until 2008, seven EU Member States until 2012, one EU Member State until 2013 and one EU Member State until 2014 (Directive 94/62/EC on packaging and packaging waste, 1994 (a.6)). Moreover, according to Article 11 of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance) by 2020 preparing for re-use and the recycling of waste materials such as paper, metal, plastic and glass from households shall be increased to a minimum of overall 50 % by weight.

The aim of this paper is to research the packaging waste recycling possibilities in Latvia and to ascertain the main problems and positive aspects in the sector. As a result, the main problems in the field of the packaging waste recycling will be defined and the recommendations for its improvement will be provided. The following research methods are applied in this paper: the study of legislative acts, such as the EU Directive 94/62/EC on packaging and packaging waste, the Packaging Law and the Natural Resources Tax Law of the Republic of Latvia, the research of scientific papers, literature and internet resources in the field of packaging waste management, statistical data analysis based on the Latvian Environment, Geology and Meteorology Centre report on the produced, imported and used packaging types and the volume of resource recovery as well an interview with Ruta Bendere, the Chairman of the Board of the Waste Management Association of Latvia, and telephone interviews with representatives from the packaging recycling companies – “Paper mill “Ligatne”” Ltd. and “V.L.T.” Ltd. on the issue of the packaging waste recycling capacity.

RESEARCH RESULTS AND DISCUSSION

1. PACKAGING WASTE AND IMPORTANCE OF ITS MANAGEMENT

According to the Packaging Law of the Republic of Latvia, “Packaging is the aggregate of products attached to goods, which are utilized in order to protect, contain, deliver, preserve, easily use, and sell raw materials and finished goods and to become acquainted with them in the whole cycle of the circulation of packaging from producer to consumer. Packaging detached from the goods prior to consumption or during consumption” (Packaging Law, 2001 (c.1)).

There are various types of packaging. Depending on the kind of use, packaging is divided into the following types (Packaging Law, 2001 (c.5)).

- primary (sales) packaging – packaging utilised for sales purposes. This packaging reaches the packer or consumer at the sales location and is in direct contact with the goods or the product;
- secondary packaging – packaging which is utilised in the packaging together of specific quantities of goods intended for sale as a unit. This packaging may reach the packer or consumer without being unpacked, or it also may be removed from the goods at the sales location;
- tertiary (transport) packaging – packaging which is utilised for transportation of goods or secondary packaged units intended for sale or production, and to avoid damaging the goods during carriage.

Depending on the material, packaging is divided into the following types: glass; plastic; metal; paper, cardboard and wood.

The packaging waste management as a part of the waste management is considered as one of sustainable development issues, which secures healthy environment and preservation of natural resources. One of the waste, including packaging waste management’s elements is its recycling.

Brodin and Anderson (2008) point out in their research paper that nowadays recycling has grown in importance in the industrialised world, and for many products recycling has become more of a rule than an exception. The authors state that originally waste was recycled due to resource shortage and an effort to avoid a range of wastes (e.g. waste of material, waste of energy in producing from raw materials). Lately and specifically for some large product fractions, the volumes of recycled materials have increased due to a rapidly growing concern for the natural environment. This development has been specifically promoted by the emerging legislation on product management and producers’ responsibility for a variety of product groups. Today, one of the great concerns for recycling is how to establish, manage and operate effective and efficient recycling systems. In order to get these systems operating under “normal” business conditions, that is, without subsidies, the focus so far has been on cutting costs and on securing the volumes of waste flows.

Reid (1990) indicates that concerns about the environment and the damage that consumers can potentially make to environment have caused businesses and consumers to explore ways of minimising usage of scarce natural resources.

Recycling and consumption of recycled products appear to have gained significant people's attention as a means to "leave the environment as it is".

Essoussi, L.H. & Linton, J.D. (2010) emphasise that sensitivity to environmental issues shifts consumer behaviour towards supporting the growth and diffusion of green marketing and ecologically-conscious consumer behaviour, e.g. increase in demand for greener products and greater acceptance of recycled products; besides, recycling presents opportunities for job creation and for better social behaviour.

According to information provided by the European Commission in the "Roadmap to a Resource Efficient Europe", more than 80% of waste is recycled in some Member States, indicating the possibilities of using waste as one of the EU's key resources. Improved waste management enables better use of resources and can open up new markets and create jobs, as well as encouraging less dependence on imports of raw materials and lower impacts on the environment. Improvement of the raw materials reuse through greater "industrial symbiosis" (where the waste of some firms is used as a resource for others) across the EU could save €1.4bn a year and generate €1.6bn in sales (European Commission, 2011).

Glass is a material which can be easily recycled. Glass fragments and some used glass goods recycled into new glass products make it possible to save a notable amount of high quality quartz sand, soda ash, electric power and fuel. For example, 1 ton of glass fragments makes it possible to save 1 ton of quartz sand and 250 kilograms of soda ash. It is calculated that addition of 10% glass waste to the glass raw material reduces energy consumption by 2.5% (Kruzs 2003, p. 99). One bottle made from the recycled glass ensures the energy saving which is necessary to run a 100-watt light bulb four hours (LZP b, 2011).

Glass waste recycling can prolong the service life of furnace for glass melting on average by 15–20%, because the melting process can be made by lower temperature. The reuse of the glass packaging ensures a considerable saving of energy resources (Kruzs 2003, p. 99).

Plastic is one of the packaging materials most in demand. Plastic can be recycled and new products can be made from secondary resources, new products can be made or it can be burned. By burning one ton of plastic it is possible to obtain as many calories as by burning one ton of oil (LZP d, 2011).

Nevertheless, during the process of burning of PET (Polyethylene terephthalate) bottles dioxin emissions occur. This toxic substance harmfully affects liver, the immune, nervous and endocrine system. By burning of PET bottles harm to the environment is not caused in the case when PET is burned in a special furnace with special filter system at least at the temperature of 1200°C (LZP d, 2011). At the same time, new goods are produced from the recycled PET: food packaging and manufactured goods, for example, the polyester fibre

for T-shirts, winter jacket fillers, car air filters, flowerpots and other goods. From 27 recycled PET bottles, one jumper can be made. PET bottles can also be used for the production of polymer concrete goods. For example, 10 PET bottles are required for the production of one paving block. It should be noted that the PET bottle was patented in 1973 and was recycled the first time in 1977 (LZP d, 2011).

A large part of total packaging amount is constituted by **paper** and **cardboard** packaging. Therefore, it is important to pay attention to paper and cardboard waste packaging collection and recycling, because one ton of waste paper saves on average 4 m³ of wood (Kruzs 2003, p. 100). New packaging and products are made from the recycled paper waste. Nowadays there are magazines and newspapers for the printing of which 100% recycled paper is used; for example, in Latvia it is the “*Vides vēstis*” (“Environmental News”) magazine. The recycled paper is also used for the production of booklets, writing blocks, writing paper and tickets. It is to emphasise that the production of new paper goods from recycled paper saves energy, wood, water and is ecologically cleaner in comparison to the production from new raw materials (Kruzs 2005, p. 58). Despite the significance of paper and cardboard recycling it is to note that the number of recycling cycles is limited because with every recycling cycle the mechanical and printing quality of the material deteriorates. Wooden fibre can be recycled 6 times, and every time the fibre length decreases (LZP c, 2011).

Metal waste materials are less environmentally harmful than polymers because with the lapse of time metal is subject to rust and decomposition. Recycling of metal waste saves metal ore, energy, workforce and time. The sorting process of metal waste is relatively simple, i.e. metal materials are separated by magnet from the other waste flow. Metal materials are recyclable a number times (Zaļā josta).

Recycling of **wood materials** saves trees. Wood waste is used for the production of wooden pallets. Wood waste is also used as fuel (Zaļā josta).

The above-mentioned proves the significance of the re-use and recycling of the packaging waste. In the next sub-part of this research the authors will pay attention to the analysis of the legislative acts in the area of packaging management, particularly packaging recycling in Latvia as the EU Member State.

2. PACKAGING MANAGEMENT REQUIREMENTS

In the legislative acts of the EU and the Republic of Latvia the following requirements are defined in the field of packaging waste management: the packaging recovery and recycling rate of the total produced packaging volume, the implementation principles of packaging deposit system and issues connected with packaging accounting and tax payment.

In order to reduce the total amount of packaging produced and the amount packaging waste which is landfilled as well as increasing the reuse and recycling of packaging waste the European Parliament and Council Directive 94/62/EC

on Packaging and Packaging waste was adopted and defines the rate of the total produced packaging amount which must be recovered and recycled in the EU Member States (WMAL 2007, p. 23). The minimal percentage of the packaging recovery and recycling is indicated in Table 1 (Directive 94/62/EC on packaging and packaging waste, 1994 (a.6)).

Table 1

Recovery and recycling rate of packaging waste to be reached by 2015 and has been reached in Latvia in 2010

No.	Packaging material	Required recovery rate, %	Recovery rate fulfillment, %	Required recycling rate, %	Recycling rate fulfillment, %
1.	Glass	–	50.3	60	50.3
2.	Plastic	–	36.4	22.5	25.3
3.	Paper, cardboard	–	78.6	60	78.6
4.	Metal	–	78.5	50	69.1
5.	Wood	–	40.6	15	31.7
6.	Total	60	55.5	55	51.1

Source: the authors' calculations based on the European Parliament and Council Directive 94/62/EC and on the Latvian Environment, Geology and Meteorology Centre data on the produced, imported and used packaging types and the volume of resource recovery in 2010

Data indicated in Table 1 was calculated by the authors of the paper based on the information from the Latvian Environment, Geology and Meteorology Centre report on the produced, imported and used packaging types and the volume of resource recovery in 2010. The data for the above mentioned report was submitted by the following seven packaging waste management organizations: “Zaļā josta” Ltd., JSC “Latvijas Zalais punkts”, JSC “Grīziņkalns”, JSC “Latvijas zaļais elektrons”, “MP Tehnoloģijas” Ltd., “Dova” Ltd., “Dars 2000” Ltd., and by 209 companies which manage their own packaging waste (Latvian Environment, Geology and Meteorology Centre, 2011).

From the data in Table 1 the authors conclude that in 2010 the total recovery and recycling rate of packaging waste in Latvia was behind the requirements of the European Parliament and Council Directive 94/62/EC on packaging and packaging waste. The data shows that the glass recycling rate in Latvia is considerably lagging behind the EU Directive requirements.

The volume of the recycled packaging waste produced in Latvia in 2010 is presented in Table 2 (Latvian Environment, Geology and Meteorology Centre, 2011).

Table 2 shows that the recycled glass packaging waste volume produced in Latvia in 2010 was 24588 t. More than two thirds, namely, 17055 t or 69.4% of the recycled glass packaging was recycled in Latvia and 7533 t or 30.6% was sent abroad for the recycling. (Latvian Environment, Geology and Meteorology Centre, 2011). In addition, Latvia has not reached the glass packaging recycling

goal defined in the EU Directive 94/62/EC on waste and packaging waste. During the interview with the authors of this paper, the Chairman of the Board of the Waste Management Association of Latvia Ruta Bendere pointed out that glass packaging waste recycling possibilities in Latvia were insufficient.

Table 2

Volume of the recycled packaging waste produced in Latvia in 2010

No.	Packaging material	Total recycled packaging waste volume	Recycled in Latvia		Sent abroad for recycling	
		t	T	%	t	%
1.	Glass	24588	17055	69.4	7533	30.6
2.	Plastic	8336	3419	41	4917	59
3.	Paper, cardboard	46912	11896	25.4	35016	74.6
4.	Metal	7018	5348	76.2	1670	23.8
5.	Wood	15505	15505	100	0	0
6.	Total	102359	53223	52	49136	48

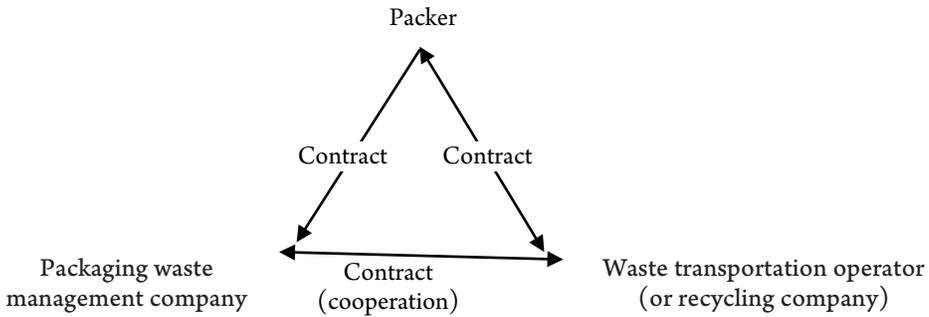
Source: the authors' calculations based on the Latvian Environment, Geology and Meteorology Centre data on the produced, imported and used packaging types and the volume of resource recovery in 2010

Total recycled plastic packaging waste volume produced in Latvia was 8336 t, out of which, 3419 t or 41% were recycled in Latvia and more than a half (4917 t, or 59%) were sent abroad for recycling. It is to note that paper and cardboard packaging waste produced in Latvia was mostly sent abroad for recycling, namely, 11896 t or 25.4% from 46912 t – were recycled in Latvia and 35016 t or 74.6% were sent abroad for the recycling due to more competitive prices offered for the paper and cardboard waste by foreign companies (Latvian Environment, Geology and Meteorology Centre, 2011).

Meanwhile, most of the metal packaging waste volume produced in Latvia was recycled in Latvia, namely, out of 7018 t, 5348 t or 76.2% were recycled in Latvia and only 1670 t or 23.8% were sent abroad (Latvian Environment, Geology and Meteorology Centre, 2011). Latvia has exceeded the metal packaging waste recycling rate required by the EU Directive 94/62/EC on waste and packaging waste by 19.1%. It is to conclude that metal packaging waste recycling capacity in Latvia is adequate.

Nevertheless, when evaluating the total recycled volume of packaging waste produced in Latvia (102359 t) it should be noted that almost one half (49136 t or 48%) was exported abroad for recycling and 53223 t or just 52% was recycled in Latvia (Latvian Environment, Geology and Meteorology Centre, 2011). During the interview with the authors of this paper, the Chairman of the Board of the Waste Management Association of Latvia Ruta Bendere indicated that a high export rate of the packaging waste could be explained by higher prices for the packaging waste materials offered by foreign companies or by inadequate recycling capacities in Latvia, depending on the packaging waste material and its quality.

In Latvia, the packaging waste management system is based on the connection of 3 elements: the packer, the packaging waste management company and the waste transportation operator (Figure 1), which in general ensures the requirements fulfilment in the field of packaging management.



Source: Sauluns E.-A., Cudeckis V. *Packaging development tendencies in Latvia*

Fig. 1. **Scheme of the packaging management**

Into the packaging and packaging waste system involved organizations (Sauluns and Cudeckis 2008, p. 40):

- **packer** (importer or seller) – a producer of goods, a service provider or a seller who packs the goods and also an importer who imports packaged goods or products;
- **packaging waste management company** – an organization, which estimates, accepts and plans the volume of packaging waste to be recovered and recycled which is larger than the one set by the law as well as dealing with the implementation and coordination of the system at all of its stages: storing, transportation, primary treatment and recycling (recovery);
- **recycling company or waste transportation operator** – an enterprise in which waste packaging material is turned into the same or another kind of material, or the enterprise which, within the framework of signed contracts and based on the obtained solid household waste permits, for example, transportation of waste packaging, collects and transports it for further recycling or recovery.

In order to reduce the total amount of the packaging waste as well as increasing the percentage of the environmentally friendly packaging types in the total packaging amount, the natural resources tax is imposed on packaging in accordance with the Natural Resources Tax Law of the Republic of Latvia. The natural resources tax rate depends on the chemical composition of packaging. The higher the potential harm for the environment from the packaging material the higher tax rate is imposed. The natural resources tax rates on packaging are as follows: glass packaging – 0.25 LVL per kilogram; plastic packaging, except bio-plastic, oxy-degradable plastic or polystyrene source materials – 0.65 LVL;

wood, paper and cardboard or other natural fiber and bio-plastic source materials 0.15 LVL; metal packaging – 0.70 LVL; packaging of oxy-degradable plastic source materials – 0.45 LVL; and packaging of polystyrene materials – 0.90 LVL (Natural Resources Tax Law of the Republic of Latvia, 2005 (annex 7)).

At the same time, every enterprise that places on the Latvian market more than 300 kilograms of packaging during a year, is responsible for packaging management. The packer manages the packaging waste himself, ensuring the necessary packaging recovery and recycling rate or signs the contract with the packaging waste management company. A taxpayer shall not pay the tax for packaging if he or she ensures the fulfillment of the recovery and recycling norms for the packaging waste as well as complying with one of the following conditions: the taxpayer has established and applies a system for the management of used packaging, or has entered into an agreement with a packaging waste manager (if the manager is registered with the Environment State Bureau) (Natural Resources Tax Law of the Republic of Latvia, 2005 (s.8)).

According to information provided by the Environment State Bureau (2011) following packaging waste management companies have been registered in Latvia: JSC “Latvijas Zaļais punkts”, “Zaļā josta” Ltd., “FEDAK” Ltd., JSC “Grīziņkalns”, “Dars 2000” Ltd., “Resurss nova” Ltd., “MP tehnoloģija” Ltd., “Dova” Ltd., “Zaļais centrs” Ltd., “Enviro” Ltd. and JSC “Latvijas zaļais elektrons”.

One of the market leaders in the area of the packaging waste management in Latvia is the JSC “Latvijas Zaļais punkts” (JSC “Latvian green dot”), which was founded on 11 January, 2000. The purpose of the company is to involve Latvian producers who pack their goods as well as goods importers into the so called “Green dot chain”, which provides the collection, sorting and recycling of packaging waste. JSC “Latvijas Zaļais punkts” is a member of the European packaging waste management organization – “PRO Europe” (Packaging Recovery Organization Europe) member. “PRO Europe” was established in 1995 in Brussels in order to avoid the trading barriers by introducing EU Directive 94/62/EC on packaging and packaging waste. This organization unites 33 national packaging waste management systems, which the Green Dot uses as its trademark (LZP 2011, p. 3).

Having entered into an agreement on the packaging waste management with a packaging waste management company, the packer does not have to pay the natural resources tax on the packaging. At the same time, the packer pays the fee to the packaging waste manager for the service provided. For example, the fees for the packaging waste management of the JSC “Latvijas Zaļais punkts” are as follows (excluding VAT): for glass packaging – 0.0396 LVL/kg, for plastic packaging, including oxy-degradable plastic and polystyrene packaging – 0.1048 LVL/kg, for paper and cardboard packaging – 0.0232 LVL/kg, for metal packaging – 0.048 LVL/kg, and for wood packaging – 0.011 LVL/kg (LZP a, 2011).

This leads the research authors to conclude that it is considerably more cost-efficient to pay a fee to the packaging waste management company than to pay the natural resources tax on packaging. The savings are from 77% for oxy-degradable plastic packaging to 93% for metal packaging.

The authors of the research consider that the requirements on packaging recovery and recycling rate determined in the Directive 94/62/EC on packaging and packaging waste and implemented into Latvian legislative acts as well as the requirements on household waste recovery and recycling rate set out in the Directive 2008/98/EC on waste and repealing certain Directives (Text with EEA relevance) will contribute to the reduction of the total produced packaging waste volume, to the increase in the recycling and reuse of packaging waste volume and to the increase in recycling capacity in Latvia as well to the reduction of the landfilled amount of the packaging waste in Latvia.

At the same time, it should be noted that given the present landfilling fees the waste polygons are not interested in the reduction of the waste landfilling amount. Upon making a decision for the construction of a waste landfill as well as being granted co-financing from the Cohesion Fund and receiving bank loans for the construction, a certain waste flow and return on investments has been planned. By the reduction of the landfilled waste amount the planned return on investment can be secured by increasing the landfilling fee. Thereby separate waste collection would be promoted.

Another measure for the reduction of the total landfilled waste volume and for increase the reuse and recycling of waste is the introduction of the deposit system on the reusable and disposable beverage packaging. On the one hand, during the annual Big Clean-up in Latvia, a great part of the collected waste are glass, PET bottles and tins. On the other hand, the PET recycling company *PET Baltija imports* used PET bottles of appropriate quality. Therefore, the authors of the paper propose to introduce in Latvia a mandatory deposit system on the reusable and disposable beverage packaging: glass, PET bottles and tins. It can increase the rate of the reused glass bottles, improve the quality of the secondary resource materials which can be recycled as well as reducing the landfilled amount of packaging waste.

A significant role in the packaging waste management is played by packaging waste management companies, which educate the society and explain the significance of separate waste collection. Besides, it is necessary to financially motivate people to separate their waste by setting a higher price for the collection of separated waste. Thereby the volume of recyclable waste materials will increase.

3. PACKAGING WASTE RECYCLING COMPANIES IN LATVIA

In spite of an increase in total collected packaging waste volume offered for recycling over the last few years the packaging waste recycling of some packaging waste materials is not sufficient in Latvia.

Glass packaging. The glass recycling sector in Latvia is underdeveloped. Due to that, glass packaging waste is exported abroad for recycling, namely, to Lithuania (AB “Warta Glass Panevėžys”) and to Ukraine, where new bottles are produced from glass waste (LZP 2011, p. 11). In Latvia, glass packaging waste is recycled by “Eko Cikls” Ltd. The company annually produces 900 tons of glass sand from the glass waste. The company offers its product to local building and road construction companies as well exports to Ukraine and Belarus (Šveida, 2011).

Plastic packaging. In recent years the plastic recycling sector displays marked improvements. The company for recycling PET bottles, JSC “PET Baltija”, was established in 2003; it is the largest company in its field among the Baltic states and the only such factory in Latvia. From used PET bottles, the company produces color sorted, clean, hot-washed PET flakes, which can be used in the production of food packaging material and disposable dishes as well in the fiber and strapping industries. The factory is located in Jelgava and its recycling capacity is approximately 24000 tons of PET bottles per year. Co-financing from the EU funds has contributed to the increase of the factory’s capacity. The company is cooperating with Latvian and foreign used packaging collectors and suppliers (PET Baltija, 2012). According to unpublished information provided by the JSC “PET Baltija”, the price of the used PET bottles is from 250 EUR to 450 EUR per ton depending on the color. The lowest price is offered for mixed-color PET bottles and the highest, for light PET bottles.

The polyethylene film recycling companies in Latvia are “Nordic Plast” Ltd. and “Ādažu polietilēna industrija” Ltd. Nordic Plast recycles transparent and colored LDPE (low-density polyethylene) film and various HDPE (high-density polyethylene) products, for example, cans of different detergents and windshield washing agents as well PET bottle caps. The company produces the high quality LDPE and HDPE pellets from plastic waste. “Nordic Plast” Ltd. is situated in the Nordic Industrial Park in Olaine. “Nordic Plast” makes great effort to constantly expand its market. Currently one fourth of the company’s production remains in the Latvian market, while the bulk of the output is sold to a number of countries in Europe. “Nordic Plast” can recycle up to 500-600 tons of waste per month (Nordic Plast, 2012).

The main field of activity of the company Green World Ltd. is recycling of LDPE, LLDPE (low-density polyethylene), HDPE (high-density polyethylene) and polypropylene. The company offers to its customers secondary granules and intermediate treatment products – crushed plastic and agglomerate. The company’s recycling capacity is 700 tons of polyethylene film waste per month (Green World, 2012).

The company “PSG tehnoloģijas” Ltd. located in Salaspils utilises the used PET bottles, polyethylene and glass waste as secondary raw material for the production of paving blocks (LZP 2011, p. 11). There are several other local companies which manage plastic packaging waste, such as “RĪORK” Ltd., “Eko Reverss” Ltd, “Formika” Ltd. and “European Plastic Industries” Ltd.

The authors believe that the recycling of PET, LDPE and HDPE is well-developed in Latvia. Nevertheless, there are some kinds of plastic waste which are not recycled in this country, for instance, polystyrene (PS).

Paper and cardboard packaging. The companies recycling paper and cardboard packaging waste are “Papīrfabrika “Līgatne”” Ltd. (“Paper mill “Līgatne”” Ltd.) located in Līgatne and “V.L.T.” Ltd. located in Valmiera (LZP 2011, p. 11). The “Līgatne” paper mill is the major recycler of paper fiber in Latvia. The company specializes in the production of art papers, core board and paper cores, special purpose technical and packaging papers. The paper mill exports approximately 70-80 % of its products (Papīrfabrika “Līgatne”, 2012). According to unpublished information provided by the company during the phone enquiry the company recycles 12000-14000 t of paper waste per year. “V.L.T.” Ltd. produces egg boxes for the retail sale and transportation of eggs. (LZP 2011, p. 11). According to unpublished information provided by the company during a telephone enquiry, the recycling capacity is 13t of paper waste per day, and in 2011 3769 t of paper waste was recycled. The companies “RĪORK” Ltd., “Eko Reverss” Ltd., “Gofre Baltija” Ltd. and “Juglas Papīrs” Ltd. manage the paper and cardboard packaging waste.

As mentioned above, a large part of the paper and cardboard packaging waste is exported abroad. Cardboard packaging waste is exported for recycling to Lithuania, AB “Klaipedos kartonas” (Klaipeda).

Metal packaging. Ferrous metals are recycled by JSC “Liepājas metalurģs” located in Liepāja, “Tolmets” Ltd. and by other machine building companies with foundries. Metal waste in Latvia is collected by companies such as “RĪORK” Ltd., “Konti” Ltd., JSC “Krāsainie lējumi”, “Tvertne” Ltd. and JSC “Kuusakoski”. Nonferrous metals are recycled by JSC “Latvijas krāsmetāli”.

The authors of the paper draw attention to the fact that some packaging waste recycling companies have received co-financing from foreign financial instruments, for instance, the European Economic Area and Norwegian Financial Instrument and the Climate Change Financial Instrument. At the moment, there is no unified support program designed specifically for the recycling of secondary resources. Entrepreneurs can apply for co-financing from the various foreign financial instruments which are not directly related to recycling. The authors consider that such a uniform supporting programme could contribute to the development of the secondary resources recycling sector.

Based on the analyses provided in this sub-part and on the Latvian Environment, Geology and Meteorology Centre data for the produced, imported and used packaging types and the volume of resource recovery in 2010, the research authors conclude that the capacity for recycling glass packaging waste in Latvia is limited. However, the recycling system of the metal packaging waste used PET bottles and polyethylene packaging waste is well developed.

Due to a shortage of recycling capacity for some waste packaging materials in Latvia, for instance, glass, and taking into account the provisions of the EU

Directives 94/62/EC on packaging and packaging waste and 2008/98/EC on waste and repealing certain Directives (Text with EEA relevance) concerning packaging and household waste recycling rates, the authors believe that there is potential for the development of recycling business in the country.

CONCLUSIONS, PROPOSALS, RECOMMENDATIONS

1. Recycling has currently grown in importance in the industrialised world. Europe 2020 Strategy sets the aim to ensure a resource efficient Europe, for example, by turning waste into a resource. The improvement of the raw material reuse through closer “industrial symbiosis” (where the waste of some firms is used as a resource for others) across the EU could save €1.4bn a year and generate €1.6bn in sales. To this end in 2013 and 2014 the European Commission will stimulate the secondary materials market and demand for recycled materials through economic incentives as well reviewing the existing prevention, re-use, recycling, recovery and landfill targets to move towards an economy based on re-use and recycling.
2. In order to reduce the landfilled packaging waste amount and to increase the reuse and recycling of packaging, the European Parliament and Council Directive 94/62/EC on Packaging and Packaging waste was adopted. According to the Directive, by the end of 2015, Latvia should recycle at least 55% and recover at least 60% of the total produced packaging amount. The 15 “old” EU Member States had to reach the above mentioned goals as early as by 2008. In 2010, Latvia failed to meet the requirements on the recovery and recycling rate of the total packaging waste volume set out in the Directive 94/62/EC.
3. Almost a half of the packaging waste produced in Latvia is exported abroad for recycling. A high export rate of packaging waste can be explained by higher prices offered by foreign companies for the packaging waste materials as well as by limited recycling capacities for some packaging waste materials in Latvia.
4. The recycling rate for glass packaging waste lags behind the rate laid down in the Directive 94/62/EC on Packaging and Packaging waste, namely, from the required 60 %, only 50,3% of glass packaging waste was recycled in Latvia. It can be explained by limited possibilities for glass packaging waste recycling in Latvia.

The authors of the research propose to increase the recycling capacity for glass packaging waste in Latvia. To that end, the authors recommend Latvian entrepreneurs to seek co-financing from foreign financial instruments for the implementation of the packaging waste recycling projects.

The authors propose to introduce in Latvia the mandatory deposit system on the reusable and disposable beverage packaging: glass, PET (Polyethylene terephthalate) bottles and tins. It will increase the rate of the reused glass bottles, improve the quality of the secondary resource materials which can be recycled as well as reducing the landfilled amount of packaging waste.

5. There is no unified support program devised specifically for recycling secondary resources. Entrepreneurs can apply for co-financing from the various foreign financial instruments, which are not directly related to recycling. The authors of the research consider that such a unified supporting programme would contribute to the development of the secondary resource recycling sector.

Therefore, the authors propose that the Ministry of Environmental Protection and Regional Development in cooperation with the Ministry of Economics and the Ministry of Finance create a specialised programme for investments into the secondary resource recycling in the framework of a foreign financial instrument, for example, the European Regional Development Fund.

6. The Latvian Environment, Geology and Meteorology Centre annually publishes a report on the types of produced, imported and used packaging and the volume of resource recovery providing information on the produced, recycled, recovered and exported packaging waste volumes in Latvia. The report, however, does not contain information on Latvian and foreign recycling companies which recycle the packaging waste produced in Latvia.

The authors of the research propose to include the analysis on the companies which recycle the packaging waste produced in Latvia into the annual report on packaging produced by the Latvian Environment, Geology and Meteorology Centre. Such analysis is necessary in order to inform the society about recycling activities in Latvia.

7. Due to limited capacity for recycling some packaging waste materials, for instance, glass, in Latvia, as well as taking into account the requirements of the EU Directives 94/62/EC and 2008/98/EC on packaging and household waste recycling rates, the authors consider that there is potential for the recycling business development in the country.

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THE APPLICATION OF THE DATA ENVELOPMENT ANALYSIS METHOD TO EVALUATION AND PLANNING OF HOSPITAL EFFICIENCY IN LATVIA

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Abstract. The political goal of the Guidelines for Public Health for 2011-2017 is to promote the efficient management of the health care system and the use of resources to optimize spending and the long term operation of the health care system. In accordance with this political goal, the most optimal state funded hospitals were determined from the standpoint of productivity and efficiency. Additionally, an evaluation was carried out to establish how funding has influenced hospital productivity and efficiency. This study analysed hospitals that provide state funded emergency medical assistance by separating them into three groups according to their status and size. The study applied the Data Envelopment Analysis (DEA) method to evaluate the technical and cost efficiency of hospitals. Technical efficiency is evaluated by analysing human resource suitability for hospital activities. Cost efficiency is evaluated by analysing the efficient use of financial resources for hospital activities. Formulas developed by the author of this study as well as formulas developed by other authors were used as a basis for evaluating hospital productivity and efficiency. The DEA method's formula was used to evaluate efficiency. Five productivity, twelve technical efficiency and seven cost efficiency indicators were calculated for each hospital. The obtained results were summarised in three tables in which the attained efficiency was recalculated into percentages. These results show significant differences in each group for both productivity and efficiency. Similarly, differences in productivity and efficiency are apparent for one hospital over the course of time.

Key words: *hospital; productivity; efficiency.*

JEL code: I12

INTRODUCTION

The efficient operation of hospitals is one topic that is discussed more and more frequently within the framework of health care planning, organization and financing in many European countries. The goal of these debates is not to reduce the continuously increasing costs of health care, but to reflect how efficiently health care resources are used. This, taking into account the Public Health

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Guidelines for 2011-2017 approved by the Latvian Cabinet of Ministers, in which one goal is identified as the implementation of efficient management in the health care system and use of resources, activates the current and future issue of hospital efficiency in the upcoming years. Until now, no studies have been conducted in Latvia on the efficiency and productivity of state funded hospitals in a way that the comparison and evaluation of hospitals would be possible. Similarly, state funded hospitals have not been by evaluated using approbated scientific methods to obtain new information and knowledge on hospital efficiency. Given that, the main objective of this study is to apply the DEA method to determine the most optimal hospitals from an efficiency standpoint and evaluate if different levels of funding have had an effect on hospital productivity and efficiency.

It is also essential to generate ideas for more extensive evaluation and planning of hospitals so that a more cost-effective network of hospitals in line with the goals of the Basic Guidelines for Public Health can be developed in Latvia in the future. Within the framework of the study, an evaluation was performed with the aim of studying and assessing hospital productivity and applying the results of the study towards the evaluation of efficiency in human resource planning. Books, scientific publications and other resources were reviewed for this study describing the DEA method, its strengths and its weaknesses. Additionally information about hospital activities, human resources and funding was obtained from National Health Service data.

Hospital comparison studies are diverse and complicated and must have carefully selected objects and data for study (Kjekshus, 2000). For instance, different levels of hospitals cannot be compared, nor can the productivity and efficiency of state vs. private hospitals if these hospitals provide services for different groups of patients with differing diagnoses (Bogen, Dahl and Karlsen, 1996). For this reason, a database of comparable data is necessary. Often hospital productivity and efficiency are studied and evaluated in comparable studies of the hospital sector, but productivity and efficiency are not synonymous. In general, productivity can be characterized as the sum of what has been accomplished or created, but efficiency, the worth of what has been accomplished or created. Therefore, productivity is a descriptive measurement, but efficiency – a normative concept that measures an institution's achievement against a norm or the best result in a specific group of institutions. For instance, there are productive hospitals, but being productive does not mean they are efficient because there are less productive hospitals that are nonetheless efficient as they use their available resources better than others (Kjekshus, 2000). Productivity measurement spans a wide range – from individual treatments or practitioners to the productivity of a whole system (Street and Häkkinen, 2009). Productivity is the connection between resources and results where it can be analysed at multiple levels. Other authors (Pettersen, Magnussen, Nyland and Bjørnenak, 2008) argue that productivity measurements can be performed in a single hospital, or even within the hospital departments. Similarly, the productivity of doctors and overall personnel between various hospitals that provide similar services can be

compared (Skjerve, 2003). Efficiency, however, reflects the usefulness of resource application as it relates to productivity (Ray, 2012). As early as in 1974, a more comprehensive approach to efficiency emerged. Concepts such as internal and external efficiency of hospitals were recognized (Ozcan, 2008). In the context of health economics, a hospital's external efficiency is the connection between the efficient application of available resources as it relates to the services provided and the associated health care policy goals. Hospital internal efficiency is a standard that a hospital should be capable of reaching given the available resources. (Kjekshus, 2000). Economic models most often specifically compare internal efficiency. Internal efficiency is divided into two subgroups: technical and cost efficiency (Biørn, Hagen, Iversen and Magnussen, 2001). Technical efficiency, for example, is associated with the use of human resources in relationship to hospital activities (the number of consultations, operations, hospitalizations, etc.), but cost efficiency is associated with the financial resources used for hospital activities (Thuy, 2011). Efficiency and productivity are correlated, but this does not pose an obstacle to studying any of these components separately—in this case the defining question is the goal of the study, the object to be studied and data interpretation.

One of the most popular methods used to evaluate and analyse hospital efficiency is Data Envelopment Analysis (Jacobs and Street 2006). The Danish Ministry of Finance indicates that the Benchmarking methods and the Data Envelopment Analysis method (henceforth – DEA method), in the form of systematic performance comparisons and experience, is part of the answers to the effective use of financial resources in the public sector, including healthcare. This is the reason why the DEA method is also used in the “Development Plan for the Health Care System for 2013-2018” published by the Ministry of Health.

With the use of the DEA method, we can not only analyse the efficiency of facilities, but also weigh the best resource reorganization options within organisations and between organisations (Masiye, 2007). The method is also essential in the context of hospital planning. Since it is possible to use the DEA method approach to evaluate and compare similar hospital productivity and efficiency, it is mandatory for the policy goal of the policy planning document, “Guidelines for Public Health for 2011-2017” that directly accentuates cost efficient health care, including hospitals.

RESEARCH RESULTS AND DISCUSSION

By using the DEA method to analyse Latvian hospitals, the hospitals were divided into three groups and examined for productivity and internal efficiency – technical and cost efficiency respectively. The first group includes former local multispecialty hospitals, the second group includes former regional multispecialty hospitals and the third group included university hospitals. The DEA method could not be wholly applied to the third group because the Children's Clinical University Hospital essentially differs from the other two university hospitals due

to the patients' age group and thus is not comparable. In analysing the hospitals and the individual groups, several indicators were selected and analysed that characterise hospital productivity and efficiency. The fact that hospital costs are made up of costs that are directly attributed to the patient, such as tests, treatment, and others, as well as costs necessary for hospital maintenance was taken into account choosing the indicators (Pettersen, Magnussen, Nyland and Bjørnenak, 2008). Additionally, the fact that the largest proportion of hospital costs are for salaries and the costs of treatment was also taken into account to identify those efficiency indicators that include as many hospital activities and expenses as possible.

This study was conducted in 2011 using 2010 and 2008 data from the National Health Service Management and Information System that registers hospital activities (hospitalizations, outpatient consultations, etc.) for hospitals that have a contract with the service. The National Health Service reviews from 2010 and 2008 were also used that specify costs, human resources and other information. An evaluation of hospital productivity is a fundamental indicator in the context of a hospital's budget because a large part of the funding granted to hospitals is used to pay salaries. Accordingly, the specialists' volume of work and the cost of their salaries are closely tied to a hospital's cost efficiency. For this reason it is necessary to also evaluate the efficiency of hospitals. Similarly, the evaluation of hospital productivity identifies preconditions for further studies associated with human resource planning. In publications, some authors note that the productivity of doctors must be studied in the context of treated patients (Thuy, 2011 and Skjerve, 2003). Due to this factor, the following productivity indicators were chosen:

1. Productivity (henceforth – PR) of doctors was evaluated using three parameters. The first – the total sum of hospital activities (outpatient visits were divided by 2) in relation to the total sum of doctors' shifts in a hospital; the total sum of doctors' shifts inclusive of all doctors that work in the hospital, including laboratories, diagnostic units, etc. The second – the total sum of hospital activities (outpatient visits were divided by 2) in relation to the total number of doctors' shifts in the inpatient part of the hospital (not including laboratories and diagnostic units). The third – inpatient activities (hospitalisations) in relation to doctors' shifts for inpatient treatment. Thus doctors' productivity was calculated according to the following formulas (Skjerve, 2003):

$$1. PR_1 = \frac{\sum (H_o + D_p + (A_k/2))}{K_{SA}}$$

$$2. PR_2 = \frac{\sum (H_o + D_p + (A_k/2))}{K_{Ast}}$$

$$3. PR_3 = \frac{H_o}{K_{Ast}}$$

2. Total productivity, within which total hospital activities (outpatient visits were divided by 2) in relation to the total number of shifts in a hospital (including doctors, nurses and other personnel) were evaluated. As the length of treatment is related to the seriousness of an illness and the length of treatment also is related to the calculation of the length of hospital stays, the calculation of nursing and other personnel productivity took into account hospital stay days. Total productivity was calculated according to the following formulas (Skjerve, 2003):

$$4. PR_4 = \frac{\sum (H_o + D_p + (A_k/2))}{K_s}$$

$$5. PR_5 = \frac{\sum (G_d + D_p + (A_k/2))}{K_s}$$

Where PR is the productivity indicator; H_o – number of hospitalized patients; D_p – number of inpatients; A_k – number of outpatients; K_{sA} – total work-load of doctors in the hospital by hours; K_{Ast} – total work load of inpatient doctors (excluding work load of outpatient doctors); K_s – total work load in the hospital including doctors, nurses, nursing assistants, support staff and administrative staff, G_d – hospital stay days.

To offer a general overview of costs in relation to hospital activities and to indicate the value of various hospital activities within the framework of the DEA method, macro-efficiency indicators were calculated using the following formulas:

$$6. M_{acr/ef1} = \frac{I_f}{\sum (H_o + D_p + A_k)}$$

$$7. M_{acr/ef2} = \frac{B_r}{\sum (H_o + D_p + A_k)}$$

Where $M_{acr/ef1,2}$ is the macro-efficiency outcome; I_f is the actual total of hospital costs that planned for treatment and care, excluding costs of facility maintenance, and B_r is the gross total of costs excluding European Union funds. The data was processed and calculated using Excel. Data on outpatients were collected from the National Health Service's reviews and the Management Information System. The calculation of hospital productivity indicators and the obtained results show that differences exist within one hospital group in all PR values. Also, the obtained results demonstrate that productivity differs between 2008 (Table 1), when health care had the highest amount of funding and 2010 (Table 2), when funding for health care was reduced.

Table 1

Productivity Indicators for Latvian Hospitals in 2008

Group number of hospitals	Hospital	Year 2008.						
		Productivity value 1 (PR ₁)	Productivity value 2 (PR ₂)	Productivity value 3 (PR ₃)	Productivity value 4 (PR ₄)	Productivity value 5 (PR ₅)	Productivity (total costs per 1 activity, in LVL)	Productivity (netto costs per 1 activity, in LVL)
1.	Alūksne Hospital	187	220	174	27	177	185	294
	Balvi and Gulbene Hospital Partnership	467	681	183	73	197	54	76
	Madona Hospital	520	886	185	106	220	47	73
	Preiļi Hospital	316	399	116	54	141	67	105
	Cēsis Clinic	493	578	147	78	183	47	71
	Krāslava Hospital	417	652	134	73	173	40	73
	Kuldīga Hospital	223	258	109	38	146	116	198
	Dobele and Vicinity Hospital	776	1553	291	115	230	46	71
	Jūrmala Hospital	208	286	176	40	153	127	222
	Ogre Regional Hospital	370	540	152	77	216	47	78
Tukums Hospital	352	529	168	55	156	69	108	
2.	Vidzeme Hospital	345	622	165	63	179	89	130
	Daugavpils Regional Hospital	435	527	160	72	218	75	97
	Rēzekne Hospital	228	329	223	34	200	191	261
	Jelgava City Hospital	195	242	143	43	188	132	169
	Jēkabpils Regional Hospital	413	584	161	61	195	69	102
	Liepāja Regional Hospital	198	235	135	32	145	207	279
	Northern Kurzeme Regional Hospital	231	231	129	38	161	148	208
3.	Children's Clinical University Hospital	261	284	101	45	127	101	134
	Pauls Stradiņš Clinical University Hospital	171	172	63	42	127	262	330
	Riga Eastern Clinical University Hospital	160	176	66	33	128	205	297

Source: calculations by the author based on the National Health Service reviews for 2008 and the above-mentioned formulas

As presented in Table 1, productivity indicators differ within one hospital group. For instance, the productivity indicator PR₁ that reflects the relationship between all hospital activities and the total workload for doctors in the entire hospital varies from 187 (PR₁ = 187) at the Alūksne Hospital to 776 at the Dobele and Vicinity Hospital (PR₁ = 776). That means that at the Alūksne Hospital one doctor has a workload of 187 hospital activities per year, whereas a doctor at the Dobele and Vicinity Hospital has 776 per year. This difference can be explained

by the National Health Service's review analysis, which indicates that the Dobele and Vicinity Hospital has a comparatively higher amount of outpatient activities in comparison to the rest of the hospitals in the first group. Table 2 summarizes the PR indicators for 2010 reveals a similar situation, namely, that the indicator PR_1 ranges from 218 for the Alūksne Hospital ($PR_1 = 218$) to 675 for the Dobele and Vicinity Hospital ($PR_1 = 675$). A similar scenario is apparent in the second group of hospitals where the indicator PR_1 in 2008 varies between 195 at the Jelgava City Hospital ($PR_1 = 195$) and 435 at the Daugavpils Regional Hospital ($PR_1 = 435$), but in 2010 (see Table 2) the aforementioned indicator varies between 283 for the Rēzekne Hospital ($PR_1 = 283$) and 464 at the Daugavpils Regional Hospital ($PR_1 = 464$). The variation can be explained by the 2008 and 2012 National Health Service review analysis indicating that in 2008 and 2010 the Daugavpils Regional Hospital had the highest total number of activities in the second group of hospitals. There are similar results for the remaining PR indicators. PR_2 , which reveal the relationship between total hospital activities and the total workload for inpatient doctors, excluding workload for doctors for diagnostics and laboratory services, varies between 220 for the Alūksne Hospital ($PR_2 = 220$) and 1553 for the Dobele and Vicinity Hospital ($PR_2 = 1553$) in 2008. In 2010 it varies between 255 for the Alūksne Hospital ($PR_2 = 255$) and 1099 for the Dobele and Vicinity Hospital ($PR_2 = 1099$). This difference can also be explained by the high number of outpatient activities at the Dobele and Vicinity Hospital. The indicator PR_2 for 2008 in the second group of hospitals also varies and ranges from 231 at Northern Kurzeme Regional Hospital ($PR_2 = 231$) to 622 at Vidzeme Hospital ($PR_2 = 622$). In 2010 this indicator varies between 312 at Rēzekne Hospital ($PR_2 = 312$) and 569 at the Daugavpils Regional Hospital ($PR_2 = 569$). The variations between the hospitals in the second group can also be explained by the number of outpatient services. Indicator PR_3 , which shows the relationship between inpatient activities (hospitalisations) and the workload of doctors at inpatient care points towards differences among the first as well as second group of hospitals. As shown in Table 1, indicator PR_3 varies from 116 at the Preiļi Hospital ($PR_3 = 116$) to 291 at the Dobele and Vicinity Hospital ($PR_3 = 291$). This means that in 2008, the workload equivalent of one doctor at the Preiļi Hospital treated 116 patients in a year, but at the Dobele and Vicinity Hospital, the workload equivalent of one doctor treated 291 patients in the course of that year, a number 2.5 times higher than at the Preiļi Hospital. In 2010 there also are significant differences between the hospitals in the first group. For instance, during the annual workload equivalent of one doctor at the Preiļi Hospital, 48 patients were treated ($PR_3 = 48$), but at the Balvi and Gulbene Hospital Partnership the workload equivalent of one doctor treated 221 patients ($PR_3 = 221$) in the course of that year, showing a 4.6 times difference in doctors' productivity. Such differences cannot be explained by analysing the National Health Services reviews and statistics. There are also differences in the PR_3 indicator values for the second group of hospitals for 2008, namely, the PR_3 indicator varies between 129 for the Northern Kurzeme Regional Hospital

($PR_3 = 129$) and a 1.73 times high figure, or 223 for the Rēzekne Hospital ($PR_3 = 223$). In 2010 the PR_3 values range between 116 for the Northern Kurzeme Regional Hospital ($PR_3 = 116$) and a 2.5 times high figure, or 291 for the Jelgava City Hospital ($PR_3 = 291$). Indicators PR_4 and PR_5 show the relationship between the hospital activity indicators and the workload of all hospital staff, including nurses and nursing assistants. The results here also reveal differences between hospital groups and between the years 2008 and 2010.

To offer an overall view of the costs related to hospital activities, two indicators were calculated that reflect the activities of one hospital in LVL (1 LVL = 1,408 EUR). As shown in Tables 1 and 2, the actual hospital costs (indicator $M_{acr/ef1}$), that are planned for treatment and care (including salaries for personnel), excluding facility maintenance costs, differ within one hospital group. Specifically, in 2008 one activity at the Alūksne Hospital cost 185 LVL, but 46 LVL, at the Dobele and Vicinity Hospital. Similarly, in 2008 there were differences in hospitals' gross costs (indicator $M_{acr/ef2}$), not including European Union funding for hospitals but including facility maintenance costs. As shown in Table 1, in 2008 the Alūksne Hospital spent 294 LVL for one activity, but the Dobele and Vicinity Hospital, 71 LVL. Similar differences are apparent in the second group of hospitals. The indicator $M_{acr/ef1}$ shows that the Daugavpils Regional Hospital spent 97 LVL per hospital activity in 2008, but the Liepāja Regional Hospital, 279 LVL. Likewise, there were differences shown by the indicator $M_{acr/ef2}$ in the second group of hospitals, where the Jēkabpils Regional Hospital spent 69 LVL per hospital activity, but Liepāja Regional Hospital spent 207 LVL. The variation of costs per one hospital event cannot be explained by the information obtained during the course of this study or by statistical analysis. It can be noted that it is not possible to compare the cost per hospital activity for 2008 and 2010, because hospital funding was reduced starting from 2009, and the cuts continued in 2010. Due to this factor, the data are incomparable. It is, however, worthwhile to examine the productivity data within the context of cost efficiency and hospital funding to judge the effect of reduced financial resources on hospital productivity and efficiency. As apparent from Table 1 and 2, indicator PR_1 values in the first and second group are higher in 2010 than in 2008 with the exception of the Dobele and Vicinity Hospital and the Jēkabpils Regional Hospital. This means that the hospitals have been able to work more efficiently with less funding. The National Health Service reviews explain that in 2010 a higher percentage of patients were treated as outpatients rather than hospitalised. The indicator PR_2 shows the same conditions, demonstrating that in 2010 most hospitals in both groups were able to work more productively, except for 4 hospitals in the first and second groups. As for the indicator PR_3 , it reveals that productivity had fallen in 10 hospitals in the first and second group. By analysing the National Health Service's reviews, these results can be explained by the fall in the numbers of hospitalised patients. The indicator PR_4 also confirms an increase in productivity in 2010, when hospital funding was lower than in 2008.

Table 2

Productivity Indicators for Latvian Hospitals in 2010

Group number for hospitals	Hospital	Year 2010						
		Productivity value 1 (PR ₁)	Productivity value 2 (PR ₂)	Productivity value 3 (PR ₃)	Productivity value 4 (PR ₄)	Productivity value 5 (PR ₅)	Productivity (total costs per 1 activity, in LVL)	Productivity (netto costs per 1 activity, in LVL)
1.	Alūksne Hospital	218	255	124	53	172	81	125
	Balvi and Gulbene Hospital Partnership	617	991	221	104	203	35	47
	Madona Hospital	542	897	186	123	223	30	54
	Preiļi Hospital	482	654	48	99	130	33	50
	Cēsis Clinic	895	964	172	163	259	31	42
	Krāslava Hospital	653	1422	107	145	207	22	35
	Kuldīga Hospital	349	396	133	61	158	63	99
	Dobele and Vicinity Hospital	675	1099	183	132	213	35	51
	Jūrmala Hospital	295	423	161	65	151	68	123
	Ogre Regional Hospital	480	801	176	97	200	30	50
	Tukums Hospital	379	599	186	71	173	45	68
2.	Vidzeme Hospital	399	552	127	77	176	59	90
	Daugavpils Regional Hospital	464	569	157	76	197	69	88
	Rēzekne Hospital	283	312	180	46	202	109	158
	Jelgava City Hospital	384	548	291	68	246	73	107
	Jēkabpils Regional Hospital	346	467	158	59	172	62	84
	Liepāja Regional Hospital	452	529	152	65	160	80	114
	Northern Kurzeme Regional Hospital	360	360	116	63	167	68	108
3.	Children's Clinical University Hospital	248	265	76	46	106	76	108
	Pauls Stradiņš Clinical University Hospital	194	196	59	46	113	196	285
	Riga Eastern Clinical University Hospital	246	296	97	52	165	113	175

Source: calculations by the author based on the National Health Service's reviews for 2010 and formulas which are mentioned above

The obtained productivity indicators do not, however, show hospital efficiency as such or factors that influence this efficiency. They specify existing differences in each hospital group, accenting that a similar labour force provides differing volumes of work, thus indicating only one direction for further situational analysis. In addition, data analysis shows that hospital productivity has not decreased along with the reduction of financial resources. To obtain more

information about hospital efficiency, data is processed with the DEA method and more closely analysed, evaluating the hospital's achievements from the efficiency perspective. Hospital efficiency achievements are calculated using the following formula (Danish Ministry of Finance, 2000):

$$8. P = \frac{(U_1 \times Y_1 + U_2 \times Y_2)}{(V_1 \times X)}$$

where U_1 and U_2 is the value for hospital activities (using the number of shifts to calculate the technical efficiency and the financial resources to calculate cost efficiency). Usually the value for activities is calculated using the smallest possible product value, thereby determining the best result for one of the facilities. Y_1 and Y_2 are hospital activity indicators: hospitalisations, the number of outpatient consultations, inpatient visits, day treatments, operations etc.; V_1 is the value of used resources and X is the used resource – workload or financial resources. In accordance with the available literature on the DEA, the maximum attainable result is 1. By attaining the value of 1, a facility is efficient in relation to other facilities in a specific group. Results that are less than 1 indicate a lower level of efficiency in relation to the best result (Ray 2012). The obtained productivity data is corrected according to the level of severity of the patient's illness using the DRG (Diagnosis-related group) index because patients with similar diagnoses, age, and course of treatment can have differing lengths of treatment due to severity of the illness. However, in evaluating and analysing all the hospital groups in Latvia, it was not possible to correct the data with the help of the DRG index because the DRG payment system is not currently in use in Latvia. Therefore, to get an idea about the severity of a patient's illness, hospital stay days were taken into consideration as a possible indicator of the severity of illness, assuming that more severely ill patients stay in the hospital for longer periods of time.

By using the methods and experience of the Danish Ministry of Finance and the aforementioned basic formula for the calculation of hospital efficiency in all hospital groups, a total of nineteen P values from P_1 to P_{19} , were calculated. The third group is an exception, because in total only twelve P values were calculated: $P_1 - P_3$; $P_7 - P_9$; P_{12} to P_{17} . To calculate technical efficiency, data on several activities for the entire year of 2008 and 2010 were used and they are: hospitalisation, ambulatory consultations, outpatient visits in day departments, visual and functional diagnostic testing visits, amount of beds and bed days (output), whereas for resources (input) data for all available workloads of all specialists (doctors, nurses) and other employees in hospitals were used. In total twelve P values for the evaluation of technical efficiency were calculated and seven P values for cost efficiency for years 2008 and 2010. To calculate cost efficiency the same outputs (hospitalisation, ambulatory consultations etc.) were used, but the following costs were taken in account as inputs: the total of hospital costs that had been planned for treatment and care, excluding the costs of facility maintenance per year, the gross total of costs excluding European Union funds, hospital costs for ambulatory services, hospital costs for in-patients. Activity

data separated into two groups of inpatient and outpatient data was taken into account in calculating cost efficiency (output), and funding (input) was divided accordingly into inpatient and outpatient funding. This separation of funding in the calculation of efficiency is an important factor because Latvian hospitals sign separate contracts with the National Health Service for inpatient and outpatient services.

The maximum attainable result for each P value is 1.0. This means that hospitals that have the highest number of “1” results efficiently use their resources for hospital activities and expenses. The hospitals that have results that are less than “1” are deemed less efficient in relation to the best performers. The lower the result is under “1,” the lower the efficiency, as it relates to the most optimal hospital. To be able to summarise and evaluate all P values, the values were divided into 2 groups – P values for technical efficiency and P values for cost efficiency. Next, all the P values for each group were added resulting in a sum P value for each hospital separately in the overall technical and cost efficiency overview. Lastly, the maximal sum in each group was equated to 100%. Table 3 summarizes results from 2010 and 2008 on the technical and cost efficiency of hospitals. Results for both years were also compared, because funding for health care and hospitals was greater in 2008 than in 2010. This comparison can at the same time confirm or refute the hypothesis that more funding secures a more optimal efficiency.

According to the Table 3, the technical efficiency of 10 hospitals (in all the three groups) has worsened in 2010 as compared to 2008. This can be explained by a reduction in the total number of secondary health care patients, as reflected in the National Health Service reviews. The cost efficiency, however, has improved in 15 hospitals, an improvement that can be explained with the proportional increase in outpatients in hospitals. As is apparent in Table 3, individual hospitals show good results, but others – poorer results. Of the results summarized in the table for former local hospitals (group 1), the Cēsis Clinic has good technical efficiency in 2010, but the results also show that Preiļi, Krāslava, Jūrmala and Alūksne lag behind. The Dobele and Vicinity Hospital has optimal cost efficiency for 2010, but Kuldīga, Preiļi and Jūrmala Hospitals are less cost efficient. Comparing the 2010 technical and cost efficiency results to the 2008 results, differences in technical and cost efficiency revealed. However, the Kuldīga, Preiļi, Krāslava and Jūrmala hospitals still do not show optimal efficiency results. The results obtained for the first group of hospitals indicate at least two components that have not allowed those hospitals to work more efficiently. The hospitals that do not work efficiently have numerically few activities or the existing staff is more numerous than necessary for the planned hospital activities when compared to the most efficient hospital. Thus it can be concluded that in order to improve the technical efficiency of a hospital, activities would need to be increased or the staff needs to be reduced. When looking individually at less efficient hospitals in the first group, a further study of the health service providers within the region serviced by the hospital reveals that the reason for low efficiency indicators is a

dense network of health care providers. For instance, within the primary region serviced by the Alūksne hospital, secondary outpatient services are available at the Alūksne Hospital and also at the health care centre located in the city of Alūksne. Due to this situation, the hospital cannot increase its activities because there are two facilities providing the same services within the comparatively small primary care region of the hospital, and there has not been an opportunity to consolidate services into one facility. The leader's position of the Cēsis Clinic and the Dobele and Vicinity Hospital can be explained by the concentration of secondary outpatient services in the hospitals' outpatient wards.

Table 3

Summary of Latvian Hospital Efficiency Indicators for 2008 and 2010 (recalculated into percentages)

Group number for hospitals	Hospital	Year 2010		Year 2008	
		Total technical efficiency result (Performance in %)	Total cost efficiency result (Performance in %)	Total technical efficiency result (Performance in %)	Total cost efficiency result (Performance in %)
1.	Alūksne Hospital	70	94	72	75
	Balvi and Gulbene Hospital Partnership	86	91	77	91
	Madona Hospital	76	91	75	78
	Preiļi Hospital	38	65	61	91
	Cēsis Clinic	100	95	77	90
	Krāslava Hospital	59	87	60	93
	Kuldīga Hospital	67	68	54	57
	Dobele and Vicinity Hospital	81	100	100	97
	Jūrmala Hospital	68	60	67	70
	Ogre Regional Hospital	72	78	71	100
	Tukums Hospital	72	78	65	75
2.	Vidzeme Hospital	62	80	78	66
	Daugavpils Regional Hospital	88	85	100	100
	Rēzekne Hospital	75	79	91	78
	Jelgava City Hospital	100	100	72	81
	Jēkabpils Regional Hospital	69	84	88	79
	Liepāja Regional Hospital	84	87	67	55
	Northern Kurzeme Regional Hospital	59	94	67	64
3.	Children's Clinical University Hospital	78	100	100	100
	Pauls Stradiņš Clinical University Hospital	92	44	90	69
	Riga Eastern Clinical University Hospital	100	81	74	81

Source: calculations by the author based on DEA method

In the groups of former regional hospitals, the Jelgava City Hospital showed the most optimal technical efficiency result for 2010, but the Northern Kurzeme Regional Hospital and the Vidzeme Hospital scored low technical efficiency results. The Vidzeme Hospital is in a similar situation as the Alūksne Hospital; there is a health centre in the city of Valmiera that provides secondary outpatient services and as a result the hospital does not have an opportunity to increase its activities. In the technical and cost efficiency categories for 2008, the strongest leader is the Daugavpils Regional Hospital.

Looking at the available data and results obtained for the third group of hospitals, the Rīga Eastern Clinical University Hospital could be interpreted as a technically efficient hospital in 2010; however, it must be taken into account that the existing university hospitals provide differing health care services to varying population groups. For example, the Children's Clinical University Hospital cannot be compared to the other two university hospitals because it only provides services to children. For its part, the Pauls Stradiņš Clinical University Hospital provides wider cardiology services in comparison to the Rīga Eastern Clinical University Hospital. Due to these differences the comparison of university hospitals with the DEA would not provide enough objectivity. If within the framework of this study the productivity and efficiency of separate university hospital units, such as the neurology and surgery units of the Rīga Eastern Clinical University Hospital and Pauls Stradiņš Clinical University Hospital, is reviewed, then by processing the data according to the DEA method, will be possible to draw a comparison between these units as regards their productivity and efficiency.

If Table 3 is to be viewed through a funding perspective, then hospitals had more funding in 2008 than in 2010 and, based on the completed calculations and results summary it is apparent that some hospitals are less efficient regardless of funding. For instance, the Kuldīga Hospital shows poor technical and cost results in both 2010 and 2008.

CONCLUSIONS

From the results obtained and study conducted it can be concluded that:

1. Increased funding has not ensured more optimal functioning of hospitals, namely, greater funding for hospitals has not ensured their greater productivity and improved cost efficiency. Therefore, funding is not the determining factor that influences hospital productivity and cost efficiency.
2. Using the Data Envelopment Analysis method it is possible to determine, evaluate and compare the efficiency indicators of similar hospitals. These indicators are binding under the chosen policy goal of the Latvian Public Health Guidelines for 2011-2017 that accents the efficient management and use of resources in the health care system, including hospitals. The conducted study is only a part of the further evaluation of hospitals with respect to the

establish policy goal and additional studies should be conducted to further expand the basis for discussion at a political level on the future network of hospitals, their location and functions. There is a plethora of factors that influence hospital productivity and efficiency that were not identified within this study.

3. With the help of the Data Envelopment Analysis method, it is possible to compare the efficiency of one hospital over the course of time by comparing its efficiency in separate time periods.
4. Within the framework of the existing health care funding system in Latvia, the Cēsis Hospital and the Jelgava City Hospital can be rated as technically efficient hospitals in 2010, and the Dobele and Vicinity Hospital and the Jelgava City Hospital can be rated as cost efficient hospitals. In 2008, the Dobele and Vicinity Hospital and the Daugavpils Regional Hospital were leaders in technical efficiency, but the Ogre Regional Hospital, in cost efficiency.
5. In accordance with the study results for 2010, the Preiļi, Krāslava, Jūrmala, Kuldīga and Alūksne Hospitals are the least technically efficient in the first group of hospitals. As regards cost efficiency, the Kuldīga, Jūrmala and Preiļi Hospitals did not show optimal results.

PROPOSALS

This study can be a starting point for further discussions on hospitals and the planning and location of their services, because the chosen policy goal of the Public Health Guidelines for 2011-2017 accents the efficient management and use of resources in the health care system.

RECOMMENDATIONS

1. With the help of the Data Envelopment Analysis method, this study determined the efficiency of hospitals, as well as sought the reasons for their inefficiency in individual cases. As a result, a more detailed study of the factors that influence hospital efficiency and productivity should be conducted. Furthermore, the factors that influence hospital efficiency should be studied separately, dividing them in at least 2 groups: factors within the organisation and external factors outside the organization. A possible determining external factor is the existence of a dense network of health care facilities within the territorial region of a hospital and a possible internal factor—an organisation's ability to adapt to financial changes.
2. This type of study offers a direction for further studies on efficiency and productivity in the hospital sector in Latvia thus creating a mechanism for improvements to efficiency in this sector in the future. It also serves to steer the future planning of hospital networks and their functions in Latvia.

3. In order to determine the general effectiveness of Latvian hospitals, it is necessary to carry out additional studies in other countries where the DEA method and identical inputs and outputs are used. Thereafter, a comparative study is necessary where a comparison is made between Latvia and other countries.

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THE INTRODUCTION OF LOCAL REFERENDUMS – LATVIAN POPULATION ASSESSMENT

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Abstract. Citizen participation at the local level is very important element of democracy. It means that provisions have been made, rights regulated, and opportunities provided for residents to have a direct impact on decisions made by the representative bodies on matters that affect the local community and their lives. Citizens can be involved in local politics in two principal ways: through the ballot box and through direct participation in local affairs. A local referendum is one of the direct participation forms, and the introduction of those is currently on the Latvian political agenda.

The objective of this research is to investigate how residents in Latvia judge the necessity to introduce local referendums; whether there are differences in individuals' assessment of a concrete public initiative according to socio-demographic criteria; whether there are any correlations between the level of satisfaction with the performance of self-governments and the assessment of introduction of local referendums. In this paper, the public opinion survey among the residents of Latvia carried out in July 2012 has been reviewed by applying the monographic method and the document analysis method.

The research results show that there is no cogent support among the residents of Latvia for the introduction of local referendums. The assessment of residents has been affected by a series of subjective causes, resulting from poor preparation of policy initiatives and the process of explanation.

Key words: *citizen participation; local democracy; local governments; direct democracy; local referendum.*

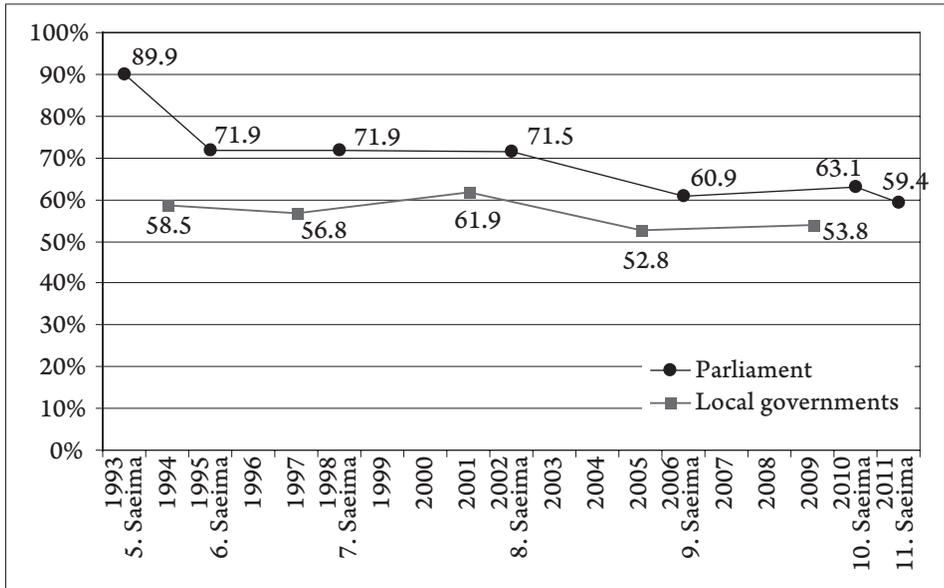
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INTRODUCTION

Institutions of representative democracy in many countries, including the so called old democracies, experience decline in citizen trust. Edelman Trust Barometer 2012, the trust survey conducted by an international network of public relations agencies in 25 countries around the world, shows that 38% of citizens trust in the national governments (Edelman, 2012). Besides that, levels of citizen trust in governments in 2012 have reached the lowest point in the past five years.

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The state of affairs in Latvia is fairly similar. A sign of a crisis in democratic representative institutions is the low trust in public authorities, decrease in electoral participation, little interest to become involved in participation forms of representative democracy. The voter turnout in the regular elections of the parliament of the Republic of Latvia has decreased from 89% in 1993 elections to 61% in 2006 elections, and further down to 59% in an early election of the parliament in 2011 (Fig. 1).



Data source: *The Central Election Commission of Latvia, 2012*

Fig. 1. **Voter turnout in the parliamentary and local elections in Latvia (1993-2011)**

According to data from a survey conducted in July 2012, only 16% of the residents of Latvia have trust in the parliament and 21% – in the government (Seimuskane, SKDS, 2012). Although the voter turnout in local government elections is decreasing (Fig. 1), the level of residents' trust in local governments is comparatively higher – the results of the 2012 survey revealed that 48% of the residents have trust in local governments, while 45% have not (Seimuskane, SKDS, 2012). The indicators of public trust in Latvia correspond to tendencies in other European countries where the population has more trust in local governments than in public authorities at the national level (Eurobarometer, 2009). People have more trust in those public authorities which are closer to the epicentre of their challenges, those who know better the needs and the desires of the population.

The weak state of representative bodies increasingly calls into question the securing of the role of direct democracy. There are questions of increasing

urgency – how to overcome distrust in representative bodies, and whether the introduction of forms of direct participation or their improvement could have a transformational effect. This challenge is so crucial to the member states that the Committee of the Congress of Local and Regional Authorities in October 2011 adopted a special recommendation, stressing that *the improvement of local democracy and direct citizen participation is likely to be a key issue in the future activity of the Council of Europe* (EC, Rec 307 (2011)).

Already since 1999, various forums in Latvia have debated the role and the introduction of local referendums. Since 2008 the ministry in charge of local governments has produced several draft laws on local referendums. The most recent 2012 version of the draft law prepared by the Ministry of Environmental Protection and Regional Development (since 2011 ministry is responsible for local governments) is now subject to public consultation. The draft law provides for introduction of local referendums in Latvia as from 1 July, 2013.

THEORETICAL FRAMEWORK OF THE RESEARCH

Citizens can be involved in local politics in two principal ways – through the ballot box and through direct participation in local affairs. It is vitally important to combine elements of representative and participatory democracy (Ruus, 2011). Sharing of responsibility is a key part of the direct participation of citizens in public life at local level. The enhancement of direct democracy or direct decision-making process by citizens on important issues and the development of the local community governance are the essence for an immediate influence of citizens on the processes in the community. Increasing the significance of local referendums, the enhancement of the legal and political effects of citizens' initiatives, and the directly needed reform of the local community governance are the basic steps towards the fundamental distribution of responsibilities between the local authorities and citizens (Standing Conference of Towns and Municipalities, 2006).

Direct democracy means that citizens have a right to directly participate in making the most important decisions for the country and the society through a popular vote, not only to fulfil the obligatory requirements of the law, but also on personal initiative, regardless of the preferences of the representative bodies. In the context of direct democracy, it is important to note two criteria.

First, it applies to decision-making on important political matters, but it does not apply to particular individuals. Namely, the right to elect own representatives and to withdraw them (for example, members of the city council, or the parliament) is not considered an expression of direct democracy.

Second, direct democracy grants power to citizens, but its procedures are aimed at the distribution of powers. It means that the legal framework lays down the number of citizens required to initiate procedures of direct democracy, regardless of the preferences of the judicial power, or the executive power, at any level of the governance (Buchi, 2011).

Direct democracy as a part of the system of local democracy can have various impacts. It can represent competition as well as cooperation with representative institutions and their main actors, and it may serve correcting, supplementary and qualifying functions in the democratic policy (Schiller, 2011).

Direct democracy comprises several forms of participation – referendums, citizens' initiatives, counter-proposals, public meetings, citizens' panels, focus groups or electronic debates, or other. Procedures of popular vote, initiated not by citizens but by public authorities (plebiscite), do not attribute to direct democracy (Buchi, 2011).

In order to ensure direct participation, European countries use various models, yet the referendum is the most common form of citizen participation (CG (21)3, 2011). Most European countries have a practice of consultative referendums, few countries – only binding referendums, but in several countries, for example, in Switzerland, both consultative and binding referendums are used. It is because of the tradition of referenda and their great experience that Switzerland is considered to be the founder of direct democracy.

French researcher Premat, when analyzing the tradition of Swiss direct democracy, draws attention to a series of interesting conclusions:

- direct democracy procedures are much harder to manipulate with. They cannot be implemented immediately, and, to receive support to the issue that is put to vote, the population needs to be convinced;
- direct democracy procedures aim at the interests of the majority. But, in order to achieve a positive outcome in the long term, the perfect construct is maintaining balance between the rule of majority and the protection of minorities;
- direct democracy means elaborate tradition. Referenda and popular initiatives are a way of reaching agreement on common interests, when community representatives take a vote;
- it is wrong to think that direct democracy procedures are a deep disturbance of representative government. The case of Swiss referendums is that from 1848 to 2006, of 160 popular initiatives, only 9% were approved;
- direct democracy procedures can be a good way to solve social inequities or conflicts;
- direct democracy is a part of the political education of citizens. The involvement of the incompetent citizen is an argument used against direct democracy procedures which are characterized as simplifying some political problems. In fact “direct” does not mean the “simple” or fulfilment of immediate wish but a closer relation between citizens and political topics. The complexity of the procedures allows citizens to organize themselves, to learn much from political culture and the culture of cooperation of their country;
- direct democracy is not an area governed by the media. Their task is to help the citizens to understand the manifold aspects of the referendum

question. Yet the media cannot determine the outcome of the referendum vote;

- direct democracy is not an inexpensive procedure, but sometimes it may help to avoid the huge effects of lobbying, including financial expenses;
- a clear legal framework for procedures has an impact on the quality of direct democracy;
- any abuse of direct democracy might be banned by a Constitutional Court (Premat, 2006).

Obviously, whether the direct democracy procedures will improve the quality of citizen participation or not, depends also on other factors, including the tradition of organizing the participation process, and the political culture and culture.

RESEARCH METHODOLOGY

From 13 July till 24 July, 2012, the authors of this paper in cooperation with the Marketing and Public Opinion Research Centre (SKDS) conducted a survey among the residents of Latvia, using the method of direct interview at the respondent's home (Seimuskane, SKDS, 2012). Using stratified random sampling, 1050 permanent residents of Latvia aged 15-74 were surveyed, which is the representative sample of the general population. All regions of Latvia were included in the polling. The aim of the poll was to study the following: which forms of citizen participation are used by the residents; which factors determine and influence citizen participation; are there any connections between participation and trust in representative bodies; how the residents view the introduction of local referendums, and would the introduction of local referendums increase the level of citizen participation and lessen the crisis of trust in representative bodies. Most of the questions of the survey were measured using ten point scale from "strongly disagree" or "fully ineffective" (1) to "strongly agree" or "fully effective" (10). The survey data was analyzed using SPSS statistics program.

The research is based also on the monographic method and the document analysis method, namely, the study and evaluation of the normative acts and scientific research papers.

LEGAL FRAMEWORK FOR PARTICIPATION ON LOCAL GOVERNMENT LEVEL IN LATVIA

Legislation in the Republic of Latvia offers various options for residents to get involved in the work of the local government and its policy-making and decision-making process.

The Constitution of the Republic of Latvia guarantees that every citizen of Latvia has the right, as provided for by law, to participate in the work of the State

and of local government, and to hold a position in the civil service (Constitution, Art. 101). Although in general the society perceives the participation in the work of the State and of local government as the right to participate in the selection of the legislature – whether the Parliament (Saeima) or the local council – by voting and by standing as candidates; however, it is just one possible way of participation. This particular article gives the right to every citizen of Latvia not only to participate in elections and referendums, as provided for by law, but also to participate in exercising the legislative, executive and judicial powers in other ways laid down by law (Kusiņš, 2011, p. 384-385). Direct and indirect participation in state affairs may take place, and Article 101 in the Constitution covers both of these forms of participation (Kusiņš, 2011).

In accordance with the legislation, citizens of the Republic of Latvia and citizens of the European Union countries with permanent residency in Latvia are entitled to vote and to stand for election at parliament (Saeima) and local government elections. All residents of the country are entitled to form and join associations and political parties, to lodge complaints and submissions, to have a fair hearing, to challenge local administrative provisions, and other. (Vanags, Vilka, 2005).

To inform the citizens and for citizen participation in the local government, the legislation in the Republic of Latvia provides the following:

- local council elections;
- open council and committee meetings;
- availability of the council meeting minutes;
- council members' office hours for receiving visitors;
- reviewing complaints and submissions;
- public consultations;
- producing annual public reports (Vanags, Vilka, 2005)

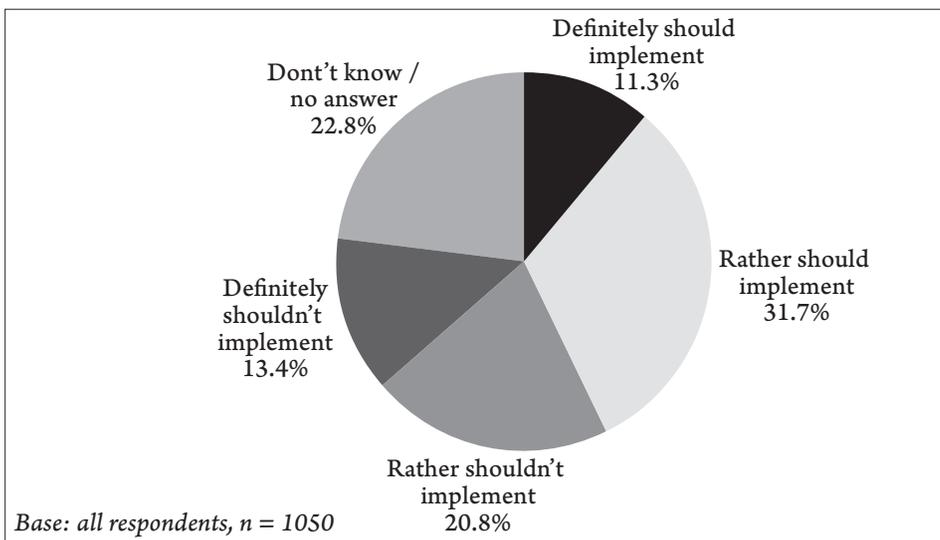
In 2008, the *Law on Local Governments* (1994) was amended with a section on the right to organize local referendums, and the Cabinet of Ministers was instructed to draft a bill on local referendums and to submit it to the Parliament (Saeima). Since 2008, the ministry responsible for local governments (the Ministry of Regional Development and Local Governments till 2011; since 2011, the Ministry of Environmental Protection and Regional Development) has redrafted the law on local referendums a number of times. The clause containing transitional provisions has been amended four times and the term for the preparation and submission of the draft law to the Parliament has been postponed many times. Now it is clear that the qualifying date (05.01.2012) for the *Law on Local Governments*, by which the Cabinet of Ministers had to submit the draft law for consideration and decision making to the national parliament has expired. This allows us to assume that the term for the draft law to come into effect will be moved again.

In order to cooperate with residents, local governments may also use other forms of participation, because Section 12 in the *Law on Local Governments*

(1994) allows them, in the interests of residents of the relevant administrative territory, to voluntarily carry out their initiatives with respect to any matter if it is not within the competence of the *Saeima*, the Cabinet of Ministers, ministries, other State administrative institutions, the courts or other self-governments, and if such activity is not prohibited by law. In Latvia, local governments may conduct opinion polls, resident meetings and forums, including representatives from NGOs or advocacy groups in committees and working groups, etc. The relevant legal framework in Latvia does not forbid a local government council, acting by a majority, to call a consultative referendum in its administrative territory.

RESEARCH RESULTS

One of the survey objectives was to elicit the views of the residents on local referendums: how the residents understand and value this form of direct participation.



Data source: The public opinion survey (Seimuskane, SKDS, 2012)

Fig. 2. Respondents' opinion about the necessity to introduce local referendums in Latvia

43% of the respondents support the introduction of local referendums in Latvia, while 1/3 of the respondents (34%) do not. Nearly one in four respondents (23%) found this question difficult to answer. In the authors' opinion, the results of the survey and the fairly large number of indecisive responses reflects the dual nature of the attitude towards referendums in the public rhetoric during the past year, which, on one hand, accentuates the significance of direct citizen participation, including referendums, in the development of the democracy, and, on the other hand, quite often points to the use of the referendum procedure

as a fighting method in political competition, and placing too much emphasis on its role in parliamentary democracy and the high financial cost of holding a referendum. Such statements are the most common in public rhetoric and largely coincide with the answers of the respondents when assessing several statements about local referendums – most often the respondents noted that not all matters of local policy should be subject to referendum (69%), it was expensive to hold them (64%), there could be a lack of understanding among the residents about many issues that fall within municipal jurisdiction, resulting in short-sighted decisions (51%), referendums are a weapon of the political opposition used in political warfare to express discontent with the results of the election (51%).

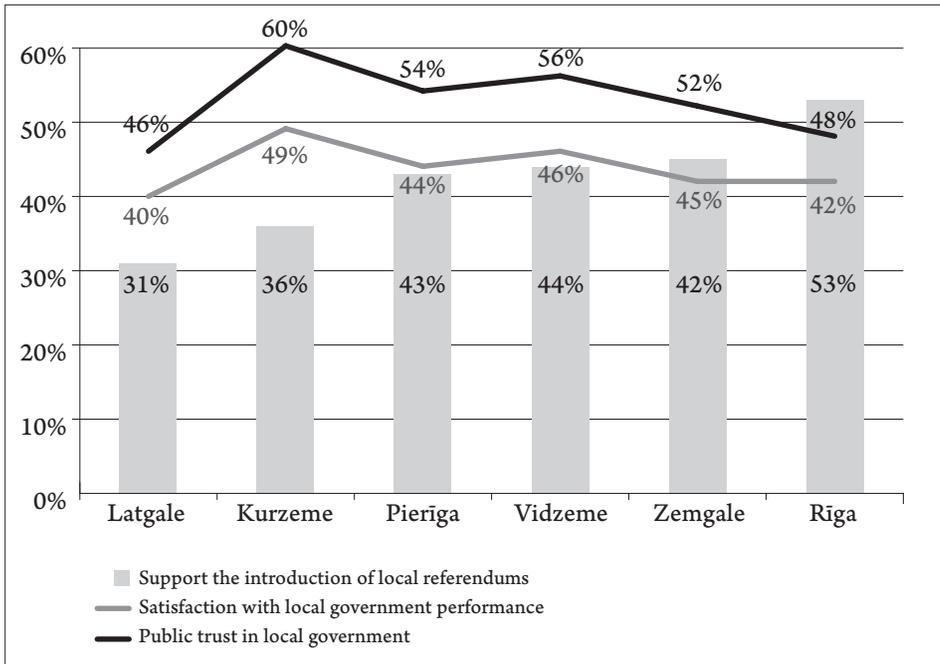
The regional distribution of the research data among the six Latvian statistical regions demonstrates that the highest support for introduction of a local referendum is in Riga (53%), Zemgale (45%) and Vidzeme (44%), but the lowest – in Latgale (31%) and Kurzeme (36%). Significantly, more than a half (54%) of respondents in Latgale, which is economically the least developed region in Latvia, does not support introduction of local referendum.

As the research examined the correlation between the responses in favour of introduction or rejection of local referendum and relation to public confidence indicators in self-governments, it was revealed that the least support to local referendums have been expressed by people from those regions, where self-governments are trusted the most – in Kurzeme (60%), and the least – in Latgale (46%). Looking at the distribution of responses in a similar issue on people's satisfaction with self-government performance, the results obtained coincide with the assessment of the issue on public trust – those who live in Kurzeme are the most satisfied with the self-government performance, but the most frustrated are those who live in Latgale.

The data obtained from the study exploring public participation motivation underline the need to devote more attention to the following aspects: whether low public participation always means only dissatisfaction with and distrust in public authorities; lack of belief that participation can bring the change; disinterest and seeing no sense in participation. Or – low participation is based on the awareness that people's everyday lives and well-being is not compromised in any way, and residents are confident that their interests are well represented by the local government.

The correlation between support for the introduction of a local referendum, popular trust indicators and satisfaction with self-government performance is given in Fig. 3.

The opinions of different socio-demographic groups in terms of age were compared regarding the need for the introduction of local referendums, and the findings demonstrate that support by the respondents aged 25-44 years for the introduction of referendums is higher than the average figures for Latvia (43%). In addition, the introduction of local referendums is supported by more than a half (52%) of respondents aged 25-34 (48%).



Data source: Author's calculations, data of the public opinion survey (Seimuskāne, SKDS, 2012)

Fig. 3. **The correlation among support for introduction of local referendum, people's trust indicators and satisfaction with self-government by statistical region**

In assessing the respondents' answers about the necessity to introduce local referendums according to education criterion, the strongest support for the introduction of referendums has been shown by respondents with higher and incomplete higher education: more than a half (50.5%) of respondents supported the introduction of local referendums. They are followed by respondents with secondary and specialized secondary education – 41% of respondents support the introduction of referendums.

The lowest support to the introduction of local referendums has been expressed by respondents with primary education: only 34% of this group supported the introduction of referendums. The group also has the greatest number of persons with no particular opinion – one third of respondents with primary education have difficulties to answer this question.

The Draft Law on Local Referendums as a political initiative is being directed for the final decision in the Parliament, so that the local referendum could be introduced in Latvia from 1st July 2013. The study results show a rather large proportion of uncertain responses on the need for the introduction of local referendums. This suggests that public officials have failed to sufficiently and professionally explain the advantages of the introduction of local referendums.

CONCLUSIONS

The analysis of the results of survey among the population of Latvia on the introduction of local referendums leads to the following conclusions:

1. The introduction of local referendums in Latvia is not yet supported by the overwhelming majority of residents. More than a half of respondents have expressed support for introducing local referendums: 1/3 of the respondents (34%) oppose the introduction, and 23% have abstained from a particular answer choice. This means that the majority of Latvian population are not convinced of the need for introducing local referendums;
2. The greatest support for the introduction of local referendums came from Riga (53%) – from respondents with higher or incomplete higher education, aged 25-44 years. The least support for the introduction of local referendums is observed in Latgale and Kurzeme, and among the respondents with primary education and age groups of 15-24 and 55-74. Moreover, the respondents of these age groups encountered the highest percentage of difficulties when selecting specific answers to the question about the introduction of local referendums;
3. The study does not confirm the correlation between the level of satisfaction with self-government performance and support for the introduction of referendums as a factor of participation. Introducing local referendums is least supported by the residents who are the most satisfied (Kurzeme) and the least satisfied (Latgale) with self-government work. This suggests that there are different motives shaping opinions among residents in the regions about the introduction of local referendums, but – within the context of the data given in this study it cannot be claimed that the more satisfied people are with the self-government work, the more they support the introduction of local referendums as the form of direct participation; or – the least satisfied people are with the self-government work, the more they feel the need for local referendums as a form of direct participation;
4. Nearly one in four (23%) of survey participants does not provide a concrete answer on the issue of introducing local referendums. This means that quite a significant part of society hesitates over the decision, looking for answers and arguments *in favour* or *against* the need to introduce local referendums. A professional public debate on this particular political initiative has not yet taken place in the public sector. This is reflected in the lack of support for launching this political initiative.
5. The viewpoints of respondents when assessing advantages and disadvantages of introducing local referendums reflect the statements publicly expressed by politicians and officials about the nature and various aspects of local referendums, and the arguments in favour or against the implementation thereof. More often than not, the reasoning and explanations publicly expressed by politicians and officials are politically, not professionally, grounded. The public rhetoric shapes public awareness of a specific initiative and the attitudes towards it.

Although, in the author's opinion, the introduction of local referendums is a form of participation to be supported, the results of the study show that currently it lacks strong public support, which, probably, has been determined by the rapid progress of a political initiative without the approbatory political will to explain that in a professional, constructive- and sustainable manner.

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JOB ENRICHMENT, TASK SATISFACTION AND SOCIO-ECONOMIC EFFICIENCY: A RESEARCH IN SOCIO-PSYCHOLOGICAL THEORIES RELATED TO DISSONANCES IN DEVELOPMENT DEPARTMENTS OF MEDIUM-SIZED COMPANIES

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Abstract. Modern product development is hard to imagine without the use of 3D CAD (three dimensional computer aided design) software. And it is even more difficult to imagine that the implementation of that versatile software resulted in additional workload for engineers. This conflict is caused by a reduction in auxiliary staff within development teams as a consequence of an over-assessment of 3D CAD capabilities. This paper examines the relevant literature using scientific databases, in respect to social-psychological efficiency aspects with the aim of formulating hypotheses for that problem area. The study revealed a strong dependence/correlation between task content and self-image.

Key words: *new product development; division of work; job satisfaction; cognitive dissonance; socio-psychological efficiency.*

JEL code: M54

INTRODUCTION

The person who is faster in presenting convincing concepts determines the customer's mindset and has therefore a better chance to succeed in the current, hard competition. The ability to transfer new ideas to commercial products in a timely manner is an important competitive factor with high influence on the corporate success today (cf. Scheer A.W., 2003; Hirzel, Leder & Partner 1992). In a respective analysis, Prof. Dr. Klaus Ehrenspiel showed: the dominating problem of the development process where all members of staff, every company, all hierarchical positions and every line of business meet are project durations and deadlines (Ehrenspiel K., 2007). In departments concerned with the development of products, reaction time, processing time, lead time and innovation performance are being influenced by the availability of qualified members of staff. These members of staff within the development departments are

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comparatively expensive. Owing to a tremendous deficit of qualified employees, which is already now being lamented and will probably even accelerate (cf. Bader S., 2006; Wittenstein A., 2006; BMBF, 2004), personnel costs for this group of employees are likely to increase in the following years. In the meantime the appropriate number of personnel is one of the most crucial basic conditions for the ability to innovation (SMI, 2005). According to the BMBF (BMBF, 2005), the ability to innovation of small and medium-sized companies is especially strongly related to the availability of qualified and experienced members of staff. But not only is the number of qualified staff in medium-sized companies small for the above mentioned reasons, it is also getting even further reduced through a typical form of work organization. The problem – as you can often register in large companies – does not lie in specialization, but mainly in the excessive workload of engineers due to numerous organizational and auxiliary tasks. A development engineer has to fulfil several tasks at the same time: he works in the sales, accompanies the manufacture and assembly or the work preparation for problems with new products, is responsible for the ordering of tools and machines, and generates nearly the whole product documentation (Ehrlenspiel K., 2007). Interruptions and unforeseen tasks are characteristic of the daily routine. Time for the actual product development is drastically restricted. In addition, due to the 3D CAD growth, another auxiliary task was loaded onto engineers in development departments of medium-sized companies. Medium-sized companies were convinced that engineers can, on the side, easily take over product documentation with this 3D CAD software. The number of technical draughtspeople who had done this kind of work so far had declined rapidly. As a matter of fact, the 3D CAD software cannot take over the product documentation automatically and an engineer in medium-sized companies these days usually creates the documentation (mainly part and assembly drawings) which is deeply time consuming. One of the engineer's main tasks lies in the conceptualization of future systems. This means that it is rather a complex process which requires both analytical skills and creativity to generate innovative solutions for the next generation of commercial products. Owing to the above-described progressing engineer multi-functionality, proven concepts that offer the best possible solution with available resources are often preferred in practice (Ehrlenspiel K., 2007). These exploitation processes with their unsound fixation on existing solutions is a major hurdle to innovation (Kliesch-Eberl M./Eberl P., 2009). The traditional main task of technical draughtspeople is the drawing up of norm-proven technical drawings as a draft, itemization or assembly drawing in form of outlines, details, views and sections (product documentation). Under the described situation (to have qualified and motivated employees available according to the relevant requirements), it is reasonable for managers to consider more seriously how an ambitious, dedicated engineer would deal with the obvious disparity between his professional expectations and his professional reality, especially in respect to his decisions to represent his company positively, to recruit partners for his company, to remain loyal to his company, to be ready for change etc. There is

obviously an urgent need for an appropriate rectification of the exaggerated changes in personnel structure. What is required is a verifiable procedure to find the right team structure in this specific new 3D CAD engineering environment. That problem leads to the research question: Does the assignment of technical draughtspeople in mechanical development departments of medium-sized companies within a 3D CAD engineering environment increase the economic and the socio-psychological efficiency? The intention of this paper is to give top priority to the socio-psychological and socio-economic efficiency. Therefore, a review of the relevant scientific literature is undertaken concerning the topics of socio-psychology to identify the major mechanisms related to job or task satisfaction, to the contentment of engineers and technical drafters with the task. The results of that analysis have yet to be tested in a follow-up field study resulting in a suitable causal model to detect reliable cause-effect relations. The follow-up study is not the subject of this paper and will be introduced but briefly.

RESEARCH RESULTS AND DISCUSSION

RESULTS OF THE LITERATURE REVIEW: MOTIVATION AND TASK SATISFACTION

The research question has demonstrated the conflicting role of an engineer in mechanical development departments of medium-sized companies under a 3D CAD engineering environment. From the historical point of view those engineers seem to be the “victim” of a humanization process which got under way in the second half of the 20th century with the aim of handing back to humans their individuality in the commercial system. The positive intention has to some extent changed into a negative one, and efficiency has suffered. The explanation is given by the review of current discussions in sociology and psychology. Sociology analyses the society as an accumulation of humans, the subject of social class stratification, the social structure of the society and the establishments. Psychology is seen as an empirical science (Aronson, 2008). (Rohracher H., 1988) describes psychology as the experience and the behaviour of humans. Experience is understood as a result of conscious-processes, for example, perceptions, thoughts and emotions. The definition of psychology as a science of human experience and behaviour is unambiguous, but there are different paradigms (Lewin K., 1971; Bischof N., 1980; Rosenstiel v. L., 1982): psychology as an exact natural science, as a humanistic science, as a social science and as a specific component of biology. Psychology, whatever direction, is defined as the science of experience and behaviour. Social psychology is concentrating on social influence on experience and behaviour. We all get influenced by other people. There are direct attempts at social influence, for instance, advertising campaigns or election campaigns. These direct attempts of social influence are one part, while social influence goes beyond observable behaviour. Social influence also concerns our cognitions and emotions. Besides the attempts of persuasion, we

are influenced by the presence of others and also by their absence. On a different level, everybody is involved in a social and cultural context. Social psychologists analyse how and why our cognition, our emotions and behaviour are influenced and shaped by the total social environment (Aronson, 2008). When we take into account all these factors, social psychology can be described as the scientific study of the modality in which cognitions, emotions and behaviour of humans are influenced by others who are de facto present or absent (Aronson E., 2008, p. 4). Social psychologists analyse individuals in the context of a social situation. The aim of social psychology is to find general valid properties of human nature which make everyone receptive of social influence independent of social classes or culture. In a specific scientific analysis it is actually impossible to discern between the individual and the situation and therefore context variables must be recorded. Context variables are included in the object of psychological research. The centrepiece should, however, always be the experience and the behaviour when the analysis regards psychology. The boundaries to related science are often blurred, and in organisational psychology it is particularly obvious. While psychology is the science of experience, behaviour and actions of humans, organisational psychology is the science of experience, behaviour and actions of humans in organisations (Rosenstiel v. L., 2003).

The organisational/industrial psychology goes back to the industrial revolution where Taylorism, the scientific management, was the dominant system for the organisation of operating procedures in order to achieve maximum productivity, and the leading and celebrated idea was division of labour. The workman was not seen as a group member and the willingness to work depended only on economic stimulations. The wage system, especially the individual incentive wage was in the focus. An effort was made to analyse the task completion process and to use the energy of humans in an efficient way. Work behaviour was prescribed into the smallest detail (Rosenstiel v. L., 2003). Insights into the disadvantages of division of labour are described already by Münsterberg H., 1912, emphasizing the risk of emotional damage and atrophy during active labour. Frey (Frey J.P., 1920) mentioned the macroeconomic harm and the damage of the society as a whole. A turnabout was heralded with research in the Western Electric Company in Hawthorne from 1924 to 1932, initially a Taylorist – oriented examination. These industrial psychological examinations revealed that the effects of social interaction and, therefore, social psychological variables had more influence on the individual performance than the incentive wage system. The work content now came into the spotlight of humanistically oriented psychologists, who concentrated their efforts on work motivation (c.f. Maslow A.H., 1954; Herzberg F., Mauser B. & Snyderman B., 1959). The empirical recorded tendency of working people to find self realisation at the workplace led to some extent to a reversal of division of labour. In recent years different research areas developed in industrial psychology, because it is not generally proven that humans are searching for satisfaction in work content. The terms are “well-being”, “mental health” (Kronhauser A., 1965), “physical health”

(Udris, 1982), or “qualification and personality development” (Hacker W., 1998). The development of industrial psychology is explained by the model of implicit personality (Schein E.H., 1965, Bögel R. & Rosenstiel v. L., 1993; Ulich E., 2001). The initial phase has two viewpoints. First, a human as “homo oeconomicus” is only oriented to achieve maximum profit. Second, human as “l’homme machine” is seen as a technical device and is used energy-efficiently and maintenance-free unrelated to what he is producing. In the second phase humans are seen as social beings and the satisfaction is not coming from the work itself, but from the relationships with other humans. In the third phase the assumption is that workmen strive towards self-realisation and, therefore, areas of independent decision-making must be arranged in order to use individual abilities. In the last phase there is a stronger uniformity of different concepts, and Schein E.H., 1965 speaks about the “complex man” (Rosenstiel v. L., 2003).

Psychological theories on motivation and job satisfaction can be transferred to the 3D CAD environment and the work sharing between engineers and technical draughter. Work satisfaction is characterised through the analytical unit – an individual, the analytical element – labour, and the type of measurement – validation (Rosenstiel v. L., 2003). Work satisfaction normally is recorded by an anonymous survey. Mean values and scattering are analysed and referred to departments, subsidiaries and total organisations. Since the beginning of the humanization of work life (Gaugler E., Kolb M. & Ling B., 1977) work satisfaction is an indicator for humanization. Job satisfaction is the attitude to work and to the work situation with three different aspects, the evaluated comments to one’s work or work elements (Rosenstiel v. L., 2003). Locke (Locke E.A., 1976) describes work satisfaction as a pleasant and positive emotional state that follows from the evaluation of the own work or work experience. According to Rosenstiel (Rosenstiel v. L., 2003), work satisfaction theory can be classified in needs, incentives, humanistic and cognitive oriented approaches, and all have in common the search for some kind of equilibrium. In the needs oriented approaches the organism seeks internal equilibrium. If the internal balance is disturbed, needs are recognised with the aim towards internal equilibrium. Incentive oriented approaches assume that work satisfaction is the highest and the most pleasurable emotion available to the individual. The focus of the incentive oriented approaches is to determine those traits of the organisation that influence work satisfaction to a particularly high extent. Humanistic approaches claim that the aim of human action is self realization and intellectual growth. Satisfaction accrues through facing challenges, which leads to new experience and connotation. These concepts investigate the way of human life fulfilment in respect to how the individual can cope with existence and therefore are hard to operationalise. Cognitive equilibrium approaches are dealing with the cognitive concept of people who try to match the perceived environment with their designed cognitive plan. Disturbances are recognized as tension and imbalance and they lead to dissatisfaction. Decreasing tension leads to satisfaction as a consequence of the emotional reaction (Rosenstiel v. L., 2003).

Satisfaction is found when the perceived conditions of the workplace optimally match the perceived own role. Demands and individual suitability, personal performance and wages should correspond to each other (Brophy A.L., 1959; Brehm J.W. & Cohen A.R., 1962). The question of how to handle disturbances/non-correspondences leads to the cognitive dissonance theory. The starting point of the theory is that most humans see themselves as reasonable, moral and intelligent, and therefore information and situations which in some way make us look irrational, immoral or naive lead to violent discomfort. This discomfort, triggered by an action which our positive self-image runs counter, is cognitive dissonance (Aronson, 2008). Cognitive dissonance is an essential factor of human thinking. Festinger was the first to investigate and summarize that phenomenon in the most important and provocative theory of social psychology – the cognitive dissonance theory. Initially the social psychologists believed that cognitive dissonance appeared by any two contradictory thoughts and opinions (Festinger L., 1957; Festinger L. & Aronson E., 1960). Later research made clear that not each cognitive inconsistency is equally disturbing. Social psychologists recognized that cognitive dissonance works most strongly, when humans act in a way that threatens their self-image. The big gap between what we think we are and the de facto behaviour is the reason for hard discomfort (Aronson, 1968, 1969). Cognitive dissonance always creates discomfort and the reaction is to reduce that discomfort. There are three elementary different strategies to reduce discomfort: the change of the dissonant behaviour to bring it in line with the self-image; the change of the dissonant cognition by justifying the behaviour; and adding additional cognitions. The engineer in the above-described situation – must feel extreme discomfort, because his self-image is damaged, (cognitive dissonance occurs). His own cognition – the urge to be a reasonable and experienced human is dissonant with the effort put in merely to do a time consuming product documentation work, which is far from the conceptualisation of future systems – the task the engineer was educated for. If this person applies the second strategy of coping with cognitive dissonance and suggests himself that, for example, the preparation of a drawing set is an important work, as that document is the main output of a development department at the end of new product development process. It is needed in every plant worldwide for building that new product. Actually, the document itself is important, but it should be generated by technical draughtspeople. They are better trained for that type of work and cost less. Back to the engineer – he is motivated to see his work as something valuable and tends to interpret the ambivalence more positive. The strategy to see things that need hard effort as more positive is called justification of effort by modern psychologists (Aronson, 2008). So probably some engineers reach cognitive comfort again by suggesting themselves that the generation of the drawing set and the documentation handling to market maturity is very important work, namely, to achieve consonance the engineer could live with the dissonant working conditions by finding some new arguments. However, this strategy might not necessarily be working for a dedicated engineer, and he could, as the worst case

for the company, look according to the strategy for better conditions – in a new employment. Depending on the individual and the job market conditions, there could emerge an undesired tendency of an increased fluctuation, especially among key personnel, caused by a permanently imbalanced team structure.

MEASUREMENT OF TASK SATISFACTION AND ANALYSIS VIA CAUSAL MODEL

In the planned (follow-up) experimental field study, development projects with different levels of the independent variable team structure will be carried out, which means that engineers/ technical draughters will create documentation with varying intensity. To measure the effects, psychologists examine how the individual is feeling in his professional work, bearing in mind that the individual aspiration level changes with experiences (Rosenstiel v. L., 2003) and that the individual condition of consciousness has some influence on job satisfaction (Werner, 1974). In the empirical science the concept of job satisfaction has to be operationalised. Job satisfaction is commonly understood as multidimensional. Through factor analysis researcher found a couple of diverse job satisfaction dimensions. Colleagues, task contents, management and leadership, salary, working conditions, company, career advancement, social benefits, training, recognition and status, performance achievement, responsibility, safety and personal development are the main dimensions discovered (Rosenstiel v. L., 2003). According to Vroom (Vroom H., 1964) general factors for job satisfaction are different personality traits, different response tendencies, different environmental conditions. Herzberg and others (Herzberg et. al., 1959) gave a fresh turn to the discussion, assuming that job satisfaction has two dimensions. The first dimension is described as work satisfaction and the second, as not dissatisfaction. Empirical hints indicate that work satisfaction is stronger established through intrinsic motifs, for example, achievement, recognition, work itself, responsibility, advancement and growth. Dissatisfaction can be better diminished through extrinsic motifs, for example, company policy, supervision, relationship with the boss, working conditions, salary, relationship with peers and security. Transferred to the paper, two factors from the socio-psychological realm will be subject to a specific investigation. Will the work itself and the compliance of education level with the demands of the development task increase the satisfaction and the socio-psychological/economic efficiency in the specific 3 D CAD environment? The accent on task satisfaction is justified, because job satisfaction is strongest through the work itself (Ironson G.H., Smith P.C., Brannik M.T., Gibson W.M. & Paul K.B., 1989) and therefore that intrinsic aspect seems to be the most important one. A lot of studies are conducted to see which factors influence job satisfaction in organizations (Vroom H., 1964; Rosenstiel v. L., 1975, 1988; Locke E.A., 1976; Semmer N. & Udriș L., 1995; Weinert A.B., 1998). The results, for the most part, display statistical correlation . In addition, the above-mentioned field study in preparation intends to establish substantial cause-effect relations.

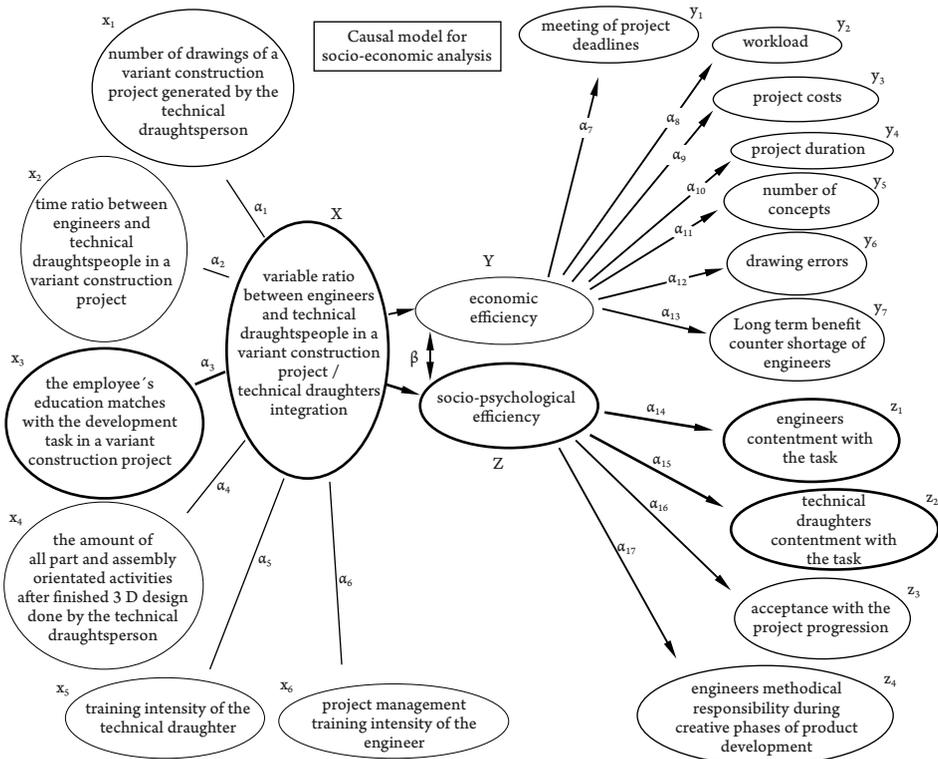


Fig. 1. Causal Model (Staita, 2011)

Legend for the causal model – completed in addition to the explanatory text
 $\alpha_1 \dots \alpha_{16}$ = correl. degrees of dependence between dependent structural & measurement variables
 β = correlative degree of dependence between dependent structural variables

The insights gained through the relevant literature review suggest the assumption that employment of technical draughtspeople for the production of technical drawings (product documentation) and the documentation handling till market maturity within a 3D CAD environment can increase the economic and socio-psychological efficiency of mechanical development departments in medium-sized companies. Socio-psychological efficiency is a decision criterion for all areas of human actions, transactions and interactions, interpersonal relationships and leisure, analysing evaluable variables, such as satisfaction, acceptance, and others. The intended socio-economic analysis will combine the economic terms (cost aspects) with the evaluable variables of sociological, psychological and social psychological provenance, with the view of undertaking cost-benefit analyses and deducing recommendations for the design and use in commercial systems (Neuert J., 2009). The intention is to examine the execution of standard projects at various levels of selected independent variables as indicated in figure 1. The standard projects belong to variant construction, the most frequent development project identified on the whole (cf. Ehrlenspiel K.,

2007; Pahl G., 2005; Eversheim W., 1998). Previous research suggests that project complexity can have significant influence on a team's performance (Ancona G. & / Caldwell D., 1992) and speed to market, or lead time (Kessler E.H. & Chakrabarti A.K., 1999). Therefore, a standard project will be used to obtain evidence that the manipulation of independent variables leads to changes in the dependent ones. The interpretation method to be used is causal analysis, the established method for the analysis of various social and economic issues. Causal analytic models are mathematical constructs which shape the proposed cause-effect relations and try to prove them by statistical procedures, as covariance, correlation, and regression analyses (Neuert, 2009, p. 134ff). According to Buckler (Buckler F., 2001), a causal model is basically composed of an independent structural variable (X), which has effect on the dependent structural variables (Y, Z), that is, – in the simplest case $Y/Z = f(X)$. The independent structural variable (X) itself is explained by a set of exogenous latent variables whose values are determined by factors outside the model (measured by $x_1 - x_n$) and in this connection X is a dependent variable. The dependent structural variables Y and Z are determined by factors within the model i.e. by X and measured by latent – to be further explained – endogenous variables $y_1 - y_n$ and $z_1 - z_n$.

Transferring this understanding to the object of the paper we receive the explanatory model – figure 1; the topic of the paper, the area of socio-psychological efficiency is marked by thick black lines. The relevant path runs from x_3 , the education conformity with the task, to X, the degree of technical draughters' integration, further on to Z, the socio-psychological efficiency, and to z_1/z_2 , the contentment with the task. Whether the outcome of the literature review can be substantiated by that model, is subject to the subsequent research.

CONCLUSIONS

This review of theoretical findings in the area of socio-psychological efficiency was triggered by the severe imbalance, from the view point of the development team concerned, between the organisation of development departments established by the management and efficient working conditions. The research revealed that, if the concerns of the development team are permanently removed from the performance of its actual task, the optimal new product, there are strong reasons for the management to analyse the situation, as it could open good opportunities for increasing the efficiency; while if not, it might as well carry the risk of a continuous divergence from the socio-psychological optimum.

In detail, the findings are as follows:

1. Job enrichment does not necessarily lead to job satisfaction.
2. The aim of economic and social-psychological efficiency imposes limitations on job enrichment.
3. The relevant socio-psychological criterion seems to be task satisfaction, not job satisfaction.

4. Job dissatisfaction factors are not mandatory negative for task satisfaction.
5. Striving for harmony and equilibrium means looking for individual solutions with the least resistance.
6. The study revealed a strong dependence and correlation between task content and self-image.
7. The review of the relevant literature suggests the assumption that a higher conformity of self-image with task content leads to a higher task satisfaction and socio-psychological and socio-economic efficiency.
8. The design of a coherent team structure should be possible that increases the economic and socio-psychological efficiency of the development department and of the company as a whole.

There is at least another problem that needs further investigation: a low fluctuation rate must not necessarily indicate well balanced working conditions; the question is whether in a superficially appearing low fluctuation rate key personnel are over-represented due to their stronger demands for task satisfaction and their higher readiness to change.

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EQUITY CRITERION IN PENSION SYSTEMS ASSESSMENT AND ITS MANIFESTATION IN ESTONIAN AND LATVIAN PENSION SCHEMES

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Abstract. Criteria for the assessment of pension systems are developing with the course of time. The last decade brought the awareness of such dimensions as equity, fairness, transparency and predictability.

The paper provides a verification test of compliance with the criterion of equity for pension systems of Estonia and Latvia. The Estonian system has successfully passed the test, while the Latvian system has failed. The Latvian system lacks elements of income redistribution in favour of lower income groups, and the intergenerational equity is hindered by fundamental properties of NDC scheme.

Key words: *pension systems; equity; Estonia; Latvia.*

JEL code: H55, H75, J26, J32

INTRODUCTION

The taxonomy and criteria for the assessment of pension systems are a developing subject area. At the end of 20th century, economists and politicians predominantly stressed the importance of financial sustainability, affordability and adequacy, and a set of quite reliable indicators has been elaborated for assessing the conformity of pension systems with such criteria. The evaluation of more recently introduced characteristics, such as equity, is less developed. This paper is intended to provide for a sample assessment of the equity criterion through the example of Latvian and Estonian pension systems.

The aim was to identify the exact elements of pension system design that promote or hinder the manifestation of equity principle. To achieve this, pension legislation in the study countries was reviewed for compliance with the attributes of the principle of equity, and hypothetical case studies were examined quantitatively with the methods of simulation analysis.

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1. PENSION SYSTEMS: OBJECTIVES AND CRITERIA FOR ASSESSMENT

All societies, in one way or another, try to meet people's needs as they age and can no longer provide for themselves. Globally speaking, the objectives of all pension systems can be described from two viewpoints (Barr and Diamond, 2006; 2010). From an individual point of view, pension is: (1) a mechanism for consumption smoothing, which enables a person to transfer consumption from his productive years to his retired years; and (2) a means of insurance against the risk of outliving personal pension savings. Politically, pension is an instrument of public policy and is aimed at: (3) poverty relief, as the elderly are a particular group of poverty risk; and (4) income redistribution between income groups. A pension system may also entail redistribution between generations.

Relative weights assigned to the above objectives may vary significantly amongst countries and with the course of time.

Pension systems can be organized in different ways, but in terms of these generally recognized objectives a concept of distinct pension pillars (tiers) have been developed. The three-pillar model was first delineated by the World Bank (1994) seminal report entitled "Averting the Old-Age Crisis". The paper has introduced the concept of multi-pillar pension system and actively propagated the substantial shift to privatization of mandatory pensions. These concepts had first priority in the reforms implemented in the second half of the 90s with the active participation of the Bank – e.g., pension reform in Latvia (Estonians to a much greater extent reformed their pension system under their own steam). Eventually, the World Bank has mitigated its position and begun to advocate a more flexible approach: the initial three-pillar model – (I) a mandated unfunded and publicly managed pay-as-you-go system + (II) a mandated, funded, and privately managed defined-contribution scheme + (III) voluntary retirement savings – has been later extended to include two additional pillars: (0) a basic zero pillar to deal more explicitly with the poverty objective and (IV) a nonfinancial pillar to include a broader context of social policy, such as family support, access to health care, and housing. The experience in implementing pension reforms in numerous countries has also induced Bank experts to appreciate a diversity of effective approaches in response to particular circumstances or needs.

The conceptual framework for assessing existing pension systems and their degree of being in need for reform was also developing with time. In 2005 a group of the World Bank experts prepared the report (Holzmann and Hinz, 2005) which incorporated the lessons learnt from the Bank's experience and research and was intended to conceptualize and explain current policy thinking within the Bank and provide a guide to the criteria and standards applied to provision of pensions. The authors have introduced the above mentioned five-pillar concept and formulated four primary goals of any successful pension system: it should be *adequate, affordable, sustainable and robust*:

- An *adequate* system is one that provides benefits to the full breadth of the population that are sufficient to prevent old-age poverty on a country-specific absolute level in addition to providing a reliable means to smooth lifetime consumption for the vast majority of the population.
- An *affordable* system is one that is within the financing capacity of individuals and the society and does not unduly displace other social or economic imperatives or have untenable fiscal consequences.
- A *sustainable* system is one that is financially sound and can be maintained over a foreseeable horizon under a broad set of reasonable assumptions.
- A *robust* system is one that has the capacity to withstand major shocks, including those coming from economic, demographic, and political volatility.

This concept underwent further development in 2008: the primary evaluation criteria were expanded to include two new parameters: *equity* and *predictability*, and they were not merely added at the end of the list, but notably ranged prior to robustness criterion. The wording of the previously listed criteria has not been changed, while the criteria of equity and predictability have been formulated as follows (Holzmann, Hinz and Dorfmann, 2008, p. 8):

- An *equitable* system is one that provides the income redistribution from the lifetime rich to the lifetime poor consistent with the societal preferences in a way that does not tax the rest of society external to the system; and one that provides the same benefit for the same contribution.
- A *predictable* benefit is provided by a system where (i) the benefit formula is specified by law and not subject to the discretion of policymakers or administrators, (ii) the defined benefit formula is designed to insulate the individual from inflation and wage adjustments prior to retirement or the defined contribution investment policy can insulate the beneficiary from material effects on benefits from asset price adjustments prior to retirement; and (iii) the benefit is automatically indexed during retirement so as to shield the worker from effects of price adjustments.

In his very recent paper Robert Holzmann (2012) explains that the reassessment of what constitutes a good target for pension system reform was influenced, inter alia, by the refocus on basic income protection for the elderly, as reforms of earnings-related schemes towards a tighter contribution-benefit link limited the capability to redistribute income towards low income groups within the schemes.

A similar set of criteria have been also developed by the EU. The Member States have agreed a set of objectives for their pension systems (European Commission, 2010, p. 16):

“Member States are committed to providing adequate and sustainable pensions by ensuring:

- (1) *adequate* retirement incomes for all and access to pensions which allow people to maintain, to a reasonable degree, their living standard after

- retirement, in the spirit of solidarity and fairness between and within generations;
- (2) the financial *sustainability* of public and private pension schemes, bearing in mind pressures on public finances and the ageing of populations, and in the context of the three-pronged strategy for tackling the budgetary implications of ageing, notably by: supporting longer working lives and active ageing; by balancing contributions and benefits in an appropriate and socially fair manner; and by promoting the affordability and the security of funded and private schemes;
 - (3) that pension systems are *transparent, well adapted* to the needs and aspirations of women and men and the requirements of modern societies, demographic ageing and structural change; that people receive the information they need to plan their retirement and that reforms are conducted on the basis of the broadest possible consensus”.

When compared to the definitions cited earlier, in the EU list ‘adequacy’, ‘sustainability’ and ‘affordability’ are named directly (the last one as a precondition of ‘sustainability’); the notion of ‘equity’ appears twice: firstly, as a part of ‘adequacy’ (“spirit of solidarity and fairness”), and secondly, as a part of ‘sustainability’ (“socially fair manner”); ‘predictability’ is expressed by the terms of ‘transparency’ and ‘security’; and ‘robust’ systems are qualified as ‘well adapted’.

In my opinion, the first set of definitions, suggested by Holzmann, Hinz and Dorfman, is more comprehensive and straightforward. While ‘the spirit of solidarity and fairness’ lends itself to measuring with difficulty, the manifestations of that spirit outlined by the Bank’s economists can be assessed more easily.

However, while quite a reliable set of indicators has been elaborated for assessing the conformity of pension systems with such criteria as adequacy, sustainability and affordability – a review of indicators used by OECD, World Bank and EU can be found, for instance, in the work of Mark Dorfman and Robert Palacios (2012), the evaluation of equity, predictability and robustness is less developed. This paper is intended to provide a sample assessment of equity criterion through the case of Latvian and Estonian pension systems.

2. ASSESSMENT OF EQUITY CRITERION: GENERAL REMARKS

The performance of a pension system can be assessed in two ways: by analyzing the actual statistical data, and by analyzing the logic of the legislator and modeling and studying hypothetical cases. This study follows the second approach: I examine those elements of pension systems in Latvia and Estonia that are influencing the ability of those systems to comply with the equity criteria as formulated above, i.e. to (1) provide income redistribution from the lifetime rich to the lifetime poor, and (2) ensure the same benefits for the same contributions.

Both Latvia and Estonia entered their new eras of independence with identical old-age security systems inherited from the Soviet period. They also faced very similar transition-related challenges: the severe economic turmoil surrounding the collapse of the Soviet Union, leading to extremely high inflation rates and deep recession. The processes of radical economic reforms were accompanied by reforming the old social security institutions and schemes, the countries were motivated to escape from the legacy of the communist period and to build new pension systems to suit new political and economic realities. This process was shaped by the world-wide trend towards multi-pillar structures.

While the role of funded (2nd and 3rd) pillars is increasing with the ageing of population, they do not contribute to ensuring compliance with the equitability goal: benefits in funded schemes are very much depending on the rates of return produced by pension plans chosen by participants and on volatile security markets, thus the rule “same benefits for same contributions” conflicts the very nature of the funded pillars. No redistribution from the lifetime rich to the lifetime poor is provided in these pillars. Moreover, the promotion of voluntary pension plans under the third pillar (by granting tax reliefs on the contributions made to private funds) can be successful only among those persons who have enough “extra” money that can be directed to long-term savings. Those who live from paycheck to paycheck can hardly afford to withdraw any additional amounts from their household budgets and cannot, therefore, expect any significant third-pillar supplement to their mandatory 1st and 2nd pillar old-age pension benefits. This effect is enhanced by the level of financial literacy: as shown in a recent international research (Atkinson and Messy, 2011), persons with higher levels of education – who, as a rule, have higher incomes and therefore make larger contributions to pension funds, – are better informed on financial matters and are less vulnerable to risks of choosing an inappropriate investment strategy. Less educated persons, whose incomes are lower, are more exposed to the risk of making a wrong investment choice. In this context, funded pillars are rendering a disservice to the lifetime poor, causing further distortion in income distribution in old age. The larger share of total pension tax goes to the second pillar, the higher degree of inequity the system generates. In Latvia the pension tax (or, more accurately speaking, social insurance contributions directed to pension insurance) is set as 20% of gross salary, and the present target for I/II pillar division is 14/6 (was varying over time, with initial target proportion of 10/10), i.e. II pillar fraction is planned to account for 30% of the total pension tax. The pension tax rate in Estonia amounts to 22%, with the division between pillars set at 16/6 – respectively, II pillar fraction accounts for 27.3% of the total pension tax. The difference is not too critical, but, nevertheless, future generations of Latvian retirees will be to some extent more dependent on II pillar benefits than their Estonian agemates.

Generally, legislators incorporate instruments for income redistribution into the first and zero pillars. The zero pillar benefits in the two study countries are intended for persons who do not qualify for a “normal” social insurance old-age

pension (e.g., have short service records). In Estonia, such persons are entitled to the so called ‘national pension’, currently (in 2012) the national pension benefit amounts to 134.10 EUR, and the figure is subject to annual indexation. It also serves as a benchmark for the minimal I pillar pension benefit. Latvian legislation does not provide for any specific zero pillar pensions, but the persons not eligible for a “normal” I pillar pension can apply for a social security state benefit of 45 lats (64.03 EUR). It is worth mentioning that the qualification age for this benefit is 5 years higher than the legal “normal” pensionable age (that is, presently 67 years vs. 62). The state social security benefit is not indexed on a regular basis (and no rules prescribe any kind of indexation), and the present rate has remained unchanged since 2006. Minimum old-age pension levels are linked to the state social security benefit with multiplying factors (depending on service records – from 1.1 for persons with less than 20 years of length of service to 1.7 for those with more than 40 years of length of service). As there is no indexation for the state social security benefit, there is no indexation for the minimum pension either, in contrast to Estonia.

Furthermore, the Latvian zero pillar benefit does not fully meet the condition formulated above, namely, that the income redistribution in an equitable system should be arranged “in a way that does not tax the rest of society external to the system”, since it is financed by social insurance contributions other than direct pension tax, at the cost of funds available for unemployment, maternity, child care and disability benefits.

The most illustrative example of different societal preferences in Latvia and Estonia are I pillar formulae in these countries, and they have been closely analysed below.

3. VERIFICATION OF THE EQUITY CRITERION IN I PILLAR SCHEME IN ESTONIA

The first pillar scheme in Estonia consists of three components:

- flat basic component;
- insurance component;
- pre-reform service component (for service record till 31/12/1998)

The basic amount presently equals 120.2069 EUR. The amount of the insurance component is calculated on the basis of the sum of annual factors (points) of pension insurance since January 1, 1999. A person is annually awarded a number of points that are equal to the ratio between his/her salary and nationwide average insured wage in the respective year (average insured wage differs from average wage, since the first is taking into account those unemployed, on sick-leave, on maternity or child-care leave, etc.). Thus, if a person’s salary was equal to the average insured wage – s/he gets one point, if it was twice higher than average – two points, if twice lower – 0.5 points, and so on. The points earned

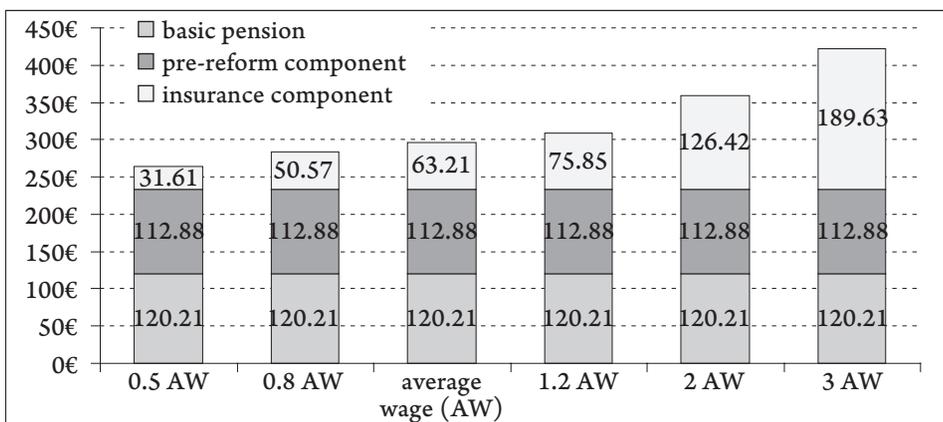
throughout the working career are then summarised, and the sum multiplied by the monetary value of one year (for 2012, one year monetary value equals 4.515 EUR). The third component – for the pre-reform service period – is losing its importance as the years go by, but is calculated likewise. All the pre-reform years of service (i.e. those before 1 January 1999) have a value of one point, irrespectively of actual earnings. Hence, only length of employment matters, and the income gap is neutralised.

Both the basic component and the monetary value of one year are indexed and annually revised and approved by the government. Strict and univocal rules for such revisions are prescribed by the law: a) in no case these values can decrease, even in periods of deflation and/or decrease in the average insured wage; and b) the basic component grows faster than the monetary value of one year.

Benefits are adjusted annually in April according to changes in the consumer price index and the annual increase in social tax contributions. The yearly increase of the consumer price index shall be multiplied by 0.2, the yearly increase in receipt of the pension insurance part of social tax shall be multiplied by 0.8, and the results shall be added together (before 2008 the proportion was 0.5 to 0.5). The obtained figure K is then used for indexing the main parameters of the first pillar pension. Should K be lower than 1, no indexation takes place. Otherwise:

- national pension (zero pillar) is multiplied by K ;
- basic pension is multiplied by $K \times 1.1$;
- monetary value of a year of employment is multiplied by $K \times 0.9$.

Thus, the basic pension is increasing relatively more steeply in order to strengthen redistribution in favour of less paid employees.



Source: author's construction and own calculations based on pension legislation in the Republic of Estonia, Estonian National Social Insurance Board (www.ensib.ee)

Fig. 1. Pension benefit in Estonia as a function of wage (25 years of pre-reform service)

Let us consider a hypothetical case study – a pensioner with 25 years of pre-reform service retires this year (2012) in Estonia – and compare what his/her pension would be depending on his/her average weighted salary in the post-reform period. The Figure 1 below provides calculations for cases from $\frac{1}{2}$ to 3 average nationwide wage (AW) levels.

Although a hypothetical pensioner with 0.5 AW earned four times less than a pensioner with 2 AW, his pension benefit is only 26% lower than the pension of his more prosperous fellow.

Let us assume further that in a year the prices will rise by 5%, but average salaries in the country will increase by 15% (a rather over-optimistic scenario used for the ease of calculations). Then $K=1.13$, and having applied indexation rules to the figures above we shall obtain an increase in basic pension by 24.3% and monetary value of one year by 1.7%. For our hypothetical case study this means that the total pension benefit of our first “poor” pensioner grows by 12%, while the gain of his “rich” counterpart amounts only to 9.3%. The difference between their pensions would shrink respectively. Meanwhile, the difference will not dissolve completely, the principle of proportionality (more contributions – higher benefit) remains honoured, along with the second countermark of equity criterion: the same contributions would continue to provide the same benefits, both intragenerationally and intergenerationally – all persons (both already retired and those whose retirement is still ahead), who earned the same salaries (and, respectively, paid the same contributions) in any given year T get the same annual factor (“points”) for this year, further translated into the same money equivalent by multiplying this annual factor by a monetary value of one year.

We can, therefore, conclude that Estonian 1st pillar pension scheme conforms to the criterion of equity. Surely, there will always be some distortions: for instance, the wealthy, on the average, live longer than the poor and, hence, their retirement lasts longer and they manage to receive more benefits for the same contributions. Women live longer than men – thus a pension system provides some sort of redistribution from men to women. But such distortions can be found in any country and are unavoidable.

4. VERIFICATION OF THE EQUITY CRITERION IN I PILLAR SCHEME IN LATVIA

Latvian first pillar pension formula is much more complicated. It lacks any basic component equal for all. The insurance and pre-reform (service record till 31/12/1995) components formula is designed according to notional defined contribution (NDC) – the pseudo-actuarial approach.

The insurance pension component is based on the insured’s contributions, annual capital growth (K) adjusted according to changes in the earnings index (A), and average life expectancy at the retirement age (G) in the year of taking the retirement (p). The monthly pension benefit (B) is then calculated in accordance

with the formula (1). Formulae (1) and (3) have been devised by the author, based on Cabinet Regulation (2007); the setup of the formula (2) has been slightly modified.

$$B = \frac{\sum_{i=1996}^p Ki \times Ai}{G \times 12} \quad (1)$$

The earnings indices are recalculated each year, as they are products of a number of sub-multipliers – capital indices I_t .

The capital index is calculated by using the following formula:

$$I_t = W_t / W_{(t-1)} \quad (2)$$

where I_t – the capital index in year t ;

W_t – the amount of wages subject to social insurance contributions from 1 August of year $(t-1)$ until 31 July of year t ; and

$W_{(t-1)}$ – the amount of wages subject to social insurance contributions from 1 August of year $(t-2)$ until 31 July of year $(t-1)$.

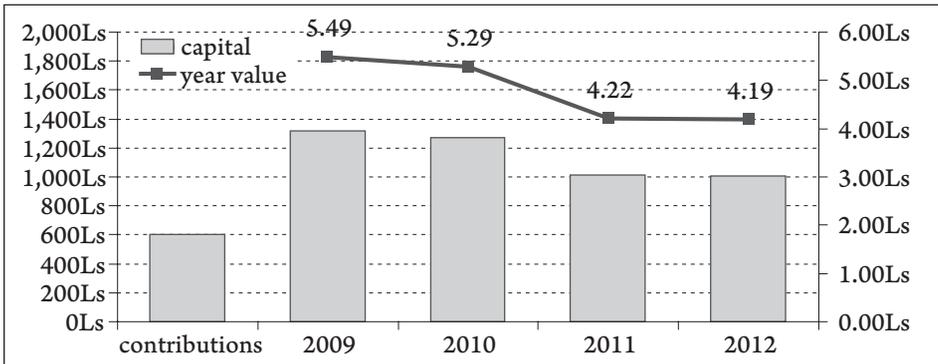
Then, the (annually) updated earnings indices A_i are calculated as products of all capital indices from $I_{(i+1)}$ to I_n , where n is the year preceding the current one.

$$A_i (i=1996 \text{ to } n) = \prod_{t=i+1}^n I_t \quad (3)$$

These indices are respectively applied to adjust all contributions made from 1996 ($I_{1996} = 1$), and also to adjust the initial capital – the pensionable service period component (if any). When a person retires the contributions made in the very year of his/her retirement and the preceding year are included into the pension capital without adjustment (i.e., that $A_p = A_{(p-1)} = 1$, where p is the year of taking the retirement).

Such cumbersome computations are designed to imitate the logic of funded pension systems, and the indices A_i play the role of rates of return. There are no limitations for these indices to fall below 1 (in ‘bad’ years, when the number of contributors and/or nationwide wages decrease); therefore, the accumulated notional pension capital can both grow and reduce. The pension capital is indexed not as a whole, but is split into yearly fractions, each fraction having its own multiplier. The number of fractions equals to the years of service of a person and, since the system was introduced in 1996, by now the maximum amount of fractions in a person’s pension capital is 17.

Let us, by way of example, take a closer look at one fraction and undertake a hypothetical case study on pensioners who were earning the same salary (and respectively, had paid the same contributions) but retired in different years. For such a hypothetical case study I assumed that such pensioners were earning 250 lats per month in 2005, and retired consequently in 2009, 2010, 2011 and 2012.



Source: author's construction and own calculations based on pension legislation in the Republic of Latvia, the State Social Insurance Agency (www.vsa.gov.lv)

Fig. 2. The fraction of notional pension capital and its “monetary value” for Latvian pensioners as a function of the year of retirement

In order to confront Latvian and Estonian formulae, the indexed capital was then translated into “monetary value” of one year (that is, how much money the share of the year 2005 is bringing to the total pension benefit), with an assumption that life expectancy at the retirement age (G) was not changing and was equal to 20 years (such an assumption was made for the ease of calculations – this figure is close to the actually applied coefficients, but it was impossible to find them in publicly open sources). In three years’ time, the notional pension capital and the monetary value have decreased by almost one third (in nominal prices, not taking inflation into account) – for the same contributions ill-fated pensioners retiring in 2012 get significantly lower pension benefits than the more lucky retirees of 2009.

The pre-reform component in the Latvian pension formula is calculated by the same logic – as a separate fraction: the formula simulates that during all pre-reform service years (i.e. before 1996) a person was earning as much as his/her average earnings were in 1996-1999 and 20% pension tax was imposed on those “earnings” – thus, low or high salaries in these four years play disproportionately significant role in retirement incomes for the rest of the life and the income gap is aggravated.

The below figure demonstrates another hypothetical case study: the evolution of a pension capital accumulated by the end of 2009 by a person with an average nationwide insured salary and 25 years of pre-reform service record, having not yet reached the pensionable age. Further contributions (made in 2010-2012) were not taken into account: let us assume that the person stopped to contribute (for example, left the country or lost the job).

In three years’ time, the capital has decreased by almost 11 thousand lats, which means a monthly pension lower by 45 lats. This is a result of the crisis, and will be faced by all the prospective pensioners. However, for the purpose of this study it is not important whether the capital has decreased or increased – during the “fat” pre-crisis years earning indices were high and notional capital was rising much faster

than the capital invested in II and III pillar pension funds. What is important – the rule “same benefit for same contributions” is not working, and the very design of Latvian pension scheme makes no provision for honouring this principle.



Source: author's construction and own calculations based on pension legislation in the Republic of Latvia and statistical data by the State Social Insurance Agency

Fig. 3. Evolution of the accumulated notional pension capital (a person with 25 years of pre-reform service record and average wage)

The Latvian pension formula also lacks any mechanism for income redistribution from the lifetime rich to the lifetime poor: a person with twice higher earnings would get twice higher pension, a person with ten times higher earnings would get a ten times higher pension, and so on. The existing indexation rule, contrary to the Estonian one, does not provide for any difference in the indexation of small and large pensions: the same rate is prescribed for all (an earlier version of the law prescribed more favourable indexation for small pensions, but was revoked).

Thus, both attributes of an equitable pension system are missing in Latvian legislative acts; the manifestation of “the spirit of solidarity and fairness” is very weak.

Public opinion polls (European Commission 2009, 2012) show that Estonians are much less concerned about whether their income in old age will be sufficient to live dignified lives, demonstrating more positive results than the EU average; they return higher ratings when requested to evaluate the situation with pension provision in their country and its anticipated development; they are, on the one hand, more aware of coming population ageing, but, on the other hand, less worried about this fact. They demonstrate significantly higher level of credibility in their pension system. Surely, the situation in Estonia is not so propitious, especially when compared with more developed countries – not with Latvia. Nevertheless, the degree of solidarity and cooperation between generations in Estonia is significantly higher than the one in Latvia.

CONCLUSIONS AND RECOMMENDATIONS

1. A successful pension system should be adequate, affordable, sustainable, equitable, predictable and robust. Relative weights assigned to the above objectives vary significantly amongst countries and with the course of time. A multi-pillar composition of a pension system allows achieving a balanced representation of the whole spectrum of societal preferences.
2. In 1990s the emphasis was mainly placed on sustainability – in the narrow sense of financial sustainability, in the last decade the importance of equity (fairness, justice) criterion is also being more widely acknowledged. An equitable system is one that provides the income redistribution from the lifetime rich to the lifetime poor consistent with the societal preferences in a way that does not tax the rest of society external to the system; and one that provides the same benefit for the same contribution.
3. Pension systems of Estonia and Latvia have much in common, but some elements of their institutional designs make them very different in respect of ensuring an equitable provision of old-age pensions.
4. The analysis of pension legislation and hypothetical case studies demonstrate that pension formula and indexation rules in Estonia promote both income redistribution in favour of the lifetime poor and honour the maxim “the same benefit for the same contribution” in inter- and intragenerational dimensions. The elements of system institutional design that are instrumental in promoting equity principles are: flat demogrants – the national pension (zero pillar) and the basic pension (first pillar), an egalitarian pre-reform service component, and progressive indexation rules – smaller pension rise faster.
5. Similar analysis for Latvia exhibits non-conformity of the Latvian pension system with both the requirements. Its institutional design has no elements promoting those goals; notional pension capital indexation rules even hinder the application of equity principles, but these indexation rules are fundamental for the NDC system and cannot be eliminated. An unfair pre-reform service component further exacerbates income disparities.
6. Should prospective Latvian policy-makers become driven by ‘the spirit of solidarity and fairness’ and place the objective of equity on the agenda – this can be partially reached by adopting the elements of Estonian pension system design: implementing a flat basic component (or at least rising the level of minimum pension bringing it more in line with the subsistence standards) and elaborating more equitable indexation rules: a relatively slower pace of growth for higher pensions, and, conversely, a relatively faster pace of growth for small pensions are recommended.
7. The level of credibility granted to the pension system by the population of a country positively correlates with the degree of equitability specific to the system and creates positive feedback, strengthening its sustainability and robustness. No single objective can be achieved independently but as a concordant ensemble only.

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INTERGENERATIONAL EARNINGS MOBILITY IN NORWAY: EXPLORING REVERSED TRENDS FOR THE TOP AND BOTTOM OF THE INCOME DISTRIBUTION AND THE EFFECTS OF EDUCATION AS TRANSMISSION CHANNEL

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Abstract. Intergenerational earnings mobility can be characterized as the extent to which offspring's earnings are dependent on their parents. Previous research on Norwegian intergenerational earnings mobility and income mobility has revealed strong non-linearities across the (conditional) earnings distribution, with generally increasing mobility across the distribution. In order to obtain a first estimate of the intergenerational earnings mobility, we use an ordinary least square estimator. However, as argued before, research has shown that strong non-linear patterns exist in Norway. Thus, we use a quantile regression approach. Whereas OLS estimates the elasticity on the conditional mean of the income distribution, quantile regression estimates it for θ th-quantile (percentile) of the earning's distribution conditional on the sons' earnings. Transition matrixes are also used for discovering non-linearities. For other countries, top-income literature has shown that a comparable trend of higher intergenerational mobility across the conditional income distribution is actually reversed at the very top (0.1%). We find that a roughly comparable effect can also be observed for Norway. What is more striking is that basically the same behaviour – a reversal of the general trend – is even more distinct for the very bottom of the conditional earnings distribution, where quasi absolute mobility is the case. In line with former studies, we also conduct research on education as a potential transmission channel. We conclude that it plays an important role and find that its effect is also non-linear across the distribution, as it is relatively more valuable to those at the bottom of the distribution.

Key words: *intergenerational mobility; earnings mobility; conditional earnings distribution.*

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INTRODUCTION

Intergenerational earnings mobility can be characterized as the extent to which offspring's earnings are dependent on those of their families. A low degree of mobility means that a person's position in the earnings distribution is highly dependent on their parents' position in the earnings distribution (Nilsen et al., 2011). If this is the case, there is inequality in society over generations that have implications for both society and economy. If primarily the social background defines a child's life opportunities, this contradicts one of the basic ideas of meritocracies. Also, if a lower intergenerational mobility were true for either of the tails of the (conditional) earnings distribution, this would mean that for the fraction with the highest/the lowest income the children's income would tend to be linked closer to their father's than in the rest of the sample. This is perceived as unfairness in society because all members of society (especially children with fathers with low income in this case) should have the same possibility to improve their earnings (as discussed e.g. by Björklund et al. (2012)). In practically all the OECD countries for which evidence is available, parental or socio-economic background influences descendants' educational, earnings and wage outcomes. However, policy reforms can remove obstacles to intergenerational social and/or earnings mobility and thereby promote equality of opportunities across individuals. [OECD, 2010]

So far international comparisons of earnings elasticities (how much a one-percent change in parents' earnings impacts the offspring's earnings) indicate that in Scandinavian societies there is a higher degree of mobility, possibly as a result of policies aimed at reducing inequality, like free schooling (Bratsberg et al., 2006). At the same time, many papers discuss non-linearities (instead of linear estimates) that are observed in measuring intergenerational mobility for separate countries. This approach allows the effect of father's income¹ to differ across the population, depending on the (conditional or unconditional) earnings distribution. Especially for the Nordic countries such non-linear estimators seem appropriate (Bratsberg et al., 2006). The goal of research is to estimate the intergenerational earnings mobility over generations and its non-linear patterns. Besides providing such non-linear estimates, we present transition matrixes to confirm our findings. This approach involves dividing the population into groups ranked in the order of income of parents as well as offspring, and presenting the correlations between the groups.

Furthermore, many studies have shown that additional schooling raises earnings, and also that the returns to higher education have been steadily increasing over the past years. Across European OECD countries, there is a substantial wage premium associated with growing up in a better-educated

¹ As outlined by Nilsen et al. (2011) using father's earnings as a proxy for households earnings is not too unrealistic, as fathers were typically the breadwinners for the families included in the cohorts analysed in this study, while mothers commonly undertook home duties.

family and a corresponding penalty with growing up in a less-educated family. [OECD, 2010] By including education in the intergenerational earnings mobility model (quantile regression), we can measure how much of the correlation in earnings across generations is because of education for the different quantiles (as e.g. discussed by Eide and Showalter (1999)). Thereby, we can analyse if there are differences in effect of additional schooling to earnings for the bottom, and for top earning groups of offsprings. If a higher return to education is true for offsprings from lower income backgrounds, this is a strong argument for Norway to implement more policies to educate especially the poor. Overall, an increased income mobility may improve equity by reducing economic inequality, promoting social justice, and achieving a more equitable allocation of resources. For example, the likelihood of achieving social cohesion may be higher in a society where people believe they can improve their economic circumstances on merit rather than be limited by a poor socio-economic background. Furthermore, improving income mobility may be a way to achieve greater economic efficiency, in that the talents of people from disadvantaged backgrounds are not wasted. [<http://www.conferenceboard.ca/hcp/details/society/intergenerational-income-mobility.aspx>]

RESEARCH RESULTS AND DISCUSSION

1. DATA DESCRIPTION

Our data source is the Norwegian Database of Generations and Norwegian Central Person Register merged by Statistics Norway; this includes the cohorts born every fifth year over the period of 1950 – 1990, merged with data on their biological parents. Earnings are observed based on tax reports over the period of 1967 – 1995. Our sample consists of three cohorts born in 1950, 1955 and 1960. In these cohorts, earnings until the age of 35 were available; that means there will not be biases in lifetime earning measurement that can appear if earnings are observed at a young age. Earnings are measured as five-year averages, and years with zero earnings are excluded from all averages². Earnings are measured in logs, and the averages are calculated from log earnings. For both children (sons and daughters) and their fathers, the five-year averages are based on at least three years of positive earnings. We use the fathers' earnings as the only indicator of the family's earnings capacity. This is the usual approach used nationally and internationally (e.g. Bratberg et al. (2005)). A five-year average is used instead of single-year earnings to avoid short-run measurement errors that can otherwise occur (Nilsen et al., 2011). Using single-year earnings as a proxy of long-term

² As the earnings data were originally collected for calculating old-age pensions, interest and capital income are excluded but unemployment and disability benefits as well as sick payments are included. That actually says that the group of true zero earnings is low and cannot be characterized as zeros unequivocal. (Nilsen et al. 2011)

economic status leads to a downward bias in the estimate of the level of mobility (Hansen, 2010). We also drop observations where the years of education are not observed (409 observations in all cohorts together) as we want to analyse education as transmission channel.

Table 1

Sons' Descriptive statistics

variable	Obs	Mean	Std.Dev.	Min	Max
education	67695	12.1879	2.717029	6	18
log_earnings_son	67695	5.27048	0.692034	-2.30259	8.417385
log_earnings_father	67695	5.176303	0.678854	-1.57819	7.083549
earnings_son	67695	232.3945	107.1144	0.1	4968.331
earnings_father	67695	209.3448	91.70443	0.206349	1841.27

Source: authors' calculations based on Norwegian Database of Generations and Norwegian Central Person Register merged by Statistics Norway

Table 2

Daughters' Descriptive statistics

variable	Obs	Mean	Std.Dev.	Min	Max
education	53873	12.04017	2.627613	6	18
log_earnings_daughter	53873	4.406751	1.103591	-2.241936	7.336112
log_earnings_father	53873	5.211348	0.689744	-1.578185	7.299834
earnings_daughter	53873	125.8167	81.07381	0.1062526	5884.279
earnings_father	53873	216.8171	93.22328	0.2063492	1543.634

Source: authors' calculations based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

Altogether we have 67 695 pairs of fathers and sons and 53 873 pairs of fathers and daughters. The average education year of a child (both sons and daughters) is 12. Looking at earnings, we see that in average daughters earn only a half of sons' as well as fathers' earnings; we also see that sons earn more than their fathers do, which could mean that the average salary (among men) has increased with time.

2. ECONOMETRICAL MODELS AND RESULTS

In order to obtain a first estimate of the intergenerational earnings mobility, we use an ordinary least square estimator. This treats the impact of fathers' earnings on those of their sons' (and then daughters') as linear across the whole conditional sons' (daughters') earnings distribution. The following equations are estimated:

$$y_{si} = \beta_0 + \beta_1 y_{fi} + \varepsilon_i, \tag{1}$$

where y_{si} is the logarithm of the earnings of an offspring in family i and y_{fi} the corresponding logarithm of the father's earnings (β_0 being the intercept and ε_i being the error term). As the offspring's earnings in our respective data sets are all measured at the same periods in their lives, we need not control for their ages. Since this is not true for their fathers, we have to do so for them by including their age in linear and quadratic form (this is a common practice in this field of research, see, for instance, Couch and Lillard (1998) or Björklund et al. (2012)). Moreover, to control for time effects when using data from the cohorts born in 1950, 1955 and 1960, we also include year dummies for the cohorts from 1955 and 1960 (to control for general shifts in the earnings) and have them interact with the fathers' earnings (to control for differing earnings mobility over time, which, as we have evidence to believe, exists (Bratberg et al., 2007)). Hence, our complete model is the following:

$$y_{si} = \beta_0 + \beta_1 y_{fi} + \beta_2 age_f + \beta_3 age_f^2 + \beta_4 Dummy_{1955} + \beta_5 Dummy_{1960} + \beta_6 y_{fi} Dummy_{1955} + \beta_7 y_{fi} Dummy_{1960} + \varepsilon_i, \tag{2}$$

We can interpret β_1 as elasticity; a one percent increase in the father's earnings leads to a change of β_1 percent in the expected earnings of the offspring. The linear estimations yield the following results:

Table 3

Linear Estimate for men

Log_earnings_father_5y	0.130*** (0.00389)
_cons	4.596*** (0.0203)
N	67695

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4

Linear Estimate for women

Log_earnings_father_5y	0.146*** (0.00686)
_cons	3.645*** (0.0361)
N	53873

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: authors' calculations based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

The estimated coefficients (0.130 for sons and 0.146 for daughters) have the same magnitude as former research (Bratberg et al., 2007)³. They mean that for

³ We have tested our results for robust by including age in linear and squared form. Moreover, we have also included year dummies and have them interact with the father's earnings. Even though there is a time trend (Bratberg et al., 2007), which we can also observe, the results are stable. Only for women the coefficient is increased up to 0.223 when including all control variables.

the whole respective income distributions, the effect of a one percentage change in the father's earnings would lead to a 1% increase in the expected offspring's earnings. However, as stated before, we do not trust the linear results and are in particular interested in the coefficients at the extremes of the conditional earnings distribution. Former research has shown that strong non-linear patterns exist in Norway, depending on the conditional earnings distribution (Bratberg et al., 2007). Thus, in line with such previous research with the focus on non-linearities and with the focus on the extremes of earnings distribution (Björklund et al., 2010), we use a quantile regression approach. Whereas OLS estimates the elasticity on the conditional mean of the income distribution, quantile regression estimates it for θ th quantile (percentile) of the earning's distribution conditional on the sons' earnings. Thus, the coefficient vector β will differ depending on the particular quantile being estimated. As we use a log-log specification, the coefficients may be interpreted as elasticities: that is, what is the percentage change at the θ th percentile in the child's earnings resulting from a one percent increase in the father's earnings. This method provides measures of intergenerational mobility at different levels of sons' outcomes, rather than assuming that the mobility parameter is equal for all children. Mobility in the different percentiles of the child's earnings reflects different notions of equality of opportunity for a given society (Roemer, 2004; Bratberg et al. 2007; Grawe, 2004).

In our case, we have set these quantiles so that we also gain insight about both the very bottom (lowest 0.1%) as well as the very top (top 0.1%) of the conditional earnings distribution. As formerly described by Koenker and Bassett (1978), we minimize the following equation:

$$\min_{\beta \in \mathbb{R}^k} \sum_{i \in (i: y \geq x_i \beta)} \theta |y_i - x_i \beta| + \sum_{i \in (i: y < x_i \beta)} (1 - \theta) |y_i - x_i \beta| \quad (3)$$

with y_i being the dependent variable, x_i the k by 1 vector of explanatory variables with the first element equal to unity, β being the coefficient vector and θ as the particular quantile to be estimated.

The quantile regression yields the following results (reported without intercepts, in order to increase readability)⁴:

⁴ We have also run the regression controlling for father's age and the pre-mentioned time dimensions. Findings are roughly the same; regression results for men are shown in the annex. However, then the increase at the very top of the distribution cannot be observed anymore, whereas the elasticity at the bottom of the cond. distribution stays the same.

Table 5

Conditional Regressions⁵

Quantile		Men	Women
0.1%	log_earnings_father_5y	-0.000892 -0.162	0.00772 -0.153
1%	log_earnings_father_5y	0.299*** -0.0637	0.147*** -0.044
5%	log_earnings_father_5y	0.213*** -0.0324	0.242*** -0.0408
10%	log_earnings_father_5y	0.220*** -0.0135	0.246*** -0.0259
25%	log_earnings_father_5y	0.165*** -0.00531	0.243*** -0.0156
50%	log_earnings_father_5y	0.115*** -0.00227	0.158*** -0.00936
75%	log_earnings_father_5y	0.107*** -0.00309	0.102*** -0.00495
90%	log_earnings_father_5y	0.103*** -0.00217	0.0782*** -0.00317
95%	log_earnings_father_5y	0.104*** -0.00253	0.0751*** -0.00372
99%	log_earnings_father_5y	0.0952*** -0.00563	0.0899*** -0.00576
99.9%	log_earnings_father_5y	0.132*** -0.00841	0.0730*** -0.0151
N		67695	53873

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

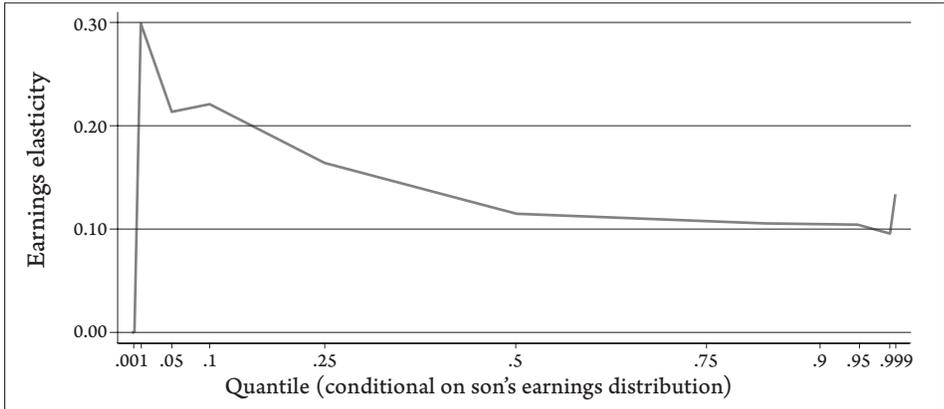
Source: authors' calculations based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

The quantile regression in Table 3 shows us strong non-linearities across the sons' conditional earnings distribution. Between the 1st and 50th percentile the coefficients decrease strongly, from 0.299 to 0.115, meaning increasing mobility. Between the 50th and the 99th percentile, this coefficient goes down further, to 0.0952. At both ends, however, we observe that their corresponding tails' trends are reversed: for the very bottom (0.1%), the earnings elasticity is insignificant (and even slightly negative), meaning perfect independence from fathers' earnings; for the extreme top (0.1% again), the elasticity is higher (against the decreasing trend), it is 0.132 (even though this reverse in trend is considerably

⁵ All quantile regressions reported without intercept (due to space constraints and no additional insights to be gained)

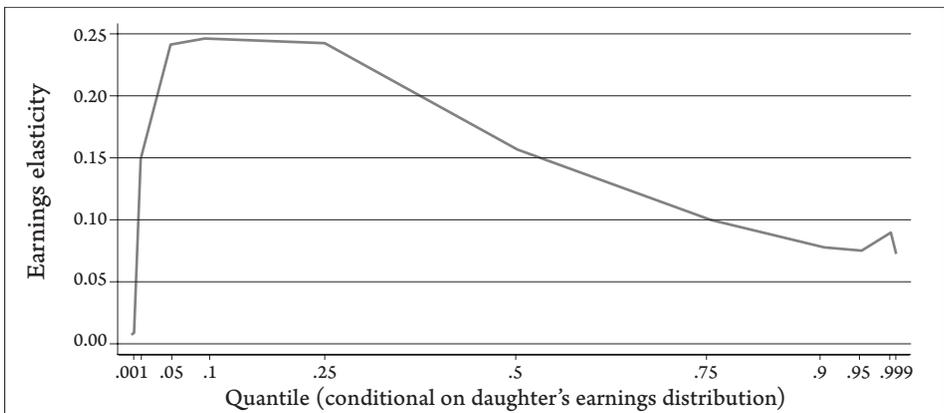
weaker than at the bottom end). Other than for the very bottom, all coefficients are statistically significant on the one percent level.

For women, the general picture is roughly the same. We also observe distinct non-linearities across the conditional earnings distribution. In addition, an overall decrease in elasticities occurs, and we see the reversing of the trends at the extremes. However, these already appear at the 1%–most extreme ends, not only at the very extremes.



Source: authors' construction based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

Fig. 1. Earnings elasticity in Norway for men⁶



Source: authors' construction based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

Fig. 2. Earnings elasticity in Norway for women

⁶ The graphs showing the results of the quantile regressions have been produced using the `grqreg`-command by Azevedo (2011). The command has been adjusted to correctly handle quantiles smaller than 10%.

Our findings emphasize the non-linearities found by former studies. The general trend of decreasing earnings elasticity across the conditional earnings distribution is reversed at both extremes. This tells us that a) for the very top, the earnings mobility is lower, meaning that for the top 0.1 percent of the conditional earnings distribution, their persistence in the absolute top is higher, and b) that those at the very bottom of the conditional distribution have absolute mobility, meaning that they are independent of their fathers' earnings.

In the transition matrix rows, we see the different quantiles of the sons' earnings distribution (the values being the actual thresholds between the quantiles, which are meaningless for our analysis). In the columns, we see the respective numbers for the fathers' earnings distribution. As before, the groups are 0-0.1%, 0.1-1%, 1-5%, 5-10%, 10-25%, 25-50%, 50-75%, 75-90%, 90-95%, 95-99% and 99-99.9%. The cells' values show what percentage of the boys in the respective row originates in the corresponding groups of the fathers' earnings distribution.

Table 6

Transition matrix for men

log_earnings_son_5y	log_earnings_father_5y												Total
	-1.578	-0.352	2.29	4.032	4.536	5.026	5.291	5.53	5.738	5.919	6.152	6.442	
-2.302585	0	0	4.62	3.08	20	26.15	21.54	10.77	10.77	1.54	1.54	0	100
-0.1579682	0.33	1.64	7.22	5.43	28.06	22.17	24.63	12.15	3.78	3.61	0.82	0.16	100
2.27542	0.18	1.7	6.31	6.72	16.8	23.23	22.05	13.52	4.84	3.91	0.7	0.04	100
4.052809	0.12	1.57	6.35	8.86	18.32	23.16	20.65	12.58	4.25	3.13	0.86	0.15	100
4.624096	0.05	1.02	6.05	7.76	20.47	26.1	21.32	10.94	3.37	2.32	0.54	0.05	100
5.164457	0.16	1.12	4.42	5.37	17.79	29.58	24.56	11.32	3.37	1.91	0.36	0.04	100
5.393277	0.06	0.073	3.18	4.02	13.32	26.34	27.76	16	4.57	3.27	0.67	0.06	100
5.067246	0.09	0.46	2.45	3.13	10.72	21.13	27.95	20.17	7.08	5.59	1.08	0.14	100
5.83733	0.09	0.65	2.04	2.75	8.36	17.61	24.99	22.27	8.86	9.81	2.45	0.12	100
5.984186	0.07	0.44	1.81	2.36	7.35	15.95	23.04	22.71	10.75	12	3.14	0.37	100
6.263933	0	0.16	1.15	2.13	6.4	11.49	20.85	19.05	11.99	18.88	6.57	1.31	100
6.730992	0	0	0	3.03	1.52	3.03	12.12	21.21	16.67	27.27	12.12	3.03	100
Quantiles' percentage	0.1	0.9	4	5	15	25	25	15	5	4	0.9	0.1	100

Source: authors' calculations based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

Table 7

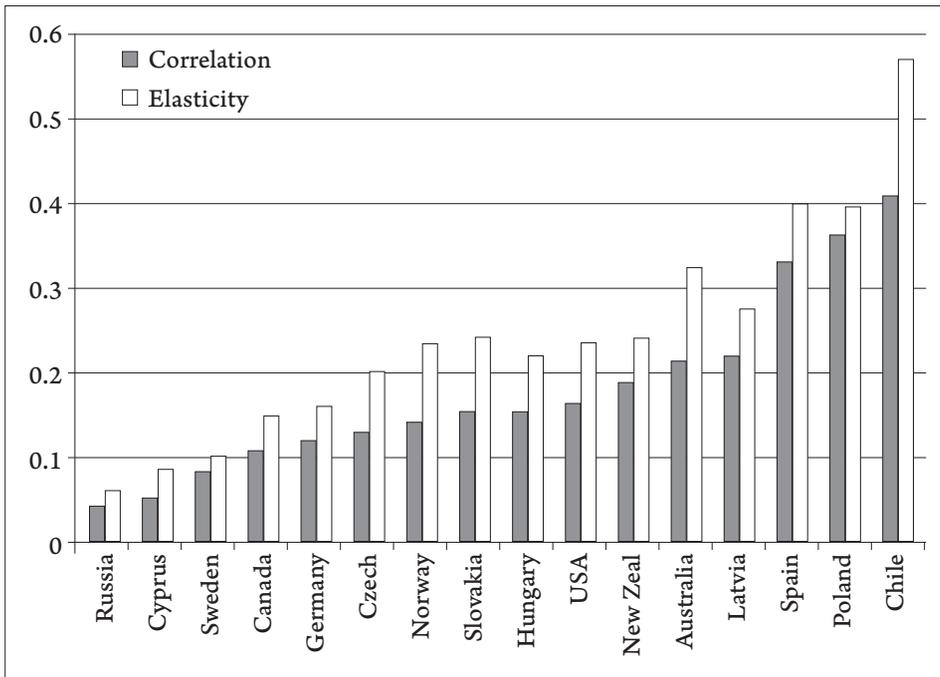
Transition matrix for women

log_earnings_daughter_5y	log_earnings_father_5y												Total
	-1.578	-0.244	2.126	4.1	4.62	5.072	5.322	5.559	5.778	5.954	6.185	6.464	
-2.241936	0	0	9.62	1.92	11.5	28.85	28.85	7.69	7.69	3.85	0	0	100
-0.9162907	0	1.45	5.18	5.38	18.4	28.16	20.5	12.63	5.18	2.28	0.83	0	100
0.5154985	0.14	1.16	3.59	7	17.5	27.41	23.42	11.73	3.71	2.74	0.46	0.09	100
2.070304	0.07	1.45	5.31	5.72	19	26.17	22.68	12.62	3.75	2.9	0.3	0.07	100
2.894453	0.15	0.89	5.17	5.95	18	27.38	22.36	13.16	3.48	2.66	0.72	0.09	100
4.014149	0.1	1	4.19	5.18	16.5	27.36	25.69	12.69	3.76	3.04	0.49	0.05	100
4.736387	0.08	0.91	3.78	4.99	14.5	25.04	25.85	15.24	5.09	3.71	0.76	0.08	100
5.155867	0.11	0.62	3.38	4.24	12.1	22.89	26.99	17.75	6	4.75	1.11	0.09	100
5.475497	0	0.85	2.56	3.41	11	19.3	26.39	19.97	7.83	6.57	1.97	0.15	100
5.502993	0	0.46	2.04	2.74	8.17	14.8	23.06	23.62	11.18	10.39	3.02	0.51	100
5.806283	0.21	0.21	1.24	3.51	5.36	11.14	19.18	22.47	13.61	18.56	4.12	0.41	100
6.18459	0	0	0	1.89	9.43	15.09	13.21	16.98	16.98	11.32	15.09	0	100
Quantiles' percentage	0.1	0.9	4	5	15	25	25	15	5	4	0.9	0.1	100

Source: authors' calculations based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

The transition matrix affirms our regression results. In general, we see that mobility between the quantiles is rather high. Still, we observe our previously discovered patterns. 3.03% of the sons in the top 0.1% come from fathers from the very top (which is 30 times higher than the expected 0.1% if it were randomly distributed), indicating the relatively high degree of stability in that quantile. Moreover, we also notice that none of the sons at the very bottom come from the lowest 0.1% or even 0.1%, once more confirming our findings of very high mobility among those sons who themselves earn very little. For women, the picture is basically the same, albeit we find that none of the women in the very top of the distribution have fathers with very high income. However, the share of fathers in the 99-99.9% quantile is 15.09%, about 17 times higher than the expected 0.9%.

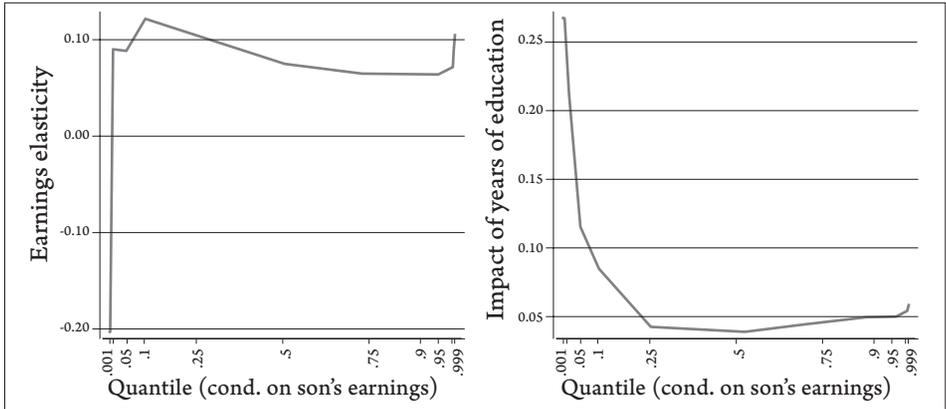
Brief information for readers interested in the situation in Latvia: The intergenerational income elasticity coefficient in Latvia is somewhere close to 0.3, which, although higher than in Norway (less mobility), is a fairly good indicator. From Figure 3 below we also see that the situation in Latvia is better than in Poland but worse than in the Czech Republic, Hungary and Slovakia. We still suggest not to rely only on one estimate for the entire offspring distribution: as we have seen strong non-linearities for Norway, we should be aware that this can also be the case for Eastern Europe and Latvia.



Source: Andrews and Leigh (2008), figure A1

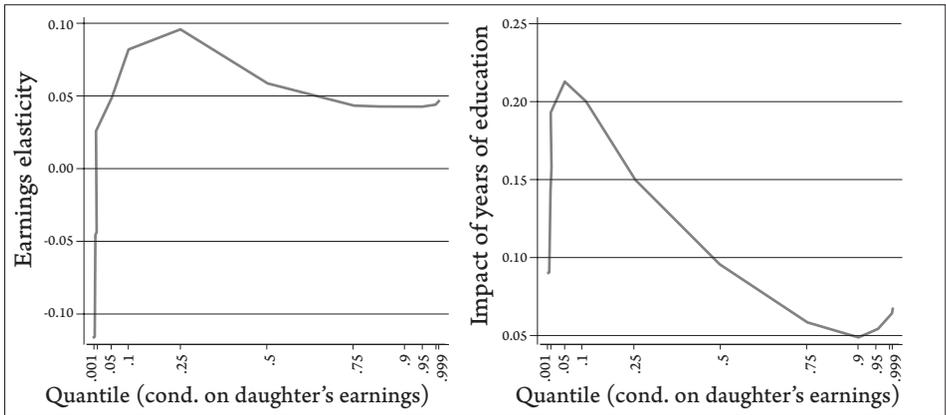
Fig. 3. **Intergenerational income elasticities and correlations from Andrews and Leigh (2008)**

We also conduct research on education as one of the possible transmission channels for potential non-linearity. This factor is often seen as a major transmission channel (e.g. Björklung et al., 2012); in addition, the completed years of education are rather simple to measure, so that biases are unlikely to appear instead when including subjective attributes. To do so, including a control variable for the son’s education in the quantile regression is a proper way (Eide and Showalter, 1999).



Source: authors' construction based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

Fig. 4. Cond. earnings elasticity and the impact of education for men



Source: authors' construction based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

Fig. 5. Cond. earnings elasticity and the impact of education for women

Thus, we see two things: how valuable education is for the different quantiles (possibly different for different quantiles) and by how much the previously-estimated elasticity is decreased through this inclusion (the percentage of decline in the earnings elasticity reflects how much of the intergenerational earnings correlation is transmitted through education (Eide and Showalter, 1999).

Table 8

Conditional Regressions incl. Education

		Men	Women
0.11%	log_earnings_father_5y	-0.204***	-0.116
		(-0.0386)	(-0.0761)
	education_y	0.267***	0.0905***
		(-0.038)	(-0.0261)
1%	log_earnings_father_5y	0.0896	0.0265
		(-0.0462)	(-0.0431)
	education_y	0.226***	0.194***
		(-0.00884)	(-0.019)
5%	log_earnings_father_5y	0.0869***	0.0474
		(-0.0202)	(-0.0355)
	education_y	0.115***	0.214***
		(-0.00429)	(-0.00611)
10%	log_earnings_father_5y	0.122***	0.0825***
		(-0.0108)	(-0.0248)
	education_y	0.0840***	0.202***
		(-0.00232)	(-0.00589)
25%	log_earnings_father_5y	0.103***	0.0961***
		(-0.00689)	(-0.0172)
	education_y	0.0423***	0.150***
		(-0.000965)	(-0.0031)
50%	log_earnings_father_5y	0.0748***	0.0595***
		(-0.00247)	(-0.00807)
	education_y	0.0385***	0.0948***
		(-0.000705)	(-0.00149)
75%	log_earnings_father_5y	0.0633***	0.0438***
		(-0.00207)	(-0.00464)
	education_y	0.0457***	0.0587***
		(-0.000499)	(-0.000953)
90%	log_earnings_father_5y	0.0634***	0.0422***
		(-0.00288)	(-0.00303)
	education_y	0.0500***	0.0488***
		(-0.000468)	(-0.000851)
95%	log_earnings_father_5y	0.0649***	0.0434***
		(-0.00325)	(-0.00259)
	education_y	0.0497***	0.0539***
		(-0.000617)	(-0.000834)
99%	log_earnings_father_5y	0.0708***	0.0444***
		(-0.00468)	(-0.00776)
	education_y	0.0544***	0.0629***
		(-0.00288)	(-0.00195)
99.9%	log_earnings_father_5y	0.106***	0.0472**
		(-0.0152)	(-0.0169)
	education_y	0.0595***	0.0683***
		(-0.0149)	(-0.0136)
	N	67695	53873

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: authors' calculations based on the Norwegian Database of Generations and the Norwegian Central Person Register merged by Statistics Norway

Our results from looking to education as a transmission channel are in line with findings by Eide and Showalter (1999) for US father and son pairs. Firstly, including education, the intergenerational earnings correlations (elasticities) are reduced, secondly, education affects son's earnings differently across the conditional earnings distribution, and, furthermore, education is more valuable at the bottom. For sons the education is more important at the 0.1% quantile than at the 1% quantile with coefficients 0.2667 and 0.2264 respectively. But for girls this is not the case, and the highest effect from education appears for daughters in the 5% and 10% quantiles (coefficients are 0.214 and 0.202, respectively). We see across the whole earnings distribution that the earnings elasticities are reduced by far, meaning that a large share (mostly between 30 and 50%) of intergenerational transmission can actually be explained via education.

We also see differences in non-linearities between genders: the lowest effect of education is in the middle of distribution for sons (50% quantile coefficient is 0.0385), while for daughters it is in the 90% quantile (0.0488). This actually indicates that it is more important for girls to study until a high level of earnings is reached. For sons, higher effects are observed on both extremes; however, the educational effect on the top increases only to the same level to a level equal to the value between 10% and 25% (99.9% quantile coefficient is 0.0595 while 10% and 25% quantile coefficients are 0.084 and 0.042 respectively). This means that there is an enormous effect of education on the first 5% of poorest sons and a high impact also on the 10% of poorest sons, while above that, the effect of additional education on sons' earnings is approximately equal and only increasing slightly at the very top.

In terms of interpretation this means that sons with very low or low income (and relatively low-earning daughters) could earn considerably more if they firmly focused on education, since every year of education has a very high return for them. At the same time this also implies that, those in the very top could also do even better if they studied more. These findings are in line with Eide and Showalter (1999), who also found the biggest effect of education for the 5 and 10%-quantiles.

CONCLUSIONS, PROPOSALS, AND RECOMMENDATIONS

1. In line with former research, we found strong non-linearities across the conditional earnings distribution for Norway, with generally increasing mobility for higher incomes. The highest elasticities at the lower quantiles are about three times larger than the elasticities at the top.
2. We found the evidence of "reversed trends" at the very extremes. The very top 0.1% are less mobile than the top 1%; and the bottom 0.1% are much more mobile than their peers from the 1% group. We observe this pattern roughly for offsprings of both genders. From a policy perspective, the non-linearities

suggest that inequalities exist even in a country like Norway. An even more progressive or further-going tax system might be able to tackle these, even though such a system would probably be hard to implement, and does not automatically lead to higher degrees of mobility and equality. Our findings for the very bottom indicate that there is no need for additional focus of governmental policies on these very poor in particular.

3. These findings are confirmed by the transition matrix, where we find a generally high level of mobility, and also distinctive patterns (very high mobility at the very bottom; relatively low mobility at the very top).
4. Next, we turned towards the reasons for this pattern and more closely examined one likely transmission channel, education. After including it into our regression, the effect of the father's earnings had decreased strongly (30-50%), meaning that such a share of the intergenerational earnings elasticity is actually passed on via education.
5. Furthermore, in line with former studies, we find that the effect of education on earnings is also non-linear. It is more important for those at the bottom of the conditional income distribution, but also increasingly important for those at the top (the exact pattern here is different for the two genders). This finding is relevant for governmental policies. Even though much has been done in Norway to promote a free and fair educational system, more years of education will most benefit the poorest.

We suggest further research on the very bottom and top of the income distribution. Irregularities in trends across the income distribution at the extremes explain very specific phenomena in the intergenerational income mobility and can have a high relevance for policy-makers.

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Iespiests SIA «Latgales druka»