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Today I am introducing interested readers to the newest issue of an international scientific journal which tackles a wide range of issues related to sustainability both in the civil and military domain.

In order to preserve our planet for future generations we need to increase our awareness of threats, as well as discuss and generate solutions. The ultimate aim of such discussions is to arrive at concrete policy developments, which would lead to greater efficiency, consistent with a more manageable use of scarce resources, be it energy, natural, capital or human resources. We need to enhance the awareness and cultural dimensions in the field of security and sustainability, irrespectively of intercultural differences.

Let us cooperate in raising issues, discussing and developing solutions and policies. I truly believe that the joint efforts of civil and military societies, of international organizations, such as the North Atlantic Treaty Organization and the European Union, together with a variety of other stakeholders will ultimately allow us to move towards a secure and sustainable future.

*Sincerely yours,*

**LLOYD CHUBBS**  
LCol (OF-4 CAN Army)  
SHAPE Joint Engineering Division  
Staff Officer Environmental Management

Chairman NATO  
Environmental Protection Working Group
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**EDITORIAL CORRESPONDENCE** including manuscripts and subscription

Prof. Dr. Manuela Tvaronavičienë

Tel.: +370 687 83 944

E-mail: submissions@jssidoi.org, Manuela.Tvaronaviene@vgtu.lt, manuela.tvaronaviciene@lka.lt

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Dr. Jerzy Stańczyk, Siedlce University of Natural Sciences and Humanities, Poland jerzy(at)stanczyk.info.pl
Prof. Ani Matei, National School of Political Studies and Public Administration, Romania amatei(at)snspa.ro
Prof. Gediminas Dubauskas, The General Jonas Žemaitis Military Academy of Lithuania Gediminas.Dubauskas(at)mil.lt
Prof. Agota Giedrė Raišienė, Mykolas Romeris University, AVADA, Lithuania
Prof. Mehmet Huseyin Bilgin, Istanbul Medeniyet University, Turkey bilgin(at)ebesweb.org
Prof. Marina Sheresheva, Lomonosov Moscow State University, Faculty of Economics, Russian Federation m.shersheva(at)mai.ru
Prof. Ramaswamy Ganesan, King Saud University, Kingdom of Saudi Arabia ganesan_sivam(at)rediffmail.com
Prof. Bora Aktan, University of Bahrain, the Kingdom of Bahrain gboru(at)uob.edu.bh
Prof. Leon Pretorius, University of Pretoria, Graduate School of Technology Management, Republic of South Africa, leon.pretoriu(at)up.ac.za
THE INFLUENCE OF PROTECTED AREAS ON MILITARY TRAINING AREAS
IN TERMS OF SUSTAINABLE DEVELOPMENT

Magdalena Zug

Wroclaw University of Economics, Faculty Economics, Management and Tourism in Jelenia Gora,
St. Nowowiejska 3 58-500 Jelenia Gora, Poland

E-mail: magdalena.zug@ue.wroc.pl

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Abstract. Protecting natural resources, for example through a functioning of environmentally protected areas at present is actually connected with eco-development concept, which helps to avoid some mistakes and socio-economical wastes. Creating and functioning of protected areas must be correlated with the development of the neighboring areas, in such a way that it would not be a threat for natural environment. Such neighboring areas are for example military training areas, which partly conserve the environment, as rich nature reserves, including protected areas are located on the majority of them. Therefore, the aim of the article is to examine the connection of protected areas on active military training areas. The article contains the diagnosis of military training areas in connection with protected areas and evaluation of the role of military training areas in nature conservation. The activity of the army on training areas, in view of current intensity and form of activities, should be regarded as not detrimental for nature.

Keywords: protected areas, military training areas, sustainable development

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JEL Classification: Q26, Q01

1. Introduction – sustainable development and protected areas

We begin to appreciate the natural environment when it is seriously endangered and the level of degradation becomes a barrier for further economic and social development, at the same time leading to the worsening of the quality of life of a human being. The protection of the existing and newly created protected areas, whose main objective is nature conservation, is an opportunity to stop this negative situation Nature conservation by, for example functioning of protected areas, is currently strongly connected with the concept of sustainable development, which contributes to minimization and avoiding mistakes as well as socio-economic losses (Zielińska 2009, p. 108).

The notion of sustainable development is stipulated by the Environmental Protection Law (Journal of Laws Environmental Protection) in section 3 subsection 50, where sustainable development is understood as such a social and economic development, where political, economic and social activities are integrated with maintaining environmental balance and stability of basic natural processes, in order to guarantee the possibility to satisfy the basic needs of particular communities and citizens both of the present and future generations. The concept of sustainable development, directly as the first one, indicates the necessity of integral approach to the economic, human and environmental capital. The sectoral approach, that is a separate approach to particular
capitals, damages the process of development as such (Kryk & Zielińska 2007, p. 102).

Protected areas encompass the following forms, as stipulated by the Act on Environment Protection: nature reserves, national parks, landscape parks, protected landscape areas and Nature 2000 areas (Journal of Laws Act on Environment Protection). These areas are particularly predisposed to effective and successful implementation of the concept of sustainable development (Zielińska 2011, p. 87).

The creation and functioning of protected areas must be correlated with the development of adjacent/ neighboring areas, so that they do not pose any danger for natural environment (Zielińska 2009; 2014). Military training areas should be regarded as such areas, as they partially protect the environment, as rich natural resources cover considerable parts of their areas, including protected areas. Therefore, the aim of the article will be to diagnose the connection of the location of protected areas on active military training areas in Poland.

Thus, the article presents:
- the role of military training areas in view of nature conservation,
- protected areas in military training areas in Poland.

The method of normative material analysis regarding protected areas and military training areas was applied in the article.

2. Military training areas vs nature protection

The general public usually considers military training areas as a devastated moonscape. This opinion is widespread especially among those who have never been to a military area, or who lack the necessary information. People are often convinced that operations in the military areas cause large-scale contamination by chemical or radioactive combat substances, fuels, destruction of vegetation and soil, killing animals or disturbance by excessive noise. These negative factors, if they do occur, usually affect only small areas within the military areas which are intensively used for training. Much larger areas of military districts, however, serve only as a buffer zone for the intensively used parts and military operations are almost never carried out here, or only irregularly and very rarely. Such extensive buffer zones are needed primarily for safety reasons. They often serve as important refuge for endangered species and communities. Human activities with negative impact on the natural environment, such as over-intensive agriculture and forestry, construction, industry and recreation, are excluded in the long term from the areas of active military operations. Moreover, the regular disruption of land cover during military operations supports the maintenance of several habitats of community interest (it often replaces the natural function of wind on drift sands). Military areas are isolated from the surrounding landscape for decades. Its biological value is several times greater than of the surrounding countryside (Klimová & Šíbl 2009, p.28).

Global defense spending is $US 1753 billion annually or approximately 2.5% of the world GDP. Significant time and resources is spent in training 28 million defense personnel worldwide. Much of this training on land takes place within specifically designated military training areas (MTAs). Globally, the size of the military training areas estate is likely to be very large, but just how large is unknown. Our preliminary analyses has identified that military training areas cover at least 1% of the Earth’s surface. This figure is believed to be closer to 5–6% as no verifiable data exist for the majority of Africa, South America and Asia. Military training areas occur in all major global ecosystems and have the potential to increase the global protected area network by at least 25%. Military training areas therefore have an important complementary role to play in global conservation. However, public policy makers, the scientific community, government agencies, and nongovernmental organizations have largely ignored military training areas as a conservation resource. We propose four key policy changes to recognize the potential major contribution to conservation that military training areas can play:

1) better document the environmental values of military training areas,
2) develop integrated military training areas land management models,
3) increase dedicated financial resources for the land management of military training areas, and
4) strengthened global leadership to manage military training areas as an environmental resource (Zentelis & Lindenmayer 2015).

5) Given that they host such important natural heritage, it is not surprising that considerable portions of the military estates in the EU scientifically qualify for inclusion in the Natura 2000 network, and have indeed been proposed (for examples: in the Netherlands 50% of the total military estate have been included into Natura 2000, in Belgium 70% was included, 45% of Danish military areas has been included into Natura 2000). The armed forces are already important stakeholders in Natura 2000 by the very fact that military areas have been proposed for the network, but they are also potential partners. Natura 2000 has much to gain from a partnership with the military owners and managers of pSCI (Areas of Community Importance) and SPAs (Special Protection Areas). Natura 2000 is by no means intended to be a system of totally closed reserves, and multifunctional use (including military activities) of the areas is one of the essential characteristics of the network (Kustrová, p.61).

Although some military training areas are degraded as a result of high-intensity training activities and exercises, many remain in relatively good ecological condition. Fort Carson, Colorado, in the United States is an example of a military training areas that is heavily used but supports high quality natural prairie (Herring 2004). Military training areas can maintain high habitat value because they are not subject to pressures like logging, land clearing, agriculture, and urbanization which are degrading the formal reserve systems of many nations (Mascia & Pailler 2011). This is, in part, because they contain unexploded ordnance (Havlick 2011). Thus, for ecosystems already in reserve systems but at risk of degradation, similar ecosystems within military training areas may play an „insurance” role by maintaining the values and biodiversity of those environments.

Both active and abandoned military areas have – recently begun to be perceived as areas with high species diversity, hosting many protected and endangered species. Biologists have gradually discovered that they serve as refuges for organisms which are rare or vanishing from the countryside (Reif et al. 2011). Research shows that these sites are of the same, and for some taxa even of greater importance than reserves with similar types of habitats (Cizek et al. submitted). Areas influenced by military activities are of key importance especially to organisms requiring disturbed and early successional stages, sites which have practically disappeared from the landscape in the past decades (Marhoul & Žámečník).

The current location, extent, and environmental values of military training areas are poorly understood. Preliminary analysis indicates that due to their sheer size, distribution, and coverage of an array of ecosystems, military training areas have the potential to make a significant formal contribution to biodiversity conservation, being recognized as a global biodiversity resource in their own right (Zentelis & Lindenmayer 2015).

3. Protected areas on selected military training areas in Poland

In many cases, closed areas such as military training areas, are located within the limits of protected areas. The access to these areas is formally forbidden for the civilians, they are off-limits to the public, which significantly reduces their usage. These limitations contribute to maintaining rich habitats also as a result of a specific usage of these area by the army.

Military units, as other economic entities, are subject to the Environmental Protection Law and Nature Conservation. On military training areas exist such forms of nature protection as: natural reserves, Nature 2000 areas and some rarest plant and animal species in Poland. The high natural values of military training areas might be proved by the fact, that many Nature 2000 areas are located there - on 10 MTA’s there are as many as 19. (Military training areas-eldorado...).
The facilities called closed areas in the woodlands are connected with the existence of military units or training areas thereon. (Cieszewska, Adamczyk et al. 2011, p. 62). Woodlands, which are often under legal protection in selected nature conservation forms, are located on military training areas. The most common nature resource located in military training areas are dry heathlands. Military training areas usually foster the preservation of such heathlands. It is often the case, that huge heathlands, having the area of even a few thousand hectares, arise and exist on military training areas as a consequence of the activity happening thereon. Different forms of military activity, such as ploughing heathlands in order to clean the area after the exercise, is beneficial for the nature and such activity does not have to damage the habitat. At the same time, as a result of military activity for example the trees are removed. (Pawlaczyk 2002, p. 237).

Protected areas rich in natural values exist on many military training areas (map 1). The most important military training areas will be described below in terms of nature protection.

### Table 1. The biggest active military training areas in Poland

<table>
<thead>
<tr>
<th>MTA</th>
<th>Location</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biedrusko</td>
<td>north from Poznań, between Biedrusko and Chludowo</td>
<td>active</td>
<td>Land forces training area, used mainly by Stefan Czarnecki Land Forces Training Center as tank training area.</td>
</tr>
<tr>
<td>Czarne</td>
<td>north and south-west from the Town of Czarnie</td>
<td>active</td>
<td>Tank training area.</td>
</tr>
<tr>
<td>Drawsko Pomorskie</td>
<td>south from the town Drawsko Pomorskie</td>
<td>active</td>
<td>Land Forces Training Center, equipped state-of-the-art training area for land and air forces, often used for NATO exercises.</td>
</tr>
<tr>
<td>Jagodne</td>
<td>in the woods of Łuków, North–west from the town of Łuków</td>
<td>active</td>
<td>Land training area, academic training area of Polish Air Force Academy.</td>
</tr>
<tr>
<td>Lipa</td>
<td>North-west from the village of Lipa</td>
<td>active temporarily</td>
<td>Land forces training area.</td>
</tr>
<tr>
<td>Nadarzyce</td>
<td>north-west from the village of Nadarzyce</td>
<td>active</td>
<td>Air forces training area (the biggest in Europe), equipped with bomb working site. Former air port and planes in its neighbourhood are used as targets. In the past together with training areas in Borne Sulinowo and Okonek it created a complex of training areas of Russian Army North Group.</td>
</tr>
<tr>
<td>Nowa Dęba</td>
<td>east from the town Nowa Dęba</td>
<td>active</td>
<td>Land forces training area.</td>
</tr>
<tr>
<td>Orzęsz</td>
<td>south-east from the Town of Orzęsz</td>
<td>active</td>
<td>Managed by the Unit of Training Areas of Land Forces Orzęsz with its headquarters in Bemowo Piskie.</td>
</tr>
<tr>
<td>Radomyśl nad Sanem</td>
<td>at the River San, near the mouth of the river to Wisła</td>
<td>active temporarily</td>
<td>Training area used for river crossing exercises and for building pontoon bridges.</td>
</tr>
<tr>
<td>Strzepcz</td>
<td>south from the town of Łębork, between the villages Strzepcz and Osiek</td>
<td>active temporarily</td>
<td>Academic training area of Polish Naval Academy.</td>
</tr>
<tr>
<td>Słubowo</td>
<td>between towns Mława and Chorzele</td>
<td>active temporarily</td>
<td>Training area of Air Force Institute of Technology.</td>
</tr>
<tr>
<td>Toruń</td>
<td>south from the town of Toruń</td>
<td>active temporarily</td>
<td>Training area for artillery exercises, one of the oldest on Poland and in the word.</td>
</tr>
<tr>
<td>Ustka-Wicko Morskie</td>
<td>at the coast, between Jarosławiec and Ustka</td>
<td>active</td>
<td>Air Forces training area, also antiaircraft forces and Polish Navy.</td>
</tr>
<tr>
<td>Wędrzyn</td>
<td>south east from Sulęcin</td>
<td>active</td>
<td>Land forces training area, equipped for example with tank training site and special forces working site</td>
</tr>
<tr>
<td>Zielonka</td>
<td>North east from Warszawa</td>
<td>active temporarily</td>
<td>Used less intensively although the area is still used by the Military Institute of Armament Technology.</td>
</tr>
<tr>
<td>Zagan–Świętoszów</td>
<td>south and south east from Zagan</td>
<td>active</td>
<td>Center of Military Training, joined areas of Zagan and Świętoszów, the base for the MTA is also the former post-German training area in Pstrąż.</td>
</tr>
</tbody>
</table>

Source: Politowski 2015, p. 38
In military facilities, in Międzyrzecz Fortification Region, there is the biggest European overwintering area of bats. Every year over 30,000 bats spend winter there. They come from half of Europe. And in the richest Polish caves their number does exceed 2,000 at the most. (Military training areas-eldorado...).

On the other hand in Jagodne military training area it is possible to meet many species of animals: a moose, a roe deer, a deer, a boar, a wolf, a marten. There are lesser spotted eagles and white-tailed eagles, in the forests surrounding the military training area two nests were located. An osprey, a very rare in our part of the country, has been observed in this area in the recent years. All birds come to the military training area to pray. The most common bird for the area is the European nightjar. It is estimated that in the forests of Łuków exists at least 1% of the Polish population of the bird, and on the training area several couples have their nests. (Military train-
ing areas-eldorado...). On the area Nature 2000 Jeziorno Lubie and Dolina Drawy there are vast heathlands on Military Training Area in Drawsko Pomorskie, which are maintained as result of conducted military activity. Despite intensive military exercise, including NATO forces, the heathlands appear to be a convenient biotope for a wolf, and the training area permanently hosts a herd of European bison. (Pawlaczyk 2002; Training Center Army Drawsko…). In Biedrusko, there is a Protected Landscape Area Biedrusko, which is almost totally located on the area of MTA “Biedrusko”. The area is characterized by extensive open spaces, where are numerous bushes of different kind. One should note here: the orchis, the Dianthus superbus, the Iris sibirica, the Trollius europaeus and the Ononis spinosa. The area was included into Nature 2000, as a special area of habitat protection, there is also a nature reserve “Grogulec”, which protects well maintained poor fen. (http://ebiedrusko.pl/; http://lopuchowko.poznan.lasy.gov.pl/).

Yet area, the MTA Orzysz encompasses the military training area Orzysz and its surroundings located to the east from Lake Śniardwy. A very characteristic landscape element of MTA Orzysz are vast, open glades with sandy grasslands and heathlands, which arise as a result of military activity. Additionally, the military training area is a valuable bird sanctuary. The existence 11 bird species were identified and it is one of the most valuable staging place of the black grouse in Poland and one of the most important nesting areas of the little crake. (Szymkiewicz & Mellin 2009). The Rembertów MTA is located within the limits of Lasy Rembertowsko-Okuniewskie, growing in the east part of Warsaw Valley. The natural peculiarity of this area are fields of open sands (Dune Szwalnicka) and the mosaic of plants connected with natural process of consolidation of inland dunes. A very interesting element of former working areas of armored forces are dry heathlands with dominating common heather. Keeping the lines of fire, using the training areas by armored units, fires have hindered the succession processes and have maintained impermanent non-forest vegetation (Regional Directorate of environment protection in Warsaw).

The MTA Ustka-Wicko Morskie is a well-known sea training area located at the Protected Landscape Area „Pas Pobrzeża na zachód od Ustki”. The area was created in order to protect a part of the Baltic Sea shore with existing there characteristic plant communities of beaches, dunes and cliffs as well as peaty planes along with Lake Wick at the back of them and for the preservation of the unique landscapes of Middle Pomerania. (The Polish Military Aviation; http://rzeszow.rdos.gov.pl/).

On military training areas Żagań-Świętoszó there are vast heathlands and birch woods and alder carr in wet depressions. At the training area in Zagań exists a complex of dry heathlands having the area of app. 600 hectares, which is located within the working areas of the MTA. The heath patches are separated by the MTA roads, sometimes by woods. The army cuts down and mows the newly growing trees on a large area. Whereas, during the period of common heath bloom the space of open training area is used by bee-keepers. (Pawlaczyk 2002, p. 238). At the training area in Nowa Dęba, in Puszcza Sandomierska, there are heathlands used at different intensity for military training. In places used intensively by the army, there are vast areas without plant cover (missile crates, tank roads, burnt areas, quicksand) (Pawlaczyk 2002, p. 238). A few animal species exists there as well, such as: the wolf, the European fire-bellied toad, the Eurasian blue tit (Regional Directorate of environment protection in Rzeszów).

On the area Nature 2000 „Czerwony Bór” a smaller patches of dry heathlands exist, located at the military training area. The heath cover is maintained at the level of 75-90 %. However, in Nature 2000 and natural reserve “Diabelskie Pustacie” there are vast heathlands, which exist also at the MTA. These areas are largely protected actively by cutting down trees and mowing, as a result of which their surface is preserved and the process of overgrowing posing a danger to heathlands regards only separate patches. (Pawlaczyk 2002, p. 235).

The last one from the described MTA is the training are in Wędrzyno, where at the working site exists a rich complex of dry heathlands and grassland.
4. Conclusions

The most important fact is, that on the areas of protected areas there is a concentration of many functions (environmental, social and economic), which in turn lead to arising socio-economic conflicts concerning the functioning of these areas, and this problem also concerns military training areas.

Army activity at the military training areas, at the current intensity and form of conducted activity, need to be recognized as beneficial for the nature. Army training makes the working areas of MTA inaccessible for the civilians, industry and other form of interference. That, in turn, provides sufficient level of nature protection on military training areas and fosters the development of many protected species.

It must be noted that the importance of military training areas in terms of nature protection and maintaining biodiversity in Poland and other European countries is beyond doubt. Many important habitats for the European Union community, especially those which require such protection, as heathlands and different types of meadows are mostly represented in Poland on military areas and have been included into protected areas as Nature 2000 areas, natural reserves and protected landscape areas. The management of training areas should be adjusted in view of the particular activity conducted by military units on those areas. The fate of these priceless habitats, particularly achieving a good level of their protection, is largely dependant on the change of usage of the land, the change of military training needs and in the case of liquidation of military training areas on the active management of those areas. Paradoxically, some of the disturbance that occurs during military activities can be beneficial for conservation. Pioneer communities of fauna and flora depend upon disturbance; in nature this can be soil erosion, wildfire, flooding etc., to which certain species are adapted. In the absence of disturbance, such communities evolve into other habitats through the process of natural succession. Bombing, shelling, prescribed burning for training purposes and armoured vehicle manoeuvres can mimic these natural disturbances and create pioneer communities, or maintain them against natural succession. Thus bare sand and soil, uncommon habitats which rapidly evolve through succession but host a range of rare plants and invertebrates, are constantly created in military areas used for such exercises (Gazenbeek 2005).

While the primary purpose of military training areas will always be military training, their large area, global distribution and representativeness, means they are likely to have significant environmental and conservation values. Indeed, if managed appropriately, military training areas have the potential to augment the global terrestrial protected area network by a conservatively estimated further 4 percent beyond the existing ~12% of the earth’s land surface (Zentelis & Lindenmayer 2015).

Military units, which manage the training areas, should be aware that the protected areas are not only disturbances in functioning of those training areas but also the functioning of those training areas gives a chance to preserve unique natural resources. A thorough research concerning the ecological importance of military training areas has not been conducted yet.

No other areas except the core zones of the national parks and reserves are nowadays so rich on environmental values like the military polygons with a unique charm (Seidl & Chromý 2010).

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ISSUES OF SECURE AND SUSTAINABLE E-TOURISM: CASE OF THE CZECH REPUBLIC

Martin Vaško¹, Josef Abrhám²,

¹, ²Department of Tourism, Faculty of International Relations
University of Economics Prague
W. Churchill Sq. 4, 130 67 Praha 3
Prague, Czech Republic

E-mails: ¹vasko@vse.cz; ²abrham@vse.cz

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Abstract. The extent of the sustainable tourism is increasingly linked to the development of information and communication technologies, especially the Internet and for a long time the online market is becoming a key aspect of its further secure development. Current technological development brings with it significant digitization of all processes and significantly affects how today’s companies are entering and communicating on the online tourism market. Similarly, as a result of these changes, the significant change occurs in consumer behaviour, and across all age groups. With the development of these technologies, today’s consumer is not only knowledgeable and more experienced, but is increasingly being constant online part of this market. The development of online tourism market is thus increasingly strongly linked with the growth of the total Internet population and currently also the one, that is using to the Internet access the cellular infrastructure and equipment. From the perspective of the Internet population the Czech Republic is the fourth largest online population in Central and Eastern Europe, which creates a good starting point for its further application on the growing Central European online travel market. This article aims to analyse current consumer behaviour of Internet users in the Czech Republic in the field of tourism.

Keywords: eTourism, mTourism, sustainability, Internet, tourism, security, consumer behaviour

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JEL classification: L83, L81

1. Introduction

The development of information and communication technologies and the Internet in the last decades significantly affects the development of the global economy and its individual components, including its security and sustainability (Vosylius et al. 2013; Streimikiene, Bilan 2015; Išoraitė 2014; Grubicka, Matuska 2015; Tvaronavičienė, Černevičiūtė 2015; Štitilis, Klišauskas 2015). Tourism is no exception and e-Tourism is becoming one of the most striking phenomena of the late 20th and early 21st century and today it is one of the fastest growing areas (see e.g. Chiabai et al. 2014). Thanks to that the online information and services now are of the key factors affecting the consumer behaviour of tourists across markets. Permanent access to information of various kinds on the Internet leads to the fact that today’s tourist is much more able to influence not only its own travel, but also travel of other tourists.

Current technological development brings with it significant digitization of all processes and significantly
affects how innovatively today’s companies are entering and communicating on the online tourism market (Išoraitė 2014; Tvaronavičienė, Černevičiūtė 2015; Rezk et al. 2015; Išoraitė 2015). Similarly, as a result of these changes, the significant change occurs in consumer behaviour, and across all age groups. With the development of these technologies, today’s consumer is not only knowledgeable and more experienced, but is increasingly being constant online part of this market. The development of online tourism market is thus increasingly strongly linked with the growth of the total Internet population and currently also the one, that is using to the Internet access the cellular infrastructure and equipment. From the perspective of the Internet population the Czech Republic is the fourth largest online population in Central and Eastern Europe, which creates a good starting point for its further application on the growing Central European online travel market (Indrova et al. 2015; or Herget et al. 2015).

This article aims to analyse current consumer behaviour of Internet users in the Czech Republic in the field of tourism. Due to absence of relevant data in this field in the Czech Republic own investigation of consumer behaviour of Internet users was part of this project, is carried out in period from November to December of 2013. The primary objective of this survey was to provide data characterizing the current position of the consumer in the sector of tourism. The secondary objective then was to create a default database for further comparison of the evolution of changes as a result of current and future development trends in eTourism on the domestic market and create the possibility of comparison with the development of the advanced countries of Europe, or the world.

2. Theoretical and methodological base

Theoretical base

As stated by Buhalis and Law (2008) innovation and technology have developed hand in hand with tourism. From the 90th years of the last century, information and communication technologies contributed to the global transformation of tourism. A significant attribute of the current development is, for many years, undoubt-edly Internet. Due to the significant increase in Internet penetration in the last decade it has seen a significant increase of eTourism which according Buhalis (2003) is the digitization and innovation of all processes and relations in tourism, which enables stakeholders to maximize their operation and efficiency. Authors Zelenka and Paskova (2012) in their glossary define generally eTourism as a label for connection of tourism and digital media, today especially with the Internet.

The reasons why the tourism sector is ideal for business on the Internet, are primarily product and service features that are marketable in the electronic environment. Peterson et al. 1997, Garín - Muñoz & Pérez- Amaral, 2010 see low cost, generally, as the key to the success on the Internet, nonmaterial values and high differentiability, which products and services in tourism represent. However, due to these features a high risk is related to the purchase, and as Buhalis & Jun (2011) state, this is the real reason why the customer goes on line and looks for as much information as possible to eliminate the perceived risk. At the same, Buhalis and Jun (2011) note that online booking of tourism products and services is considered to be the most successful eCommerce capitalization.

Equally significantly, the consumer behaviour is now affected by social media. Today’s tourist is not only influenced by the information obtained from a distribution channel offering mainly reviews of clients who actually consumed the offer and decided to share their experiences through social media, will be in the viewfinder as factors that will radically affect the behaviour of today’s consumer. The importance of this is statistically proven: up to 65 % of tourists from all over the world use sites related to tourism on social media (Rose 2011). With the development of ICT, the literature points to the emergence of a new type of user called prosumer (Kaplan & Haenlein 2010). The word is a combination of words Producer (PRO) and Consumer (SUMER), a new generation of customers who generate information (reviews, comments, videos, photos, etc.) and share them with others while, at the same time, they search other people’s information for their own benefit. What is important to know about this expanding group: they trust their peers or other users/colleagues/friends more.
than the information from professionals or businesses themselves. They might even not notice that they were addressed by marketing departments through distribution channels such as television, radio, magazines, websites, etc. Opinions of people from the same community they usually consider relevant and unbiased (Rodriguez 2009).

Rodriguez (2009) goes on to subdivide these prosumers into native digital users, digital immigrants and digitally conscious people. The first group are so-called native speakers of the Internet language. They were born into the information and knowledgeable society and consider it natural to accept new applications. The second group, the digital immigrants, is formed by the generation of users aged around 30-50 who are at the peak of their careers and do not have sufficient time to become familiar with new technologies. If they wanted to keep up with the society, they would have to put in a lot of effort. The last group are digitally conscious people who have enough time and readiness to learn about the latest releases.

Currently, the mobile Internet and mobile technologies are starting to be a key aspect for the further development of eTourism. If we go from definition of eTourism from Buhalis (2003), we can define mTourism as a set of digital activities that tourism bodies make through a mobile device (Vasko 2013). A significant trend that mobile technology brings today is to strengthen the influence of the customer. Mobile phones and tablets have become an integral part of his life, as confirmed by the results of numerous studies. Travelling with technology is becoming common phenomenon, and by Molz (2012), we can talk about these tourists as “flashpackers”. It is a neoplasm that refers to the current situation when in their backpack; people are packing their digital devices such as laptops, smartphones and tablets, to be able to stay online during the trip.

Consumer behaviour (Koudelka 2006) is one of the levels of human behaviour. It includes both the reasons that lead consumers to use certain goods and ways in which they perform, including the effects that accompany this process. It also includes how they subsequently behave after consumption of the goods. In relation to the use of the Internet and its impact on consumer behaviour in tourism here can be included what devices users use to connect to the Internet and to plan their journeys, how to look up for information and services, structure and sources of information, what is susceptible to their decision making, with what equipment they book their stays at hotels or flights, and how much time users spend on the Internet during their holidays, etc. From this perspective, the current level of development of current technology gives consumers the opportunity to perform a variety of new activities, which is reflected not only in practical action but also in a change in the characteristics of its behaviour.

The behaviour of tourists who make extensive use of the Internet and ICT has recently changed radically, according to Sigal (2012), and also significantly affected the tourism sector, namely, in principle, in two different waves. On the one hand, in terms of content, consumers are involved in its creation: they write reviews on accommodation facilities in which they have stayed, they propose new activities, get in touch with other tourists and create new experiences, etc. All of the above influences the decisions of other passengers, thus significantly change their consumer habits. On the other hand, in terms of technology, new devices (such as tablets, smartphones, etc.), technologies (maps, geotagging, etc.) and connectivity (Wi-Fi, 3G networks, etc.) make such behaviour easier and that is before, during and after the actual consumption process.

The use of technology in the context of consumer behaviour is influenced by lifestyle changes - technology serves as a mark of fashion, or social status, allowing us to link the activities of work and leisure, allow us to change the ways of communicating and sharing experiences. In addition, individual technologies do not act separately, but there is a greater extent than before to more complex solutions and applications. This overlap strongly influences the actual buying process in all its stages. Mobile technologies allow us to fundamentally change the time needed for own decisions and more or less blend the different phases of consumer behaviour (Vasko 2013). In addition, the development of mobile applications and implementation of new technologies into mobile devices are creating ideal conditions for their wider use, which is now increasingly moving into the area of self-consumption in the place of residence. At the same time mobile technology offers more options and
time flexibility, which is reflected primarily in the use of services at the last minute, but offers great potential in terms of travel management (its changes) within own trip duration. Mobile technology brings a deeper and broader opportunity for further development eTourism (Vasko 2013).

**Methodological base**

For obtaining the basic empirical data was used statistical method of quantitative research based on respondent questioning. Statistical survey was done by indirect questioning on random respondent sample, so the results can be considered as unbiased and generalized on whole population. Statistical survey was done in accordance with the generally valid methodology for all steps of survey: sample design, data collection instruments, statistical adjustment of data, data processing and final data analysis. For creating the questionnaire were used mainly direct questions with closed answers. In some cases were used questions with semi-opened answers or with multiple choices. As a result of the survey were obtained data file with nominal-polytomous or ordinal-polytomous variables. The evaluation of the results has been done by simple statistic methods using descriptive methods and contingency tables.

Creating of the questionnaire was based, besides its own objectives, on similar researches abroad - mainly research of the company PhoCusWright’s in order to make a comparison of the results with several studies of this company focused on both the European and international tourism services market. The choice of this company was not accidental, as it is a reputable company operating on the international market, which is dealing with this issue for many years and their services are also used by major companies in the distribution of tourism services around the world - such as GDS Amadeus, Sabre, IATA and more. The questionnaire was divided into two parts - the first general one focused on the overall impact of the development of online travel market in the Czech Republic, or its impact on consumer behaviour of Internet users. In the second part, we tried to capture the cumulative impact of the development of mTourism probably as significant future driving force for its further development.

The actual survey was conducted by CAWI (Computer Assisted Web Interview). To obtain a relevant sample of respondents in the dissemination of the questionnaire was used a potential of social networks and e-mailing. Some respondents filled out the questionnaire in the form of direct links with mobile devices. However, from the perspective of resource site visits with the questionnaire predominant a form of direct link over social networks (Facebook) clearly and was 98 %. On the other hand, it is expected that a large number of survey respondents primarily receiving information from social networks used to access also the direct link with the questionnaire. The overall scope and complexity of the questionnaire (25 questions mostly structured) was also reflected in the total final number of completed responses. In the period, the questionnaire was opened by 1129 respondents, finally was completed by 676 respondents, representing 59.88 %. To a full 52 % of respondents completing took approximately something between 5-10 minutes, to the next about 18 % of the respondents filling took 10 to 30 minutes.

In terms of territorial distribution of respondents the largest proportions of respondents was in Prague (39 %), Central and Southern region (12 %), various other regions then have a relatively equal representation. For self-evaluation was used after cleaning 625 questionnaires. From this amount 46.5 % respondents were men and 53.5 % women.

Development of own contribution is based primarily on the methods of analysis, synthesis and scientific reasoning.

**3. Results**

The current research is divided into two main parts. The first part of it focuses on the general specifics of the impact of the Internet on consumer behaviour in tourism. Then the second part deals exclusively with mTourism and its impact on consumer behaviour of Czech citizens. Subsequently in both cases the particular stages
of the purchasing process of consumers were examined, namely it was a phase:
- purchase planning, including searching for information;
- choice of services and comparing options;
- the purchase itself;
- enjoying the services;
- post-purchase, including the experience and feedback of tourists.

Both parts are closely connected and in many aspects the contents overlap. In terms of the research objectives, however, it is very interesting to analyze them separately.

**E-Tourism and general characteristics of consumer behaviour**

Based on the research and the following analysis of relevant data it was found that in the Czech Republic the Internet is used by more than 90 % of Internet users to plan their travels. The chart (Fig. 1) below clearly shows that planning their trips with the help of the Internet is used most by people under 34 years of age. Tourists over 35 also use the Internet, but mainly the male population. In contrast to the development of the Internet population we can see lesser activity especially in the older age population, which is generally relatively large in the Czech Republic. It can be concluded that in the tourist information field these users are still not as experienced and more general use of the Internet prevails among them.

**Figure 1. Usage of Internet for trip planning by gender and age**

Looking at the devices used by most Internet users who plan their journeys, it is naturally a PC which still dominates over mobile devices (Fig.2). It is probably due to the fact that they plan their trips from their homes or workplaces where they have a computer available and they can utilize all their advantages, among which is especially a greater clarity and comfort of use.
Figure 2. Devices used for the Internet trip planning by gender and age

<table>
<thead>
<tr>
<th></th>
<th>Computer</th>
<th>Smartphone</th>
<th>Tablet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men 18-34</td>
<td>17.02%</td>
<td>19.50%</td>
<td>4.96%</td>
</tr>
<tr>
<td>Men 35-54</td>
<td>9.57%</td>
<td>9.22%</td>
<td>5.67%</td>
</tr>
<tr>
<td>Men 55+</td>
<td>7.71%</td>
<td>14.36%</td>
<td>4.02%</td>
</tr>
<tr>
<td>Women 18-34</td>
<td>5.31%</td>
<td>2.48%</td>
<td>8.69%</td>
</tr>
<tr>
<td>Women 35-54</td>
<td>2.48%</td>
<td>8.69%</td>
<td>14.36%</td>
</tr>
<tr>
<td>Women 55+</td>
<td>1.60%</td>
<td>8.53%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Source: Own research

On the other hand, we can also see a relatively high percentage of mobile devices, which corresponds with a similar trend abroad. Tablets and smartphones are used, again, more by men than women.

Respondents browse the Internet especially for information about accommodation, transport and destination itself (Fig.3). The spectre of interest is, however, rather wide – they are also interested in Internet reviews, optional tours, car rentals, information about local transport, climate, weather, visa requirements and the like. Although respondents enjoy searching (64 %) and then they exploit the Internet reviews about the providers and the intermediaries of travel services, then after the trip, they do not bother to write such reviews, as we can see from the results of this research.

Figure 3. Information searched on the Internet

<table>
<thead>
<tr>
<th>What kind of information are you searching of the internet?</th>
<th>Tours</th>
<th>Accommodation</th>
<th>Transport</th>
<th>Car rental</th>
<th>Information about destination</th>
<th>Local transport</th>
<th>Leisure activities (restaurants, tickets, ...)</th>
<th>Reviews (on hotels, airlines, ...)</th>
<th>Other - specify</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48.14%</td>
<td>88.14%</td>
<td>79.82%</td>
<td>87.08%</td>
<td>68.85%</td>
<td>64.25%</td>
<td>64.25%</td>
<td>87.08%</td>
<td>68.85%</td>
</tr>
</tbody>
</table>

Source: Own research
When choosing services, the most frequently used sources of information are Internet search engines like Google.com or the Czech Seznam.cz. The runners up are service provider websites, i.e. hotels, airlines and other. Here we have to point out that there is a difference in the information sources used for the selection of services and for their purchase. Many people choose services via Internet search engines, but then, they make the purchase through a travel agent. Or vice versa - they use Booking.com to find a hotel, and then they contact the hotel directly and buy the service directly from the provider. As the number of compared online resources for the selection of the route is concerned, almost 60% respondents used the information from three to five different sources. A quarter of them tried six or more resources and less than a fifth selects a maximum of two sources. As follows from the previous questions, it is mostly about information related to accommodation, transport, destinations themselves and leisure options. That shows some experience in using the Internet for purchases of travel services – again, the Internet users follow the European trend.

In the shopping process, consumers are already sure when and where they want to go. But the decision where they will buy the service, it is not so clear - at the age of the Internet, the possibilities are many. When purchasing most Internet users (72%) visit a particular provider website directly, where they do the purchase. Less than a half of respondents purchase desired services as a package in the form of a trip from a travel agent. Frequent are also purchases through intermediary services, such as Booking.com or Kayak.com. Mobile applications are used for purchases by only 8% respondents. Comparison of the planning and purchasing phases shows that, when choosing a trip, respondents try more sites, but they purchase mainly from one. The difficulty here might be the lack of trust in online payments. Some respondents therefore stated that they do not buy on the Internet, they only book. During their stay itself, again, 75% respondents go online mainly to Google or Seznam to look for information. Less than a half of the Internet users find useful destination websites and online tourist guides. While mobile applications are not much used when buying the journeys, a greater percentage of uses was observed during the stay – here again, unlike the shopping phase, we are talking about offline maps, navigation and traffic information. Part of the answer to the question respondents were asked was, that they do not use online resources during the stay because most of the information has already been found in advance, or they prefer asking locals for advice or they use printed materials. This can be explained by the high price of mobile connection, especially abroad, and also the commitment to the Internet resources provided free of charge by the providers of tourism services. The least percentage is represented by the information from travel agents and tour operators (3.5%).

As already noted, although Czech Internet users plan their journeys using the experience of others on review sites, they are not very active themselves (Fig.4). In this respect, the Czech consumers compared to other countries lack behind a little, as almost 40% of respondents have never written a review, and 30% more often than not write them. Those who are willing to share their impressions of the visited destinations rather use service provider sites directly, then Booking.com, intermediaries’ (travel agents or tour operators) sites or Tripadvisor.com. Less popular are Orbion, Holidaycheck, Zoover or social networks.
Influence of mTourism on consumer behaviour

The rise of smart phones has greatly affected the tourism market, too. Consumers use paper maps and printed guides less and less and they favour Internet in mobiles phones conveniently available anywhere in the world. Current smartphones and applications can quickly translate unknown words, help with transportation or locate you anywhere in the world. They work as boarding passes, make dinner reservations for you and help you find accommodation. This part of the survey gives an insight into the frequency and the possibility of using mobile phones not only for planning and purchase of trips and services during their stay, but also when using mobile applications.

Mobile devices are used for planning trips by around 40% of Internet users of this survey (Fig.5). In the chart below we can see that the mobile phone for these purposes is favoured by predominantly male population.

![Figure 5: Usage of the Internet in mobile phones for trip planning by gender and age.](source)

**Source:** Own research
Significant differences were observed in comparison with the shopping phase. In this case, the respondents used mobile phones more cautiously. When buying their journeys only 10% of respondents trust purchasing via mobile phone. Most frequently they buy accommodation (79%), airline tickets (70%), bus tickets (62%), train tickets (35%) and local transport tickets in the destination (28%). The graph below shows an interesting aspect in the category of 35-54-year-old males, where 32% of respondents purchase services through mobile phones, a ratio very different from the remaining categories (Fig. 6). The most common reason why respondents would not buy their trips through mobile phones is the poor readability and clarity on the small screen. Other reasons for the reluctance to pay via mobile phone is slow loading pages, lack of confidence in the safety of the reservation, expensive connection and inability of the mobile version of the site to make such reservation. Some respondents stated that they do not have or use the Internet in the mobile phone. While purchasing by mobile phone is used by the minimum number of respondents, during the stay in the destination the number increases significantly, up to 51%. Most frequently maps are used and then the respondents seek further information about local transport, particular attractions, restaurants and tours. Less frequently mobile phones are used for restaurant bookings and tickets as well as online flight checking-in or boarding passes. As most other respondents stated, they used mobile phones to stay connected with family and friends, both through email and social networks, they are also interested in domestic affairs or seek information about the weather.

Figure 6. Usage of the Internet in mobile phone for buying of the trip

Despite the fact that smartphones are owned by an increasing percentage of the population, travel-related mobile applications are use by only 32% respondents. The biggest complication is the need of mobile applications online access, which is not affordable for most consumers abroad. Therefore, more and more respondents are interested in offline applications that can be downloaded before the trip, which are then used in large numbers. At the same time the research shows that of the respondents who said they use the Internet in the mobile phone during their stay in the destination, only less than 48% of them also use also mobile applications (Fig. 7) associated with travelling. Specific examples of widely used applications associated with travel include maps, navigation, airlines’ applications, dictionaries, timetables, weather, Booking.com, Tripadvisor, Michelin Travel, Tabletenky etc. Most respondents found their applications at the App Store/Obchod Play or they downloaded them on the recommendation of friends and people they know.
Figure 7. Purposes of usage of mobile applications

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tours</td>
<td>6.08%</td>
</tr>
<tr>
<td>Accommodation</td>
<td>40.88%</td>
</tr>
<tr>
<td>Flight tickets</td>
<td>39.78%</td>
</tr>
<tr>
<td>Bus tickets</td>
<td>28.18%</td>
</tr>
<tr>
<td>Train tickets</td>
<td>16.02%</td>
</tr>
<tr>
<td>Local transport</td>
<td>38.12%</td>
</tr>
<tr>
<td>Car rental</td>
<td>3.31%</td>
</tr>
<tr>
<td>Travel guide</td>
<td>38.67%</td>
</tr>
<tr>
<td>GPS</td>
<td>76.24%</td>
</tr>
<tr>
<td>Maps</td>
<td>88.95%</td>
</tr>
<tr>
<td>Dictionary</td>
<td>54.70%</td>
</tr>
<tr>
<td>Other - specify</td>
<td>2.76%</td>
</tr>
</tbody>
</table>

Source: Own research

4. Conclusions

The market analysis shows that the Czech Republic is now a territory which benefit from high-tech level and user maturity of its consumers, just as the developed countries of Western Europe. At the same time it can be assumed that their consumer behaviour is strongly influenced by the high penetration of mobile phones in particular, when a role is also played by a social aspect and a higher commitment by Czech consumers for the fashion brand. From the perspective of online resources used in planning and own travel (or place of stay), can be observed rather slightly different representation, however, the same trend. Also, as in other European countries, such as France or Germany, there are probably reflected some experience in the use of online resources, which is reflected in the way the Internet users in the CR approach to search and purchase travel services. The overall level of services used and the information shows the growing importance of mobile technology for the tourism sector. Looking at the releasing mobile services market in the Czech Republic can be expected an increasing demand for mobile Internet and consequently an increase in the use of mobile applications, mobile web and tourism services in general.

Despite the overall high use of social networks in the Czech Republic, it is clear that the Czech Internet users like to be influenced by these resources, but do not tend yet to share their experiences within different review systems. Also, it can be stated that a relatively high percentage of Internet users use mobile Internet and applications at target destination. However, it is expected that abroad rather will be used within the free connection to Wi-Fi networks of tourism services providers as wider use will probably still impeded by the high price strategies of domestic mobile data services providers.

In the introduction it was stated, that this research was inspired by similar researches from abroad, mainly by research of the company PhoCusWright’s from 2012. This part will be dedicated to comparing the situation in the Czech Republic with the European trend. In general it is obvious, that the situation in the Czech Republic copies the European average, although one can encounter several partial differences.
When planning and purchasing trips, people still tend to prefer using computers because they find them more comfortable. Also, it is clearer and safer for them, mainly in payment operations, in comparison with smartphones and tablets. 60% of Czech Internet users compare 3 to 5 different sources when planning a trip. Only one third uses more than 6 different sources. In Europe, more than 6 resources are used only by about 14% of travellers. On the other hand, one third of Europeans compare only 1 to 3 sources, which is considerably higher percentage than in the Czech Republic. When selecting the journey most of the Europeans use the Internet search engines, the second most preferable way are websites of travel agents and tour operators. Here another slight difference is visible – people in the Czech Republic are increasingly turning directly to the service providers – hotels, airlines, etc. Both Czech and Europeans pay attention to travel websites providing information and reviews on travel-related businesses. Unlike Europeans, Czechs unfortunately don’t participate in writing reviews.

Smartphones and tablets are more used during the stay in the destination, where the people don’t have computers and prefer to be more mobile. These devices are then used more by men than women. There are several reasons for that. The research has shown that smartphones are used especially by business travellers, who are mostly men, and men are also bigger fans of modern technologies. Also, the age is an important indicator – the older the Internet user is, the less they use the Internet in mobile phones. This trend, however, is changing, and according to research work in the world, from year to year there are more and more people older than 55 years using Internet in mobile phones. In the future this increase is expected to continue, which corresponds hand in hand with the aging of the current Internet population.

Czech Internet users differ from Europeans also in the usage of smartphones during their stay in a destination. While Czechs use their mobile phones mostly for maps and dictionaries, Europeans in general, besides maps, they look for restaurants, cultural events, hotels or flight tickets. The most used mobile applications are maps in the first place, both in the Czech Republic and Europe. Offline applications are especially popular with travellers. Those are downloaded at home or in the hotel, therefore they don’t need Internet connection, which may be abroad relatively expensive. Sustainable development of tourism is dependent on level of cybersecurity and possibilities to develop of e-tourism in the future.

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Grubicka, J.; Matuska, E. 2015. Sustainable entrepreneurship in conditions of UN (Safety) and technological convergence, Entrepreneurship and Sustainability Issues 2 (4):188–197. DOI: http://dx.doi.org/10.9770/jesi.2015.2.4(2)


Abstract. Promotion of social innovation has been identified as one of the EU priorities because it contributes to the improvement of the quality of life of citizens and national competitiveness. In Latvia, concrete ways to promote social innovation remain not defined yet, therefore the study focused on elaboration of alternative scenarios of social innovation development that would enhance the growth of the economy of Latvia: self-initiative scenario, enterprise initiated development scenario and public participation scenario. The authors defined the aim of the research to evaluate social innovation scenarios for the development of the economy of Latvia. The scenarios were evaluated based on the analytic hierarchy process, which led to the conclusion that the most appropriate scenario for the promotion of social innovation in Latvia is the development of public participation scenario. This scenario emphasizes the need to create an appropriate legislative framework for promoting social innovation and the development of financial and information support tools for social innovation promoters and implementers in Latvia.

Key words: sustainable development, social innovation, scenarios, hierarchy analysis.

DOI: http://dx.doi.org/10.9770/jssi.2015.5.2(2)

JEL Classifications: O35; O31; A13.

1. Introduction

Since 2009, an increasing number of discussions on social innovation initiatives and their implementation opportunities in the Member States have taken place at the European Commission level. Social innovation has been promoted as the solution to the growing social needs, and as an innovative solution for those issues that require structural changes to promote the welfare of the population and more efficient use of financial resources.

Although scientific literature analysis reflects many different views on the definition of the term “social innovation”, its role is gradually growing in the discussions on the EU policy priorities. This is evidenced by the fact that social innovation is one of the “Europe 2020” strategy’s seven flagship initiatives that the European Commission has drawn up to determine the national, European and international measures that would be implemented in the field of innovation in order to achieve the goals set by the “Europe 2020” strategy. Moreover, special attention to the social innovation is provided in scope of the European Union’s initiative “Innovation Union”, which emphasizes the need to incorporate social innovation support measures for the European Social Fund programmes in 2014-2020. In this programming period, for the first time a separate support programme
dedicated to social innovation was established – the EU Programme for Employment and Social Innovation with a total budget of 919 million EUR. The urgency of social innovation can be justified by its importance for economic development and ability to reduce costs or to solve social problems in society (Mulgan et al. 2006) as well as to improve the overall welfare of the society. Social innovation is also important to overcome the market imperfections, in particular to deal with minorities or some specific groups in society (Kacou 2011; Murray, Caulier-Grice & Mulgan 2010; Saul 2011; Evers et al. 2004) or to address the problems faced by government related to provision of public services (Mulgan & Landry 1995; Leadbeater 1997). It is also important to mention that behind business innovation usually stands targeted investor, but social innovation requires different and diverse set of support resources, including policy makers’ recognition and support, and often volunteering and charity (Mulgan et al. 2006). The authors conclude that social innovation is an essential tool for solving social problems, however in Latvia there is lack of research on the importance of social innovation development for the growth of the economy of Latvia. Therefore, the authors have studied the promotion of social innovation in the Latvian context by elaborating the scenarios of social innovation development and performing their evaluation.

The aim of the research is to evaluate the scenarios of social innovation promotion for enhancing the development of the economy of Latvia. The aim of the research has set the following tasks:
1) to elaborate the potential scenarios of social innovation promotion for enhancing the development of the economy of Latvia;
2) based on the experts’ opinion, to define the most appropriate scenario for promotion of social innovation in Latvia.

Materials and methods. In order to summarize the essence of social innovation, the authors used literature analysis. Abstract logical method was used to establish logical constructions that were necessary to identify the problem. The authors also used the methods of analysis and synthesis. Analysis was applied to divide the integrity into components and thus get a view of certain parts of interest, but synthesis allowed consolidating particular elements of the research object in unified integrity (Kozlinskis et al. 2005).

In order to ensure an in-depth study of the current situation in the field of social innovation, the researchers organized a focus group discussion on 20 May 2015, in which experts representing different areas of social innovation participated. The focus group discussion was recorded and afterwards thoroughly investigated by the authors. By using content analysis, the authors summarized and classified the viewpoints expressed during the focus group discussion. The discussion participants represented different spheres of Latvian society: entrepreneurs of different industries, representatives of education institutions, founders of social movements and representatives of NGOs. Since the intention of the authors was to explore the opportunities of enhancing social innovation from the economic perspective, in the subsequent research stages the authors determined three extensive sectors that, on the one hand, by their activities influence the development of the national economy, but, on the other hand, benefit from this development. These sectors are: social sector (individuals of society), business sector (entrepreneurs) and public sector (public institutions). The viewpoints of the discussion participants were useful for further scenario elaboration of social innovation development because the participants represented all the three sectors that are important stakeholders of social innovation promotion.

Based on the findings obtained in scope of the focus group discussion, the authors of this paper elaborated three scenarios of social innovation promotion that would enhance the growth of the economy of Latvia. The scenario method was used because up to now concrete ways to promote social innovation have not yet been determined in Latvia. Therefore, the authors have envisaged several possible future alternatives for promoting social innovation focusing on social innovation topicality from the economic perspective. A scenario is a story about possible future; it is not intended to predict how it will be, but to outline the borders for future development (Rotmans et al. 2000). The scenario method makes it possible to reduce the subjectivity of decision-making, because it is designed for a variety of possible future perspectives (Van der Heijden 2005). Moreover, the scenario planning takes into account the views of various stakeholder groups (Durand 2003; Meissner & Wulf 2012). In scenario elaboration for social innovation promotion in Latvia, the authors used intuitive logic approach (Van der Heijden et al.
According to its guidelines, the elaboration of social innovation scenarios was based on three subsequent steps:
1. To determine the aim of scenario analysis and the scope of the research;
2. To identify the driving forces that determine the development of social innovation;
3. To characterize the scenarios based on the previous research (identification of the driving forces and the results of the focus group discussion);
4. To perform the scenario evaluation.

To define the most appropriate scenario for the promotion of social innovation in Latvia, the authors used the analytic hierarchy process (AHP) developed by American scientist T. Saaty. This method is intended for complex decision making. The essence of the method lies in a systemic hierarchical arrangement of the problem elements. The problem is gradually divided into several simpler parts that are compared eventually in pairs, thus assessing the level of the problem elements’ interaction in hierarchy. Since the AHP intends to involve several experts in assessing priorities, the interests of all the stakeholders of the analysed problem are respected. The evaluations of the experts are presented in numerical values using a relative importance scale (Saaty 1994, 1977).

After filling in the hierarchy matrix, it is necessary to calculate the priority vector for each of the hierarchy elements indicating its importance relative to each criterion of the higher level (Alphonce 1997). The priority vector is obtained after calculation of eigenvector set for each pair evaluation matrix and finally normalizing the result to 1 (Kronbergs, Rivza & Boze 1988). There are several methods for obtaining the coordinates of the priority vector. One of the most common methods uses the calculation of the geometric mean, according to which the elements of each row are multiplied and n-degree root is extracted (n = the number of elements). After dividing each number by the sum of all the numbers, the obtained set of numbers is normalized.

In the hierarchy analysis, the evaluation results obtained from each expert are processed separately and afterwards aggregated in the evaluation summary, thus obtaining the final coordinates of priority vectors for each criterion. The results of criteria comparison are reflected graphically showing the minimum, maximum and average coordinate of the priority vector.

The authors decided to use the AHP method for the current study because it has many advantages. Firstly, the subjective decision making is systemic, which results in precise evaluations. Secondly, the decision takers receive information on evaluation criteria and relative importance scale (Narasimhan 1983). Thirdly, the AHP ensures understanding and reconciliation among the decision-makers (Harker & Vargas 1987).

2. Characterization of the scenarios of social innovation promotion in Latvia

The aim of scenario analysis and the scope of the research. The aim of the scenario method is to elaborate three scenarios for social innovation promotion and of them determine one most appropriate scenario that would most effectively enhance sustainable economic development in Latvia. In order to achieve this aim, it is necessary to investigate the essence of social innovation. To understand the concept of social innovation in the context of Latvia, it is essential to explain each of the two words – “innovation” and “social” because there is no particular definition for this concept.

James Phills points out that innovation is characterized by four essential elements (Phills, Deiglmeier & Miller 2008). Firstly, by innovation we understand the process of innovation creation – the creation of a new product or solution to the problem, which includes technical, social and economic factors. Secondly, innovation is a product or invention (the result of the process). Thirdly, it includes dissemination of the innovation (diffusion) and adaption, to ensure its wider use. Fourthly, it is important to emphasize the ultimate value provided by innovation. Moreover, innovation should include the elements of novelty and improvement. Innovation does not necessarily have to be something original, but it must be something new for its user, its creator or the particular society. In addition, the process or result should be more efficient compared to other alternatives and contain
organizational and environmental *sustainability* element, namely, innovation must operate over a long period of time.

The term “social” is mainly used to describe the needs or problems of certain social groups, social motivation or intentions, social values, or for denoting the social sector. In the context of social innovation, the creation of social value is understood as a reduction of social costs or creation of social benefits, or satisfaction of particular social needs (Phills, Deiglmeier & Miller 2008). It is important to emphasize that the benefits for society is a priority over personal benefit or profit. Many innovations have resulted in benefits to society by promoting employment, increasing productivity and economic growth.

Based on the findings made in scientific literature, the authors understand social innovation as a new, sustainable, effective solution to social problems that primarily provides benefit for society as a whole, rather than particular individuals (Surikova, Oganisjana & Grinberga-Zalite 2015; Dobele 2015). Social innovation can be a product, production process or technology; it can also be an idea, principle, part of a legal act, social movement or the combination of these elements.

**Driving forces determining social innovation.** Social innovation is influenced by different factors and conditions that exist in the external and internal environment of an organization, which accordingly determine the development of social innovation in the country (Raisiene 2012). One of the biggest political and legal obstacles for social innovation in Latvia is lack of legal recognition. Social innovation is not defined as one of priorities how to mitigate social problems; there is insufficient social innovation “policy coordination” (cooperation in the policy domain) and “operational coordination”. This explains the fact that activities related to social innovation are held periodically. Social innovation development is significantly influenced by external funds. In Latvia, social innovation activities mainly are financed from the EU funds and foundations, however, special support instruments should be made for development of social innovation at national level. There is insufficient information on social innovation in Latvia, which leads to the lack of data and measurement. Social innovation development depends also on society values and norms, their ability to take a risk and accept changes. For successful development of social innovation collaboration skills between different stakeholders are very important (Dobele 2015).

Social innovation depends also on different factors at organizational level (resources, level of risk, social innovation strategy, social innovation management practice, organizational learning, and organizational culture) and knowledge, abilities, skills, motivation and the attitudes of individuals. Lack of such characteristics may constitute a significant barrier for social innovation (Moore & Westley 2011; Dufour, Lessard & Chamberland 2014). Finally, it is important to emphasize that social innovation is relevant to all sectors of economy to address the unmet needs of society, which is also an important driving force of social innovation.

Considering the influencing factors and driving forces of social innovation, in the process of scenario elaboration the authors based on two important preconditions of social innovation: taking the initiative of the promotion of social innovation and intensity of support instruments for the promotion of social innovations.

**Taking the initiative.** Considering the fact that almost all social problems are complicated and interconnected, it is necessary to involve differentiated stakeholders in their solution. (Khuttrakun 2013; Tanimoto & Doi 2007). Scientists from various countries have shown that self-organization of society and targeted involvement in socially significant initiatives are an essential prerequisite for harmonization of interests of various members of society (Barnes 2006; Yaojun & Marsh 2008; Petrova & Tarrow 2007; Habermas 1995). Social innovation is often associated with individuals and non-profit organizations, however, many social innovations are created in the business sector. Moreover, the government, the market, a variety of social movements, organizations and educational institutions are also interested in the creation of social innovation (Bulut, Eren & Halac 2013; Phills, Deiglmeier & Miller 2008; Balkiene 2013). This finding was also confirmed by the results of the focus group interviews, in which participants strongly agreed that social innovation is important for all the sectors of the economy of Latvia to satisfy unmet needs of Latvian society.
That means that the initiative of social innovation promotion can be taken by the state, entrepreneurs and/or individuals of the society.

*Intensity of the support instruments.* There could be different support instruments used for the promotion of social innovation. The state can support social innovation by financially considerable support instruments – tax incentives, grants, raising ESf financing for promotion of social innovation. The entrepreneurs and individuals of the society can also promote social innovation by using their own resources.

**The characterization of the scenarios for the promotion of social innovation.** Based on the two before mentioned important pre-conditions that determine the development of social innovation, the authors defined three equally possible future alternatives of social innovation development in Latvia:

- **self-initiative scenario** – social innovation as voluntary work;
- **public participation scenario** – social innovation as a promoter of the country’s sustainable development;
- **enterprise initiated** development scenario – social innovation as an economic existence security guaranty.

The **self-initiative** scenario provides that the incentive of social innovation is undertaken mainly by individuals of the society by doing voluntary work in return receiving no fee or special public aid for promotion of social innovation. Social innovation is implemented as a self-initiative that is motivated by particular community’s unmet needs.

The **public participation** scenario provides that the state is the main initiator of promotion of social innovation. In this case, state ensures access to particular support instruments (financial, legal, informative etc.) for creators and implementers of social innovation. This scenario includes also municipal support, namely, the municipality can promote the development of social innovation by providing infrastructure or informative support. In general, the implementation of this scenario enhances sustainable development of the society because social and economic problems are solved by using financial and other support instruments for social innovation promotion.

The **enterprise initiated** development scenario focuses on entrepreneurs as the main promoters of social innovation including the support instruments that are at their disposal (e.g. mentoring). This scenario enhances social innovation as an economic existence security guaranty for a business.

3. **Evaluation of the scenarios promoting social innovation**

The scenarios of promoting social innovation were evaluated by using hierarchy analysis. In order to apply the hierarchy analysis, the authors elaborated the hierarchy pyramid that was divided into four levels (Figure 1). At the first level, the general objective is defined – choice of the most appropriate scenario for promotion of social innovation development in Latvia. The second level reveals the objects that are interested in social innovation development. Each object is characterised by specific set of criteria and was determined by asking the question: “To whom is it important that social innovation development is promoted in Latvia?” Based on the findings of the scientific literature analysis and the results of the focus group discussion, the authors distinguished three groups of criteria:

- individuals;
- entrepreneurs;
- state (national interests).

At the third level, the authors determined evaluation criteria (interests of the criteria groups). The components of the criteria groups were determined based on the results of the focus group discussion, experts’ evaluation and theoretical study of components that characterise social innovation development.

The fourth level is intended to analyse the three alternative scenarios (self-initiative scenario; public participation scenario; enterprise initiated scenario) for social innovation promotion in Latvia.
The experts had to evaluate the three above-mentioned scenarios (alternatives) in relation to the second and third group of criteria. The authors used differentiated approach for elaboration and evaluation of the scenarios – the scenarios were elaborated by the authors, but the evaluation of the scenarios was performed by five experts that represent different groups of interests.

1. An entrepreneur and founder of a small enterprise “Oskars un partneri” Ltd. The company has been operating for 10 years in the Latvian market. Its core activity is maintenance and trade of computer technologies. The founder of the company is proud of being able to create a workplace for himself (he is the only employee of the company, all other services are outsourced), is an active participant of the socially innovative project “Laika banka” (“Time bank”) and is planning to create a new better platform for exchanging with services in Latvia.

2. An entrepreneur, the member of the board of “Galas parstrades uznemums Nakotne” Ltd., which is a well-known meat processing company in Latvia, founded in 2000, having more than 300 employees, thus referred to as a large company for Latvia’s scale. The company has won Latvia’s public recognition owing to the high quality of their products and the fact that the company is active in introducing social innovations at the enterprise level.

3. The State Secretary of the Ministry of Economics of the Republic of Latvia who has been appointed to this position in July 2015. The Ministry of Economics of the Republic of Latvia is the leading state administration institution responsible for the development of innovation policy in the country.

4. The leading manager of the State JSC “State Real Estate” who is responsible for sustainable maintenance and development of public properties in Latvia.

5. The chairman of the board of rural partnership “Lielupe” who has been awarded a special prize of the Ministry of Agriculture of the Republic of Latvia for active promotion of social projects with rural initiative groups in 2013.

Fig.1. Hierarchy of the evaluation criteria of social innovation promotion

Source: elaborated by the authors
The main aspects that the authors took into consideration to ensure appropriate methodology of scenario evaluation were the number and sphere of activity of the experts.

1. Necessity to have at least four experts involved because too small group of experts can result in a situation when the subjective evaluations of particular experts can significantly influence the coherence of evaluations.

2. Selected experts’ knowledge and competence in social innovation.

Initially, the experts had to compare the criteria groups of the second level in pairs in relation to the overall objective of the first level. To compare the criteria, the authors used a standardised scale of relative importance. Each expert filled in his/her results of criteria group comparison in a specially designated table. After summing up all the experts’ assessments, the authors concluded that national interests or benefits are the most important in promoting social innovation in Latvia (0.38). This criteria group also has the lowest variation coefficient, i.e. 14.6%, which shows the largest expert consensus on this issue (Figure 2).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Minimum value</th>
<th>Maximum value</th>
<th>Average value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interests of the society individuals</td>
<td>0.07</td>
<td>0.53</td>
<td>0.30</td>
</tr>
<tr>
<td>Interests of entrepreneurs</td>
<td>0.14</td>
<td>0.32</td>
<td>0.20</td>
</tr>
<tr>
<td>National interests</td>
<td>0.07</td>
<td>0.47</td>
<td>0.33</td>
</tr>
</tbody>
</table>

**Fig. 2.** Evaluations provided by experts in criteria groups  
*Source: authors’ calculations and construction*

Such results suggest that the state will obtain the most benefit of social innovation development. According to such an assumption, the national competitiveness increase will enable the state to focus on social and economic problems and involve the population in this process. Consequently, later on these benefits will pass over to business community and individuals of the society who will also feel those benefits. This explains the experts’ assessments within this criteria group, namely that individuals of the society will feel less benefits resulting from social innovation development (the arithmetic mean value of the priority vector coordinate – 0.30). However, this priority group indicated the largest variation coefficient – 48.7%, thus revealing sharp differences of experts’ opinion on this issue. This is explained by the fact that people will feel the positive effects of social innovation by improved quality of life, reduction of social exclusion, but at the same time, this effect may be small and little felt in reality.

As a result of AHP, the authors detected the role of the alternatives to the achievement of the main objective according to the nine criteria. In experts’ opinion, the most optimal scenario is public participation scenario (global priority vector – 0.45) followed by enterprise initiated development scenario (0.35) (Figure 3).
The state participation scenario dominates also according to the priority calculations within individual groups of criteria, with the exception of entrepreneur interest positions, in which experts have suggested enterprise initiated development scenario as the most optimal one.

The experts’ assessment has led to the conclusion that the state support instruments are currently most necessary to promote social innovation in Latvia, which includes the establishment of an appropriate legislative basis and informative support instruments for social innovation promoters and implementers. This is evidenced by experts’ determination of public participation scenario as a priority. In addition, the calculations revealed low dispersion around the average value (14%), which can be explained by the fact that all the experts are aware that it is essential to provide a legislative framework for social innovation and introduce support tools for their development to solve social and economic problems in the country. Whereas high evaluation of the enterprise initiated development scenario (global priority vector - 0.35) shows that in Latvia enterprises have an important role in driving social innovation. Experts’ assessment results also show that without the individual’s own activity and initiative, social innovation cannot be successfully promoted in Latvia. In addition, the evaluations of this scenario showed that there is basically consensus achieved in the experts’ views (dispersion around the average value is 23%). This suggests that basically all the experts believe that social innovation is impossible without provision of a variety of support tools, but at the same time individuals’ own initiative is also of high importance.

4. Conclusions and recommendations

Social innovation is a new, sustainable and effective solution to social problems and the value created primarily provides benefit for the society as a whole, rather than individuals. Social innovation can be a product, a production process or technology; it can also be an idea, a principle, and a part of a legal act, social movement or a combination of these elements.

In Latvia, specific instruments for social innovation promotion are not specified at the national level. Therefore the authors elaborated three scenarios for social innovation development: self-initiative scenario; enterprise initiated development scenario; public partnership development scenario.

In the process of the scenario elaboration, the authors determined two main pre-conditions: initiative taking over social innovation promotion and intensity of support instruments for the development of social innovation. The scenarios were evaluated based on the hierarchy analysis method, which led to the discovery that the most appropriate scenario for the development of social innovation in Latvia that would enhance sustainable development of the economy of Latvia is public participation scenario. This scenario emphasizes the need to create an appropriate
legislative framework for promoting social innovation and the development of financial and information support tools for social innovation promoters and implementers.

Since the Ministry of Economics of the Republic of Latvia is the leading state administration institution in the field of economic policy as well as to implement and develop innovation policy in the country, it should take the initiative to create the legislative framework for promoting social innovation in Latvia.

In the further research directions it would be necessary to explore the experience of other European countries in creating their legislative framework for promoting social innovation as well as available support tools in these countries for innovation promoters and implementers. Future studies should also gather experience of other countries in measuring the efficiency of support measures provided by different public partnership projects.

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References


SUSTAINABLE BUSINESS MODELS AND STRUCTURES FOR INDUSTRY 4.0

Gunnar Prause

Tallinn University of Technology
Tallinn School of Economics and Business Administration
Akadeemia tee 3, 12618 Tallinn, Estonia

Tel: +372 5305 9488, E-mail: gunnar.prause@ttu.ee

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Abstract. EU industry accounts for 15% of European value added and the industrial sector plays the role of a key driver for research, innovation, productivity, job creation and exports. One important measure in order to stop the decline of Europe’s global industrial position is represented by Industry 4.0 aiming for the implementation of smart production and logistics. Industry 4.0 touches the entire supply chain comprising product design and development, operations management and logistics and by doing so new business models and structures are required.

Currently, companies start to practice first steps in 3D printing, production in networks and smart logistics and begin to develop new organisational structures and business models to benefit more from the opportunities that the new technology offers. Empirical evidences of successful companies reveals that the new business models are oriented rather on service design, open innovation and network approaches than on the traditional concepts of industrial enterprises. Consequently, traditional industrial companies have to rethink and to renew their business structures and models in parallel with the ongoing implementation of Industry 4.0 to use the new opportunities.

The main focus of Industry 4.0 is laid on the fusion of the virtual and the physical world so that also new concepts are required for managing information and business administration tasks in the context of Industry 4.0. One big step towards the implementation of such a concept is embodied by the Estonian concept of “e-Residency”, which might be an appropriate e-business approach especially when taking into account the needs of internationally operating entrepreneurs and SME’s.

The paper addresses the research question of how new and sustainable business models and structures for Industry 4.0 might look like and in which direction existing traditional business concepts have to be developed to deploy a strong business impact of Industry 4.0.

By focussing on the needs of entrepreneurs and SME sector the paper also discusses why e-residency might be the appropriate concept in the context of Industry 4.0.

Keywords: Industry 4.0, Business Models, Organisational Structures, e-Residency

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JEL Classifications: O3; 015
1. Introduction

After two decades of decline, manufacturing and re-industrialization enjoy a renaissance on the Western economic agenda because politicians, business leaders and scientists recall the role of the industrial sector as a key driver of research, productivity, and job creation (Tvaronavičienė 2014; Rezk et al. 2015; Travkina, Tvaronavičienė 2015). Industry generates 80% of the EU’s private innovations and 75% of its exports (Travkina 2015). Despite these facts a view into the statistical figures reveals that the global share of European manufacturing value added dropped from 36% in 1991 to 25% in 2012 (Veugelers 2013; Heymann and Vetter 2013). Currently, EU industry accounts for only about 15% of the total gross value added and so, consequently, the weakening industrial base in the EU is threatening its wealth and future innovation performance (Eurostat 2015; Tvaronavičienė 2014). Within the last years, many manufacturing initiatives have been started in different parts of the world, directed at re-establishing and regaining a significant industrial share in the economy. A very promising approach seems to be the fusion of the virtual and the real world, i.e. the linkage between internet and manufacturing leading to concepts of smart manufacturing and logistics. Smart manufacturing aims to develop cyber-physical systems (CPS) and dynamic production networks in order to achieve flexible and open value chains in manufacturing of complex mass customization products in small series up to lot size 1 (Ramsauer 2013).

In Germany, the most important industrial EU country with an industrial gross value added of about 30%, this approach has been called “Industry 4.0”, whereas comparable initiatives outside Europe are called “Advanced Manufacturing Partnerships” for the USA or “Made in China 2025” for China (Dujin et al. 2014; Kagermann et al. 2013). Meanwhile, since July 2015, the German minister of economics, Sigmar Gabriel, and the Chinese minister for industry and ICT, Miao Wei, signed an agreement about German and Chinese cooperation in the field of “intelligent manufacturing” including the German Industry 4.0 activities (Handelsblatt 2015). When analyzing the objectives of Industry 4.0 it turns out that Industry 4.0 has even higher ambitions, which are going beyond the development and use of cyber-physical systems and dynamic production networks. As Kagermann et al. (2013) pointed out Industry 4.0 aims also for energy and resource efficiency, increased productivity, shortening of innovation and time-to-market cycles together with a horizontal and vertical integration through value networks and an end-to-end digital integration of engineering across the entire value chain. Internet–linked production facilities and networked manufacturing systems open up a machine-to-machine communication and interaction, called M2M, which allows to name, identify and trace single products during their whole creation process and later on during their life time, which generates new perspectives for the entire supply chain including product design and development, operations management and logistics (Bauer et al. 2014; Brettel et al. 2014). In this sense, Industry 4.0 represents nothing less than the fourth industrial revolution, comprising 3D printing, big data, Internet of Things and Internet of Services, i.e., all of the ingredients needed to facilitate smart manufacturing and logistics processes (Kagermann et al. 2013).

Consequently, the implementation of Industry 4.0 is linked with the hope to bring back competitiveness in the manufacturing and high-tech sector to Western countries. But the successful realisation requires R&D activities and progress in eight key areas comprising standardisation and open standards for a reference architecture, the management of complex systems, the delivering of a comprehensive broadband infrastructure for industry, safety and security issues, work organisation and work design in digital industrial age, specific training and continuing professional development, an appropriate regularity framework as well as resource efficiency (Kagermann et al. 2013).

Until now smart production is still a concept related with many open questions in the eight key areas but the Western industrial countries are equipped with a sufficiently high innovation potential, a sophisticated ICT infrastructure, and highly qualified workforce so that the upcoming standards, technical solutions as well as appropriate and sustainable business structures and models might be developed (Spath et al. 2013). But the R&D needs for Industry 4.0 go far beyond sophisticated production expertise, what is also required is especially ICT related knowledge covering cyber security, e-commerce and e-government (Bileišis 2014; Grubicka, Matuska 2015; Štitilis, Klišauskas 2015).
Since Industry 4.0 emphasises cyber – physical aspects there is a special need for new concepts for the managing of information and business administration tasks in the context of Industry 4.0, safeguarding the integration of the SME sector into international supply chains together with new business models, which are stressing more cooperation and knowledge sharing aspects (Prause 2015a). Such a “Business 4.0” concept, i.e. a concept for the management of information streams and business administration issues within supply chains in the context of Industry 4.0, focussing on the needs of internationally operating entrepreneurs and SME’s has been recently launched by the Republic of Estonia under the title of “e-Residency” (e-Estonia, 2015). Estonia is the first country to offer a transnational digital identity available to anyone who is interested in administering a location-independent business online allowing to manage the related e-business and supporting the new business models of Industry 4.0.

The empirical measures of this paper combine desk top research, expert interviews and case studies, which have been executed within the Europe projects “DesignSHIP” and “Crossing Boundaries” between 2011 and 2015. The discussed business models and structures have been investigated and empirically analysed in companies operating in 3D printing, production in networks or smart logistics.

2. Value Chains and Business Structures of Industry 4.0

In his value chain theory, Porter (1998) stressed the importance the specific profile of activities as a source for the long-term competitive advantage of a company and he used the term company activities synonyms with business processes comprising supply chain processes due to the cross-company character of value chains. Today’s value chains, often evolved over longer periods, tend to be relatively static and the supporting ICT systems exchange information along the value chain via a variety of interfaces but usually there is no global overview from the product perspective that has been manufactured and distributed (Brettel et al., 2014). M2M technology of Industry 4.0 together with internet–linked production facilities and networked manufacturing systems allow to identify and to trace single products during their entire life-cycle and even more because in industry 4.0 it becomes possible for products to organise and choose their own way through the production and related logistics processes (Bauer et al. 2014). The pilot project “AMATRAK” at ISL Bremen showed that self–guided container transportation systems are feasible where the containers are able to choose and book suitable and optimal transportations means according to their own needs (ISL 2015). Thus Industry 4.0 leads to new supply chain paradigms based on complex and intertwined manufacturing networks with changed roles of designers, physical product suppliers, clients and logistics service providers.

As a consequence, Dujin et al. (2014) pointed out that Industry 4.0 value chain will undergo the same fragmentation, which have emerged already before in other monolithic industries like music or the media and that this fragmentation comes along with low entry barriers for SMEs, i.e. the “slicing up” of the aggregate value chains, as well as the entry of new countries bearing low labor costs (Belussi and Sedita 2010). Consequently, Industry 4.0 will deliver greater flexibility and robustness and Industry 4.0–related value chains will be built of flexible and adaptable business structures, which possess the permanent ability for internal evolutionary developments in order to cope with a changing business environment (Koether 2006).

Suitable business structures have been coined by Warnecke (1997) already in the 1990’s in his concept of a fractal company. A fractal enterprise is characterised by self-similarity, self-organization, self-optimization, goal-orientation, and dynamics as winning attributes of flexible and adaptable manufacturing organizations. Warnecke (1997) stressed also intrapreneurship as a success factor of fractals and pointed out that fractal organizations are linked via high performing ICT systems and they decide individually about the type and scope of access to their data. These fractals enjoy the five properties, which have been pointed out by Warnecke and these five properties are also compatible with the discussed characteristics of the Industry 4.0. The process of building a fractal structure is based on relations between material, personal and information whereby inside a fractal structure these relations are closer and more intensive than on the outside, so that fractal building is comparable to mathematical cluster process based on the relationship and weights of the resources. In the context of Industry 4.0 due to the increasing importance of information, internet, cross–company interconnectivity in
operations and supply chain management the weight of information gains significant importance in the clustering process whereby the supply chain comprises the entire product life-cycle process including product design and development, operations management and logistics (Koether 2006).

Consequently, the internet access points within a supply chain as well as the cross–company information interfaces together with their surrounding form structures of high internal interaction and exchange of resources, which can be considered as fractals in the sense of Warnecke since they are built according to the principle “join the parts around an information access point of equal information level” and they represent timely, limited, stable, optimal structures that are changing their shape and structure according to their local needs (Prause 2015b).

Thus coherence between the fractal concept of Warnecke and sub–organizations in Industry 4.0 can be identified as well as another observation of Warnecke stating that the information intensity and complexity inside a fractal is higher than between fractals. Consequently, also the workers in a fractal represent information processing individuals whose required skills and knowledge levels have to be relatively homogenous and strongly related to the used information quality of the fractal (Spath et al., 2013; Kagermann et al. 2013). Meanwhile many scholars have been inspired by the fractal concept and developed extensions of the fractal model in the direction of flexible relationship networks built of autonomous and interdependent manufacturing fragments (Canavesio, Martinez 2007; Shin et al. 2009). Such organizational expansions bring new responsibilities, new branches and growth, which gives room for the integration of information and manufacturing structures in the context of fractals, especially paving the way to the alliances of the fractals as they work together (Panetto, Molina 2008; Raye 2012). Canavesio and Martinez (2007) formulated another viewpoint on fractals by considering a fractal company as a multi-agent system, where each fractal has the ability to observe its environment and make decisions based on the feedback.

The case study of a very successful Estonian production company for functional maritime wear with global operations shall shortly illustrate the potential of a fractal approach and that already nowadays fractal concepts have captured the interest of business life. The management headquarters of the company are located in a rural area in Western Estonia whereas the company operates in highly developed foreign markets like Germany, Sweden and UK. The business operations are distributed all over the world comprising global sourcing mainly in Europe and Asia, German R&D activities, cutting and production of components in Estonia, sewing in Ukraine of the final products and sales activities outside Estonia. The local units of the company benefit of the smart specialisation advantages of the involved regions and the company units enjoy all characteristics of fractals, i.e. they are self-similar, self-organizing, self-optimizing, goal-oriented, and dynamic, and even if they are legally independent they are organizationally linked. This linkage of the company fractals is realized by Internet, common goals and standardized trans-fractal processes, which are fixed and illustrated by multi-media process documentation including e-learning tools that act as blueprint for the business processes in a fractal and the interfaces between the fractals. By doing so the company was able to become the European market leader in maritime functional clothes and showed that Industry 4.0 concepts have been tested successfully in niche markets already before Industry 4.0 reached the political and economic agenda. More details about the case study can be found in Olaniyi et al. (2015).

In summary it can be concluded that fractals can be considered as the new structural and organizational building blocks of Industry 4.0, where the different fractals are connected by related information flows, which control the processes inside and between the networks of fractals. By following Lee et al. (2014) this gluing function and the high importance of information in Industry 4.0 will open new business opportunities in the field of big data since every piece in the value chain is related and based on specific data characteristics touching the 4V of big data (IBM 2015; Mayer-Schönberger, Cukier 2013).
3. Parallels between Industry 4.0 and Green Transport Corridors

On European level an increasing number of initiatives have been started to speed up the shift towards greener and more efficient freight logistic solutions in Europe. This development process has been spurred by the Freight Transport Action Plan from 2007, the Green Paper on TEN-T from 2009, as well as the TEN-T Policy Review 2011 and the EC White Paper on “A Sustainable Future of Transport” (FTAP 2007; COM 2011). Green transport corridors are defined as transhipment routes with concentration of freight traffic between major hubs and with relatively long distances of transport marked by reduced environmental and climate impact, while increasing safety and efficiency with application of sustainable logistics solutions (COM 2011). The transport within green transport corridors is based on inter-modality, powerful logistics hubs, specific organisational frame conditions and advanced ICT-systems improving traffic management, increasing efficiency and integrating better the logistics components of such a corridor.

In this sense green transport corridors can be considered as smart logistics and transport solutions and as Prause and Hunke (2014) pointed out openness, transparency, fair and harmonised access regulations as well as co-operation aspects are common characteristics for the green transport corridor concept. Prause and Hunke continued by identifying a list of important ICT–frame conditions of green transport corridors comprising of open architecture, orientation on standards, focus on inter-operability and co-modality, independence of technology as well as the creation of a fair and balanced access of SMEs. Hanisch et al. (2016) found that green transport corridors and their frame conditions lead to governance and business models, which are closely linked to co-operative business models embracing openness, fair and balanced access as well as cooperative interaction of large firms and SMEs in networks. All these topics are also dominating the discussions concerning “Industry 4.0”. A recently published survey about the “prospects for Industry 4.0” comprising 278 manufacturing companies brought to light that standardisation, new business models, a regulatory framework and new concepts for process and work organisation were mentioned among the most important challenges of Industry 4.0 (BITKOM et al., 2013). In addition to this, Kargermann et al. (2013) stressed the need of new business and partnership models as crucial for the success Industry 4.0 and they continued by stating that these new business models should be more geared towards meeting individual, last-minute customer requirements, enabling SMEs to use services and software systems that they are unable to afford under current licensing and business models, providing more solutions for dynamic pricing by taking into account the customers’ and competitors’ situations as well as facilitating the quality of service level agreements (SLAs), which are embracing more networking and cooperation aspects between business partners compared to now. This new emphasis of cooperative business models in the context of Industry 4.0 will ensure the fair distribution of potential business benefits among all the stakeholders in the value chain.

In addition to that, a closer view into the agendas of Industry 4.0 as well as into the frame conditions of green corridors display strong emphasis on safety and security issues in both concepts. These security topics are related to data security as well as to process and functional security. Finally, Kargermann et al. (2013) demanded the integration of environmental issues into the regulatory framework of Industry 4.0 in order to spur green business models and establish sustainable business networks that are upheld collectively by the partners. In this sense Industry 4.0 and the concept of green transport corridors share many common business features including openness, standardization, sustainability, cooperation and networking concepts as well as the use of smart technologies comprising internet technologies. These strong parallels between green transport corridors and Industry 4.0 are supporting the exchange of business concepts and models between both topics. Since the theory of green transport corridors enjoys a slightly longer history than the Industry 4.0 approach some points of the regulatory framework of green transport corridors can be transferred into the Industry 4.0 world like the frame conditions for integrated ICT–systems (Prause, Hunke 2014). Additionally, new business models or structures stemming from one of the two topics bear the potential to deliver suitable solutions in the other research topic. The scientific discipline integrating both topics represents the theory of supply and value chains since Industry 4.0 as well as the green transport corridors are based and dealing with smart business operations and logistics so that holistic business concepts might be expected from supply chain management.
4. Business Models for Industry 4.0

Business models describe rationales how companies create, deliver and capture value and the process of constructing a business model is part of the business strategy (Hummel et al., 2010). The importance of business model comprising the identification of strategic supply and demand drivers, macroeconomic environment, megatrends, the level of innovation, business sophistication, technological readiness, financial market development, labour market efficiency, hard/soft infrastructure has been outlined and mentioned in a range of scientific publications and research papers (Eckert 2014). Osterwalder and Pigneur (2010) identified nine building blocks that make up a business model, the so-called “Business Canvas”, which can be considered as an example of an operative business model approach comprising nine elements: customer segments, value propositions, channels, customer relationships, revenue sources, key resources, key activities, key partnerships and cost structure.

Since Industry 4.0 embraces “networked manufacturing”, “self-organising adaptive logistics” and “customer-integrated engineering”, suitable business models will primarily be embedded in highly dynamic business networks than restricted to a single company. Consequently, new and sustainable business models have to ensure fairly shared business benefits among all stakeholders in the value chain and might be more complex, open, collective and evolutionary than the existing ones. Furthermore, they have to facilitate innovation, product development, financing, reliability, risk, intellectual property and know-how protection in a network environment. These considerations lead to different business areas for new business models.

4.1. Open Innovation Models

Today, innovation is increasingly complex, fast, interactive, and requires the access to external and internal knowledge in order to develop new or significantly improved good or service, process or new marketing method, new organizational methods in business practice, workplace organization or external relations (Chesbrough 2003; OECD/EC 2005; Hoffmann, Prause 2015). Firms acquire knowledge from different sources, actors and geographical locations, combining it with internal knowledge and competences. This innovation approach is in line with the internet and network orientation of the Industry 4.0 concept and it embraces collective concepts in innovation, especially all kinds of open innovation thinking. Following Bartl (2008), open innovation is referred to as a concept, which underscores the way of going beyond the corporate boundaries, i.e. an active strategic deployment of environmental clout or external factors of influence to increase its own innovation potential. Crucial determinants of such concepts are the shift from the industrial society to the network-based knowledge and communication society like it is facilitated in Industry 4.0. As a result, innovation occurs and ideas are generated in such a society through the interactive creation of value.

Prause and Thurner (2014) pointed out how developments in communication technology have enabled new forms of user integration in the innovation processes and how virtual communities, communities of practitioners and living labs can be used as a powerful tool to safeguard user oriented and accepted new technologies. This development recognizes cluster aspects as well as the complexity and interdisciplinary of new R&D fields related to sustainability and multimodality and can be applied in the Industry 4.0 value chain with the targeted ICT infrastructure. Collaborative innovation approaches integrate the SME sector with the complex open innovation approaches, where the access points for open innovation are the product design and development fractals in the supply chain. The underlying business model in open innovation activities is related to IPR issues. Hoffmann and Prause (2015) highlighted that product-related data provided by users in virtual communities in form of comments, feedbacks, and recommendations is already today an essential source of innovation and that these data are basically freely accessible on the web endangering a company’s legal position in patenting due to the risk of lack of novelty. So there are various intellectual property issues protecting the user’s contribution, which are often not taken into account by companies making use of the respective data, causing an eventual infringement of protected rights and therefore the sustainability of the company’s innovation policy.
4.2. Service Design Models

Industry 4.0 paves the way for new business models covering also new sustainability concepts of product life cycles. Derived sustainable business models can deliver marketing advantages for sustainable products even if they are related with higher prices. Prause et al. (2012) discussed the case study of a multiple useable teapot warmers developed by the Sustainable Design Centre in Berlin in order to demonstrate a new service–design oriented business model. The product “teapot warmer” enjoys already now a lot of characteristics of Industry 4.0 because it is built in small series, consists of high quality steel parts and the full life-cycle of the product is traceable since the manufacturing takes place by craftsmen in Berlin and the selling and distribution is mainly realised via internet. The client is able to customize his product according to his specific design requirements and the teapot warmer is delivered in parts via postal mail to the client who only assembles the parts. Compared to ordinary product, the price but also the quality of the sustainable teapot warmer is significantly higher and the big difference to Industry 4.0 is that the manufacturing process is fully realised by persons and not in a network of CPS. Nevertheless the teapot warmer can be taken as a blueprint for a new business model in the context of Industry 4.0 due to the long list of common characteristics with Industry 4.0 as well as the need for developing a sophisticated marketing strategy for the sustainable teapot warmer in order to keep the high–price product competitive.

The Sustainable Design Centre created a new business model based on the idea that the interested client can buy the product for a fixed price including the option to give back the teapot warmer to the producer after a certain time of use. This approach develops further the well-known example of the recycling system of return bottles but now for an entire high–quality product, which is still fully functioning. By virtue of the high quality of the material and the stick-together technology of the product the producer is able to renovate the returned parts and sell them again to the next client with the same business model. Therefore, this particular product integrating design and technology along with its specific business model results in a sustainable product that enjoys a multiple product lifetime and becomes competitive compared to traditional products that are bought and trashed after usage. It was possible to realize this business model only because the whole product was created and sold by one manufacturer, i.e. from Sustainable Design Centre.

Industry 4.0 opens now up the possibility to implement comparable business models also for complex products with cross-company operations and a complex supply chain due to the involvement of internet-use and CPS, which makes the full production process traceable and transparent so that life-cycle oriented business models like the teapot warmer can be realized also for sophisticated products. Such a business model represents the realisation of a service design concept where the customer does not primarily purchase itself a product but rather buys the service the product or devices is realizing with the consequence that the product design changes into service design (Scheider, Stickdorn 2011). In this sense service design represents sustainable design since not the material product stands in the focus of the business model but the service, which is realized by the product, which poses new challenges since successful service design solutions have to be connected to a strong and coherent brand identity and a smart business model (Kaivo-oja 2012).

4.3. e-Residency for Industry 4.0

The fusion of cyber–world and material world in Industry 4.0 leads to virtual structures in the value and supply chains, which require organisational and managerial tasks for related cross-company operations processes in networks touching manufacturing, logistics and distribution (Sydow, Möllering, 2009). These management tasks are realised and controlled by information flows within the Industry 4.0 networks and they are running parallel to the physical value and supply chain flow (Simchi-Levi et al. 2007). Consequently, the physical value streams in Industry 4.0 – related supply chains require an appropriate cyber – platform to be able to control the parallel information streams and to handle the related business administration tasks.

The Republic of Estonia is the first country to offer a transnational digital identity available to anyone who is interested in administering a location-independent business online. This sophisticated form of e-business
is called “e-Residency” and offers a government-issued digital identity and the opportunity to run a trusted company online, unleashing the world’s entrepreneurial potential. The concept of e-residency is in line with ongoing approaches in the context of Industry 4.0 trying to realise the fusion of the virtual and the real world, i.e. the linkage between internet and manufacturing leading to concepts of smart supply chain management.

The Estonian ministry of Economic Affairs and Communication initiated recently a study for analysing the pain points for entrepreneurs and SME’s participating in international supply and value chains (e-Estonia 2015). The results of these investigations reveal that the e-residency platform enables SMEs which are participating in Industry 4.0–supply chains to control the information streams of material added value streams of supply chains and to handle related business administration tasks (Figure 1; e-Estonia 2015).

Thus, the Estonian e-residency concept can be considered as the fusion of the cyber and business administration world which might play the role of international business administration platform for Industry 4.0 which possesses the potential to spur the evolvement of further international business models in the context of Industry 4.0, especially for internationally operating entrepreneurs and SME’s. As special case one can consider two non-European entrepreneurs from Japan and Mexico who are able to do “remote” business as e-residents via Estonia everywhere in the world by using the e-Estonia platform. The special advantages for both entrepreneurs are that they can use all Estonian e-services and other service offers that even don’t exist in their home countries, they enjoy access to the EU–banking system (SEPA) including the advantage of quick and cheap financial transactions inside EU, contracting and enforcement in a reliable Estonian law system as well as the possibility of a remote foundation of a Estonian holding company including the favourable Estonian taxation

Figure1. Crucial business administration tasks of supply chains for entrepreneurs

system. As a long term advantage both entrepreneurs are able to achieve an EU-residency after having bought real estate in Estonia. The special advantages for the Estonian side is to develop Estonia via the e-residency to an international business hub with growing service offers for foreign entrepreneurs and investors in the fields of finance, consultancy, accountancy and law services (Prause 2015c).

5. Conclusions

Industry 4.0 aims to create a horizontal integration through value networks with an end-to-end digital integration of engineering across the entire value chain together with a vertical integration and networked manufacturing systems. The new value chains open the way towards complex and intertwined manufacturing networks, which will change the roles of designers, physical product suppliers and the interfaces with the customer causing a fragmentation of the value chain, which have been seen already before in other monolithic industries. Consequently, this process will be accompanied by fragmentation, new structures and new business models.

Internet usage, CPS and cross–company information interfaces in supply chains lead to fractal structures in the sense of Warnecke. These fractals are built according to the principle of “join the parts around an information access point of equal information level” and they represent timely, limited, stable, optimal structures, which are changing their shape and structure according to their local needs. The fractal structures exist already in successful companies and corresponding business models focus on the entire life-cycle of products, on service design concepts and the open innovation approaches. Thus, the new structures in Industry 4.0 are fractals and they represent crystallization point around the internet access point in the supply chain.

This high importance of information opens up new business opportunities in the environment of big data for Industry 4.0 but also in the establishment of new business models. A comparison with the concept of green transport corridors discloses huge similarities of the frame conditions so that exchange of concepts and solutions seems to be fruitful, especially concerning cooperative and network approaches, security issues as well as sustainability aspects. The transparency and traceability of the products during their entire production process and their life-cycle generates new opportunities for business models embracing sustainability, sustainable product design as well as service design concepts. The industry 4.0–related business administration activities might find their suitable platform in the e-residency concept of the e-Estonia.

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SUSTAINABLE DEVELOPMENT AND BEHAVIOURAL PATTERNS: TO INNOVATIONS THROUGH COACHING

Angelina Rosha¹, Natalja Lace²

¹,² Faculty of Engineering Economics and Management, Riga Technical University
6 Kalnciema Str., Riga, LV-1007, Latvia

E-mails: ¹a.rosha@inbox.lv; ²natalja.lace@rtu.lv

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Abstract. The paper aims to study how coaching can accelerate the innovation processes in organization considering the peculiar issues of the use of coaching in Latvia and Lithuania. For this purpose, literature review and a qualitative dominated mixed method approach to obtain and analyze the data are implemented. A literature review was undertaken to find out the current trends in the theory and practice of coaching in the context of innovation and organizational change. The findings of the literature review are compared with the results of two surveys. The aim of the first survey is to explore the experts’ opinion about the manifestation of coaching in organization. The aim of the second survey is to find out the importance of conditions to promote coaching in organisational context. The results of literature review and surveys demonstrate that coaching can accelerate the leadership development, strategic thinking and collaboration within and across teams. These processes are crucial for organization’s innovation capabilities.

Keywords: innovation, coaching, facilitating practice, organizational change, leadership development, strategic thinking, teams collaboration

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JEL Classifications: O15, O30

1. Introduction

Innovation and entrepreneurship are becoming key concepts for economic sustainable development in today’s complex and dynamic business world. Economic, social and environmental sustainable development is significantly important for organization performance (Bilevičienė, Bilevičiūtė 2015; Rezk et al. 2015). Organizations need to respond to changing business environment, technological capabilities and customer demand (Baregheh et al. 2009). In other words, organizations need to be innovative to increase competitiveness and achieve sustainable business performance (Kumar et al. 2012, Tvaronavičienė 2014, Laužikas et al. 2015).

Scholars connect innovation with the implementation of newness in relation to processes, products, people etc. (Kimberly 1981; Baer and Fres 2003; Rezk et al. 2015). Schumpeter (1934) distinguished the following types of innovation: launching new products on the market; using technological novelties for production or sales; opening new markets or new sources of materials supply; reorganizing the forms of organization. Damanpour (1996) defines innovation “as a means of changing an organization, either as a response to changes in the external environment or as a pre-emptive action to influence the environment”. Baregheh et al. (2009) provides an attempt to propose an integrative definition of organizational innovation, arguing that “there is no clear and
authoritative definition of innovation”. They analyzed 60 definitions under the following categories: nature of innovation, type of innovation, aim of innovation, social context, means of innovation, stages of innovation and summary of attributes frequency. A unifying definition states “innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace” (Baregheh et al. 2009).

The role of innovation and entrepreneurship for economic growth has been debated by the economists since the beginning of the twentieth century or even before. The comprehension of the term “innovation” has changed in recent years. Traditional integration model of innovation in which internally developed products are distributed through internal organizational channels is gradually substituted for open innovation model in which both internal and external ideas are used to create value (Chesbrough 2006). In open innovation model, internal innovation is fostered by internal and external flows of knowledge. External ideas and external ways to market are placed at the same level of importance as that assumed for internal ideas and internal distributed channels (Chesbrough 2006).

Open innovation is closely related to the concept of continuing innovation (Hoffmann, Prause 2015). A key concern for most organizations how to enhance their innovative ability and organize continuous innovation to renew organization and produce novelty products and services. Steiber and Alange (2013) studied organizational characteristics for continuous innovation in rapidly changing industries. They believe that similar organizational characteristics would be proper to for continuous innovation in more slow-moving industries. The key organizational characteristics compose: key drivers for innovation (culture focused on innovation and competent individuals committed to innovation); facilitators (empowering and coaching leaders removing obstacles for innovation); factors to facilitate innovative behaviour (semi-structured, non-bureaucratic organization, recognition system for innovative behaviour, continuous organizational learning) and foundation (innovation-oriented and change-prone top-management and board, internal innovative processes supplemented by external interaction, open innovation). Baer and Frese (2003) investigated the impact of environmental factors on the process of innovations, they argue that the climate for innovations entails active attitude to work and fosters interpersonal collaboration. Innovative environment in organization depends on several factors, including promotion of leadership behaviours such as results orientation, communicating the vision, collaborating with stakeholders.

Facilitating practices play a significant role in establishing a favorable creative environment and encouraging innovation in organizations. There are a variety of practices, including coaching, that facilitate people providing them support and accelerating the process of setting and achieving work-related goals (Grant 2013). Coaching as facilitating practice has a high potential to accelerate innovative processes in organizations. However, the theoretical and evidence literature on coaching for innovation is limited.

Therefore, realizing the importance of innovation for sustainable development of organization and understanding the necessity to create certain conditions to promote innovation, the paper aims to study how coaching can accelerate the innovation processes in organization considering the peculiar issues of the use of coaching in Latvia and Lithuania. For this purpose, literature review and a qualitative dominated mixed method approach to obtain and analyze the data are implemented.

2. Coaching in organizational context

A literature review was undertaken to gather together the facts, discussion, frameworks and models relevant to the exploration of the essence of coaching in the context of innovation. The analysis of sources, identified in the literature review, shows that coaching is referred to as the activity that facilitates individuals and teams discovering opportunities and creating ‘a culture of development’ (Popper and Lipshitz 1992) to enhance performance and efficiency (Orth, Wilkinson, and Benfari 1987; Burdett 1998). Zeus and Skiffington (2000) explain how coaching affects change. They argue that coaching generates individual’s sustainable behavioural change in working and personal life. The positive personal change may result in enhancing the entire organisation (Peltier 2001). Vidal-Salazar et al. (2012) also offer empirical evidence of the positive effect of coaching on organi-
sational change. The results of Baron and Morin (2010) study suggest that coaching can have a real practical impact on the development of strong self-efficacy that enables to perform tasks more effectively.

In literature, coaching is considered as a management development activity that promotes organisational change and leads to sustainability (Bozer et al. 2013). Coaching enables both people to recognize opportunities to enhance their performance and skills (Orth et al., 1987) and business to find new peculiar solutions and insights to achieve sustained change (Peltier 2001; Stober 2008; Cox et al. 2011).

Coaching is also recognized as an interactive form of organisational learning and leadership development (Page and de Haan 2014) that enhances individual’s behavioral change through self-awareness and learning, and thereby contributes to individual and organizational success (Bozer et al. 2013). Coaching facilitates learning and development (Mink et al. 1993) focusing on experiential learning (Hudson 1999) and self-directed learning (Grant 2001, 2006; Grant and Cavanagh 2004). Coaching helps increase performance (Grant 2006; Grant and Cavanagh 2004; Kilburg 2000; McCarthy 2014) as well as promote self-awareness (Passmore and Fillery-Travis 2011; Bozer et al. 2013; McCarthy 2014) and personal growth (Grant and Cavanagh 2004; Stobe 2008). An external feedback and reflection provided by coaches, lead to an increase in individual’s self-awareness, improve capacity of thinking and ultimately enhance leadership skills (McCarthy 2014). By McCarthy (2014), coaching helps individuals become more aware of their own strengths and the strengths of other people. Coaching also facilitates a deeper understanding of what is blocking people when they need to make some change. During coaching process coach observes behaviour and provides feedback. Questioning as a core component of the coaching process (Cox 2013), aims to help managers to view the innovative opportunities from different perspective. Particular emphasis is placed on the use of coaching for teams. Connor and Pokora (2007) state that coaching boosts teamworking of existing groups, it also facilitates the development of newly-formed teams and cross boundary teams and improves the communicating skills of team leaders.

Based on commonly used characteristics, coaching is defined as a regular (Grant 2006), synergic (Zeus and Skiffington 2000; Grant 2006; McCarthy 2014), learning and development (Cox et al. 2011, Cox 2013), goal-oriented (Grant 2001, 2006; Grant and Cavanagh 2004) process.

The literature on implementation of coaching for innovation is rather scarce. A limited number of sources have been found as a result of literature search. The study conducted by Kelley et al. (2005) claims that coaching facilitates moving beyond innovative technologies from finding ideas and developing them to linking innovations to the company’s strategy and the markets for what they have done. Coaching promotes the development of entrepreneurial skills through facilitating implementation of the own strategic vision (Audet and Couteret, 2012).

For successful innovation process, the ideas and technology should be commercialized, in other words, the ideas should be turned into business. Coaching, concerning to innovation, aims to accelerate the process of converting a good idea into a profitable product or service. McCarthy (2014) suggests that the main use of coaching for innovation is to “foster a climate of innovation” in organization by facilitating the development of the innovation capability. Coaching designs atmosphere that empowers employees and organisation to produce results (Evered and Selman 1989; Hargrove 1995).

The research conducted by Gilley et al. (2009) concluded that coaching together with communication, motivation and involving others, significantly influence on a leaders’ ability to move forward innovation and change. They argue that coaching creates environment that enhances “collective partnership between leaders and their employees” and improves innovation activities. McCarthy (2014) considers that in the context of innovation, coaching can be used for encouraging innovation, generating and selecting options and implementing innovation. Encouraging innovation implies the empowerment of employees to apply their creative ability to generate ideas and convert them into innovations. The environment that supports idea generation and creativity is essentially crucial. Summarizing the results of the study, Prajogo and Ahmed (2006) concluded that high innovation performance can be achieved through the development of behavioural and cultural context and practices for innovation that motivates and encourages individuals to innovate.
3. Methodology

For the needs of the present research, it was decided to adopt a qualitative dominated mixed method approach. A literature review was undertaken to find out the current trends in the theory and practice of coaching in the context of innovation and organizational change. The findings of the literature review are compared with the results of two surveys.

The aim of the first survey is to explore the experts’ opinion about the manifestation of coaching in organization. For the purposes of the survey, it was decided to focus on key informants, i.e. experienced practitioners in coaching, to generate the primary data for qualitative analysis. A list of potential participants was compiled through direct contacts in the coaching community.

An online questionnaire comprises 24 Likert scale type, ranking and open-ended questions. The questions are distributed in seven parts. (1) *Professional Background and Experience* to collect data about experts’ background. (2) *Clients’ Profile* to determine the characteristics of the organisations that use coaching. (3) *Professional Practice* to collect data about the purpose of coaching engagement and the effect that coaching has had on the business skills and processes. (4) *Coaching Process* to determine the distinctive features of coaching and key elements of coaching process. (5) *Measuring Coaching Results* to find out the experts’ opinion about the importance of measuring the results in coaching. (6) *Benefits and Challenges of Coaching* to summarize experts’ perception about benefits of coaching for individuals and organizations as well as challenges and threats.

The aim of the second survey is to find out the importance of conditions to promote coaching in organisational context. The questionnaire consists of two sections. The aim of the first section is to gather the information to create the profiles of respondents of two target groups: coaching specialists and coaching clients. Section 2 of the questionnaire contains closed-ended importance questions. Coaches and clients are asked to rate the importance of the conditions that are likely to facilitate the promotion of coaching in organisations, on a rating scale of 1 to 5. These questions enable to better understand what hold significance to the respondents; they also enable to make comparison and find disagreement in the perception of the importance of conditions.

A conceptual scheme is designed to help explore and describe the conditions and different levels, with the aim of extracting the favorable conditions for coaching development in the context of organisation. A list of conditions includes external indirect conditions, external direct conditions, internal conditions at the level of organisation, internal conditions at the level of groups and internal conditions at individual (client’s) level.

Both questionnaires are pilot tested and validated. Triangulation of research results through cross verification from two sources.

4. Results and discussion

The first survey on manifestation of coaching in organization was conducted from August to December of 2013. Based on the established criteria for selection and with regard to qualification, experience and position, 15 coaches from Latvia, Lithuania, Poland and Germany have participated in the survey. The experts from Poland and Germany were invited with an aim to trace the tendency of development of the subject matter in the countries that might have an influence on the Baltic countries.

Vast majority of coaches (87%) defined their professional background as an executive coach. Eleven out of fifteen coaches marked more the one profession she/he is engaged in. The position of an executive coach was combined with the role of a consultant in 7 cases, with the role of an HR and training professional in 5 cases, and with the post of a manager and organisation leader in 4 and 3 cases respectively. 80% of coaches graduated from an accredited coach-training program. Almost all respondents have graduated from accredited coach training programmes. The average experience in coaching is 3-5 years.
The coaches were asked to define the industry sectors that used their coaching services and the size of the companies. The analysis of responses shows that the respondents work in different industries and with the companies of different size. The coaches are engaged in Retail and Wholesale (22%), Banking and Finance Services (17%), Information Technology (17%), Manufacturing and Production (15%), Education (11%), Health Care (7%). The coaches identified the company size from 51 to 250 employees in 12 cases, under 50 employees in 10 cases, from 251 to 500 employees in 6 cases, 1,000 or more employees in 5 cases and from 500 to 1,000 employees in 4 cases.

The paper covers the results that meet the aim of the present research, that is: to study how coaching can accelerate innovation in organization. The results of the first survey indicated that by experts' opinion, coaching is mostly used for performance development and improvement and leadership development (Fig. 1). This result coincides with the findings of the literature review.

Bozer et al. 2013 claims that coaching is a ‘promising learning and development discipline’ with the aim to facilitate behavior development in the goal attainment. Both the consideration of performance development and improvement, and the consideration of leadership development have important implications on innovation.

The assessment of the level of effectiveness of coaching on business skills and processes confirms the results of the first question. Analysing the results, it has been discovered that by coaches’ opinion, coaching is used more effectively for learning and development, leadership development and strategic thinking. (See Fig. 2).
The development of strategic thinking skills is essential for a success in innovation. McCarthy (2014) states that facilitating the process of critical thinking is a core aim of coaching. Coaching techniques, such as listening, questioning and reflection encourage people to think about options they may reject rashly. By reframing individual’s thinking, coaching contributes to the shift of organization’s thinking. McCarthy (2014) explains the usefulness of coaching for strategic thinking. First of all, coaching helps individuals conceptualize their ideas and consider their complex issues from ‘a helicopter view’. At the same time, coaching contributes to the development of strategic thinking skills. By answering coach’s questions, individuals learn to ask themselves thought-provoking questions that facilitate increasing self-awareness and help identify new opportunities. The development of strategic thinking skills is essential for a success in innovation.

By experts’ opinion, coaching mostly impacts on relationships and teamwork between employees at different levels (Fig. 3). This result is in the agreement with literature finding. Clutterbuck (2009) sees the role of the team coaching as a catalyst to stimulate open dialogue in the team. Focusing on teams and collaboration is considered important to a new approach to innovation.

![Image](https://example.com/diagram.png)

*Fig. 3. The level of impact of coaching in organization (mean value)*

*Source: authors*

The second survey on identifying the conditions to promote coaching in organizations consists of two steps: during the first step, from December 2014 to May 2015, the focus is made on the survey of coaches. The sample size of the respondents is explained in the following. In a traditional sense, recognition coaching as a profession is in a long-term perspective (Lane et.al, 2011). In the current state, coaching is mostly considered as a cross-disciplinary occupation (Gray, 2010) self-regulated by professional bodies, among which are the following: International Coach Federation, European Mentoring and Coaching Council, Association for Coaching. However, coaching is not the subject of governmental accreditation and professional license. A variety of credentialing coach training programs are provided by professional organizations, but at the same time a person can practice as a coach without any training and professional recognition. As a consequence, it is nearly impossible to determine the total number of coaches in Latvia and Lithuania to calculate the right sample size. For the purpose of the present survey, it was decided to use the open databases provided by coaching and training organizations of Latvia and Lithuania. The complete list of respondents included 60 coaches from Latvia and 77 coaches from Lithuania. All coach practitioners were invited to participate in the survey by personal invitation letters. Totally 52 coaching specialists (23 coaches from Latvia and 29 coaches from Lithuania) agreed to participate and took part in the survey. The response rate is 38 per cent of the total number of coach practitioners (n = 52). Almost 70% of coaches who did respond to the survey reported that they have graduated from the International Coach Federation approved or accredited coach training programs, and a little more than 70 % of respondents positioned themselves as executive coaches. 40 % of coaches have practiced in coaching for 3 – 5 years and 29 % of coaches have been in business for 6 – 9 years.
During the second step, which began in May 2015 and is currently continuing, the main focus is made on the organisations that use coaching or are aware of coaching and have their own opinion about this subject matter. The owners, top and middle-level managers as well as specialists are invited to participate in the survey. Totally 20 respondents from Latvia and Lithuania have participated so far. The present paper discusses the results of the first phase of the survey.

Since the survey of clients is in the process now, the paper presents the preliminary results of the importance level of internal conditions at the organizational level to develop coaching practice. However, even these results are able to demonstrate the agreement and disagreement between the different points of view. Coaches and clients of Latvia and Lithuania totally agree with the level of importance such conditions as the demand to acquire new skills, the necessity to retain the right people as well as the motivation to learn. At the same time, there is a disagreement in the evaluation of the level of importance of the relationship of trust and openness among the members of organization. The study of this disagreement is the subject matter of the further research because this is important for understanding the essence of coaching, in particular the role of coaching in accelerating innovation.

**Fig.4.** Internal conditions to promote coaching at the level of organisation

*Source: authors*
5. Conclusions

Organizations need innovation to be competitive and sustainable on their marketplace. Having defined innovation as the multi-stage process of transition the idea into new or enhanced product, service or process, scholars emphasize the importance of the commercialization in order to achieve competitive advantage and successful differentiation. A new approach to innovation assumes the combination of the continuous character of innovation with open innovation model. The essence of the Open Innovation model is the allocation of the external flows of knowledge and distribution channels at the same level of importance as internal ones. The achievement of continuous innovation demands the presence of certain conditions in the organization. The environment that encourages innovation and committed people who generate and realize the ideas are considered as the ‘key drivers’ of continuous innovation. Facilitators and facilitating factors have a crucial role to play in implementing innovative projects.

Coaching as facilitating practice has a high potential to accelerate innovative processes in organizations. In practice, coaching is used to facilitate individuals and teams discovering opportunities and establishing a culture of development and growth. Coaching also promotes individual’s sustainable behavioral change through increase of self-awareness and development of strong self-efficiency.

The results of literature review and surveys demonstrate that coaching can accelerate the leadership development, strategic thinking and collaboration within and across teams. These processes are crucial for organization’s innovation capabilities.

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Design for Product and Service Innovation in Industry 4.0 and Emerging Smart Society

Laima Gerlitz

Wismar University of Applied Sciences
Philipp-Müller-Str. 14, 23966 Wismar, Germany

E-mail: laima.gerlitz@hs-wismar.de

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Abstract. Within the context of the increasing digitalisation and intertwining cyber and physical dimensions connected by Internet, the paper aims at contributing towards understanding and conceptualising extent and scope of design integration for smart production and services and value generation for smart society including enterprises, customers and end-users. Research on design integration within the industry 4.0 or “internet of things” phenomena from strategic management perspective is still marginalised. Concepts from strategic and innovation management as well as open innovation including design and industry 4.0 perceptions are linked to propose a practice-oriented design integration approach for business practices in developing and exploiting new products or services in industry 4.0 context. The paper proposes conceptual approach to design integration and implementation within product or process development processes leading towards valuable innovations on corporate and societal level. It exemplifies how smart digitalisation and new enabling technologies might generate innovations driven by design as a tool and process. Design’s role is demonstrated by intertwining dimensions of information, knowledge, technology, communication and society with different players and stakeholders, who share production or service inputs and outputs between different stakeholders in an open, distributed and co-existing way at different spatial and temporal scale.

Keywords: design, design-driven innovation, design value, value creation, industry 4.0.

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1. Introduction

In recent years, society is progressively moving towards a socio-technical-digital ecosystem, in which physical, virtual dimensions are increasingly intertwining, and more interactions between people, machines and digital technologies are taking place to serve the needs of society, to benefit the economy, environment, to improve our lives and to deliver meaningful experiences, which shared bring value added for all involved in the ecosystem –
manufacturers, services providers, customers and users.

Indeed, it is now a time of structural transformation within the ecosystem – economy and society. Evolutionary, it is moving from the agrarian society, over industrial revolution in 19th Century towards a smart industrial and service driven society characterised by advanced manufacturing and key enabling technologies, bio-based products, clean vehicles, sustainable construction, smart grids and digitalisation of business processes, networks, products and services (EU industrial policy, European Commission 2014, “For a European Industrial Renaissance”).

In particular, it is a strong need for such developing trends when taking into account the socio-economic indicators in Europe and globally, and for innovations in the social, economic, environment, business, technological and societal setting. Europe demonstrates large and growing market potential in the context of smart ecosystem. Advanced manufacturing technologies change the way of companies’ performance – they shift towards smart value chains or using technologies, which benefit the environment, e.g. environmentally friendly technologies (Wintjes 2013, p. 2; Guruz, Scherer 2014).

In this light, the present research presents an attempt of showcasing an increasing strategic role of design in the context of the current industrial evolution, smart production and digitalisation area and its value for different design stakeholders – companies, customers, end-users, etc. This will be undertaken by combining key approaches from the innovation and management fields – open innovation, design innovation. The paper is organised as follows. The next section presents the key concepts and common thread with integration of design and its tools to better embed design role and its potential in the context of industry 4.0 or smart production for innovations. The third section displays the methodology of the research. In the succeeding section, the results from the case studies are discussed. The fifth sections argues for a new perspective in the paradigm of value of design in smart production and potential of innovations through integration with consumers of smart products and services. The paper concludes with key observation-based implications and future research perspectives.

2. Theoretical background – industry 4.0, innovations and design

Aiming to reveal design value and integration within industry 4.0 trend, conceptual design of the present research is based on integration of concepts and approaches employed within strategic management – Porter’s value chain and competitive advantage (Porter 1985; 1991; 1996), resources and capabilities (Barney 1991; Teece et. al 1997; Wahl, Prause 2013); innovation management – innovation process and open innovation (Trott 2012; Tidd, Bessant 2013; Chesbrough 2003; von Hippel, 1998; 2001; 2005; Grubicka, Matuska 2015; Hoffmann, Prause 2015). Through linking corresponding concepts and their conceptual meaning with design and its value proposition for innovations, design becomes crucial enabler for smart product manufacturing and service innovations.

2.1 Industry 4.0 and product / service innovations

Evolutionary, this trend refers to as fourth trend in industrial system – the so-called industry 4.0. Often, it is called the fourth industrial revolution. Term “Industry 4.0” has been predominantly used in the German scientific literature (Brettel et al. 2014; Sendler 2013; Kagermann et al. 2013; Bauernhansl et al. 2014; Kagermann 2015; Burmeister et al. 2015, etc.). Indeed, it was established by the German Ministry of Education and Research as a roadmap to promote German high-tech industry and its strategy. Research on industry 4.0 is highly interlinked with such phenomena as “Internet of Things”, “Industrial Internet”, “Internet of Things”, “Data and Services” and “Smart Factory 4.0”, “Advanced Manufacturing” and “Smart Manufacturing”, etc. and their examination (Kagermann et al. 2013; Vermesan, Friess 2013; Porter, Heppelmann 2014; Westerlund et al. 2014; Simonite 2014; Tvaronavičienė 2014; Rezk et. al. 2015, etc.). The present research has adopted the term “Industry 4.0”, as other concepts mentioned above are likely to be small and usually complement the complex phenomenon of industry 4.0, emphasising consistent digitalisation and linking physical objects and subjects,
The core idea behind this trend is to secure high-tech manufacturing location, jobs and welfare to people in a certain region to generate the competitive advantage (Ramsauer 2013, p. 6; Avigdor et al. 2014, p. 2; Krückhans, Meier 2013, p. 31). Nevertheless, this current and future trend is of more evolutionary nature. It may be stated that the transfer towards industry 4.0 emerges in a smart society not from fast and disruptive changes, but as evolutionary process in a continuous and steadily way, integrating physical objects (technologies, machines and people) into the information network. The Internet has come before the fourth industrial revolution has started. Now, it is only about connecting through Internet with intelligent machines, systems production, processes, customers and consumers to form a sophisticated network, thus turning the real world into information system (Dujin et al. 2014, p. 7; Kagermann 2015, p. 25). Therefore, in this context, innovations are rather new adaptations or transformations by using technologies, which to some level are already developed. Foray et al. refers in this context to smart specialisation and structural evolution, which is driven not by radical innovations, but by adaptation to radical transformation. Generating new information and knowledge for the future economic value from an old, it is possible to arrive at new activities and new structural changes by using existing industrial commons, such as R&D, engineering, manufacturing and other capabilities that sustain innovation (Foray et al. 2011, 8; Rezk et al. 2015). As a result, in this course, it can be referred more to incremental (Kirzner, 1973, p. 35) rather than radical innovations (Schumpeter 1911, p. 409-410; 1942 p. 82-83). Whereas incremental innovation implies the level, which improves a certain technology as compared to a previous level, i.e. continuous improvement, radical innovation has very far-reaching impact, e.g. automobile or airplane. Nevertheless, incremental innovations are important, since they constitute a basis for radical ones and bring with economic benefits (Fagerberg et al. 2006, p. 7-8). Yet, these industry 4.0 innovations are sustained rather disruptive innovations (Christensen 1997, p. 40f), whereas disruptive innovations bring a very different value as compared to the previous one and are likely to replace sustained ones. In this case, industry 4.0 can be understood as incremental process, which may enable either sustainable or radical disruptive innovations for the market and proposing new values for businesses.

Analysis of the value of design for product and services innovations in smart and digitalised production or service development processes remains narrowed mostly to research in the field of open innovation or user-centred approaches, such as user communities or user innovations (Jawecki et al. 2011; Füller et al. 2007, 2011, 2012; Gault 2011; Dell’Era and Landoni 2014; Baldwin, von Hippel 2009; von Hippel et al. 2011, etc.). Most of scientific outputs display service and organisational innovations for smart factories and digitalisation systems (e.g. Lee et al. 2014; Rezk et. al. 2015) losing a clear linkage with design and its value of design for product, service, social or organisational innovations. Role of design for innovations through user involvement related to industry 4.0 or smart production processes is likely to be underrepresented in this context.

2.2 Design as a resource, capability and innovation enabler in industry 4.0


Design, the same applies for innovation, can be used as a noun or verb. Here, the focus is on design as an activity and process leading towards strategic and competitive advantage and innovation. The focus is on how
the design process can be organised and managed towards product and service innovations on corporate and
community (users) levels. Design as a process may propose tangible and intangible value, because it serves as a
tangible/intangible source and connector between creativity, i.e. generating new ideas and innovation, i.e. plac-
ing new ideas on the market and applying creativity to all the activities necessary to bring these ideas into use
either as product, service or process innovations, thus creating a value (Whyte et al. 2015, p. 2) and enabling or-
ganisations to differentiate and position of the market (Porter 1985, p. 35; 1991, p. 103; 1996, p. 70). Although
design is not only about invention, i.e. creating something totally new, it is a way of making (in) tangible impact
through the implementation of ideas, i.e. design of products, services and experiences that touch, change and
improve people’s daily lives (Design Management Conceptualisation and Application, Design Entrepreneur-
SHIP project 2014, p. 8). Using design to lower costs, achieve greater resource efficiency and quality on prod-
ucts and services compared to competitors and to gain stronger value and recognition by customers and users
may lead to competitive advantage. Integrating design into specific organisational activities, which enable to
create value – logistics (suppliers/partners), development, operations (manufacturing), marketing and sales and
after sale services – design becomes a part of the value chain. Thus, strategic design value can be generated not
only at the top level of the value chain, e.g. strategic management level, but also at operational level. For this,
design can create customer value at primary operational activities through differentiation/positioning gained on
the market, at functional level through integrating design at organisational support activities and using design
to improve and better coordinate functions, e.g. product or service design process. On top level, design adds
strategic value through anticipation of changes in organisational internal and external environment (Borja de

Acknowledging design’s value for organisations, its power to differentiate, position on the market and improve
functionality of internal processes and external appearance of organisations (products, services), design can be viewed as a strategic resource. Following Resource-Based View (RBV), resources are all tangible and intangible assets, capabilities, organisational processes, attributes, information, knowledge etc., i.e. all potential, which, in turn, when controlled by the enterprise allows it to recognise and implement strategies bringing organisational efficiency and efficacy (Barney 1991, p. 101; Crook et al. 2008, p. 1150-1152). Design is a resource, because it is a process (Whyte et al. 2015, p. 2; Er 1997, p. 293; Hack et al. 2012, pp. 140-141). It is a resource, since design may bring value through being hardly duplicable, imperfectly imitable and non-substitutable (Barney 1991, pp. 105-106; Boxall 1996, p. 65), it may influence products through giving them sense. Being design as a source of making sense of things, design implies messages to users, within the styling (e.g. form), functionality of a product, service or process (technology, cost), emotional and symbolic value, i.e. meaning. Meaning proposes to users a system of values by using a specific language, e.g. signs, symbols and icons that deliver the message (Verganti 2008, p. 440). Thus, it is hardly to duplicate and imitate design, when a specific sense is given through design to a certain product, service or a process. Design is also knowledge, as it is used to generate new meanings or forms (Jonas 2011, p. 1). As a result, design can be used as an organisational asset as well as information for competitive advantage. Through combination of new information flows, organisation gets ability to exploit new linkages between its activities internally and externally (Porter, Millar 1985, p. 152). As a result, design becomes a valuable resource, as it enables to differentiate, integrate, transform and be a good business practice (Borja de Mozota 2006, p. 45). Further, understanding design as a resource may create and offer a value proposition, reach markets, maintain relationships with customer segments and earn revenues (Osterwalder et al. 2014, p. 152).

Design may be perceived as capability too, particularly when using design as an activity and process – capacity to deploy design resources by incorporating organisational processes to provide enhanced productivity of its resources as well as a strategic flexibility and protection for its final product or service. Design capabilities can be developed over long-term through learning processes and are based on developing, carrying and exchanging information through organisation’s human capital. As a result, to deploy design resources, tangible or intangible capabilities need human input (would it be organisations, customers or users) for information-based organisational processes and intermediate goods / invisible assets (Amit, Schoemaker 1993, pp. 35-37). Nevertheless, in today’s dynamic word, especially in changing ecosystem and new forms of organisation – industry 4.0, such design capabilities must be dynamic. As a result, design must be able to integrate, build and reconfigure internal
and external competences to address rapidly changing environments. In this, new and innovative forms of competitive advantage can be achieved through dynamic capabilities (Teece et al. 1997, p. 516), whereby design is recognised as resourcing, organisational coordinative, protective and innovative capability deploying design resources (Jevnaker 1998, p. 21).

Understanding design as a resource, knowledge, asset, information, capability allows tracing its value within product/service development process and effective commercialisation, i.e. innovation. Launch of innovations also require specific capabilities, knowledge, skills, facilities, resources, market knowledge, financial resources and certain level of infrastructure. It is, in other words, knowledge and entrepreneurial know-how that makes innovations successful on the market (Fagerberg et al. 2006, p. 5ff). It is process turning opportunity into new ideas, ensuring its practical application in the reality (Tidd, Bessant 2013, p. 18-22) and bringing value through its availability and access to it for its users via the market and/or other channels or distribution peer-to-peer and/or by the market (Gault 2011, p. 9). In this light, design becomes an important enabler for innovation within the dynamic emerging smart community. Design, the same applies for innovation, introduces a new meaning and value for its users.

From strategic intent, it might be argued then that design, which has been perceived as knowledge, as discussed above, can be strategically deployed and exploited for product/service innovation. Strategic acting of design within the business frame can be delineated as a critical dynamic collaboration across operational and management practices of organisations or companies successfully utilising design capabilities. In the context of industry 4.0, such strategic indicators of design enable clear strategic opportunities advocated by scholars and practitioners: competitive strength, flexible manufacturing, individual customised products and services, innovative business models, new working and collaboration ways, resource-efficiency (production on demand), production at a place of use or in the market and user engineering through his integration in development process (Bartevyan 2015 p. 2). Indeed, innovation, and thus design, as showcased above, can beat on the market with same value enablers (Francis, Bessant 2005, p. 172ff).

Design can be perceived as applied innovation, i.e. capturing the talent and resources available inside and outside organisation to create new products, environments and new user perspectives. Strategic initiatives are applied by using design to, e.g. foster culture of innovation (Design Management Journal 1998, p. 17) or as innovation process (Borja de Mozota 2006, p. 47). Similarly, Brown describes design thinking as an approach to innovation, i.e. to process, which ends with a certain innovative solution (Brown 2008, p. 9). Sharing the same conceptual grounds, design management and design thinking approaches can be also perceived as twin-concepts of innovation (Carlgren 2013, p. 56).

Taking the complementarity and intertwining of design and innovation pertaining to importance and impact for functionality, technology and strategic indicators for value creation, design integration within corporate product/service development process in the context of industry 4.0 can be conceptualised, as demonstrated in Figure 1. It presents a tentative approach within current economic and social environment on how design might be perceived, integrated and exploited for smart economic and social solutions. It also demonstrates the shifting paradigm away from design used to be subject to the validation through testing, prototyping and assessment in terms of technical feasibility towards integrated design assuring high level of playroom for creativity and its tangible/intangible outputs in form of products, services or processes.
4. Methodology

The research analysis and assessment of design integration and exploitation practices in industry 4.0 discourses is reflected through integration of five principal research techniques: research approach, research type, methods, tools and scope. Since, as has been underpinned during the present research discourse, specific conceptual focus on integrated design process for innovations is to great extent lacking in the industry 4.0 research streams from strategic perspective (the present one being highly circled around individual segments and outputs of innovation processes, such as smart products, services and solutions), a qualitative approach is likely to be suited to increase significance of design application as innovative process for product/service innovation and to enrich the topical literature.

In the course of the present research process aimed at exploring visibility and feasibility of design integration and its value proposition and strategic advantage in industry 4.0 related discourses, the paper has adopted a qualitative research approach. As underpinned by Shields and Rangarajan, exploration-driven research is likely to be qualitative. It aims at understanding the topic, which seems to be underdeveloped (2013, pp. 26-27).
deductive, thematic analysis and interpretation of data was conducted. The reasoning started with development of logical explanation behind the phenomenon of design integration and exploitation for product/service innovation and strategic value creation in industry 4.0 discourses. Yet, Spiggle designates her approach for consumer-related research, her research approach proposal is likely to be true for the present research (Spiggle 1994, p. 492ff). Drawing on the particular concept by Spiggle, categorisation of data was carried out according to the application and performance domains of industry 4.0, performance areas of design, operational and strategic indicators and key creating, enabling and implementing technologies within the context of industry 4.0.

The paper is built upon analytical, qualitative and practice-based research type. It can be argued that a “funnel” has been deployed for research purposes, i.e. the information and data have been acquired, assessed, deployed, distilled, justified, synthesised, amalgamated and presented. Building upon Dixon-Woods et al., both integrative and interpretative syntheses technique have been integrated. Particularly, material and information was combined concerned with the theme, pooled and compared. As a result, topical data was aggregated for the purpose of the analysis. It is also an interpretative attempt, since synthesis has been achieved through accumulating particular concepts in the research streams into higher-order conceptual approach (2005 p. 46).

With regard to research methods, there were employed descriptive and qualitative research methods, such as cross-case or multiple case analysis (Eisenhardt 1989; Miles, Huberman 1994, p. 101; Stake 1995, pp. 4-6; Yin 2009; 2012), thematic/content analysis, template (concept) based approach to analysis to explore the data gathered at a predefined scheme identified prior the analysis as well as generated inductively from the data (Crabtree, Miller 1992, pp. 93-109, etc.). The analysis results of design application and exploitation within industry 4.0 are presented in a narrative way. Integration of information from industry 4.0 cases becomes feasible through conceptual frameworks presented in the preceding section. Drawing on design as a common thread, design manifestation in industry 4.0 might be presented in the economic and social context, i.e. design conceptualisation and exploration in innovation processes on operational (product/services development), innovation output and impact level (operational, performance, economic, environmental and social efficiency, strategic advantage and value proposition for customers and users).

For the purpose of the research, the developed research tool – an integrative model in section 3 has been applied to analyse, synthesise and evaluate the data, and thus, design integration in industry 4.0. The research scope was not limited to any specific time frames, as the data were gathered from archives, and industry cases analysed are not bound to any specific period. Nevertheless, taking into account the novelty of this industry 4.0 trend, the cases concerned reveal role of design for innovations emerged on the market in the period of over last three to four years. Further, due to the regional background, this present research is limited to case studies from Germany in terms of location scope. The observation yields the natural context and is conducted without direct researcher participation. For this, it makes it is free from bias, which could arise through experimental research environment.

5. Results from the cross-case analysis

Taking into account the present context of industry 4.0, and potential domains of design integration for innovation in this discourse, the present section presents the examination results regarding design integration in the following chosen domains of industry 4.0 practices, and thus reveals the tenets of industrial and service design potential in the following discourses:

- Industrial manufacturing – design integration in product / service development (case 1);
- Service sector – transport and mobility servicing (vehicle maintenance) (case 2);
- Energy efficiency – energy saving at home (case 3); and
- Customer / user engagement – tools in vocational education schools (case 4).

It is clear that the cross-case analysis might bear an extensive challenge in making complex research results more critical in terms of comparison as well as when articulating specific conclusions that reveal the role of design for innovations in industry 4.0 as well as its perception and performance in terms of different process
segmentation. Nevertheless, the multiple cases were examined based on the structural approach presented in the section on the concept taking into account key variables of design performance from the processual point of view (development phase) within a particular industry 4.0 discourse (one of the four fields mentioned above), innovation creation and value capturing.

The present paper does not describe the individual cases in detail due to limited scope. Indeed, the description of case studies does not influence the aim of the research and showcasing of key outputs when integrating the design. On the contrary, the analysed cases demonstrate the individual segments of innovation creation and value creation in operational, economic, social and environmental context. As a result, the cases were broken down in a particular segments in terms of their contents, necessary to reveal the contribution of design to innovation on operation and strategic level in the economic and social context. As a result, the landscape of cases is presented only to what is necessary from the research objective point of view.

5.1. Design for innovative products / services

Complying with the principles of the cross-case analysis, the focus remains on understanding and revealing the research phenomenon – design and its embedding in the industry 4.0 context. From the comprehensive umbrella perspective, as the analysed results from all four industry / sector domains of industry 4.0 trend demonstrate, all innovative processes reveal the integration of design or tend themselves to be integrative design-driven innovation processes.

First, the design integration and tangibility in all four cases concerned is evident. It is a development process, an innovative process, since it marks the change of development product / service as compared to the previous ones exploited on the market. Indeed, as it is stressed in the research streams, design process can be twinned with innovations process against the background of the same processual segments and output indicators shared. In case 1, where the industry player and manufacturer of industrial product chosen – washing machines for households – does change the development process of producing spare parts for household washing machines. Supply of spare parts after the end of the product life cycle, i.e. injection moulded plastic part of household washing machines. In this particular case, we may argue that the integrated design process (as showcased in figure 1) already starts with the deploying design as information, knowledge and a specific research.

As the previous practices showed on the corporate level, the design output (the plastic part) produced did not seem to be sustainable and efficient in terms of economic, operational and environmental sustainability. The spare parts for household washing machines maintenance were produced in advance to secure a demand from customers / users based upon request for maintenance. Further, they did not seem to ensure higher level of functionality, technical and economic flexibility: in case of stopped manufacture of a specific household washing machine model, the produced spare parts in advance were subject to change and could not be integrated in the available models. On the contrary, the use of design in the industry 4.0 context becomes possible when understanding design, as underpinned above, as a certain knowledge and organisational / corporate capability to deploy the design resources (Teece et al. 1997, p. 516), in this particular, case all resources that enable production of the output (product) in a new way – meanings, functions and forms.

In such a case, combining design resources, capabilities, information and knowledge on how a new, specifically defined and tailored spare part for a particular model of household washing machine can be expressed via new form, meaning or function, design enables generation of innovation – new spare part produced on demand, i.e. whenever needed by the customer / end-user. In contrast to a common integrated design process, design process in the context of industry 4.0 does integrate a different number of process stages (reference figure 1). Innovation generation in step 1 emerged from adopted, new, modified or absorbed design knowledge, resources deployed, knowledge and capabilities utilised, can be directly linked to developed product (in this particular context – spare part) exploited on the market by households (customers / end-users). In this light, innovation generation (conceptualisation) and its exploitation on the market are linked through key creative (design) innovation technologies that directly refer to design (design software enabling form and shape of a new spare part),
drawing, prototyping, visualisation and simulation) and key enabling technologies that link innovation generation and exploitation (production) via design. In case 1, it is 3D printing as creative innovation technology that enables the design of product to be implemented and produced. The spare part for household washing machine is produced through match of creative technology (3D printing) with ITC technologies, as Internet and software. Owing to the creative technologies that enable innovation and linking up with the enabling parameters, the design process can be speeded up, streamlined and customised.

Within the industry 4.0 context, it might be argued, design becomes as a cornerstone of the innovation processes that enables delivery of innovative products and processes. Design is likely to be embedded in all segments of the development processes – starting from design as an integration and enabler (knowledge, capability, etc.), deploying design capability in visualising and producing the desired product and delivering it to the customers/end-users. On the corporate level, an efficient and effective utilisation of design capabilities is a key for innovations. As the case 1 demonstrates, sufficient design knowledge, deployed by using specific creative technology may generate the desired product. Sourcing externally, acquiring new knowledge and sources, developing prototypes and testing become to a highly extent redundant. Stages 2-4 as known from the traditional integrated design process for product/service innovations can be merged and/or replaced by key creating, enabling and implementing technologies (Dodgson et al. 2008, pp. 5-6). Combined, such technologies already integrate the traditional stages, as, e.g. planning, conceptualisation, validation, (thus, excluding the need of prototyping) and production.

As the system linking up enabling indicators with such creative innovation technologies has been validated, a playground for designers or creative potential and capabilities employed in the product innovation process is extensive. Specific design knowledge and capabilities integrated in the development process (such as knowledge on combining shape, material and securing functionality of a spare part for household washing machine) are necessary when matching the appearance of a product and its functionality. As claimed by Wood et al. 2011, design (shape and form, meaning, function) must satisfy the functionality of such a product, which should be chosen also in terms of materials and functionality compliance. Furthermore, design principles are integrated in all three types of technologies, as all of them hold design-immanent properties. Design being as a driver for development process, can aggregate all the necessary components making up a product, and much more important, make the product/service visible, tangible through form and shape and valuable for customer/end-user through specific meanings and values generated. Without design being as a stepping stone for any development process, no efficient and effective form, functionality and meaning of a product/services can be achieved in industry 4.0.

Addressing the integration of design and its potential for innovation, or even, in more revolutionary terms, being innovation, on the corporate level, design also acts as enabler integrating customers/end-users into product/process development processes (cases 2-4). Industry 4.0 calls for integration of people, machines and technologies. It is community and customer experience that has been prioritised within the industry 4.0 on the European level (European Commission, Innovation Policy 2015). Customer experience and communities are regarded as necessary enablers for growth and efficiency drivers, infrastructure and technology for industry 4.0. in Europe (Bechtold et al. 2014, p. 5). For this reason, involvement of customers, users or end-users into innovation processes – open innovation processes – respectively, where customers and end-users do contribute towards increasing product/process efficiency with their inputs towards product/service, becomes essential. In this regard, design and integrated design processes (Figure 1) serves as an approach for capitalising from customers/end-users experiences and contributions for organisations and companies. Perception of design as coordinative, integrative and sharing activity within an organisation enables to involve customers/end-users (von Hippel 2001, p. 9). Sharing the design as a tool, its conceptualisation and generation via key enabling technologies, customers/end-users can be effectively and efficiently involved in the innovation process today (von Hippel, Katz 2002; von Hippel 2001; 2005, etc.).

To exemplify, case 2 deals with the transport and mobility service sector in Germany, specifically vehicle maintenance in the automotive trade sector, including full-service supply of car workshops to their customers/end-users. Compared to the previous case 1, this particular case covers both parts of the integrated design...
process in industry 4.0 – corporate and user-involvement (Figure 1). In this case, effective product and services development process as well as both target groups are essential for the entire value chain and value creation to both customers / end-users. Design is integrated in all three segments of the supply and value chain – spare parts producing sector / supplier, automotive trades / vehicle maintenance workshops and vehicle customers / end-users. When integrating the key creating, implementing and enabling technologies – which can be called design / innovation technologies – in this supply and value chain, design becomes a key competence and capability in terms of coordination, integration, knowledge and competence sharing as well as innovation enabler. Respectively, design can increase efficiency and effectiveness of supply chain performance (in terms of supply / delivery time) and value chain performance (streamline value creation and perception by customers / end-users through ascribing or granting new meanings, symbolic values, etc. to the products and services concerned). In this particular case, key creative (innovative technology) – 3D printing – transfers the value of design into a new, innovative dimension. Particularly, this is a case for old-timers, which are to a higher extent subject to replacement of wear parts. Through deployment of design capabilities into this field (visualisation, simulation and combination to the technologies and functionalities), replication (production) of vehicle parts, which are no longer on the market as a result of stopped manufacturing) becomes feasible. As a result, through design, the value of old-timers and especially related higher repair costs get new meaning within end-users (car owners). The same applies to other segments and stakeholders of the supply and value chain. For instance, through streamlining of key creative (design) technologies for innovation (e.g. adopting more flexible printing of spare parts, cheaper materials, etc.), efficient design capabilities, when deployed, can lead towards more flexible and efficient supply and value chain – in certain cases, for instance, becoming independent as automotive trades / vehicle maintenance workshops from the supply of spare parts from the spare parts producer and transforming to supply of such spare parts to the customers / end-users directly.

Similar are observations made from case 3, however, here, customers / end-users are left much more extensive space of action. With regard to one of the industry 4.0 tenets, as prioritised on the European level – the issue of smart home or smart living – characterised by higher energy savings as well as energy efficiency reveals a slightly different performance or appearance of design in innovation products. More specifically, design is a source and resource of new value creation and new coordinative and sharing competence and capability. The new value creation emerges only upon adaptation of new design tools for innovation technologies and involvement of customers / end-users into the product / service development and exploitation. To exemplify, German companies used to produce traditional products necessary for households and ensuring comfortable and cozy living, mainly, divided in four key product groups (windows and systems; security installations; home access (garage, gates); outdoor). New innovation in this field and transformation trend towards smart living or smart home emerged owing to integration of new, combined design skills and capabilities – design tools. For instance, design role of being integrator and coordinator enabled integration of customers / end-users together with operational control of home devices and installations produced by such German companies. The innovation itself and new value creation emerged via granting design new properties – design became as a customer / end-user tool in form of applications that can easily be installed and managed via key enabling indicators – Internet, WiFi, accessibility of server, etc.) as well as key creative (design) technologies – apps (applications). Customers / end-users are granted extensive manoeuvring room in terms of designing, i.e. conceptualising, adapting and utilising the functionalities of a product / service enabled by the producer / service provider. In such a case, customer / end-user and producer / service provider are linked through the so-called design tools, in this particular case – app (von Hippel, Katz 2002; von Hippel 2001; 2005, etc.). In this regard, the producer / service provider of a product / service for smart home / smart living has access to the generation and exploitation of the design tools by customer / end-user and thus may benefit in making additional necessary adaptations of product / service or other movements on the market. Further, the design capability of customers / end-users can be also utilised by producers through key enabling technologies to benefit from design capability of customers / end-users through individualisation of the app and application of different functionalities to the personal needs in terms of new innovative utilisation ways, adaptation possibilities, etc.

Connected with the results mentioned above are evaluation results from case 4, where playroom for design capabilities are left to pupils of vocational education schools, especially in terms of completing half of the
vocational education in laser producing specialised enterprise. In this context, the educational hardware (e.g. tablets) is used by pupils to enable them to develop and utilised design (innovative) capabilities. In contrast to the previous cases examined, the results from these particular cases reveal the design capability for innovation within the educational array. In this case, pupils as end-users are utilising design resources, tools and thus building design-driven capabilities, which integrated in the form of tablets, can be utilised as a new knowledge and information to be integrated in the corporate product / service development processes (design as integrator).

5.2 Design impact level for innovation outputs and strategic value creation

Bearing in mind the role of design, which has been already revealed in the preceding section, this part summarises key observations regarding specific areas of impact of design within the innovation processes and its impact reach. All analysed cases showcase positive value creation and its strategic role on operational, corporate strategic, environmental and social levels based on integrated design process approach for product / service development. It is to be emphasised here that value creation and capturing includes both corporate and customer / end-user level. Nevertheless, from the perspective of strategic design manifestation greater focus is placed on strategic contribution of design for organisations.

Operational level. Building upon observation of design manifestation in all four fields of application within the industry 4.0 context (cases 1-4) the present research may state that the role of design on operational level is crucial, since it influences, first, operational efficiency. As all cases demonstrate, operational efficiency has been streamlined or sustained either through design in product or service development in form of innovations within the industry 4.0 discourse. To exemplify, aesthetic appearance is of vital importance in both product and service development. In case, where form / shape of the product (external appearance expressed through design) is highly linked to the meaning or symbolic value, external appearance of the product / services embedded through design becomes crucial for generating new meanings of such a product / service. Integrated design in development processes enables manufacturing of new feasible forms and / or combinations of products / services (e.g. smart living when combining traditional products with new design-driven processes (apps user involvement in design processes, spare parts production for old cars, or production of spare parts on demand, etc.).

Further, with regard to the development process, effective and efficient design integration acts as a driver for efficient utilisation of resources (materials, personnel, equipment, etc.) and related capabilities. Key design capabilities and innovation implementing technologies in the industry 4.0 array are likely to be sufficient to develop innovative product / processes (in the cases analysed). As exemplified, development processes become shorter through effective design integration – creative (innovation) implementing technologies (e.g. 3D printing). Indeed, such technologies already integrate design knowledge, resources and capabilities, as products / services are already designed in their shape / form with visualisation or similar software and linked in terms of the viability and the available technology – 3D printing – to ensure the highest possible functionality of such a product / service. When utilised in the development process, such technologies tend to contribute to shorter development cycles – planning, research, testing and prototyping – and may become redundant for producing a new product / service and exploiting it on the market. Such technologies do already possess the validation of design (meaning and functional appearance) and thus ensures durability of a product / service over a longer time of use. In this sense, also manufacturability of products / generation of services may be streamlined in terms of time and resources employed. Supply, delivery or production time is reducing. Materials utilised are deployed in an efficient way and ensure flexibility in terms of resources acquisition and deployment. Enabling technologies ensure higher integrity of design internal and external properties and peculiarities for product / service innovation. Quality of a product / service is a key result of integrated design, as it efficiently and effectively merges the symbolic representation of a product in form / shape with technology, thus achieving aesthetics and functionality of the final result (product / service) (Candi 2005, p. 3).

Such design integration and implementation enables value creation and value capturing within operational practices, as mentioned above – addressing real-time and emergent needs in a predictive manner, offering an in-
novation product / process synergising and involving customers / end-users in the development process to share and benefit from the experiences. Possibility of easy replication (e.g. spare parts produced using 3D printing) assures value capturing. It is not necessary to predict the needed number of spare parts any longer and to produce them in advance storing them in warehouses. They can be manufactured on demand taking into account shorter production cycles, resources efficiency and stronger customer / end-user involvement.

Corporate strategic level. With regard to this indicator, design enables crucial economic efficiency in terms of increased productivity (e.g. spare parts) as well as flexibility within the supply and value chain through control / adaptation of design resources, competences and capabilities. A manufacturing enterprise, which traditionally used to be subject to production and warehousing of spare parts, is able now with utilisation of, e.g. creative (design technologies) to produce such spare parts on demand. This, in turn, enables cost savings originally used for production and rent costs and location flexibility.

Creating something new (invention) and utilising this new on the market with creative (design tools), e.g. 3D printing, visualisation software, apps, etc. enable organisations to differentiate and gain new positioning. Companies utilising such design tools and integrating it in product / service development process may easier enter new markets or market niches as well as streamline their supply and value chains (e.g. direct customers, end-users involvement). As a result, flexible operational capacity enabled through real-time aggregated and mobilised design capabilities significantly contribute towards several strategic assets – productivity optimisation and strategic flexibility.

Environmental context. From the environmental responsibility perspective, design integration and implementation in the industry 4.0 context enables organisations to introduce more environmentally friendly practices. Linking up with the example mentioned above, new integrated design approaches combined with key innovation creating technologies (3D printing) have positive impact on corporation strategic orientation: from the logistical point of view, production of spare parts on demand reduces logistical practices, and thus, environmental impact. Energy and fuel consumption can be efficiently saved through reduced logistical interactions, as the need for warehouses and their integration in the supply chains become unnecessary. As a result, the environmental impact is also reduced through saved energy usage and fuels used to transport and distribute spare parts concerned. This, in turns, allows greater sustainability of product / service through material savings, reduced resource usage and ecological mindset.

Taking into account the last indicator of design – design for social efficiency – this performance can be underpinned through observations from cases referring to service generation and exploitation (mainly cases 3 and 4). This is particularly crucial in context of digitalisation and open innovation. Specifically, design integration in development processes allows increased individual customisation through providing customers / end-users with design generating and implementing tools. Customers / end-users can individually design the final stage and performance of their own products (e.g. as in case on app to adapt to the individual needs house installations, devices, etc. in terms of energy saving, security, etc.). Using the provided design tools (technical app), customers / end-users are able to develop the products / services they need – e.g. increase / decrease lighting or heating, control security installations over the app. In this, they do not change the original products / services provided, but grant new meanings to the existing ones, making these innovative.

From the corporate perspective, this bears an important value creation and capturing for organisations. Through joint engagement of enterprise experts and customers / end-users and their connectivity possible through creative innovation implementing technologies and enabling indicators (Internet, software, platforms, apps, etc.), enterprises are granted access to design knowledge, resources and information generated by customers / end-users. Respectively, this new knowledge can be deployed by enterprises for adaptation or replication of new products / processes that meets customers / end-users needs to a greater extent than original ones (reference figure 1). Meeting of customers / end-users needs through providing them with a greater playroom for creativity (designing products / services by themselves) can be seen also as an important source of customers loyalty and new potential customers / end-users involvement.
6. Concluding observations and implications

Currently, design enjoys increasing recognition as an integral part in innovation-driven economy on organisational, business, societal and policy levels. Nonetheless, its integration within the industry 4.0 research streams is emerging, especially from the conceptual perspective. Growing advocacy of design is highly associated with the retrenching European industrial and business performance patterns, mounting competition and socio-economic challenges having stronger direct and indirect impact on our society (e.g. health, energy, mobility, environment, etc.).

In the context of industry 4.0, the present research contributes towards deeper understanding of capitalisation possibilities through design integration, implementation and exploitation in product or service development processes for enterprises. Practice-oriented approach proposes a solution on how design can be traced, integrated and utilised within innovation processes. It also underpins perception of design within innovation processes. Integrated design process for product/service development can be perceived as innovation process, and design is an essential knowledge, resource and capability in innovation process of industry 4.0.

From the strategic perspective, design might positively influence value creation and capturing on organisational operational and strategic levels, for both enterprises and customers/end-users, as observations showcase. Particularly, design-driven development processes lead towards flexible manufacturing and servicing, individual customised products and services, innovative business models, new working and cooperation patterns, resource-efficiency (production on demand), production location flexibility and effective customers/end-users engagement through their integration in development process.

Design also proposes value in terms of sustainability, environmental and social efficiency. Effectively employed, design as a tool and process can streamline performance of supply and value chains, reduce logistical interactions and make additional activities redundant. This, in turn, has positive implications for environment through, e.g. carbon footprint and energy reduction, at the same time ensuring social efficiency – stronger social recognition by customers/end-users for socially and environmentally responsible performance of an enterprise.

Design is perceived as a driving force for smart manufacturing, smart products and services connected with customers and consumers, increasing resource efficiency, business performance and competitiveness and level of innovations. Nevertheless, with regard to the findings, the intensity or external perception of design and its integration within the innovation product or process development process may differ. The reason behind this is a level of design tangibility and perception.

Design is traceable and viable via tangible appearance (would it be sign, form, shape, styling, etc.) combined with function and technology as well as through giving this specific form significant and designating its relation to other things, end-users, economic, environmental or social environment, customers and end-users. Through specific signs, symbols and forms, the product service developed becomes more tangible than compared to other cases, where the perception and tangibility of design is attached to intangible tenets, such as meanings, symbolic values, etc. In these particular cases, the meaning is expressed through a particular service, which can become valuable when exploited on the market by consumers or end-users.

As a result, the proposed framework integrates both perspectives – industrial and service design, targeted to support enterprises to better understand and streamline their operational and strategic patterns internally and externally on the market. The shortcoming of this proposed conceptual approach lies in the limited application practices and a number of qualitative cases observed. For this reason, the forthcoming research is set out to enrich the body of empirical findings highlighting practical orientation of the proposed framework and its integration in modern enterprises practices within the industry 4.0 trend. It is intended to specifically support this grounded framework and demonstrate its increasing coordinative, integrative and innovative capacity for product or service development practices.
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BUSINESS DEVELOPMENT MODELS FOR REGIONAL AIRPORTS – CASE STUDIES FROM THE BALTIC SEA REGION

Anatoli Beifert 1,2

1Tallinn University of Technology
Ehitajate tee 5, 19086 Tallinn, Estonia

2Wismar University of Applied Sciences
Philipp-Müller Str 14, 23966 Wismar, Germany

E-mail: anatoli.beifert@hs-wismar.de

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Abstract. According to the EU Competition Policy Brief on the new state aid rules for a competitive aviation industry issued in February 2014, the regulation for the financial public subsidies of any art on the EU national or regional level for regional airports will be a considerably stricter. The strategic aims of these new regulations, among other things, are to motivate and encourage the Member States (here: regional airports) to implement more efficient market stimulation measures, make airports work on cost efficient and profitable basis and establish transition periods for regional airports. In practice it means that public subsidies may be granted only to those regional airports that proved to have a sustainable and realistic business model that shall clearly demonstrate the durable financial stability. The authors took part in two air transportation initiatives in the Baltic Sea Region (BSR) and were lead partner in the EU Project BalticAirCargo.Net, which deployed a number of empirical measures in selected regional airports in the BSR. This paper presents success factors of sustainable business development models for the regional airports in the BSR based on cases studied during the project lifetime.

Keywords: business development models, regional airports, sustainability

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1. Introduction and problem definition

The EU White Paper on Transport Policy states: “Transport is fundamental to our economy and society. Mobility is vital for the internal market (…) enables economic growth and job creation”. According to the report of European Court of Auditors in 2014, the air transport is considered to be one of the dominant modes for the pas-
senger traffic over long and middle distances in Europe and worldwide. Air transport is playing also a vital role for the cargo with a high value added or time sensitive goods. European airports are responsible for employment over a million people, working directly or indirectly in aviation business: e.g. airlines, technical aircrafts’ maintenance, logistics or catering services, retailing or traffic control or sky-guiding. The aviation business in total contributes more than 140 billion euro to the European GDP. However, in spite of the importance, growth and opportunities of the air transport industry, the European Court of Auditors registered in 2014 ca. 48 % of European airports as loss making. Aiming at provision of accessibility or public socio-economic obligations, in spite of the current losses, the regional or national public authorities keep on supporting the airports. There are over 500 commercial airports in Europe that might be split into two categories (Horst 2006): 1) Hub airports, which provide a full range of services, including business or leisure, domestic, European or inter-continental flights. The hub airports consolidate also air traffic from smaller and regional airports; 2) Regional airports connecting remote regions to the centres of economic activity, feeding hub airports but also having direct flights to other regional airports. As it further stated in the Competition Policy Brief on the new state aid rules for a competitive aviation industry by the Competition Directorate–General of the European Commission in February 2014, it would be complicated for unprofitable airports, to get subsidies from the EU, national or regional public funds. In spite of the important social and economic role and positive impact of small airports on the regional development, the operating aid to the airports has to be cut out over a maximum of 10 years. The majority of small and regional airports appeared to experience problems to cover at least their running operative costs. As it was further stated, the airport management is using the public funds mostly for hardware infrastructural investments, to cover operating losses or to attract price-sensitive airlines. On the other hand, comparing to the airlines, the airports possess a competitive advantage in form of diversity of business and service models in the nearest operational environment. Current IATA studies reveal that the Return on Invested Capital (ROIC) for the players along the aviation value chain vary a lot, whereas the airlines noted the least ROIC index, i.e. practically every service, supply or distribution sector earned a higher return on capital than airlines. But same study also pointed out that ROIC of airlines suffer under a higher volatility and airports due to diversification options of airports related to a wider range of business models compared to airlines which are mainly active only in one business sector like pure passenger traffic. Thus, the airports due to business diversity possess a competitive advantage and the opportunity to develop in more sustainable, stable and profitable way.

The paper is organised as follows: the theoretical framework showcases key theoretical approaches and theory gap, the following section presents the methodology and results of the case studies analysed, the succeeding section formulates key implications for sustainable airport development and business sophistication. The paper ends with key concluding remarks showcasing tenets for regional airports business development across the Baltic Sea.

2. Theoretical framework and research questions

The airport business experience a severe transformation, moving from the business based on growing traffic volumes, market share and political support. Stiffer competition and increasing role of networks and strategic positioning made it for the airports and especially for regional airports difficult to sustain their competitive position on the market. To overcome the retrenching performance, airports are subject to development of new strategies and business models adopted to new value propositions on the local, regional and global markets.

Casadesus-Masanell and Ricart (2009 and 2011) differentiate strategy and business model, by viewing a business model as so called “realized strategy”. The strategy is seen by Casadesus-Masanell and Ricart as the specific plan, which aims to achieve specific business objectives (e.g. market expansion or improving of competitive advantage). The action framework including rules, resources, management structures, etc. represents so called the “raw material” to form a business model. The development, further development and the definition of the business model are considered part of the strategic process of a company. According to Casadesus-Masanell and Ricart The strategy is concerned “know-what”, i.e. WHAT a company wants to be in the future and the business model describes the elements and logic, which are necessary for tactical implementation of already designed strategic objectives, i.e. business model is concerned with the “know-how”. Other authors have tried to differentiate “strategy” and “business model” from each other, without bringing this separation in a particu-
lar hierarchical structure. For instance Magretta outlines that a business model describes various elements that must work together to make a company successful, while the strategy describes its difference in regard to the competition: “A competitive strategy explains how you want to do better than your rivals. And doing better by definition, means being different.” (Magretta 2002, p. 6). Magretta defines the term “business model” as a story that tells of how an organization works. The aim is a strategic business model to provide answers to three questions: „Who is the customer?, What does the customer value?, What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?” (Magretta 2002, p. 3). The further development or redesigning of a business model is in this view then nothing more else than writing a new story, whereas the “new” is often a variation of “already known”. By “writing the new story” a clear reference to the added value relationships must be made and it cannot be written without reference to the current situation. Furthermore, there are two essential parts in the business model innovation according to Magretta: (1) one part has to deal with the activities, dedicated to product development (e.g. development, purchasing, production); (2) in the second part the attention is paid to all the activities that are related to the sale of the product (e.g. attracting additional activity or business to the airport, pursue new air service opportunities, etc.).

Reviewing of the practical experiences demonstrate that airports’ success lies mostly beyond simple reflection of the needs of customers and delivering a sufficient return to investors or other stakeholders. Rather, strategic and operational success is likely to derive from three key tenets represented in different strategic management and research streams, namely: diversity, differentiation and innovation of airport business (Feldman 2009, p. 1; Prahalad and Hamel 1990, pp. 5-7). For this, the theoretical framework of the current research needed to recall theoretical approaches pinpointing diversification, differentiation and innovation potential internally (i.e. regional airport) and externally (market) for regional airports: Resource-Based View (RBV) (Wernerfelt 1984; Barney 1991; Grant 1991), competitive advantage and cluster theory by Porter (1991; 2000) including innovation management process (Tidd and Bessant 2013). In order to develop capabilities for diversification and differentiation, regional airports need to change their performance strategy internally (organisation-based) and externally (market-driven). Regional airports need to shift from being reliant on a single revenue source. For doing this, organisational success and performance is likely to depend on strategic utilisation of resources, such as human, physical capital, intangible assets that are valuable, rare, imperfectly imitable and non-substitutable (Barney 1991, pp. 105-106; Boxall 1996, p. 65). Following Wernerfelt, a resource can be anything that can contribute to a strength or weakness of a given organisation (Wernerfelt 1984, p. 172). Strictly speaking, in the RBV resources are all tangible and intangible assets, capabilities, organisational processes, attributes, information and knowledge, which allow an enterprise to recognise and implement strategies that lead to organisational efficiency and efficacy (Barney 1991, p. 101; Crook et al. 2008, p. 1150-1152). More specifically, a resource is a tangible or intangible asset and input to production that an organisation owns, controls or has access to (Helfat and Peteraf 2003, p. 999). The resource-based view model investigates the competitive environment from so called “inside-out” approach, dealing with the internal environment of a company (Prahalad and Hamel 1990, p. 4).

According to the RBV, it is internal resources or capabilities that determine a future development or a strategic decision-making process and strengthen organisation’s competitive advantage (Prahalad and Hamel 1990, p. 4; Porter 1996, p. 70; Hoopes et al., 003, p. 890). The core task of the management is to develop the demand and offer such products or services that potential customers surely need, but have not yet known or imagined them before. This brings to the second crucial element in the airport strategic plans – differentiation. Since today we face an increasing customer centricity, attempts to propose a unique, rare and valuable product or service to our customers, value proposition makes an important competitive advantage for regional airports. Echoing Feldman, airports now must to propose value that goes far beyond simply impressive architecture. Rather, at the core is customer experience associated with the airport, its products, services and assets, thus transforming airports into customer destination (Feldman 2009, 4). In this regard, airports need to develop or recall such resources and capabilities that make them valuable among customers. Indeed, this can be facilitated by efficient marketing and branding activities of regional airports as well as additional products and services proposed to its customers, e.g. organisation’s image or brand that can be hardly replicated; tacitness in relationships between the
market players or market structure limiting new entry (Kai 1993). Prahalad and Hamel recommend operating across organisational limits and benefit from the core competences of an organisation. Thus an organisation’s core competences may be seen as a cluster of intangible resources that make it possible to achieve competitive advantage through: providing an access to a variety of markets; contributing to the perceived customer benefits of the end product and making imitation or replication process for the competitors as very difficult, thus sustaining of competitive advantage (Thakkar 2008 and 2009). Linking up with resources and capabilities within organisations, a cluster of internal resources and capabilities residing in an organisation must be linked to the external environment. Following Porter, competitive advantage derives from an organisation’s activities in the external environment or on the market, namely, how those activities fit strategically into the external environment or the market and, therefore, create economic and customer value (Porter 1985, p. 35; 1991, p. 103). As a result, an enterprise gains a competitive advantage through fitting, for instance, its products, technology or marketing approach to the external setting (Porter 1996, p. 70). Moreover, sustained performance is a result of relevant competitive advantages gained due to industry structure and appropriate positioning of an enterprise in an appropriate industry setting (Porter 1991, pp. 99-100), i.e. cluster as “a proximate group of inter-connected companies and associated institutions in a particular field, linked by commonalities and complementarities. The geographic scope of a cluster relates to the distance over which informational, transactional, incentive, and other efficiencies occur” (Porter 2000, p. 16). Porter argues that a cluster is not just a bundle of single industries, but rather a system of interdependent industries and business entities that cooperate and complement each other in a given economic landscape. They might include suppliers of specialised resources and services as well as providers of specialised infrastructure. The identified requirements to „create“ a cluster are critical mass of companies in spatial proximity; companies, who’s businesses are in the same business area; similar or supplementary business activities and common connections to branches (ibid., p. 16f). A functioning cluster positively contributes to improving productivity and efficiency of the inter-related businesses, it stimulates a cluster-internal competition and innovations and finally a cluster provides a favourable framework for the new start-ups and entrepreneurial activities within the cluster. These positive effects are also achieved through efficient knowledge sharing and knowledge transfer within the cluster, multiplied by a learning process that does not require cost intensive investments; and where the cluster’s players may utilise the cluster business canals to other economic spaces.

The current technological and socio-economic developments have led to significant changes in many business sectors. Many enterprises and new start-up have benefited from these changing business environment (Engelen 2015, p. 2). On the other hand for many companies these changes have brought significant disadvantages by turning existing and running business to unattractive or even unprofitable at all. Which driving forces stay behind these developments? Kuratko et al. (2011) distinguishes between the changes in the competitors’ behaviour, in technological developments, in consumer behaviour and in the institutional context. Engelen pointed out that during recent decade, many competitive environments have changed dramatically, e.g. due to technology and Internet-oriented industries the complete or partial substitution on the certain business areas took place. (Engelen 2015, p 15). In fact, if we take a look at the aviation industry only, especially at the business area of integrators and intermediates companies like travel agencies or transport broker companies, it may be stated that the relevant liberalization of the information flows and Internet services for booking have changed the game rules in this area of business significantly. It may be hardly overseen that in particular newly formed start-up companies by implementing innovation business models and taking advantages of these new opportunities have managed to displace already established business partially or even wipe them completely out of the market. Most of the studied clusters in academic literature are related to ICT, life science, automotive industry and other industrial clusters, but there exists nearly nothing about logistics clusters until Yossi Sheffi (2012) published his book. In his understanding “logistics intensive clusters” are agglomerations of several types of firms and operations providing logistics services and logistics operations of industrial firms and operations of companies for whom logistics is a large part of their business. Such logistics clusters also include firms that provide services to logistics companies like maintenance operations, software providers, specialised law firms or international financial services providers (Sheffi 2013). Thus, an airport together with its surrounding business network can be considered as a logistics cluster in a comparable way, like it is well known for seaport clusters (DeLangen 2004). By doing so it means that an airport shall focus on strengthening efficient interconnections with all its relevant industries, operating institutions and organisations, therefore improving competitiveness.
and its own sustainability. For a regional airport e.g. prioritising the air cargo business cluster approach may mean building up logistical service centres that would create a network of regional logistic service providers, thus the single services might be enlarged, structured and improved. That may lead to improved tangible and intangible resources of the involved cluster participants and help to identify distinctive capabilities of an airport. If one may assume an airport not as a single branch or an entity, but rather as a cluster, it may mean that an airport shall focus on strengthening efficient interconnections with all its relevant industries, operating institutions and organisations, therefore improving competitiveness and its own sustainability. For a regional airport e.g. prioritising the air cargo business cluster approach may mean building up logistical service centres that would create a network of regional logistic service providers, thus the single services might be enlarged, structured and improved. That may lead to improved tangible and intangible resources of the involved cluster participants and help to identify distinctive capabilities of an airport.

Coming to the third tenet – innovation, it is needed in order to stay ahead and develop future trends. As today’s markets and customer needs evolve, inflexibility in terms of operations, strategy, etc. can be crucial for airport’s failure. The importance nowadays about business model prototyping including identification of strategic supply and demand drivers, macroeconomic environment, megatrends, the level of innovation, business sophistication, technological readiness, financial market development, labour market efficiency, hard/soft infrastructure, etc. has been outlined and mentioned in a range of scientific publications and research papers (Eckert 2014, pp. 7-9). Furthermore, the upcoming threat in form of so called “multipolar world”, which describes the far-reaching changes in the relevant competitive fields as a result of the growing importance of emerging markets for economic development is about a global competition for labour, capital, commodities, new consumer markets and for innovations. (Scholtissek 2008, p. 27f). Thus, it may be stated that the most intensive competition has been already started for the global innovation leadership. Innovation introduces a new meaning and value for its consumers, i.e. a new or significantly improved good or service, process or new marketing method, new organisational methods in business practice, workplace organisation or external relations (OECD/ European Communities, 2005, p. 46). Innovation implies a process during which all the necessary activities such as problem resolving and/or idea generation; development; manufacturing and marketing of a new construct (would it be product, service, or process itself) are effectively and efficiently managed and commercially and practically exploited to the market (Trott 2012, p. 12-15). Innovation is to be viewed as a process of turning opportunity into new ideas, ensuring its practical application in the reality (Tidd and Bessant 2013, p. 18-22) and bringing value through its availability and access to it for its users via the market and/or other channels or distributed peer-to-peer and/or by the market (Gault 2012; Stock and Lambert 2001). Launch of innovations also require specific capabilities, knowledge, skills, facilities, resources, market knowledge, financial resources and certain level of infrastructure. It is, in other words, knowledge and entrepreneurial know-how that makes innovations successful on the market. Innovations are likely to come to the market as a result of technology push (e.g. Christensen 1997, p. 72f), can be pulled by the market after having analysed users needs and in order to satisfy users needs by firms to increase revenues and safe costs.

Furthermore, due to the disruptive innovations character in the aviation and airport business, some of new market opportunities are often seen by regional airports as not promising to invest in. However, if those opportunities start to grow, it is often too late; they might have been already occupied by other regional or national competitors (Downes and Nunes 2013). Therefore it may be recommended in this connection that regional airports must learn to identify these market opportunities and deploy them appropriately considering innovation business models in time and according to entrepreneurial use. Similar to well proved step-by-step innovation process including search for new ideas / opportunities; selection of ideas; implementation of ideas and capturing ideas and commercially benefiting form their exploitation (Tidd and Bessant 2013, p. 47), Osterwalder and Pigneur (2010) identify five components that make up a business model, so-called “Business Canvas” (Table 1). Nevertheless, a comprehensive business model developed by them include nine elements: customer segments, value propositions, channels, customer relationships, revenue sources, key resources, key activities, key partnerships and cost structure. The business model of Osterwalder and Pigneur may be considered as an example of an operative business model approach, which serves to derive from the corporate strategy, the operative business model as an intermediate step to the organisational model.
Table 1. Innovation Business Canvas by Osterwalder and Pigneur (2010)

<table>
<thead>
<tr>
<th>Nr</th>
<th>Components</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilising</td>
<td>Create an understanding that a business model restructuring is necessary. At the same time, all elements of the business model (nine Business Canvas) are collated and discussed</td>
</tr>
<tr>
<td>2</td>
<td>Understanding</td>
<td>Find and analyse the various elements of the business model in the light of possible future changes (e.g. customer requirements, new technologies)</td>
</tr>
<tr>
<td>3</td>
<td>Designing</td>
<td>Transfer various findings in several business model prototypes including intensive testing and checking. This is followed by the selection of the future business model</td>
</tr>
<tr>
<td>4</td>
<td>Implementing</td>
<td>Implement the selected future business model</td>
</tr>
<tr>
<td>5</td>
<td>Performing</td>
<td>Perform the necessary measures to stabilise the new business model, i.e. all the steps known from the successful reorganisation and transformation programs may be necessary (e.g. management structures, management processes, management decision systems, etc.).</td>
</tr>
</tbody>
</table>

Source: Adopted from Osterwalder and Pigneur (2010)

3. Identification of the research gap and research questions

With the wide variety of definitions of terms related to innovation business models and a variety of approaches have appeared on how business models might be developed or redesigned within a company. It may be stated that those phase concepts are closely connected to the known phase concepts of strategic management, innovation management or even the transformation management. However, it might be stated that too less attention has been paid to the special needs and operational requirements of the regional airports. In the framework of the evaluation analysis and further development of the business models the general approaches are applied. In the framework of this study the following research questions are investigated:

1) What are the relevant criteria elements that might be appropriate for the evaluation of regional airports and for the further development of the sustainable business models?
2) Could any discrepancies (here: overestimation or underestimation of the performance criteria) in the evaluation process between internal and external stakeholders be noticed?
3) Does the intensity of an airport’s cooperation with the regional/national public authorities or public private partnership have a positive and sustainable impact on the airport’s performance?

With regard to all concepts integrated within this theoretical framework, it is argued here that regional airports as complex, open and multi-layer ecosystems can be analysed and assessed by applying different factors, which were found in the strategic management and business modelling literature discussed above, such as resources, value propositions, internal and external structures. It is evident that most of the theoretical approaches do share the same common process, e.g. steps of identification, understanding or resources, capabilities and other tangible and intangible assets within organisations and on the markets. For these reasons and as a response to the first research question, the following matrix (based on RBV by Prahalad and Hamel and Innovation Business Canvas of Osterwalder) for the assessment and supporting sustainable airport’s development might be suggested (Table 2).

Table 2. Matrix for regional airports assessment and sustainable business model development

<table>
<thead>
<tr>
<th>Criteria element of business modelling</th>
<th>Assessment criteria for business sophistication proposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversification</td>
<td>Analysis of resources: tangible; intangible; organisation</td>
</tr>
<tr>
<td></td>
<td>Analysis of resources: valuable, rare, imperfectly imitable and non-substitutable</td>
</tr>
<tr>
<td></td>
<td>Analysis of capabilities: tangible; intangible; information-based organisational process and intermediate goods</td>
</tr>
<tr>
<td>Differentiation</td>
<td>Level of value proposition</td>
</tr>
<tr>
<td></td>
<td>Level of customer experience creation (e.g. marketing, corporate identity and branding activities)</td>
</tr>
<tr>
<td></td>
<td>Level of clustering activities:</td>
</tr>
<tr>
<td></td>
<td>Level of competing sophistication (operational effectiveness and quality of micro-economic business environment (internal &amp; external dimensions)</td>
</tr>
</tbody>
</table>
The author of this paper argues that the above-presented matrix for the regional airports’ assessment based on the consolidated theoretical frameworks of RBV by Prahalad and Hamel; Innovation Business Canvas of Osterwalder and Pigneur and Competitive Advantage and Cluster Theory of Porter enable comprehensive evaluation of airports.

4. Methodology and research approach

An evidence-based approach has been applied here to assess airports’ competitive environment as well as investigating of favourable preconditions for the successful SMEs operations in the airports. The case study approach has been applied here as a technique in exploring entrepreneur activities and performance in the airport’s operational environment (Gunasekaran and Nagi, 2003; Bernal et al., 2002 etc.). According to Yin (2009), a case study research draws a special focus on contemporary phenomena by addressing questions “how?” and “why?”. Although this qualitative method may leave a little room for researchers to control events (Yin, 2009, p. 2), it enables to catch the particularity and complexity of a single case evidences (Stake, 1995, p. xi). The degree of competition between airports or the competitive constraints have not been included in this study. Original primary and secondary data have been applied here. Expert interviews and empirical data were obtained in the frame of the project “Baltic.AirCargo.Net” (hereafter: BACN) financed by the EU Programme “INTERREG IVB, Baltic Sea Region”, ERDF Funds. The empirical data was collected from diverse sources of evidence over the project life 2011-2014, i.e. primary empirical data sources in form of qualitative observations of researchers involved into the project activities, external experts’ evaluations, project documentation and observations gathered from respective project activities such as workshops, conferences as well as from the field notes from project meetings.

Following target groups and relevant stakeholders participated in the surveys and expert interviews a) representatives from Transport Ministry and Airport Management; b) representatives from Transport and Logistics companies from participating regions; c) representatives from the academic side, c) expert from aviation sector, air cargo security and air cargo freight sector. In terms of the presented investigated case studies, 67 qualitative interviews were conducted and evaluated. The above-presented matrix for regional airports’ business assessment and development (cf. Table 2) has been chosen as a basement to present compliant evaluation analysis of the selected airport. Within the BACN project, nine regional airports from eight BSR countries have been analysed and evaluated. Grodno Airport (Belarus) has been selected here as a main demonstration case for this study. The selected findings from Kalmar Airport (Sweden) is used as supplementing case in order to outline the role of the efficient cooperation between an airport and relevant regional structures, including private public partnership, regional responsibility of an airport as well as the importance of the ICT competence and deployment. The motivation of showcasing the following two airports in this paper is the consideration of the two opposite cases: in the first case (Grodno Airport) the total dependency of the airport on public subsidies and state regulations, absence of any cooperation structures and any regional development considerations may be notified as critical feature. The supplementing case of Kalmar Airport provides a supplementing best case study on cooperation structures and the role of the airport in the regional development.
5. Case Study – Grodno Airport (Belarus)

Grodno Airport belongs to five regional airports in the Republic of Belarus that is situated near Grodno city in Western part of Belarus with approximately 325 thousand inhabitants. Grodno is located close to the borders of Poland and Lithuania: about 20 km and 30 km away respectively. Grodno is the capital of Grodno Region that may be considered as the airport’s catchment area with a population of 1,1 Mio. Road is the most used transport mode for the passengers and the cargo transport in the region. One regular flight to Kaliningrad (Russia) 2 times per week is offered at the moment. The logistical and time distance from Grodno to: Minsk: 280 km, ca. 3,5 hours (via road); Vilnius: 167 km, ca. 2,5 hours (due to cross border procedure time costs of traveling to Vilnius may vary from 2,5 hours to 4 hours); Warsaw: 274 km, ca. 3,5 hours (due to cross border procedure time costs of traveling to Warsaw may vary from 3,5 hours to 5 hours). International Airports in Minsk, Vilnius and Warsaw are the main competitors for the Grodno Airport. Grodno Airport is a 100% state-owned airport operated by national Transport Ministry – BELAERONA VOGATSIA. The navigation services for the over-flights are the main revenue source of Grodno Airport at the moment.

Diversification analysis of Grodno Airport has shown a number of gaps in the evaluation between internal stakeholders and external experts. The interviewees have been asked to identify the distinctive resources, evaluate the named resources from 1 (bad) to 10 (excellent) and distribute the weighting scale (of total 100%) between the named resources. The internal stakeholders identified the following distinctive resources as the internal strengths and opportunities in the following priority order:

<table>
<thead>
<tr>
<th>No.</th>
<th>Internal Resources</th>
<th>Resources description</th>
<th>Mean Value</th>
<th>Mean weight scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intangible</td>
<td>Favourable geographical location</td>
<td>7,89</td>
<td>0,28</td>
</tr>
<tr>
<td>2</td>
<td>Tangible</td>
<td>Radar/Navigation and supporting hard ware infrastructure</td>
<td>7,78</td>
<td>0,28</td>
</tr>
<tr>
<td>3</td>
<td>Intangible</td>
<td>Competences of the personnel</td>
<td>7,56</td>
<td>0,24</td>
</tr>
<tr>
<td>4</td>
<td>Tangible</td>
<td>Runway</td>
<td>3,67</td>
<td>0,13</td>
</tr>
<tr>
<td>5</td>
<td>Intangible</td>
<td>Internal security regulation system</td>
<td>3,56</td>
<td>0,04</td>
</tr>
<tr>
<td>6</td>
<td>Intangible</td>
<td>Low costs for aviation fuel compared to EU countries</td>
<td>1,44</td>
<td>0,02</td>
</tr>
</tbody>
</table>

Source: based on own primary data, EU project BACN

Airports Management and the airport’s stakeholders have identified also that information-based organisational process and the quality of the offered intermediate services can be considered as distinctive resources. External experts have identified the relative low costs of the aviation fuel as one of the main intangible distinctive resources of Grodno Airport for the potential refuelling of the air cargo over flights Eastbound (e.g. Europe-China) direction. In contradiction to the evaluation of the internal stakeholders, it shall be noted that the external experts pointed out that the runway is obviously too short for large cargo aircrafts. In the framework of the diversification analysis, the cross-referencing of the evaluations that were done by the airport’s stakeholders and external experts has been carried out. The interviewees have been asked to evaluate the given criteria according to scale: poor (1), satisfactory (2), good (3) (Table 4).

<table>
<thead>
<tr>
<th>No.</th>
<th>Differentiation Assessment Criteria</th>
<th>Airport’s stakeholders view</th>
<th>External experts’ view</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Level of value proposition</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Level of customer experience creation (e.g. marketing, corporate identity and branding activities)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Level of clustering activities</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Level of competing sophistication (operational effectiveness and quality of micro-economic business environment (internal &amp; external dimensions)</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: based on own primary data, EU project BACN

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The cross-referencing of the results gained by internal and external experts in the framework of the differentiation assessment has demonstrated a tendency of overestimation of the assessment criteria by the internal stakeholders. The external experts identified specifically the following diversification criteria in Grodno Airport as poor:

a) Poor availability, quality and level of value added services, including deficit of specialized services and support;

b) Poor level of competing sophistication mainly due to national regulations imposed by National Air Line, i.e. Belavia;

c) Low level of logistics services;

d) Absence of cargo terminal;

The evaluation of the business innovation criteria done by internal stakeholders and external experts have shown the following results (Table 5):

<table>
<thead>
<tr>
<th>No.</th>
<th>Business Innovation Assessment Criteria</th>
<th>Airport’s stakeholders view</th>
<th>External experts’ view</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Level of ICT deployment and technological specialisation</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Field of innovations: product, service, process, organisational (horizontal dimension) and their number incl. diffusion of those in the regional / national economy</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Innovation level in airports and their management (vertical dimension)</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Institutional and infrastructure framework in which airports operate</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Linkages of airports with other public vs. private R&amp;D</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Linkage of airports with innovation policies</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Role of demand</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Governance /cooperation level: multi-level; local; regional; national</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Level of coordination (e.g. networks), stakeholders, etc.</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: based on own primary data, EU project BACN*

External experts drew a special attention to the non-appropriate and poor deployment of the existing ICT infrastructure and ICT competence, incl. poor availability, quality and level of specific and targeted marketing activities, including poor web design presentation, low regional image in Grodno Airport. Furthermore, the Airport internal stakeholders identified linkages of the airport with other public / private R&D and linkage with innovation policies as poor, the other business innovation criteria have been evaluated as “satisfactory” or “good”. The external experts evaluated the only criteria in Grodno Airport as “satisfactory”, i.e. governance level. It was mainly explained by the fact that Grodno Airport has a sustainable financial support, investments and guidance in terms of innovative hardware and software infrastructure, the national Ministry of Transport of the Republic of Belarus provides a financial support to the airport. On the other hand, the experts pointed out that too close attention and monitoring from the Government side might be a hinder for the realization of innovative business models, since e.g. it is linked to a relative high bureaucracy level and every tactical and operation decision shall be communicated and approved with / by the responsible government body.

In response to the second research question, the collected empirical data in the given case study demonstrated that considerable deviations between internal and external stakeholders in the evaluations do really exist. Whereas, the general tendency may be noted that the airport’s internal stakeholders (e.g. airport management team and representatives of the Transport Ministry, i.e. direct and indirect airport’s stakeholders) tend to overestimate airport’s own tangible and intangible criteria; parallel to this, an underestimation of risks or inadequate availability of the innovation or differentiation criteria has been noted. Although, the readiness to take appropriate risks is considered as indispensible prerequisite for the sustainable and well-established business attainment nowadays (Engelen 2015), the obvious risks underestimation may distort decision-making process for the business development plans of the given regional airport and imply severe and irreversible impact for the business sustainability with long-lasting negative consequences (cf. Machina and Viscusi 2014).
6. Supplementing Case – Kalmar Airport (Sweden)

The following supplementing case is based on the secondary data and on the expert interviews carried out with the representatives of the Kalmar Airport Management and the representatives from the relevant public authorities from the City of Kalmar and Kalmar Region.

Kalmar Öland Airport situated near Kalmar - a town with ca. 40 thousand inhabitants, located in South – East Sweden at the coastline of the Baltic Sea Region. The airport had been a military airport till 1983 when the city of Kalmar took over the airport’s ownership. The airport’s area and the corresponding infrastructure became the property of the city of Kalmar. The catchment area of Kalmar Öland Airport consists of about 300 thousand people. The geographical / transport and time distance by car from Kalmar to the nearest airport hubs are: Copenhagen: ca. 330 km, ca. 4 hours; Stockholm: ca. 415 km, ca. 4.5 hours. Due to relative long traveling distance (here: by car), in order support local business links to national and international partners, ca. 5 daily flights to the Swedish hub Stockholm – Arlanda are offered by SAS airlines. Beside that another 4 – 6 daily flights to the city airport Stockholm Bromma are offered as an important business destination by the local airline Kalmar Flyg. Five daily flights to in Berlin-Tegel have been offered by “Sparrow Aviation” (until 2014 “Sparrow Aviation” was named “Flyglinjen”). Thus, Kalmar Airport with a catchment area that almost 3 times less than Grodno region, offers 5 regular weekly flights to the national hub (Stockholm-Arlanda) and one regular 5 weekly flights to international airport hub (here: Berlin-Tegel).

The study done by WSP Group, Sweden form 2011 estimated the impact of Kalmar Öland Airport from the view of regional development. In his study the air links to Stockholm region were analysed. The study results revealed that:
- 3.500 people are moving daily between Kalmar and Stockholm each (all modes included);
- 700 – 1000 people are moving every day between Kalmar and Stockholm by plane, including transit passengers;
- Approximately 100 people travel Kalmar-Stockholm-Kalmar by plane every day;

The flights Kalmar-Stockholm are filled by ca. 60% with business and 40% with leisure travellers. The leisure travellers are very important to compensate the gap of business seats so that the passenger load factor may reach 70%. This remote situation in South Sweden is also one main reason because Kalmar Öland Airport is outperforming in passenger growth with a sustainable development tendency compared to other regional airports in Sweden. The next distinctive competitive advantage is related to the local business sector, which demonstrated better development after financial crisis than areas with prevailing of the big companies. The interviewees stated that with the local responsibility for the airport, the needs for local skills, knowledge and political culture increased that is connected to the fact that the airport decisions have to be taken locally. Kalmar needed almost 20-30 years for the building up efficient customer experience, creation of operational effectiveness and quality of micro-economic business environment and the local know-how. The transition period was supported by the financial and intellectual support to the airport by the national government. With the regional responsibility, the airport had entered into a competition with other transport modes (i.e. train, road and sea). Nevertheless, it had been noticed that Kalmar could be considered as a remote region and the other transport links had been underdeveloped. Thus, in order to sustain an efficient accessibility, the people of Kalmar, Kalmar industry and business need airport. Local businesses invested correspondingly and became shareholders in order to build the local airline Kalmar Flyg for possible new destinations. Beside that Kalmar Municipality created a foundation to support marketing and to establish new flight links from Kalmar. The capital for the foundation originated 50% from Kalmar municipality and the other 50% from local business sector. This is an important precondition, since the city of Kalmar is not allowed to sponsor flights on its own. These financial instrument make the pre-financing of new airline connections possible and realistic (e.g. as it was the case of initiation of the Kalmar-Berlin air connection in 2013), since new flights in general need a pre-financing of ca. 1,5 years before a destination becomes profitable.

The current business plan for the Kalmar Öland Airport focuses on 3 main targets:
- Increase of leisure flight passengers, especially for incoming flights;
Increase of the attractiveness of the Kalmar region by offering charter flights and flights to Stockholm and Berlin;

Improvement of the possibilities to do global business from and in Kalmar;

In response to the third research question, it may be stated that the above-presented supplementing case clearly demonstrates the positive impact of the intensive and efficient cooperation between airport and relevant public authorities. Having recognized the potential of the airport in the regional development activities, the public authorities of Kalmar Region have been not only providing financial support, but rigorously and consequently Kalmar Airport has been involved in the regional development actions both on strategic and operational level.

7. Business Models implications for Grodno Airport

The strategic development and planning of successful and efficient business models for Grodno is required today as never before. In the strategic and long-term perspective such topic as liberalization of the air market must be initiated, i.e. in the long-term perspective, liberalization of the aviation market must be initiated in the Republic of Belarus. However, the development and planning of sustainable business models for Grodno Airport nowadays are only possible, if the plans do not contradict to the development strategies and interests of the national Airline “Belavia”. In the short-term and mid-term perspectives Grodno Airport may focus on:

a) Air Cargo Growth, including development and implementation of the Road Feeder Services (flying trucks) with the EU airports.

b) Fuelling and re-fuelling business opportunities.

Along with the availability of the internal resources one of the main reasons for recommending the Air Cargo Growth strategy are the legal frame-restrictions imposed by the National Airline, i.e. Belavia. In the short-term and mid-term run it might be realistic for Grodno Airport to start with the objectives that do not contradict with the current framework policy restrictions of Belavia that, among other things, makes it almost impossible in terms of inbound or outbound regulation of aviation traffic in Belarus for regional airports to cooperate with the non-national air lines, in spite of some potential requires from other airlines have been already received. The development and implementation of the Road Feeder Services (flying trucks) connected to ACC3 regulations, i.e. certificated air cargo destinations outside the EU via Grodno Airport with other EU airports might be the first realistic step to enter air cargo market. Here a close collaboration with relevant national authorities, regional logistics companies (business Lobby) and foreign airlines will be necessary. For the air cargo destinations outside the EU that do not have an ACC3 certification, Grodno Airport can be developed to a long haul air cargo base, due to its proximity to the EU transport corridors. The business model for Grodno Airport can be an air cargo link to non – ACC3 destinations, where incoming and outgoing cargo is forwarded by normal truck/rail e.g. via “Rail Baltic” and “East-West Transport Corridor” and Grodno over the Belarus border. This solution would offer an efficient air cargo link between the EU countries and long haul destinations without ACC3 certificate. However, it requires detailed action plan that shall make cross-border procedures between EU-States (here: Poland and Lithuania) and Belarus more time-efficient and reliable. Geographical location has been identified as one of the distinctive intangible resources of Grodno airport. The close location to Lithuanian and Polish border obviously provides huge opportunities for the regional transport industry. The high cross-border procedures (e.g. 3-4 hours, esp. for the road transport) provides a certain advantage for the development of the Road Feeder Services or “flying truck” connections between Grodno Airport and other European air hubs. A flying truck connection e.g. between Grodno Airport and Vilnius Airport assumes that the normal cargo is officially declared, transferred and handled to air cargo in Grodno Airport security zone. Further is handled to the registered flying truck operating company and is transferred by a schedule road-“flight” to Vilnius Airport. This concept assumes also that the registered “flying trucks” must have a special treatment (here: “no control regime”) on the cross-border, since among other things, they the flying trucks operate de-jure as an air cargo plane with an Air Way Bill letter and all security procedures that are applied to the air cargo. That implies that no border control for the secured and transported goods on the registered “flying trucks” is needed. Furthermore, the flying trucks will benefit from a certain number of privileges comparing to normal trucks, e.g. they dare operate during the official holidays or weekends.
In the long-term perspective such topic as liberalisation of the air market must be initiated. If we the possibilities of attracting new aviation businesses to Grodno Airport are considered, then it is most likely that international direct air-connections (from/to Grodno Airport) must be initiated. This assumption requires, however the most important prerequisite, i.e. liberalization of the air market in the Republic of Belarus. The realization of the business model of Kalmar Airport (Sweden), i.e. regionalization with the future option for privatization also indirectly requires the fulfilment of the same preconditions, i.e. liberalization of the air market framework regulations in Belarus. The requirement is mentioned here as “indirect”, since even though the “technical” and / or “formal” fulfillment of the regionalization model might be possible and is not directly demanding the granting certain freedom of air to other national or international airlines in Grodno Airport, however the Kalmar Model makes only then sense, if the given freedom of air does already exist (e.g. 5th or 6th freedom of air as minimal prerequisites). Possible realization of the Costs Leadership might be implemented e.g. through formally existing branch of Belavia, i.e. Grodno Airline in form of establishing of the low cost carrier (LCC) strategy for Grodno Airline with the permission to serve domestic as well as international air routes.

Following the Kalmar Model the success example of “regional responsibility” and the identified third research question, during evaluation internal and external stakeholders indicated the governance/cooperation level (multi-level; local; regional; national) as “good” and “satisfactory”. However, it may be stated that no adequate cooperation between Grodno Airport and relevant public authorities (on regional or national level) does really exist; we are dealing here rather with strictly regulated top-down management system, where Ministry of Transport as well as national Airline Belavia dictate and imposes regulations and development plans to the airport. These circumstances can hardly be named as appropriate for the deployment of “regional responsibility” scenario and close cooperation between Grodno Airport and relevant public authorities in Grodno Region.

Grodno Airport might be privatised, whereas the City of Grodno may be the co-owner. The board of Grodno Airport might involve experts from City of Grodno, Grodno Region and Free Economic Zone (FEZ) “Grodnoinvest” due to regional development character and the direct link between FDI and air connectivity (Sellner and Naglb, 2010; Banno et al., 2011). Further board members might be selected from regional business association(s). For a certain transition period a board members from the national level may be involved. It might be recommended in cooperation with Regional Development Agency, (here: Grodnoinvest) to consider perspectives of creation and development of so-called “Free Customs Zone” or “Bonded Industrial Park” in the area of Grodno Airport. A more detailed and deeper analysis on this matter must be fulfilled. In case of privatisation, financial sustainability of Grodno Airport shall be secured already at the initial stage, e.g. new investments, demand for the financial resources for the establishment of the new air connections between Grodno and other destinations since break-even time for new air connections may vary up to 1.5 years. This measure could be realised together with liberation of the Belarus air market so that the regional airports will be able to decide about the serving airlines and destinations. Concerning the passenger flights it is recommendable to establish regular flights from Grodno to 2 important air hubs. One hub might be in CIS area, i.e. air links to Minsk or Moscow; and to an international hub in Europe (e.g. Berlin or Vienna). Both links are important to allow business trips to support the economic development and to offers the possibility of one-day business flights from Grodno to Europe and CIS countries.

8. Conclusions

European aviation business is in a reconstructing process due to strong competition and changing frame condition of the European Union. The majority of regional and small airports in the Baltic Sea Region are not reaching the break-even point and mostly rely to a large degree on different forms of public subsidies and aids. However, according to the new master plans of the EU, the subsidies to the airports, if not justifiable and sustainable, will be limited or cut in the short and mid-term perspective. Therefore, regional and small airports have to find sustainable business models to sustain cost efficiency and profitability of operations. The “regional responsibility” case practice of Kalmar Airport may serve as best example for positive and fruitful cooperation with public authorities (here: not only financial subsidies, but also support in form of the active involving of the airport in the strategic regional development plans and actions).
According to findings of the BACN project, a high number of regional airports focus mainly on passenger traffic, whereas the benefits of the airfreight market and air cargo related business opportunities are underestimated or even completely ignored. The considered cases pointed out how air cargo business can contribute to high revenue yield parts and open up international development possibilities towards airport clusters despite the fact that air cargo volumes may be small. The related business models can lead to sustainable development concepts for the regional airports and the surrounding business clusters. The research results have also shown the lack and deficit of cooperation between the regional airports. Although the airports have been developing and implementing their business development plans and models, however this process takes place mostly isolated, i.e. experience, knowledge or even plans sharing between the airports has been hardly noticed. Therefore, it may be recommended to the airports’ management to pay attention to the horizontal cooperation, learning from each other experiences.

The availability of the needed tangible (e.g. required infrastructure, incl. runway, parking slots, security and screening equipment) and intangible resources (e.g. internal competences and skills) is considered as important preconditions for the airport’s operations. However, those resources alone as well as their adequate assessment would never guarantee the sustainable and successful business growth. Nowadays, the airports shall identify and activate their distinctive tangible or intangible resources that shall further lead to provision of unique or innovative services, positively contribute to clustering activity and improve operational effectiveness and quality business environment on internal and external dimensions.

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Organisational Innovation Strategies in the Context of Smart Specialization

Eunice Omolola Olaniyi¹, Merli Reidolf²

¹, ²Tallinn University of Technology
Tallinn School of Economics and Business Administration
Akadeemia tee 3, 12618 Tallinn, Estonia

E-mail: ¹eunice.olaniyi@ttu.ee; ²merli.reidolf@ttu.ee

Abstract. Regional economic performance is positively linked to entrepreneurship capital because it creates new direction for public policy that focuses on instruments to enhance entrepreneurship capital. However, studies related to Entrepreneurship and Innovation had somewhat established a disadvantage position for knowledge-intensive enterprises located in rural area.

The EU Smart Specialization approach supports the promotion of innovation activities in regions and embraces the concept of open innovation, not just investment in R&D but a system approach that exploits complementarities, promises high potential, are new and aimed at experimenting and discovering technological and market opportunities that can provide learning spill overs to other economy.

This paper present a case study of an Estonian production company for Maritime function wear. This example reveals that despite the fact that the company’s headquarters is located in Western Estonia countryside (peripheral part of Europe and rural part of the country) an enterprise can gain the position of an international market leader based on inter-regional operations. The discussed model highlights how high – tech enterprises can benefit from different smart specialization strategies in different regions by implementing organizational innovation strategies. The underlying business concept and its related success factors, exhibits strong affinities with the concept of smart production and logistics in relationship with fractal enterprises, paved way for a sustainable development and demonstrated that even in rural areas high – tech entrepreneurship can be successfully implemented.

Keywords: entrepreneurship, innovation, smart specialization, knowledge intensive enterprises, fractal enterprises, rural innovation

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1. Introduction

Innovation policy plays a crucial role for regional development because innovation is closely linked to economic growth and performance (Tvaronavičienė 2014; Travkina, Tvaronavičienė 2015). Also innovation and research in the 21st century are increasingly becoming international endeavours and most innovations originate from multiple sources, with many drawing in components or technologies developed in multiple locations (Hayek 2002; Rezk et al. 2015; Pather 2015; Tvaronavičienė, Černevičiūtė 2015). Innovation especially through creation of new companies and new business fields is seen as a key factor to achieving economic success of a firm, region or any nation. A restricting factor to this however is the non-availability of human competence in managing projects and/or entrepreneurial activities. Innovativeness is important because products or services that are more innovative are more likely to offer unique benefits to customers and occupy distinctive places in the market place (Fiet 2002). Studies on Entrepreneurship and Innovation however had have suggested a disadvantage position for knowledge-intensive enterprises located in rural area. One argument in this regard is that entrepreneurship and innovation tend to be higher in cities and more densely populated regions (Acs 2002; Carlino et al. 2007; Pather 2015). Furthermore, Van Oort (2004) found out that entrepreneurship and innovation are seen to be higher in more sectoral and diversified regions. Acs and Szerb (2011) also showed that entrepreneurship and innovation tend to be higher in regions with a large number of multinational companies. Finally McCann and Ortega-Argiles (2013) revealed that entrepreneurship and innovation are mostly concentrated in regions with large market potential. These results arguably indicate significant disadvantages for business operations of knowledge-intensive companies in rural areas (Prause 2014). Traditionally, the EU had based its development policies on infrastructural projects, tackling of unemployment and internationalization. However, it has been accepted by policy makers that while these project have merits, they are still lacking in consistency and in the integration of fund allocation, government spending, and outcomes (Vanhilloet, Verhetsel 2012). Thus, it is not far fetching to admit that some regions are richer than others, and some regions do catch up faster than the others (De Groot et al. 2001). The disparities among the regions can only be reduced through innovations (Kaufmann, Wagner 2005; Audretch, Keibach 2004). There is a huge gap for new concepts and strategies for the type of development that can offer direction on how to increase competitiveness and support innovation in the sub regions (MacKinnon et al. 2002). According to Michael and Rodney (2010), studies of the organizational strategies of Chinese companies is seen as an evolution of business strategies and their management practices, this is because the Chinese were able to match such programs to the fitting regions. This is in agreement with the fact that there is the need for regional economic policies that will ensure that management research and practices are specific to the needs of each region and can increase the likely hood of entrepreneurship discovery.

One perspective for the non – core regions lies in the smart specialization concept of European Union, which represents a new innovation union flagship programme of the European Commission, aiming not only to foster EU-wide economies of scale in high technology and knowledge-intensive sectors, but to accelerate the dissemination of smart technologies throughout the EU economy (EU, 2014). The principles embodied in the concept are fundamental to the construction of the Europe 2020 agenda, and closely linked with the regional development objectives of the reformed EU Cohesion Policy (Łapczyński, 2008) ; McCann, Ortega-Argilés, 2013). Foray (2012) explained that the selection of smart specialization should take place when local entrepreneurial commitment and development have achieved a sufficient level of stability and coherence. Thus a self-discovery or entrepreneurial discovery process is related to the Smart Specialization approach of the EU which supports the promotion of innovation activities in regions (OECD 2014), so that the regional success will depend on the entrepreneurial performance and its related capacity to build public – private partnerships and cooperation and there shows possibilities for successful and knowledge-intensive enterprises to operate from rural regions. Smart Specialization embraces the concept of open innovation, not just investment in R&D but a system approach that exploits complementarities, (Larosse 2013) promises high potential, are new and aimed at experimenting and discovering technological and market opportunities that can provide learning spill overs to other economic sector (Foray, Goenega 2013).

Smart specialization also pave the way towards the fractal model which is an organisational starategic approach
for inter-regional enterprises that are trying to adapt to the “smart technologies” in their regions of operation. Warnecke (1996) coined that concept of a fractal enterprise in the context of modern operations management and highlighted self-similarity, self-organization, self-optimization, goal-orientation, and dynamics as winning attributes of flexible and adaptable manufacturing organizations as well as intrapreneurship as a success factor. The “fractal units” of an inter-regional operating company can be considered regional adapted organizational parts of such a company consisting of a flexible relationship network made up of autonomous, but interdependent manufacturing fragments into the organizational structure which is capable of producing highly complex patterns that merges all the enterprise functions of an integrated organization to improving the speed of operations (Canavesio, Martinez 2007; Shin et al. 2005).

This paper aim to (a) present an approach that will facilitate continuous and quick adaptation of inter-regional operating enterprises to smart specialization strategies by using fractal concepts. Methodologically, it pursues a case study approach to analyse the fractal manufacturing organization and (b) draw conclusions concerning the smart specialization entrepreneurial discovery concept. Since the smart specialization is an innovation policy that focuses on regional growth, the authors offer an insight on opportunities for new complementarities and inter-regional innovation opportunities that can lead to building local capabilities, improving local supply chains that will lead to investment and lasting innovation and spill-overs. This work follows the following structure: the next part talks about the relationship between innovation, regional development and Smart Specialisation strategy and how these concepts encourage entrepreneurial discovery. The third section presents the method used for the work. The case of study an Estonian Maritime function wear company and highlights of how this local high – tech enterprise became an international market leader by implementing an organisational innovation strategy was presented in the fourth part. The fifth section discusses how the company activities is similar to the fractal organization concept and its alignment to the EU smart specialisation. It concludes with some insightful thoughts on entrepreneurial discovery process.

2. Innovation, Regional Development and Smart Specialisation

It has been discovered that most times, regions are faced with the challenge of scare resources and limited funding to tackle structural development, social and economic problems that they constantly battle with (Baier et al., 2013). Therefore, countries government are gradually adopting the intricacy of regional development, working on how to ensure that poorer and smaller regions catch up in terms of development with counterpart mega cities in the countries (Vanthilloet, Verhetsel 2012). Presently, the EU is working on improving and upgrading the educational system, R&D, business excellence and linking universities. The universities especially are encouraged to be the champions of such regional economic development by harnessing talented individuals into the regions where they operate in order to encourage open exchange of knowledge on a global scale (Şerbănică 2012). While there have been debates on the reasons behind the pace at which some regions move, whether fast or slow, it is important to note that growth takes place in variety of form and shape in different locality. This could suggest that the role path of each region or cluster will differ from each other even within the same region. Also, there might still be sub regions in the same regions, making it difficult to predict roles, actions and outcomes of the process (Morgan 2015). Each region will be different with issues peculiar to them alone, thus the decentralization of diverse skills set that are connected and “tailored fit” should be considered when developing policies for each region (Vanthilloet, Verhetsel 2012). Arguing why national innovation policy should incorporate regional strategy, Howell (2005) explained that national and pan-national policies will sometimes have different influences in the regions and these policies can be managed if regional differences are taken into account from the inception.

Furthermore, even though innovation activity is priority in EU policy programmes, in technological advancement and regional policy (the most prominent being R&D and technological advancement) some of the discussions on regional development while bearing in mind the actions and supporting tools, have neglected to consider the absorptive capacities of the institutions like the universities, polytechnics, vocational training institutions, research institutions, technology mediating organisations, technology licensing offices and innovation centre for innovation in the less developed regions (Tödtling, Trippl 2005). De Groot, Nijkamp,
Acs (2001) elucidated it as the “the ability of regions to develop new technologies, to assimilate existing technologies, to effectively break vested interests aimed at keeping existing technologies in place, to organise the institutions that protect property rights, and to create innovation-prone environment.” One fact however, according to Tödtling and Tripl (2005) is that, regional innovation systems are not self-sustaining, they are still in principle tied to national, international actors and innovation systems. Regions should not be seen in an isolated form but as openly connected ecosystems that is intertwined with other markets (Gianelle et al., 2014). They are also in part linked to past build ups and activities (Valdaliso et al. 2013). According to Foray (2012), structural evolution ‘is an accumulative process that links the present and future strengths of a regional economy in a particular domain of activity and knowledge’. He emphasised that the collective outcomes of the new activities will surely lead to strong and abiding structural change and diversification building on existing industrial knowledge with economic impact. A case in point as explained by Lindqvist et al., (2013) is how the declining region of Lahti, Finland was able to develop a new concept of innovation to save its reclining prosperity after the fall of its trade with the Soviet Union in the early 90s. Lahti was a large region without a university and instead of its people to see it as a setback they capitalised on this very seemingly weakness by going into partnership with four other universities outside the region to create a university technical know-how tailored to the necessities in the region. This can be referred to as “practice based innovation” which is not based on the R&D activities but on the ability to collaborate and import knowledge and competences creating a technology bank.

Smart specialization strategy (S3) was introduced by the European Commission to contribute to inclusive growth between and within EU regions by strengthening territorial cohesion, manage structural change, create economic opportunity and enable skills development, better jobs and social innovation (Dziemianowicz, Peszat 2014). It was developed by economists in a bid to come up with a concept of smart public spending and innovation enabling process. Due to the challenges of scare resources and limited funding that regions constantly face, the S3 is an essential tool to accomplishing beneficial economic and social impact through most promising sectors thereby fostering tangible prosperity across board (Baier et al. 2013). This is hoped to bring about a change in economic situation of Europe, better globalisation and sustainable jobs creation (Landabaso, 2014). Summarily, the three main phases of the smart specialization policy process according to Foray et al. (2011); Del et al. (2013); Lindqvist et al. (2013), are; (1) design: Identification and reinforcement of entrepreneurial discovery by facilitating development in the economy of knowledge-intensive activities that generate experimentation and discoveries, (2) implementation: the coordination and complementary investment through support and strengthening of the emerging trends so that the most promising projects can grow and become solid drivers for regional economic growth and (3) evaluation: the assessment of the outcome so that the support of a particular line of business will not be discontinued too early nor continued so long that subsidies are wasted on non-viable projects.

The Smart specialization addresses regional growth challenges by opening new opportunities for the member states, local and regional authorities to strengthen the region’s competitiveness and innovation (Camagni, Capello 2013). Regional development is an important policy issue for the European Union (EU) and the EU Structural Funds aim at supporting regions lagging behind in their development or facing structural problems. Moreover, regions and local authorities in Europe developing policies for innovation from a bottom-up perspective have to develop their own distinctive policies, but must compete for, receive, absorb and integrate funds and programmes developed at a national or EU level (Foray 2011). Nicos et al. (2014) emphasised that S3 should not be misconstrued as an industry specialization but should be seen as a blend of R&D, innovation and production area specialization that reduces the disparities between less advanced regions and more technologically advanced ones. A lot of empirical works have supported geographical (national and regional) approach to innovation in line with this theory. In today’s Europe, the patterns of innovation which are majorly territorial and often recognised are: Imitative innovation area; Smart and creative diversification area; Smart technological application area; Applied science area (Prause 2014).
2.2. The concept of Entrepreneurial discovery

The smart specialization strategy (S3) emphasises that concerning innovation, companies should work together with higher institutions, research centres, and government, thus, aligning with the concept of embeddedness (Smart Specialization in England 2014). McCann & Ortega-Argile’s (2014) discussing on the process of entrepreneurial discovery, explained that it entails policy makers to first examine the potential of each region and then develop policies that will foster the development of entrepreneurial behaviours and activities in these areas. These policies are not in any way limited or narrowed to a specific region but are aimed towards developing the capacities and capabilities of such regions. Since Smart specialisation insists on embeddedness of existing local industries, its strategies should be based on regional and innovation research and on regional economic transformation (Vanthilloet and Verhetsel 2012). This means that entrepreneurial players include but are not limited to universities, business organisations and associations, research institutes, inventors, SMEs and businessmen, who have the ability to embark on entrepreneurial exploration processes and create innovations centred on these discoveries (McCann and Ortega-Argile’s 2014). Foray, (2012) explained that entrepreneurial discovery process has to do with targeting projects towards exploration, experimentation and learning on future outcomes in different sectors complementarities as well as in R&D and Innovation. The entrepreneurial campaign will comprise of harmonized knowledge and taking advantage of spill over aftermath which include modernisation, broadening, evolution or deep-seated base (Landabaso 2014) as seen in Figure 1.

Foray (2013) insisted that this is slightly different from entrepreneurial innovation which are innovations undertaken by individual firms or business man to reduce the cost of R&D and innovation and bring monetary gain from good projects, using the concept of using pulp to create paper, he explained that entrepreneurial innovation is a case of transition from one useful entity to a whole new set of new and collective tools that can serve as catalyst for a new enterprise or collaborations from two different actions called entrepreneurial discovery. Some of the S3 element that can be delivered at the local region are: building local capabilities, improving local supply chains that leads to investment and collaboration, leveraging on the diverging economic prospects of social innovation, scouting for viable hubs for S3 (Smart Specialization in England 2014). For growth to occur, the focus should not only be on the diversification of technology on itself but on the pattern in which the process occur (Nicos et al. 2104). S3 encourages regions to develop their innovation actions around pre-existing structures and inter connected diversification which will bring improvement of local linkages/collaborations for new entrepreneurial activities (EU 2014). Furthermore, at this foundation level, it is critical that regions considers building each S3 strategies from existing strategies in order to learn from the experiences and take advantage of the benefits (Querejeta et al., 2013).

It can be deducted that “capacity building” and “funding streams” make regions to collaborate with more skilled actors from another regions leading up to economy of scale (EU 2014). It will further enable development and prompt evolution of new accomplishments which will lead to abiding innovation and spill-overs which will differentiate the regional structures by creating new designs, critical mass, networks and clusters within a differentiated structure (Foray 2012). Thus, prioritisation will no more be done by some detached individual or group of people in the government but by public-private collaborations where entrepreneurs give new information on new discoveries and the government in turn evaluate these possibilities and end up commissioning capable actors to achieve it. The outcome of S3 should be evidence through sector and inter sector change and work structures that are moved towards more productive solutions that brings lasting impact on the economy structure (Sobczak 2014).
Since discoveries are usually summed up to learning curves, these activities lead to spill-overs, creating a whole new set of opportunities (Foray 2012). It is however important that these outcomes are designed in a way that the outcomes are optimised in order to spur new growths from other fields as well. An important question in this context is related to the appropriate organizational structure of a company which can benefit from different smart specialization strategies, especially in the case of an inter-regional operating enterprise. One solution can be to organize the company in a way so that the regional units can adapt and benefit optimally from the different regional smart specialization strategies which could lead to the concepts of smart manufacturing as well as to fractal companies.

**Figure 1.** Smart specialisation entrepreneurial discovery process

*Source:* Created by authors
2.3. Smart manufacturing, fractal companies and entrepreneurial discovery

After years of losing ground in global manufacturing share and value added many manufacturing initiatives have been started all over the world to re-establishing and regaining an industrial share in the economy (Berger 2013). A very promising approach seems to be the linkage between internet and manufacturing that leads to concepts of smart manufacturing and logistics which aim for cyber-physical systems and dynamic production networks in order to develop flexible and open value chains in the manufacturing of complex mass customization products in a small series up to lot size one (Ramsauer 2013). Smart manufacturing should bring the competitiveness in the manufacturing and high-tech sectors back to Western countries especially to those countries with a high innovation level, sophisticated ICT infrastructure, and highly qualified workforce. Unfortunately smart manufacturing is still a concept and there are still many open questions concerning standards, technical solutions as well as appropriate business structures and models. Solutions are complex and can only be attained in cooperation and knowledge sharing since sophisticated production expertise is not sufficient for the implementation, it also requires ICT knowledge in cyber security, e-commerce and e-government, the integration of the SME sector and new business models (Prause 2015). The new value chains of smart manufacturing will change towards a fragmentation which has been seen already before in other monolithic industries like music or the media (Dujin et al. 2014). Such a fragmentation is related to a rise of trade benefits arising from lower entry barriers for SMEs, the “slicing up” of the aggregate value chain, as well as the entry of new countries bearing low labour costs (Belusi & Sedita 2010). This fragmentation will also impact significantly upcoming business structures and business models in manufacturing sector which motivated already in the 1990’s long time before smart manufacturing was in sight Hans – Jürgen Warnecke to coin the concept of a fractal company.

Warnecke (1996) published his visionary concept of a fractal enterprise in the context of modern operations management and highlighted self-similarity, self-organization, self-optimization, goal-orientation, and dynamics as winning attributes of flexible and adaptable manufacturing organizations. In his approach he stressed intrapreneurship as a success factor of fractals and he pointed out that fractal organizations are linked via high performing ICT systems and they decide individually about the type and scope of access to their data. Warnecke’s classical fractal concept was further developed by several scholars like Canavesio and Martinez (2007) who worked on manufacturing fractals describing an innovation activity that deploys the “fractal units”-a flexible relationship network made up of autonomous, but interdependent manufacturing fragments into the organizational structure. This concept is capable of producing highly complex patterns that merges all the enterprise functions of an integrated organisation to improving the speed of operations (Shin et al. 2007). To achieve this, each component within the process system responds to real time demand. The management of integration between a company administration and the manufacturing level can be tasking and challenging and it determines how far the company can go in achieving its strategic objectives. Different methods of management has been observed to give room for flexibility and speed in resolving issue, in giving room for generation and execution of ideas and process (Strauss & Hummel 1995).

The manufacturing fractal assumes that the manufacturing facility is composed of small components, or fractal objects which have the ability to adapt quickly to changes in the environment. Each fractal must have a coordinated individual and consistent system goal (Noori, Lee 2000). In other words, even though the fractals are independent organised units, they must have objectives that will accurately define the attributes of the firm as a whole (Sandkuh & Kirikova, 2011). Canavesio and Martinez, (2007) theorised networking between organisations as a notable choice for survival and profit increase, however, before it can be fully realised there must be a management structure in place that states clearly the roles, functions, tasks, objectives such as risk management to threats, increased portfolio of skills, resources and economy of scale, goals, and so on between actors and resources involved. SMEs are sometimes forced to go into different forms of collaborations and networking, sometimes they work as virtual entities using the advantage of e-business to enhance their competitive advantage. This can be cost effective especially where they are agile enough to ride on the wave of the much bigger and grounded enterprise (Panetto, Molina 2008). It is true that efficient factory and exceptional quality product will remain the focus for achieving operational effectiveness, rapid product development and manufacturing in an organisation, but, the fractal flexibility will provide a competitive advantage (Noori, Lee 2000). The manufacturing fractal or-
ganisation especially is designed to combine the logistic attributes of lean production with the strategic configuration of agile capabilities (Raye 2012). Raye considered this as the future solution to the manufacturing system. Fractals give room for the integration of information and the manufacturing structures that especially help in the alliances of the fractals as they work together (Panetto, Molina 2008). Sometimes in an organisation, each project is seen as a fractal and it is autonomous, self-optimizing, self-learning and goal-driven entity. Here experiences are combined to achieve the deliverables and each project stores the information which is in turn use as learnings to allow room for future improvement. As it is seen in project management, fractals are set of projects in a portfolio but each project runs on its own is still connected to others and the overall strategic objective of the firm (Canavesos, Martinez 2007). The broader and overall goals are made centrally and information is cascade down the fractals implying that the fractal unit is organised bottom-up, units at the topmost levels take up project that otherwise cannot be handled by the lower ordered fractals hence ensuring teamwork for the entire project and guaranteeing a firm delegation of authority (Strauss, Hummel 1995). The organisational central database provides a holistic view of the company’s overall system and is used to make schedules and to execute them. This way information flow is constantly improved for better resource allocation (Shin et al. 2005). For example, decisions such as task scheduling, cost controlling, salary payment or even budgeting can be simplified and delegated or attached to the use of IT (self-optimising). This requires little supervision as middle managers will no longer be as important as they are in everyday companies. It will also ensure timely information that will help fractals to make decisions and respond to issues as they come up (Strauss, Hummel 1995). Through this system, control is less complicated and easily understood (Ryu et al. 2003). On employees’ orientation, a fractal is a part organisation which gives room for entrepreneurship to all employees. Each tasks like quality, use of resources, work speed, and consistency is solved autonomously. One key factor to bear in mind is that each project is given to and executed by the most suitable fractal even if it is with collaboration with other fractals (Strauss, Hummel 1995).

3. Method

This is an explorative study of the activities and the structure of a unique enterprise that has managed to successfully operate in the rural area of Estonia, in the Baltic region of Europe. It was chosen as a single study unit. As it appeared, this firm used purposefully an innovative operating and organizational model which is different especially when compared to other innovative rural firms around it. The goal in building methodological approach is about working towards what is most suitable to answering the research question(s) and what is most important is the ability of the methodology strategy to relate to the aims and objectives of the research (O’Leary 2009 p.92). Guided by this, a qualitative approach for this research was used due to the exploratory nature of the research which aims to produce according to Mason 1995 and Jack, 2010: “A rounded understanding of rich, contextual, and detail data that can also be generalised in some way”, interviews were conducted. This work is mostly based on data collected in March 2014 during a face-to-face open-ended interview with the founder and the CEO of the enterprise. This helped to gather richer context description that is needed for exploration as suggested by Miles & Huberman, A. Michael, Saldana (2014). Additional information was from 15 interviews with regional key informants, homepage of the firm and its annual report. The interview was recorded and transcribed. Holistic coding was used and was based on theoretical constructions that were used to arrange the data. In vivo coding was used to better understand the things “through the eyes of the entrepreneurs” and process coding to describe and explore the actions (Miles & Huberman, A. Michael, Saldana, 2014). Based on thematic categorization (Kvale 2007) the analysis is presented as a narrative.

4. A case study on regional fractals

Armel OÜ (the authors changed the company name for publication), is a successful Estonian medium-sized production company for functional maritime wear whose headquarter is located in the rural part of Estonia, but operates in the global level and exports most of its production to different part of Europe. Estonia is a small country situated in Eastern border of European Union (EU) next to the Baltic Sea and used to belong to the Soviet Union until 1991. Since the beginning of 1990s rapid economic changes has taken place which has placed Estonia as one of the leading innovative country of Europe (EU 2014). Armel started in 1990s and currently employs staff about one hundred and twenty in four production locations in Estonia. The challenge of produc-
ing in the rural region with highly limited workforce and selling large volumes of these high quality products to different European countries and some other countries spur the firm into understanding the opportunities and weaknesses of the region and consequently adjust its production accordingly and also find new innovative solutions to overcoming them.

At the initial stage, the objective was to outsource of the production of its products and then distribute them to different markets but it was difficult to get the right partner. The company was also finding it difficult to cope with real demand, timeline and quality. As at the time, it has already built a clientele base in Germany, five of which were quite substantial hence the need for a change in strategy since for his kind of business to strive, it was important it stayed close to skilled labour force and the potential partners. It was also business wise to be geographically close to the market in Europe because the product is cheap and production is usually in big volumes, it was challenging to transport over long distance. As a result of this, small production units were established in different rural parts of Estonia where every locality even though has its limited amount of skilled staff was suitable for the enterprise and locality specific working environment. The company established new business structures and models in order to be competitive with developed markets like Germany, Sweden, France, Denmark and other exporting countries, whereas its main competitors from countries like Germany or France export only to 4-5 countries.

It has a large group of sales team in different countries that are in close contact with the customers in order to deliver valuable information and report different taste of different markets for product innovations. Smart raw materials are sourced from over a variety of countries including US, Asia, Europe. All the R&D are done in-house in the rural factories. New certifiable products are tested in certified test-houses in other European countries especially in UK and Denmark. According to the CEO “when the steps are getting bigger, we need the help from the scientific partners, and experts”. He said this in relation to the firm’s cooperation with scientific partners from Estonia and Germany. Having realised that the Estonian labour cost are on high on end and the availability of staff is limited for the larger volumes the company was producing, the technology, core of the production, the main warehouse, IT, as well as other complicated and technical processes like cutting, prototypes, high end products are limited to Estonia. The low end products that can be controlled and are capital intensive are outsourced. “We do have the main warehouse here, we buy most of the materials here, we cut everything here with fully automatic equipment, we do IT, design, prototype. We produce high end products here and low end products we give out.” – CEO. Armel capitalises on the low production cost of some regions, for example all the parts are cut in Estonia, shipped to Ukraine and other places for sewing and the semi-finished products are shipped back to Estonia to assemble and for final quality control. This way it is easier to control the end product quality. The cost of outsourcing to these places in addition to logistics is half when compare to a complete production in Estonia. The costs are also very stable and could stay the same for years making it easy for Armel to plan ahead and budget. The firm also uses this to control quality because sometimes two people are put to the same work to reduce errors.

5. Discussions

5.1 The fractal organisation of Armel

Considering Foray et al. (2012) explanation on the evolutionary pathway of innovation system, which he said is dependent on inherent structures and the adaptation of radical transformation and according to Nicos et al. (2014), for growth to occur, the focus should not only be on the diversification of technology on itself but on the pattern in which the process occur. Hence the case of Armel was used to study the pattern of its activities that led to its growth and success. Its corresponding organisational structure enjoy all characteristics of fractals, i.e. they are self-similar, self-organising self-optimising, goal-oriented, and dynamic as mentioned earlier and even though they are legally independent they are organisationally linked. This innovative fractal method for using strengths of different regions and dealing with weaknesses of the rural location of the headquarters is a classic example of the radical transformations to regional innovations as suggested by the S3 policy by Foray. Considering the attributes of the fractal model:
Self-similarity: According to Sandkuh & Kirikova (2011), fractals are self-similar units repeated on various levels. Armel ability to establish and locate small productions units in different parts of rural regions of Estonia can be likened to this. The different production units are self-similar in the way a job is performed, in how goals are formed and pursued and even in how challenges are resolved. Although the pursuit of goals could be diverse but there is always an inherent structure in place that guide the overall activities resulting to fractals with identical goals but different structures and are organised in such a way that they fit the specific project at hand. Like in some cases the ability to handle a particular machinery or expertise seen in the case of technology. Armel similar units of the production has also helped it to have a clear and in-time overview of the process.

Self-organization: This is the unique features of fractals which makes them flexible and able to respond quickly to turbulent influences without the bureaucracy that is known in typical firms. Raye (2012) called it “self-evolve in response to internal and external stimuli”. So far Armel has experienced successful business entry strategy in all the countries it moves to. It has remain flexible to any changing environment it finds itself and is constantly looking for ways to succeed in any given environment by considering the absorptive capacity of such environment. It employs expert from different countries like UK, France, Germany, Finland, Norway so that it is in touch with the realities in these nations. This helps the company to know immediately whenever there is a change in preference for any of the products and adjust accordingly for any region. This attributes of self-organization in the fractal company as explained by Strauss & Hummel, (1995) ensures reduction in inventory, improved service, and enables mechanisms of change, learning teamwork, communication and customer management. As pointed out in this example, a firm has to be flexible in production when some work is outsourced into different cultural environment. It has to be economically reasonable, so that it is possible to overcome the risks and problems that can occur because of longer distances, logistics and different cultural environmental differences. Language barrier and cultural differences are overcome with visualization, pictures and videos regarding the company’s potential problems, risks and the right working methods are delivered over long distances.

Self-optimising: Characteristics like flexibility or team orientation are usually accomplished through open distributed systems, usually enhanced through IT e.g. EDI (Strauss, Hummel 1995). Armel is constantly adapting appropriate ways to become self-optimising and this is achieved through the use of an IT system used for integration. It has a software for production process; wages are calculated automatically removing middle management – all staff can track and access how much they are making per day making the operation cost effective. This is applicable to most of its factories and it reduces a lot of unnecessary paper trail also saving cost. Aforementioned, Panetto and Molina (2008) considered this as the attribute of a fractal that gives room for the integration of information and the manufacturing structures that help in the alliances of the units as they work together.

Goal Orientation: A fractal network can manage a set of companies that could be virtual and linked to achieve organisational goals (Canavesio, Martinez 2007). A fractal does not determine its own goals but create them through environmental adaptation making each fractal intelligent with the ability to make decisions on set of activities made by its self especially as it has to do with goal formation e.g. regulation, propagation an conflict detection/resolution) (Shin et al. 2009). This way each fractal goals are tailored to match and complement each other as necessary (Shin et al. 2005). Armel’s processes are recorded for tracking and learning purposes and circulated to all production site. Armel uses E-learning tools for products information and the production steps are sent in pictures and circulated to all units. This supports Ramsauer (2013) conclusion that a very promising approach to smart manufacturing and logistics is in the support ICT gives in providing the linkage between internet and manufacturing which aim for cyber-physical systems and dynamic production networks in order to develop flexible and open value chains in the manufacturing of complex mass customization products in a small series up to lot size one. The e-learning tools according to Strauss & Hummel (1995) also help to cascade the broader and overall goals that are made centrally down to the fractals hence ensuring teamwork for the entire project and guarantying a firm delegation of authority.

The dynamism: Dynamism relates to how firms are constantly working on how to build and sustain relevance in the market place. Canavesio & Martinez (2007) pointed out that manufacturing companies in particular
find themselves in a constant pressure on how to keep up with globalisation, substitution, changing demand patterns, competition, and cost. Armel uses good forecasting system to achieve good timeline and meet real demand. The company has an IT system for tracking products and materials. This is also used to integrate the whole company, making it easy to run a virtual company. While production is taking place in one country, sales administration, invoicing and selling could take place in another. There are back up plans and resources and risk management on event of delays and other unforeseen challenges.

5.2 Alignment with Smart Specialisation Strategy

S3 strategies such as experimenting, finding complementarities with high potential and discovering technology and market opportunity are in line with all the activities Armel has been involved with since its inception. Thus the need for new concepts and strategy such as innovativeness as mentioned by MacKinnon et al. (2002) can open up a whole new way to support innovation in sub regions and will lead to strong and abiding structural change and diversification building on existing industrial knowledge with economic impact. McCann & Ortega-Argile’s (2014) suggested that the potential of each region should first be examined in order to know what is needed to foster the development of entrepreneurial behaviours and activities in these areas. That Armel was able to change and tailored its overall strategy to that of its environment in order to be competitive globally, re-emphasised the need for regional economic policies that management research and practices should be specific to the needs of each region in order to increase the likely hood of entrepreneurship discovery. Even though staying in Estonia means staying close to skilled labour force and the potential partners the management knew that to competitive successfully globally it has to change and they were right. Today Estonia can only absorb 1% of its products, the rest of the products (99%) are exported. The emerging trend of this firm is promising to S3. Today, the company has made remarkable growth and at the present has a staff strength of over 120 with 4 production sites all located in small counties in Estonia with population that ranges between 23,000 and 36,000. This is not only inspiring but can also serve as a major driver for economic growth in small regions. Also since disparities are reduced through innovation Armel has been able to bring down the barriers that young starting businesses usually face in similar rural area. Supporting the argument of Dziemianowicz, Peszat (2014), this will contribute to inclusive growth between and within the regions by strengthening territorial cohesion, manage structural change, create economic opportunity and enable skills development, better jobs and social innovation. Furthermore, looking at one of the policy process of S3 by Foray et al. (2011); Del et al. (2013); Lindqvist et al.(2013), such as the identification of an entrepreneurial activity, Armel is a company that can be identified for its innovative process and knowledge intensive activities. For example, Armel is an organisation that believe a good product is one of the major attributes that give a company competitive advantage, its major investments is in product development (a knowledge intensive activity). This innovation stance is customer driven and to stay ahead of its competitor it ensures it presents new innovations every year. The sales team are constantly in contact with the customers, and most of the product innovation ideas comes from them.

According to Vanthilloet and Verhetsel (2012), S3 must be embedded in local industry and its innovation must be regional. Armel activities can be likened to self-discovery or entrepreneurial discovery process that is related to the Smart Specialization approach of the EU which supports the promotion of innovation activities in regions. OECD (2014) explained that regional success will depend on the entrepreneurial performance and its related capacity to build public – private partnerships and cooperation, thereby encouraging successful and knowledge-intensive enterprises to operate from rural regions. Armel have gone into partnership with research organisations closely related to universities in Tallinn, Estonia and Freiburg, Germany. For example, there is an ongoing project with these organisations to create “intelligent lifejacket” a radically innovative high tech product that is called intelligent lifejacket that will be useful people who use it. Although previously it deliberately did not asked for support or external funding, for this cooperation, it is making use the opportunities of programmes provided by the government to support scientific cooperation in the field of product development. This suggests that Armel activities align with the S3 strategies by Smart Specialization in England, (2014) which states that companies should work together with higher institutions, research centres, and government in order to align with the S3 concept of embeddedness.
Experience in different cultural environments helped the firm to be ready for possible mistakes, and over 20 years of experience with the Eastern European countries also serve as a competitive advantage, this will be absent in a company that has so far worked only in Germany. This is an organisational innovation where medium sized firms can win a lot. By doing so, the company operates in various regions which are all enjoying their own smart specialization strategies even if they are not named as such. Thus the concepts of fractal enterprises can be used to achieve the strategy smart specialization in the regions. The German activities of the company for example are related R&D activities, the Estonian ones are related to high – level manufacturing, ICT operations and logistics, the Ukrainian units are focusing on sewing activities in mass production whereas the company activities in the sourcing regions are focusing on the purchase and delivery of smart materials which are special part of the smart regional development strategy. The regional units of the company enjoy the characteristics of fractals so that the company can be considered as a fractal enterprise in the field of manufacturing. Armel has been able to fulfill the requirement of Foray (2012), that the selection of smart specialization should take place when local entrepreneurial commitment and development can achieve a sufficient level of stability and coherence - the concept of entrepreneurial-discovery process whose outcomes have been optimised to spur new growths and a whole new set of opportunities.

6. Conclusions

The success story of the case company is closely linked to entrepreneurial innovation, export marketing and smart production and supply chain management which is based on a distributed multi-national production model. The underlying business concept and its related success paved way for a sustainable development and demonstrated that even in rural areas high – tech entrepreneurship can be successfully implemented. One perspective for the non – core regions lies in this self-discovery or entrepreneurial discovery process that is related to the Smart Specialization approach of the EU and it supports the promotion of innovation activities in regions (OECD 2014), so that the regional success will depend on the entrepreneurial performance and its related capacity to build public – private partnerships and cooperation and there shows possibilities for successful and knowledge-intensive enterprises to operate from smaller regions. The Smart specialization embraces the concept of open innovation, not just investment in R&D but a system approach that exploits complementarities (Larosse 2013) promises high potential, are new and aimed at experimenting and discovering technological and market opportunities that can provide learning spill overs to other economy sector (Foray, Goenega 2013).

Furthermore, since the Smart Specialization strategy suggests that Entrepreneurs should be at the fore front of discovering R&D and innovation actions that are best for the growth of each region. The Smart Specialization entrepreneurial discovery should be a combination of the knowledge about science, technology and engineering, including the knowledge of market growth potential, potential competitors as well as the whole set of inputs and services required for launching a new activity (Foray et al. 2011), as seen with Armel. The case study firm has its root founded in a small region but was able to rise about its confines and expanded beyond its territory to build a company that is not only self-sustaining but also international by using a method that can be linked to the fractal approach. This gave it the opportunities for the development of powerful intelligent control techniques with integrated adaptation, learning, self-diagnosis, reconfiguration and repair. The regional units of the company are adapted fractals to the regional Smart Specialization strategies so that the company enjoys the structures of a fractal manufacturing enterprise.

Finally, this case contribute to the theory development of fractals. It expanded on the opportunities for the rural enterprises which has not been highlighted before. It also raises the need to study the topic further. For instance, a firm has to have certain absorptive capacities to successfully implement the fractal model and ensure that its activities support the organisational strategic objectives. These needed capacity should be discussed. Furthermore, while it can be agreed that there are other firms that have been able to rise above environmental limitation to succeed, there are also different approaches and strategies employed by these firms to achieve their goal. Hence the need to also study the overall or cluster patterns of entrepreneurial process in other small regions in relation to the S3.
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RISK MANAGEMENT FOR GREEN TRANSPORT CORRIDORS

Meike Schröder¹, Gunnar Prause²

¹Hamburg University of Technology
Institute of Business Logistics and General Management
Am Schwarzenberg-Campus 4, 21073 Hamburg, Germany

²Tallinn University of Technology
Tallinn School of Economics and Business Administration
Akadeemia tee 3, 12618 Tallinn, Estonia

E-mails: ¹Meike.Schroeder@tuhh.de ; ²Gunnar.Prause@ttu.ee

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Abstract. The Green Corridor concept represents a cornerstone in the development and implementation of integrated and sustainable transport solutions based on trans-nationality, multi-modality and a high involvement of public and private stakeholders, including the political level. Hence, the implementation and management of a Green Transport Corridor is connected with a variety of risks due to the high level of complexity and the strong frame conditions of the concept. E.g. stakeholders’ violation of ecological and sustainable obligations might jeopardize the achievement of defined green targets and therefore hinder the implementation of a Green Transport Corridor system. For this reason, it is important to regard possible risks in advance in order to apply adequate measures and reduce the impact in time.

The paper addresses the research questions what kind of risks might occur in Green Transport Corridors and how they can be classified. The empirical results of this paper investigate the risks that might occur in Green Transport Corridors and classify them into the three categories economical, ecological and social risks. Based on this analysis the development of a comprehensive risk management concept for Green Transport Corridors has been started.

Keywords: Green Transport Corridors, Risk Management, Risk Classification, Mitigation Measures

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JEL Classifications: O14; O33
1. Introduction

Freight transport plays a crucial role for economic activities and is an incremental element of logistics as well as supply chain management. Current estimations for Europe are predicting a 50% increase in freight and passenger transport within the next 20 years (Tetraplan 2009). The European Commission reacted on the development by setting a political framework for an EU Transport Policy Development called Green Transport Corridor, which was presented in the White Paper on Transport (COM 2011): A competitive European transport system should be introduced for the next decades that will increase mobility and employment, remove major barriers in key areas and reduce fuel consumption. E.g. a European transhipment route should be implemented which is on the one hand characterized by a concentration on freight traffic between major hubs and on the other hand by relatively long distances of transport marked by reduced environmental and climate impact. Thereby it aims to increase safety and efficiency by applying sustainable logistics solutions, inter-modality, ICT infrastructure, common and open legal regulations and strategically placed transhipment nodes (COM 2011).

Since Green Transport Corridors are characterised by transnational network structures based on multimodal infrastructures involving complex public and private stakeholders together with strong frame conditions their implementation is connected with different kind of risks. E.g. stakeholders’ violation of ecological and sustainable obligations might jeopardize the achievement of the defined green targets and therefore hinder the implementation of a Green Transport Corridor system. For this reason, it is important to regard possible risks in advance in order to apply adequate measures and to reduce the impact in time. Until now, little research has been carried out on the role of risks within Green Transport Corridors. A literature review of existing risk management strategies focusing on Green Transport and on transport corridors indicates a research gap in this specific field. For this reason, the paper addresses the research questions what kind of risks might occur in Green Transport Corridors and how they can be classified. The aim is to compile measures and strategies to manage risks in Green Transport Corridors.

In the remainder of the paper, at first the theoretical background is provided for Green Transport Corridor as well as for risk management in general and in the field of transport. Afterwards, the research methodology for the empirical part is described. Subsequently, the empirical results of the conducted expert interviews and workshops are presented. They show which risks might occur in Green Transport Corridors and how they can be classified. The aim is to compile measures and strategies to manage risks in Green Transport Corridors.

2. Literature Review

2.1. Supply Chain Management and Green Transport Corridors

Although the term Supply Chain Management (SCM) is often used in both academia and practice, there is no consistent understanding of the construct. There are several definitions of SCM referring to the different conceptual perspectives on SCM versus logistics which have been evaluated during the last years (Mentzer et al. 2001). Some definitions contain operational activities involving the flow of materials and products, whereas others view it as a management philosophy or in terms of a management process (Tyndall et al. 1998). Christopher (1998, p. 15) stresses the cooperation of supply chain partners as well as the importance of the customer and defines SCM as “the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole”. Stock and Lambert (2001, p. 54) point out the integration of tasks in their explanation: “SCM is the integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders.”

Logistics plays an important role as part of SCM. As with SCM, there is no consistent understanding of the term logistics. This is reflected by the numerous existing definitions and furthermore by the scope of duties which are allocated to logistics and which differ from each other (Göpfert 2005; Arnold et al. 2004). Following Russell – and based on Plowman – logistics aims to “get the right product to the right customer, at the right time, at the
In the following, the flow-oriented definition of logistics by the Council of Supply Chain Management Professionals (CSCMP) is used. It defines logistics as "the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements. This definition includes inbound, outbound, internal, and external movements" (CSCMP 2015, p. 117). Moreover, it emphasizes transport as a very important activity which may also be regarded as the key element in the logistics chain (Weber, Kummer 1998). The transport system moves goods and products at the least-cost principle. It affects the results of logistics activities and influences production and sale (Tseng et al. 2005). Besides, a sound transport system provides increased logistics efficiency, reduces operational cost, and promotes service quality. These objectives are included in the Green Transport Corridor concept whereas an emphasis is placed on a minimization of environmental impact and on the creation of safe and sustainable logistics solutions by promoting trans-nationality and co-modality (Hunke, Praise 2013; 2014).

Since there are different interpretations of the main characteristics of Green Transport Corridors a number of international initiatives and concepts for Green Transportation Corridors have been developed, partly implemented and tested so far, in order to find a more practical approach to this issue. Most of the initiatives represent EU-funded regional development projects due to the political background of the Green Corridor concept with its links to the EU White Paper on Transport (COM 2011). The Baltic Sea Region (BSR) became in recent years an important arena for sustainable transport projects since in several logistics projects on European and regional level aspects of green transportation have been studied in order to design more efficient and safe processes for multi-modal transport (BSR Transportcluster 2013). All these projects highlight the efficient use of the available transport infrastructure, inter-modality and high-performance ICT-solutions together with intelligent transport systems (ITS) as well as specific organisational frame conditions as main pillars for Green Transport Corridors (Praise, Hunke 2014).

But since implementations of Green Transport Corridors are based of different understandings and realizations of the concept it is necessary to evaluate, compare and benchmark existing Green Corridor implementations. Due to the main characteristics of Green Transport Corridors which are related to sustainable aspects, multimodality and network concepts, Hunke and Praise (2013) pointed out that green SCM represents one important source for theoretical foundations since green SCM reveals interdependency between conventional SCM and eco-programs (Sarkis 2001; Praise, Hunke 2014). In this understanding the performance evaluation of Green Transport Corridors requires management control systems for supply chains comprising ecological aspects as well as the assessment of its international network environment by taking into account the international and cross-company aspects (Sydow, Möllering 2009). Praise (2014) proposed a management control system in form of a Green Corridor balanced scorecard approach by integrating different sets of Key Performance Indicators (KPI) for monitoring and management of Green Transport Corridors as well as cooperative and network-oriented concepts from SCM (Praise, Schröder 2015).

By surveying the current management control systems and existing KPI systems for Green Transport Corridors it turns out that they are stressing sustainability, growth and inter-organizational cooperation aspects by neglecting risk issues which are related to the supply chain characteristics of a corridor (EWTC 2012; Hunke, Praise 2013; Praise 2014). Already the multi-modal challenges within a Green Transport Corridor which are related to the green SCM issues to choose the right mode of transportation, to use the right equipment, and to use the right fuel have to consider risks related to costs, lead time, environmental performance and availability (Dekker et al. 2012). Consequently, a lot of risks with a negative impact on the supply chain may occur during the transport process, i.e. also within the multi-modal transportation chains within a Green Transport Corridor (Giunipero, Eltantawy 2004). The multitude of actors integrated into transport services and Green Transport Corridors as well as their diversity even increases the number of potential risks. In the next chapter, risk management in general as well as risk management in the field of transportation are described.
2.2. Risk Management and its process

Within risk management, two perspectives of risks can be distinguished. On the one hand, risks follow from the uncertainty of future events. Knight (1921) characterizes measurable uncertainty as risk in contrast to non-measurable uncertainty. On the other hand, there are different approaches depending on the disciplines. While in mathematics, risk does not yet contain a value judgement; in the field of business economics the construct indicates a potential loss or damage and therefore means the opposite of a chance (Diederichs, 2004; Holzbaur, 2000; Peker et al. 2014). This article follows the latter approach. Hence, supply chain risk is “the damage – assessed by its probability of occurrence – that is caused by an event within a company, within its supply chain or its environment affecting the business processes of more than one company in the supply chain negatively” (Kersten et al. 2011a, p. 154). Risks may have an influence on the flows of products, services, finance and information. Companies are often exposed to a large variety of potential risks which may be classified differently. While Tummala and Leung (1996) for example distinguish between catastrophic, critical, marginal and negligible risks on the level of hazard severity, Narasimhan and Sahasranam (2007) differentiate between strategic, tactical and operational risks on the planning level. According to the business function or area of operation, Christopher and Peck (2004) refer to supply, demand, process, control and environmental risks while Rogler (2002) names supply, production, distribution, financial and personnel risks. Transport risks form part of both supply and distribution risks in the latter case and can be specified as default (loss of the entire cargo), quantitative (partial destruction during transport), quality (damage during transport), cost (increase in transport costs) and time risks (delay/earliness of delivery) (Schröder et al. 2013).

In order to cope with risks and to achieve corporate goals, it is necessary to implement risk management. Due to several corporate crises and insolvencies, specific pronouncements as well as regulatory requirements exist in numerous countries relating to the analysis, communication and monitoring of risks (Kajüter 2003; Peker et al. 2014). The typical risk management process is based on the generic management process (e.g. see Terry 1972; Peker et al. 2014) and encompasses the following steps: risk identification, analysis, handling and control. The risk identification step is often considered as most important since only those risks which have been identified can be managed afterwards (Schröder et al. 2013). During risk analysis, the gathered risks are assessed at first by indicating the likelihood of occurrence and the possible damage. Then, the risks are prioritized in preparation for the risk handling step. Methods supporting risk identification and analysis are for example brainstorming or the failure mode and effects analysis (FMEA). Risk handling represents the third step of the risk management process. Strategies in order to handle risks target at avoiding, reducing, transferring, sharing or taking the risk (Norrman, Lindroth 2004, Schröder et al. 2013). Since Porter (1998, p. 55) declares a strategy to characterize “[...] the creation of a unique and valuable position, involving a different set of activities”, there are various measures which can be assigned to a strategy. Finally, during risk control it is the intention to review whether the measures have been applied and if they have been effective. Generally, the risk management process should be run through iteratively because single risks or the whole risk situation may change over time (Eberle 2005).

This paper focuses on the step of risk identification and risk handling. The number of identified risks and of potential measures in order to handle risks is high. Therefore, several authors allocate mitigation measures to risks (e.g. see Rice and Caniato 2003; Johnson 2001) or develop classifications for measures. For example, Tang (2006) chooses supply, demand, product and information management as categories while Manuj and Mentzer (2008) distinguish between postponement, speculation, hedging, control/share/transfer, security and avoidance. However, there is no composition of measures focusing on risks in Green Transport Corridors yet.

3. Risk Management for Green Transport Corridor

3.1. Research Questions and Design

It is not the aim of this paper to focus on risks which only have an effect on one company but to also look at risks impacting the Green Transport Corridor concept. However, in order to deal with Green Transport Corridor risks, the different stakeholders like corridor managers, transport service providers, shippers or infrastructure provid-
ers should be aware of the different options to manage these kinds of risks. Therefore, the research question is:

**RQ 1:** What kind of risks might occur in Green Transport Corridors?

**RQ 2:** How can these risks be classified?

**RQ 3:** What measures can be applied in order to manage these risks?

Based on the literature review and the identified research gap, this study targets at presenting a list of identified risks in Green Transport Corridors. In addition, a compilation of measures and strategies is developed to mitigate the identified risks and therefore to enable and to promote an efficient Green Transport Corridor concept. For this purpose, the research design constitutes as follows. The empirical evidence in this paper is based on the qualitative research style (Blaxter et al. 2006). Here, the complexity of the research question requires personal interviews and a qualitative approach. The willingness to answer questions in a greater depth and in an open discussion can only be achieved by personal and individual conversations with selected interview partners. Furthermore, risk management addresses a sensitive issue. Hence, it is of great importance to build trust with the different stakeholders.

The authors conducted case studies, expert interviews and workshops between 2006 and 2013 within several national and European projects comprising the BSR projects LogOn Baltic, EWTC II, C.A.S.H. and BSR Transportcluster to get a better understanding of the risks that might occur during transport services in general and in supply chains within Green Transport Corridors (Kersten et al. 2007; 2011b; EXTC 2012; BSR Transportcluster 2012). For this, surveys, interviews and workshops that have been conducted by the authors during the European projects together with corridor managers, transport service providers, shippers and infrastructure provider have been analysed.

### 3.2. Identification and Categorisation of Arising Risks in Green Transport Corridors

In different interviews the experts were asked to name important transport risks to their company as well as risks that might occur in Green Transport Corridor. The interviewed experts primarily understand the term risk as a negative event which affects the company or the corridor itself. Hence, risk is seen as a threat to the success of the company and/or corridor and the company’s and/or corridor’s aims, respectively. Taking a bottom-up approach, the authors of this paper clustered the risks in main categories describing the sources of risks. The main categories were chosen in accordance with the three pillars of sustainability that are essential for the success of the Green Transport Corridor concept (Hunke and Prause, 2013). Furthermore, the authors built subcategories to further differentiate the risks that might occur in each main category (Figure 1).

![Figure 1. Main and subcategories of arising risks in Green Transport Corridors](image)

For risks regarding “economical” aspects the authors built five subcategories. The subcategory “*Missing overall strategy*” includes risks like a delayed implementation of the Green Transport Corridor concept due to a missing overall Green Transport Corridor logistics strategy or the risk of opportunistic behaviour, meaning that the Green Transport Corridor concept is running too slowly, because stakeholders follow their own interests first. In addition hindrance of innovative solutions and uncertainty in the planning process for logistics
companies were mentioned due to long time scales of infrastructure development as well as a related lack of a comprehensive development strategy. One expert also indicated that KPI for Green Transport Corridor might be fulfilled on company level but not on upper (e.g. regional or country) Green Transport Corridor level. The second subcategory regarding economical risks deals with “Disharmonized standards”. Problems with country-specific border crossing, customs and different handling of police inspection or even corruption can lead to delayed deliveries. Bad services resulting from delayed delivery; unexpected higher costs due to disharmonized regulations of infrastructure standards (weights and measures of vehicles, hours of operation, load security) were mentioned by the expert in that field.

A third subcategory “Lack in infrastructure” summarizes the poor logistics infrastructure in some regions of the BSR (e.g. lack of warehouse and distributions centres, limited space available for port development etc.) as well as weaknesses in ICT infrastructure, because there exist very few ICT service providers which are specialised in logistics in some areas of the BSR and those that are established in the market exist in parallel. The subcategory “Not reached service levels” deals with reputation risks, due to not-fulfilled requirements (e.g. not reaching the predefined targets of total cargo volume, on-time delivery, relative transport costs, frequency, reliability or transit time). In the subcategory “Bad information exchange” risks like absence of information or bad information exchange among parties are listed as well as time delay by using intermodal transport due to no easy and fast access to information to guarantee good on-time service. The increased cyber risks due to increasing amount of electronic services as well as the mismatch of broadcasted transport information were named by the experts together with problems with IT interfaces in Green Transport Corridor. The second main category “environmental aspects” consists of two subcategories: In the subcategory “Problems of transport modes” the difficulties in resource planning, the non-optimal choice of transport routes, as well as long waiting times at transfer nodes of the corridor, or long delays at port gates are summarized. The second subcategory in this field contains the “Violations of environmental requirements”, as there are causing a too big carbon foot print, not reached predefined targets regarding total energy use, greenhouse gases, CO2 emission, engine standards, etc. to fulfil the Green Transport Corridor standard, or a wrong or missing documentation of environmental and climate impact. The third main category “social risks” was divided by the authors into three subcategories: Among “Safety deficiencies” the expert named risks like not achieved social efficiency (ISO 31000, 2009; ISO 39000, 2012), different safety cultures in countries, regions and companies along the Green Transport Corridor, as well as a lack of experience which can lead to misinterpretation of driving dynamics resulting from different weather conditions within the BSR. In addition, problems during transport (e.g. police inspection) due to unknown safety regulations, or different legal systems can appear, that have been allocated to the subcategory “Lack of knowledge”. The third subcategory “Skills shortage” deals with the shortage of qualified labour within the Green Transport Corridor regions in the BSR.

### 3.3. Measures to Manage Risks in Green Transport Corridors

Within risk handling, the risk management literature suggests five basic strategies which have been described in section 2.2, i.e. avoiding, reducing, transferring, sharing or taking the risk. The measures that have been identified to manage risks in Green Transport Corridors aim to a large extend at reducing or even avoiding the risks within the corridor. For each of the risks described in chapter 3.2 the authors have worked out specific measures that can be applied by the different stakeholders in the Green Transport Corridor. The measures are listed in Table 1. The risks of a delayed implementation of the Green Transport Corridor concept could e.g. be reduced by elaborating and adopting an overall Green Transport Corridor logistics strategy integrating all stakeholders. Or problems with IT interface could be reduced or even avoided by setting IT standards for the Green Transport Corridor.
| Table 1. Catalogue of measures to manage risks in GTC |

<table>
<thead>
<tr>
<th>ECONOMICAL RISKS</th>
<th>RISKS</th>
<th>EXAMPLES OF MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Missing overall strategy</strong></td>
<td>Delayed implementation of the Green Transport Corridor concept due to a missing overall Green Transport Corridor logistics strategy</td>
<td>Elaboration and adoption of an overall Green Transport Corridor logistics strategy integrating all stakeholders</td>
</tr>
<tr>
<td></td>
<td>Opportunistic behaviour: Green Transport Corridor concept is running too slowly, because stakeholders follow their own interests first</td>
<td></td>
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<tr>
<td></td>
<td>Uncertainty in the planning process for logistics companies due to long time scales of infrastructure development; lack of a comprehensive development strategy</td>
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</tr>
<tr>
<td></td>
<td>Fulfilling the KPI for Green Transport Corridor on company level but not on upper (e.g. regional or country) level</td>
<td>Building a steering committee for different corridor sections</td>
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<tr>
<td></td>
<td>Hindrance of innovative solutions</td>
<td>Development of a platform for innovative logistics solutions</td>
</tr>
<tr>
<td><strong>Disharmonized standards</strong></td>
<td>Problems with country-specific border crossing/ customs/ and different handling of police inspection/ corruption can lead to delayed delivery</td>
<td>Harmonizing training requirements of inspection for officials in the BSR and enhancing cooperation between authorities involved in border crossing transport</td>
</tr>
<tr>
<td></td>
<td>Bad services resulting from delayed delivery; unexpected higher costs due to disharmonized regulations of infrastructure standards, weights and measures of vehicles; hours of operation, load security</td>
<td>Create a common regulative framework and harmonized regulations within the BSR</td>
</tr>
<tr>
<td><strong>Lack in infra-structure</strong></td>
<td>Poor logistics infrastructure in some regions of the BSR (e.g. lack of warehouse and distributions centres, limited space available for port development etc.)</td>
<td>Elaborating a supra-regional infrastructure concept considering the strengths and weaknesses of each region in the BSR</td>
</tr>
<tr>
<td></td>
<td>Weaknesses in ICT infrastructure, because there exist very few ICT service providers which are specialised in logistics in some areas of the BSR and those that are established in the market exist in parallel</td>
<td>Building regional ICT cluster to establish a positive environment for ICT companies and to attract innovative ICT services provider and highly-educated people</td>
</tr>
<tr>
<td><strong>Not reached service levels</strong></td>
<td>Reputation risks, because requirements have not been fulfilled (e.g. not reaching the predefined targets of total cargo volume, on-time delivery, relative transport costs, frequency, reliability or transit time)</td>
<td>Usage of digital waybills to increase inter-modal efficiency</td>
</tr>
<tr>
<td><strong>Bad information exchange</strong></td>
<td>Absence of information / bad information exchange among parties</td>
<td>Implementation of data exchange between major transport hubs in the corridor to increase transport efficiency</td>
</tr>
<tr>
<td></td>
<td>Time delay by using intermodal transport – no easy and fast access to information (speed and volume of information that must be handled to guarantee good on-time service)</td>
<td>Establishing a well-developed ICT system, supporting the increasing use of track and tracing systems</td>
</tr>
<tr>
<td></td>
<td>Increased cyber risks due to increasing amount of electronic services</td>
<td>The increasing digitalization of the value chain requires a greater focus on cyber risks and ICT security</td>
</tr>
<tr>
<td></td>
<td>Mismatch of broadcasted transport information</td>
<td>Better matching of broadcasted transport information with the needs of logistics actors</td>
</tr>
<tr>
<td></td>
<td>Problems with IT interfaces, possible errors in data transmission, loss of data, etc.</td>
<td>Setting IT standards for the Green Transport Corridor</td>
</tr>
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</table>
### Environmental Risks

<table>
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<tr>
<th>Problems of transport modes</th>
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<tbody>
<tr>
<td>Difficulties in resource planning</td>
<td>Improved cargo tracking to facilitate resource planning for consignors, consignees and transport operators</td>
</tr>
<tr>
<td>No optimal choice of transport routes</td>
<td>Using route planning systems with real time information, well-developed ICT system, increasing use of track and tracing systems</td>
</tr>
<tr>
<td>Long waiting times at transfer nodes of the corridor</td>
<td>Up-to-date traffic information within the supply chain allows drivers and other operators to choose alternative routes</td>
</tr>
<tr>
<td>Long delays at port gates</td>
<td>Using route planning systems with real time information, well-developed ICT system, increasing use of track and tracing systems</td>
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<table>
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<tr>
<th>Violations of environmental requirements</th>
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<tbody>
<tr>
<td>Not achieved KPI / not reached the predefined targets regarding total energy use, greenhouse gases, CO2 emission, engine standards, etc.</td>
<td>Developing and implementing transport planning systems which integrates the relevant KPI in one single system</td>
</tr>
<tr>
<td>Wrong or missing documentation of environmental and climate impact</td>
<td>Easing of small cargo shipments by rail and sea in order to increase inter-modal operations related to rail and maritime transport since currently small shipments are dominated by road transport causing big carbon footprints</td>
</tr>
<tr>
<td>Causing too big carbon foot prints</td>
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</table>

### Social Risks

<table>
<thead>
<tr>
<th>Safety deficiencies</th>
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<tbody>
<tr>
<td>Not achieved social efficiency (ISO 31000, ISO 39000)</td>
<td>Establish intelligent truck parking systems to increase corridor efficiency</td>
</tr>
<tr>
<td>Different safety cultures among countries, regions and companies</td>
<td>Preparing guidelines for international safety regulations</td>
</tr>
<tr>
<td>Lack of experience leads to misinterpretation of driving dynamics resulting from weather conditions, etc.</td>
<td>Up-to-date information about traffic and weather conditions in the whole BSR, offering driving training</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lack of knowledge</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Problems during transport (e.g. police inspection) due to unknown safety regulations, or different legal systems</td>
<td>Offering free training material e.g. about regulations about cargo securing and liabilities in the transport chain</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Skills shortage</th>
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<tbody>
<tr>
<td>Shortage of qualified labour</td>
<td>Require the regions to educate and attract more logistics professional, establishing logistics clusters</td>
</tr>
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</table>

The measures to manage risks in Green Transport Corridors must be undertaken on the strategic as well as on the operational level. Therefore, they differ in terms of financial, personal and technical resources needed for the application. The compiled measures can be used by different stakeholders, like corridor managers, logistics service providers, shippers or infrastructure providers to manage Green Transport Corridor risks. But to achieve a high efficiency and to safeguard a cross-regional implementation of measure a bottom-up approach should be applied which requires transnational corridor governance structures oriented at multi-level governance concepts. Unfortunately, the development and discussions of Green Corridor governance concepts have just begun and the implementation of those concepts are still open (TransGovernance 2014; Prause, Hunke 2014). Consequently, the implementation of risk management measures in Green Transport Corridors are concentrated currently on local level mainly related to infrastructure or logistics hubs in order to remove infrastructural obstacle and to reduce risks. On the long term well-coordinated measures are nec-
essary to reduce the implementation costs for the whole Green Transport Corridor system but therefore first solutions for Green Corridor governance concepts together with common ownership and financing models have to be implemented.

Nevertheless, the compiled measures require a monitoring of actions taken to reduce the Green Transport Corridor risks. Until efficient management and governance structures in Green Transport Corridors are implemented steering committees consisting of representatives from politics and business should accompany the implementation of risk measures of the strategic level. On the operational level the existing KPI and management control systems should be amended and enlarged by risk indicators and should be integrated in well-developed ICT systems in order to monitor relevant risks related to performance and development of Green Transport Corridors (Prause, Schröder 2015).

4. Conclusions

Green Transport Corridors represent a cornerstone in the development and implementation of integrated and sustainable transport, but due to high level of complexity their implementation and management is connected with a variety of risks. Until now, the research focussed on sustainability, growth and trans-organisational cooperation whereas the role of risks has been neglected.

The empirical results of this paper investigate the risks that might occur in Green Transport Corridors and how they can be classified. Based on this analysis the development of a comprehensive risk management concept for Green Transport Corridors has been started. The implementation of an effective risk management concept depends heavily on the existence of powerful corridor management and governance concepts which are heading towards multi-level governance models but which are unfortunately still under development so far. Therefore, first steps for risk reduction should be done on local level, i.e. in infrastructural projects like logistics hub development. It should be continued on operational level by amending and enlarging the existing KPI system for Green Transport Corridors by risks indicators in order to be able to monitor risks related to corridor performance and development.

Due to the limited number of empirical measures, the evidence of this research is limited as it is typical for empirical work. Therefore, further research is needed. Firstly, risks have to be identified before they are evaluated. After assessing the risks, they need to be prioritized in preparation for risk handling. Subsequently, depending on the kind of Green Transport Corridor risk, the stakeholder may select measures from the compilation. Furthermore, it is possible to choose a measure from one of the groups depending on the impact the measure has. When deciding on the mitigation measures, costs for their implementation and occurrence of further potential risks should also be taken into account. Hence, interdependencies with general operational risks must be observed to ensure an efficient Green Transport Corridor concept.

Further research is needed in order to strengthen the evidence of this work. Additional expert interviews should be conducted. Subsequently, the results should be confirmed by a large-scale empirical survey. In addition, case studies should be carried out to apply the compilation of measures and strategies to manage Green Transport Corridor risks and to develop a corridor benchmark.

References


Strategic factor analysis for Industry 4.0

Mike Wahl

Tallinn University of Technology, Tallinn School of Economics and Business Administration,
Akadeemia tee 3-367, 12618 Tallinn, Estonia

E-mails: mike.wahl@ttu.ee

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Abstract. In impending decades Industrie 4.0 will challenge us in how to re-invent jobs in a world where machines will take our jobs. Although plenty of research has been carried out on the strategic importance of resources, capabilities, and boundaries where knowledge must be shared and assessed, no studies have been found which looking on strategic factor analysis for understanding how prepared we are for the fourth industrial revolution. Therefore asking the central research question “Is our strategy ready for the fourth industrial revolution?” Comparing the strategically related general and significant categories and subcategories of Industrie 4.0, with the strategic factor analysis summary themes and most important subcategories from firms in Estonia (n = 123), allowed answering the central research question that our strategy is only partly ready for the fourth industrial revolution. But the results of this study indicate also that we are ready in employee development, values, flexible services and products, high quality target, customer orientation, and strategy. Proposed solutions to overcome low profitability, lack of qualified manpower, and growth, could be expanding the market share into new markets, and development of innovative services. In order to be prepared for the fourth industrial revolution the development of a strategic knowledge vision is needed.

Keywords: capabilities, case study, Industrie 4.0, knowledge, skills, strategy, text analytics

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JEL Classifications: D83, J24, L23, M11, M14

1. Introduction

The first sequence of industrial revolutions took place already in the 18th century, when the first industrial revolution was about the transition from hand production job shops to steam engine powered machinery enabling mass production. The second industrial revolution took place in the early 20th century, during which manufacturing was supercharged by electrification and the production lines. The third industrial revolution started in the late 20th century with the introduction of IT and digital revolution. In impending decades Industrie 4.0 will
challenge us in how to re-invent jobs in a world where machines will take our jobs. Work will be less central-ized, more fluid, more projects oriented, and more virtual and international (SAP 2013). Decisions and actions that determine the long-run performance of a corporation is strategic management and its goal should be cre-ating and capturing values (Wahl 2015). In the process of strategic management, the interrelated activities of internal and external environment scanning, strategy formulation, implementation, and evaluation result in a set of strategies. It can be stated that resources are always means, competencies powers, and capabilities abilities (Wahl & Prause, 2013), in the ‘knowledge society’, the basic economic resource is no longer capital, natural resources or labour but is, and will be, knowledge (Drucker 1993). Successful firms also harness a wider skills base, with proficient owners, leaders and managers whose expertise combines both commercial and technical acumen, typically in science, technology, engineering or mathematics (Foresight 2013). Although plenty of research has been carried out on the strategic importance of resources (Barney 1991; Grant 1991; Grant 1996; Kogut & Zander 1992), capabilities (Teece, Pisano, Shuen 1997; Augier, Teece 2009), and boundaries where knowledge must be shared and assessed (Carlile 2002; Carlile 2004; Wahl 2015; Tvaronavičienė, Černevičiūtė 2015), no studies have been found which looking on strategic factor analysis for understanding how prepared we are for the fourth industrial revolution. Therefore the author is asking in the central research question (CRQ): “Is our strategy ready for the fourth industrial revolution?” and asking three related research questions. RQ 1: “What are the general and significant categories and subcategories of the most important strategic fac-tors?” RQ 2: “What are the general and significant categories and subcategories of Industrie 4.0?” RQ 3: “Are the most important strategic factors and Industrie 4.0 categories aligned?” The main purpose of this paper is to develop a better understanding for future and generating discussion and debate in this important research area.

The present paper is organised as follows. Section 2, “Theoretical framework: Strategies for Industrie 4.0” begins by defining the key categories that underscore the strategic management and Industrie 4.0 from a holistic perspective. Relevant theories and evidence relating to the categories are reviewed. Section 3, “Results and discussion: How prepared we are for the fourth industrial revolution” tells us about the used techniques and procedures of material and data collection into a case database and content analysis. Technical findings, results, interpretative analysis of meaningful relationships are explained. Conclude by describing the main insights and locating potential for the further research.

2. Theoretical framework: Strategies for Industrie 4.0

Here reviewing the state of the art relevant to the research questions, and presenting the major ideas in the field of Industrie 4.0. Contingency and unpredictability belong to the essence of our time - philosophy and future research show how we can profit precisely from that (Gransche 2015). The resource-based view (Barney 1991; Barney 2001) argues that valuable and rare resources can lead to the creation of competitive advantage that can be sustained over longer time periods. Accordingly, to the potential resources of a particular firm he allocates all assets, capabilities, organisational processes, firm attributes, information, knowledge etc. Adherents of the resource-based view generally agree that the most strategically important resource is knowledge (Osterloh & Frey 2000; Tvaronavičienė 2014).

The knowledge-based theory (Kogut & Zander 1992) of the firm considers knowledge as the most strategically significant resource of the firm; it is an outgrowth of resource-based view of the firm. Its proponents argue that because knowledge-based resources are usually difficult to imitate and socially complex, heterogeneous knowledge bases and capabilities among firms are the major determinants of sustained competitive advantage and superior corporate performance. This knowledge is embedded and carried through multiple entities including organizational culture and identity, policies, routines, documents, systems, and employees. While most explicit knowledge and all tacit knowledge are stored within individuals, much of this knowledge is created within the firm and is firm specific, this “organizational knowledge” is created through the interactions of individuals (Grant 1996). Both resource-based and capabilities research uses routines and resources as the units of analysis. Routines are defined as behaviour that is learned, highly patterned, repetitious or quasi-repetitious, founded in part in tacit knowledge (Winter 2003). Capabilities refer to a firm’s capacity to deploy resources by incorporating organisational processes and are generated by a firm to provide enhanced productivity of its
resources as well as a strategic flexibility and protection for its final product or service (Amit & Schoemaker 1993). The ability to sense and then seize new opportunities, and to reconfigure and protect knowledge assets, competencies, and complementary assets is dynamic capability (Augier & Teece 2009), achieving a sustained competitive advantage needs dynamic capabilities. Dynamic capabilities research emphasizes the importance of knowledge assets and learning for understanding firm performance differences (Zollo & Winter 2002).

However, instead of seeing the firm as a bundle of resources (Barney 1991), it can be more completely described as a bundle of different types of boundaries where knowledge must be shared and assessed (Carlile 2004). It starts at the origin where the differences and dependencies are known; as novelty increases the vector spreads, scaling the increasing complexity and the amount of effort required to manage the boundary. Moving up in complexity, the process or capacity at a more complex boundary still requires the capacities of those below it. Transferring is the way of crossing a syntactic boundary creating common language using taxonomies, storage and retrieval technologies. The transferability of a firm’s resources and capabilities are a critical determinant of their capacity to confer sustainable competitive advantage, with regard to knowledge, the issue of transferability is important, not only between firms, but even more critically, within the firm (Grant 1996). A syntactic capacity requires the development of a common lexicon (e.g. databases or common technical terms) for transferring domain specific knowledge. The Knowledge transfer process depends on individual factors (skills and expertise), organisational factors (structure and policy) and technological factors (available IT systems) which results in innovation capability. Actors’ proficiency is a high degree of skill and expertise, skill is the ability to do something well, where expertise is expert skill or knowledge in a particular field (Oxford dictionary of English 2010). Lack of adequate skill-sets is seen as a challenge, another is to develop employee skills in a targeted manner (Wagner 2015). Craftsmen like skills as well as corporate cultures probably develop and transfer largely through tacit communication (Hedlund 1994). Modern information and communication technologies will help to increase productivity, quality and future flexibility (Ganschar, Gerlach, Hämmelre, Krause & Schlund 2013). When managers create a work environment that allows peers to understand craftsmanship and expertise through practice and demonstrations by a master, transfer of tacit knowledge takes place (Nonaka, Toyama, & Konno 2000). Among all the other factors that influencing knowledge transfer in order to cross syntactic boundaries, the absorptive capacity of the receiving units stands out as the most significant determinant of knowledge transfer (Gupta & Govindarajan 2000). Absorptive capacity is defined as “the ability to recognize the value of new external information, assimilate it, and apply it to commercial ends” (Cohen & Levinthal 1990, p. 128). Management experience significantly stimulates start-up absorptive capacity within highly dynamic environments, whereas it hinders it within stable environments (Debrulle, Maes, & Sels 2014). Translating is the way of crossing a semantic boundary, creating shared meanings in community of practice or cross functional teams using boundary spanners or translators. A semantic capacity develops common meanings for identifying novel differences and dependencies and translating domain specific knowledge. Transforming is the way of crossing a pragmatic boundary creating common interests to share and assess knowledge, using prototyping and other kinds of boundary object. A pragmatic capacity establishes common interests for making trade-offs and transforming domain-specific knowledge. When different interests arise, developing an adequate common knowledge is a political process of negotiating interests, making trade-offs between actors, and defining common interests (Carlile 2004).

While new product and service creation is an essential task to ensure a firm’s immediate success in the marketplace, process and supply chain innovations can also create a unique source of competitive advantage for the future (Carrillo, Druelh, & Hsuan 2015). Industrie 4.0 calls the next wave of industrialization through the use of internet of things, internet of services, and cyber physical systems. The real world is turning into a huge information system (Dujin, Geissler, & Horstkötter 2014). One possible definition for Industrie 4.0 proposed: “It is a collective term for technologies and concepts of value chain organization” (Hermann, Pentek, & Otto 2015, p. 11), a new way of producing and consuming, integrating design, manufacturing and servicing. Successful firms will be capable of rapidly adapting their physical and intellectual infrastructures to exploit changes in technology as manufacturing becomes faster, more responsive to changing global markets and closer to customers. Customer orientation is becoming increasingly important; one major tendency showing a pronounced customer orientation and clear focus on customer benefit is to involve customers directly in development (Wagner 2015).
Future threats and opportunities are related to the output (personalized, local production and mass customization), process (networked manufacturing and cluster dynamics, end-to-end digital engineering, top floor-shop floor integration, real-time and value-added networks), business models (fragmentation of the value chain, integrated service offerings, creation and development of emotional products and services, modular architecture and customer co-creation), competition (converging frontiers), globalization (light footprint, low-cost and frugal innovation), skills (interdisciplinary thinking is key, higher degree of complexity), (Dujin, Geissler, & Horstkötter 2014; SAP 2013; Wagner 2015).

As mentioned in the literature review, the general and significant categories and subcategories of Industrie 4.0 are strategically related to vision, mission, values, norms, competition, knowledge, business models, skills, capabilities, actions, behaviour, processes, routines, context, globalization, results, output, performance and management, governance, learning.

3. Results and discussion: How prepared we are for the fourth industrial revolution

For answering all proposed research questions the chosen research strategy is case study, using mixed methods, and it can be categorised as an explanatory, cross-sectional research project. Case study strategy is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially because the boundaries between phenomenon and context are not clearly evident (Yin 2009). Case studies provide a rich understanding of a real life context, using and triangulate multiple sources of data.

Every chosen case were starting with a careful study of the firm, using a strategic audit worksheet. Next step included doing outside research, calculating common size financial statements, and key ratios, if appropriate. Here also describing the basic corporate governance mechanisms of the corporation. Owners and managers are the people who are primarily tasked with the strategic management process if the corporation is to have long-term success in accomplishing its mission. The advanced analysis started with the external (EfAS), and internal (IfAS) factor analysis, concluding in a comprehensive strategic factor analysis summary (SfAS). All 2014 collected material and data from firms in Estonia, is entered into a MS Excel case database. All chosen firms, cases ($n = 123$) are thoroughly described and coded. Data is checked for errors, cleaned, pre-processed. Thematic case analysis and case contrasts were done before analysis of empirical regularities.

For computer analysis Microsoft Excel and Leximancer were used. Text is more than a collection of words, it tells a story. Ideas, concepts, and relationships are buried in the words. Leximancer is text mining software that can be used for content analysis of collections of textual documents and to visually display the extracted information. The information is displayed by means of a conceptual map that provides an overview of the material, representing the main concepts contained within the text and how they are related. It analyses automatically texts to identify the high level concepts, delivering the key ideas and actionable insights needed with powerful interactive visualisations and data exports. Helping to understand of what text is really saying. (Leximancer 2014) The Leximancer is transforming lexical co-occurrence information from natural language into semantic patterns in an unsupervised manner. It employs two stages of co-occurrence information extraction – semantic and relational, using a different algorithm for each stage. The algorithms used are statistical but they employ nonlinear dynamics and machine learning. (Smith & Humphreys 2006) Leximancer enables to navigate the complexity of text in a uniquely automated fashion, it identifies ‘Concepts’ within the text – not merely keywords but focused clusters of related, defining terms as conceptualised by the author.

Themes are circles that group clusters of concepts. Internal factors, strengths are divided in three themes; they are market, range, and experience. The thematic summary includes a ‘connectivity’ score to indicate the relative importance of the themes. Connectivity scores for market (100%), range (52%), and experience (32%). Employee development, organisational culture and values, leadership, being the leader in the market, broad variety of services and products, high quality, customer orientation, long term planning and strategy are the most important subcategories. The Concepts are presented in a compelling, interactive display so that it is possible to visualise and interrogate their inter-connectedness and co-occurrence, this is as important as the concepts themselves. The insight dashboard
report is a useful way of encapsulating the quantitative correlations between selected dependent segments and the observed text concepts, along with the supporting textual evidence for better understanding. (Leximancer 2014)

Internal factors, weaknesses are divided in four themes; they are lack, turnover, growth, and group.

The most important theme is ‘lack’, and less important themes are ‘turnover’, ‘growth’, and ‘group’. Connectivity scores are shown for lack (100%), turnover (16%), growth (6%) and group (2%). Low profitability, capacity of the management, drawbacks in technology and marketing strategy, lack of qualified manpower, slacken growth of tempo, lack of International Networking, labour turnover, tight target group for services and products are the most important subcategories.

External factors, opportunities are divided in six themes; they are market, foreign, real estate, Asia, economic, and service. The most important theme is ‘market’, and less important are ‘foreign’, ‘real estate’, ‘Asia’, ‘economic’ and ‘service’. Connectivity scores are shown for market (100%), foreign (30%), real estate (14%), Asia (4%), economic (2%) and service (1%). Expanding the market share into new markets starting with Baltic Countries and Finland, the growth of demand, activating the real estate market, and the development of services are the most important subcategories.

External factors, threats are divided in six themes; they are price, materials, economic, service, competition, and market. The most important theme is ‘price’, and less important themes are ‘materials’, ‘economic’, ‘service’, ‘competition’ and ‘market’. Connectivity scores are shown for price (100%), materials (68%), economic (13%), service (4%), competition (3%), and market (2%). Tight competition, toughen laws and regulations, the growth of raw material’s prices and quality pressure are the most important subcategories. The examined categories and subcategories of the most important strategic factors should be not only described but also “understood” and “explained”, therefore the meaningful relationships that form the basis of the empirically founded themes were analysed.

Comparing the strategically related general and significant categories and subcategories of Industrie 4.0 (vision, mission, values, boundaries, competition, knowledge, business models, skills, capabilities, actions, behaviour, processes, routines, context, globalization, results, output, performance and management, governance, learning), with the most important SFAS themes (economic, experience, foreign, growth, lack, market, materials, price, range, real estate, and turnover) and most important subcategories, allowed answering the central research question that our strategy is only partly ready for the fourth industrial revolution.

These results are in accord with recent study “Roland Berger Industry 4.0 readiness index” for the EU’s key industrial countries, indicating that Estonia belongs to the cluster called “Hesitators”, lacks a reliable industrial base and suffering from severe fiscal problems and is therefore not able to make economy future-proof (Dujin, Geissler, & Horstkötter, 2014). The results of this study indicate also that our strategy is ready for the fourth industrial revolution in employee development, values, flexible services and products, high quality target, customer orientation, and strategy. Unfortunately struggling with low profitability, lack of qualified manpower, and slacken growth of tempo. Proposed solutions could be expanding the market share into new markets, and development of innovative services.

4. Conclusions

The central research question „Is our strategy ready for the fourth industrial revolution?” set by the author has been answered. The main purpose to develop a better understanding for future and generating discussion and debate in this important area reached. Interpreting the results, it is important to keep in mind that the case database consists only few competitive case studies (n = 123). It is recommended that further research should include general systems theory, which is not explicitly used as a theoretical framework in strategic management. Methodologically the research is valuable used modern text analytics for an innovative way to present, and to garner deeper insight from texts. Practically, in order to be prepared for the fourth industrial revolution the development of a strategic knowledge vision is needed.
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Tvaronavičienė, M. 2014. If industrial sector development is sustainable: Lithuania compared to the EU, *Entrepreneurship and Sustainability Issues* 1(3):134–142. DOI: http://dx.doi.org/10.9770/jesi.2014.1.3(2)


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SOCIAL INNOVATION IN THE PROMOTION OF SUSTAINABLE DEVELOPMENT OF THE CONTEMPORARY LATVIAN SOCIETY

Karine Oganisjana¹, Svetlana Surikova²

¹Faculty of Engineering Economics and Management of Riga Technical University, Kalnciema Street 6, LV-1048, Riga, Latvia
²Scientific Institute of Pedagogy at the Faculty of Education, Psychology and Art of the University of Latvia, Jurmalas Gatve 76, LV-1083, Riga, Latvia

E-mails: ¹Karine.Oganisjana@rtu.lv; ²svetlana.surikova@lu.lv

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Abstract. The paper analyses the results of a research conducted with the aim to study topical questions on social innovation attempting to disclose its role expressed via its mission and impact on the Latvian society in the context of sustainable development. The authors present the methodology, conduct and results of the qualitative content analysis of the texts of a focus group discussion with participants from the fields of entrepreneurship, education, communication, sport and charity. The empirical data were analysed with open coding using AQUAD 6 software for the registration of conceptual codes, data processing and creation of frequency tables of categories developed. Having summarised the main findings, it was concluded that social innovation may promote the development of both individuals and the entire society improving the quality of people’s life. The research resulted in the revelation of five domains of social innovation impact including the development at the: intrapersonal, interpersonal interaction, societal growth, innovation, and work opportunity levels.

Keywords: social innovation, sustainable development, quality of life, contemporary society, mission, impact, qualitative content analysis, focus group discussion, Latvia

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JEL Classifications: O35, I31

1. Introduction

People have always been concerned with improving their living conditions, with social and economic progress, a better and predictable future with opportunities to fulfill their human potential (Ionescu 2015). These concepts make the basis of quality of life and well-being which are perceived as one of the facets of sustainable development (Ercsey 2012; Dudzevičiūtė 2012; Tvaronavičienė 2014). Therefore the task of promoting a country’s sustainable development could be considered through the prism of the development of people’s life quality. Recent researches have shown that both quality of life and sustainable development can be positively affected by social innovation and social entrepreneurship owing to which they have become outstanding topics for scholars, businesses, and public institutions to study (Sanzo-Perez, Álvarez-González & Rey-García 2015; Edwards-Schachter, Matti & Alcántara 2012; De Alencar, Almeida 2013; Laužikas, Dailydaite 2013; Raudeliūnienė et al. 2015; Tvaronavičienė, Černevičiūtė 2015; Ignatavičius et al. 2015; Goyal, Sergi
2015). Being a relatively new concept, social innovation attracts the attention of researchers, policy makers, practitioners, governmental and nongovernmental organisations, entrepreneurs and individuals in Latvia as well. This paper presents the results of a research conducted in the project “Involvement of the society in social innovation for providing sustainable development of Latvia” which is carried out within the National Research Program 5.2. “Economic Transformation, Smart Growth, Governance and Legal Framework for the State and Society for Sustainable Development – a New Approach to the Creation of a Sustainable Learning Community (EKOSOC-LV)”.

The research aim: the study of topical questions on social innovation and its impact on the society at the level of individuals involved in social innovation processes and the society as a whole.

The objectives of the research:
– to conduct theoretical analysis of scientific literature, documents and other sources on the role of social innovation in the promotion of sustainable development of the society;
– to explore different aspects of social innovation and its impact on the society in the Latvian context based on the empirical data obtained in the course of focus group discussion;
– to interpret the results and make conclusions.

The research methods:
– In the theoretical part of the research: qualitative content analysis of scientific literature, documents and other sources and generalisation of the theoretical findings.
– In the empirical part of the research:
  - focus group discussion with eight invited specialists from the fields of entrepreneurship, communication, education, sport and charity;
  - qualitative content analysis of the text of the scripts made from the video records of the focus group discussion with open coding;
  - creation of tables for analysing frequencies of conceptual codes of categories using AQUAD 6 software;
  - constructing of diagrams for comparing the distribution of frequencies of categories corresponding to different demographic codes.

2. Theoretical framework of the empirical part of the research

Scientific literature analysis shows the ambiguity of the essence of social innovation, the absence of a common platform of understanding of its matter, aims, objectives, sources, contexts, agents, sectors, processes, means, outcomes and impact on the society among different theoretical approaches.

2.1. The matter of social innovation

Social innovation is considered as new solutions reflected in products, services, models, markets, processes, etc. that simultaneously meet a social need more effectively than existing solutions and lead to new or improved capabilities and relationships and better use of assets and resources (The Young Foundation 2012; Krlev, Bund & Mildenberger 2014). This definition is elaborated within TEPSIE (Theoretical, Empirical and Policy Foundations for Social Innovation in Europe) project which unites researchers from Denmark, United Kingdom, Greece and Germany. They conclude that social innovation is good for society as it enhances society’s capacity to act.

The authors of this paper analysed and systemised the definitions of social innovation which emphasize: 1) sustainability (see Table 1) and 2) quality of life as one of the facets of sustainability (see Table 2).
2.2. The mission and impact of social innovation

Social innovation in one section.

The definitions of social innovation presented in Tables 1 and 2 are closely related to the mission and impact of social innovation with an accent on its role in the improvement of quality of life and well-being as they make facets of sustainable development of society. Table 2 demonstrates that social innovation has a great potential for increasing quality of life at the level of both individuals and the society as a whole.

Table 1. The definitions of social innovation with an emphasis on sustainability

<table>
<thead>
<tr>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>A novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals.</td>
<td>Phillips, Deiglmeier &amp; Miller 2008, p. 39</td>
</tr>
<tr>
<td>Social innovation discourses see in social challenges opportunities to make societies more sustainable and cohesive through inclusive practices, coproduction and proactive grassroots initiatives.</td>
<td>Grimm et al. 2013, p. 436</td>
</tr>
<tr>
<td>As a concept, social innovation means developing original and sustainable ideas to the problems that ranging in a spectrum from working conditions to education, individual to societal development, monitoring health and environment to climate changes.</td>
<td>Bulut, Hakan &amp; Duygu Seckin 2013, p. 122</td>
</tr>
</tbody>
</table>

*Source: Tabled by the authors*

Table 1 shows that the idea of sustainability conditioned by social innovation emerges directly from the texts of its definitions. But the causal interrelation between social innovation and sustainability can be followed indirectly in definitions of social innovation with an accent on its role in the improvement of quality of life and well-being as they make facets of sustainable development of society. Table 2 demonstrates that social innovation has a great potential for increasing quality of life at the level of both individuals and the society as a whole.

Table 2. The definitions of social innovation with an emphasis on increase of quality of life

<table>
<thead>
<tr>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>… an innovation is termed a social innovation if the implied new idea has the potential to improve either the quality or the quantity of life. The macro-quality of life can be characterized as the set of valuable options that a group of people has the opportunity to select. By and large, the determinants of the quality of life at the aggregate level include the following elements, not necessarily in order of importance: material well-being, education opportunities (including quality of teaching and learning practices), health domain, job security, family life, community life, environment (climate and geography), political freedom, political stability and security, and gender equality. Social innovation can be broadly described as the development of new concepts, strategies and tools that support groups in achieving the objective of improved well-being.</td>
<td>Pol &amp; Ville 2009, p. 881-882</td>
</tr>
<tr>
<td>Social innovation is a type of innovation that answers to social problems by identifying and delivering new services that improve the quality of life and welfare of individuals and communities, both as consumers and producers.</td>
<td>OECD 2010, p. 223</td>
</tr>
<tr>
<td>… a social innovation is a novel mechanism that increases the welfare of the individuals who adopt it compared with the status quo”.</td>
<td>Young 2011, p. 21285</td>
</tr>
<tr>
<td>Social innovation can be defined as the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations. It represents new responses to pressing social demands, which affect the process of social interactions. It is aimed at improving human well-being. Social innovations are innovations that are social in both their ends and their means. They are innovations that are not only good for society but also enhance individuals’ capacity to act.</td>
<td>European Commission 2013, p. 6</td>
</tr>
<tr>
<td>… social innovation is a process of internalizing the tension of symmetries in the configuration of reality as a system, determined by social actions of learning, sensitizing, rallying and taking action, which lead to a social change in the sense of an improvement of the current situation and of increasing the quality of life for large groups of people, for society as a whole, and which has as effect the rejection of norms and/or existing social models, and adopting a new one.</td>
<td>Ionescu 2015, p. 60</td>
</tr>
</tbody>
</table>

*Source: Tabled by the authors*

The definitions of social innovation presented in Tables 1 and 2 are closely related to the mission and impact of social innovation on the sustainable development of society.

2.2. The mission and impact of social innovation

The role of social innovation in the promotion of sustainable development is connected with its mission, on the one hand, and its impact on the society, on the other hand. Mission is mainly considered in relation to the expectations from certain goals or objectives put forward; as for impact, it is understood as the influence of the realization of these expectations in life and achievement of these goals. While analyzing scientific literature, the authors of this paper faced the challenge of understanding the clear boundary between the mission and impact of social innovation, as these two concepts were often spoken about together in a mixed integrated manner through different contexts. Therefore the theoretical research presents the results on the mission and impact of social innovation in one section.
The mission and impact of social innovation are related to:

- support in creation of better futures via developing new ideas for improving quality of life (Bonifacio 2014; Edwards-Schachter, Matti & Alcántara 2012; Li, Sun & Lin 2012; OECD 2010; Pol & Ville 2009) or quantity of life (Pol & Ville 2009);
- increase of well-being and welfare (Bonifacio 2014; Edwards-Schachter, Matti & Alcántara 2012; European Commission 2013; Hubert et al. 2011; OECD 2010; Sanzo-Perez, Álvarez-González & Rey-Garcia 2015; Young 2011);
- development of social capital, social cohesion, empowerment and democracy (Davies & Simon 2013);
- promotion of social development (Phillips et al. 2015) and improvement of social quality (Li, Sun & Lin 2012; Oeij, Dhondt & Korver 2011);
- achievement of sustainable social and economic impact (Nichols et al. 2013; Jiménez Escobar & Morales Gutiérrez 2011; Murray, Caulier-Grice & Mulgan 2010; Ortega et al. 2014; Phillips et al. 2015);
- sustainable systemic change (Hubert et al. 2011), social change and societal transformation (Cajaiba-Santana 2013; OECD 2010; Westley et al. 2014);
- creation of social value (Bonifacio 2014; Le Ber & Branzei 2010);
- development of cross-sectoral partnership (Jiménez Escobar & Morales Gutiérrez 2011; Le Ber & Branzei 2010; Sanzo-Perez, Álvarez-González & Rey-Garcia 2015);

Edwards-Schachter, Matti and Alcántara (2012) conducted a research aimed at the analysis of some common and distinctive characteristics of social innovation based on 109 documents. The systemization of the aims (including improvement of quality of life and sustainable development) and outcomes (including improvements to well-being, sustainability, social inclusion, and quality of life) of social innovation given by that group of researchers demonstrates once again that the mission and the impact of social innovation are causally interconnected (Edwards-Schachter, Matti & Alcántara 2012).

However, some scholars (Grimm et al. 2013) think that the mission of social innovation is overestimated and objectives put forward are extremely too ambitious. They consider that there is only limited proof of whether social innovation can or already has delivered on some of its promises. They emphasize that it is difficult to judge to what extent social innovation might help to develop sustainable answers to burning social questions of the twenty-first century (Grimm et al. 2013).

Social innovation is a new concept in Latvia. Therefore first of all it needs to be understood and researched in order to become aware of the expectations and potential good which social innovation can bring to the contemporary Latvian society. This is the focus of the empirical part of the research presented in this paper.

3. The methodology, conduct and results of the empirical part of the research

The empirical data were collected in the focus group discussion organised in Riga Technical University on 20 May, 2015 within the project “Involvement of the society in social innovation for providing sustainable development of Latvia” of the National Research Program 5.2. EKOSOC-LV. The eight invited experts represented the fields of entrepreneurship, education, communication, sport and charity. The questions discussed were related to: the understanding of the matter, examples and role of social innovation; factors which promote or hinder the development of social innovation in the Latvian society; the conditions which motivate governmental and non-governmental organisations, enterprises and individuals to participate in the solution of social problems; the changes which should be made in the system of education to develop students’ readiness and motivation to initiate and realize social innovation projects.
The scripts made from the video-records of the focus group discussion were prepared in 13 files each containing the text of the discussion on one question. The qualitative content analysis was conducted by the authors using AQUAD 6 software (Huber & Gürtler 2004). The demographic codes encompassed the gender: ‘Male’ and ‘Female’ and the field represented by the participants of the focus group discussion: ‘Education’, ‘Communication’, ‘Sport’, ‘Charity’ and ‘Entrepreneurship’. The qualitative content analysis with open coding resulted in fifteen metacodes which contain from three to twenty two conceptual codes. Conceptual codes were used for the convenience of the conducting of the qualitative content analysis as intermediate data for developing corresponding categories. Therefore, in the phase of the interpretation of the final results only categories will be considered. This paper presents the analysis of the categories which were included in the metacodes: ‘The mission of social innovation’ and ‘The impact of social innovation’.

3.1. The mission of social innovation

The metacode ‘The mission of social innovation’ consists of the four categories shown in Table 3. It can be seen that the participants of the focus group discussion consider that social innovation is to develop both individuals and the society as a whole, improve people’s life quality and give them the opportunity to live a more interesting life.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Male</th>
<th>Female</th>
<th>Education</th>
<th>Communication</th>
<th>Sport</th>
<th>Charity</th>
<th>Entrepreneurship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement of quality of life</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Interesting lifestyle</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Development of individuals</td>
<td>39</td>
<td>35</td>
<td>34</td>
<td>39</td>
<td>39</td>
<td>26</td>
<td>39</td>
</tr>
<tr>
<td>Development of the society</td>
<td>30</td>
<td>28</td>
<td>26</td>
<td>25</td>
<td>28</td>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: The authors

For understanding the extents to which the mission of social innovation is related to these four categories, the diagram of the distribution of their frequencies is constructed (see Figure 1) for seven scopes which represent the demographic codes (see Table 3). The diagram shows that regardless of the gender and the fields represented by the participants of the focus group discussion, the mission of social innovation is mainly connected to the development of individuals (about 45 %) and the society as a whole (about 40 %). Within this distribution only 10 % is related to the improvement of quality of life and about 5 % – to an interesting lifestyle.
Figure 1. The distribution of frequencies of the categories included in the metacode “The mission of social innovation”.

The similar distribution of the frequencies of these four categories which were developed in the course of the qualitative content analysis speaks for the validity and reliability of the inference on the mission and developing function of social innovation both for individuals and the entire society.

3.2. The impact of social innovation

Since the question about the impact of social innovation was not discussed directly during the focus group discussion, the emergence of the categories which make the metacode ‘The impact of social innovation’ during the qualitative content analysis of the discussion text is especially important (see Table 4).

Table 4. The frequencies of the categories included in the metacode ‘The impact of social innovation’

<table>
<thead>
<tr>
<th>No</th>
<th>Domains of social innovation impact</th>
<th>Categories</th>
<th>Demographic codes</th>
<th>Sum</th>
<th>Weight of each domain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Intrapersonal development domain</td>
<td>Changes in attitudes</td>
<td>Male: 52 Female: 48</td>
<td>100</td>
<td>301</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes in thinking</td>
<td>Male: 51 Female: 49</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes in performance</td>
<td>Male: 42 Female: 38</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Achievement satisfaction</td>
<td>Male: 12 Female: 9</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Interpersonal interaction development domain</td>
<td>Changes in problem solving</td>
<td>Male: 36 Female: 34</td>
<td>70</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes in relationships</td>
<td>Male: 34 Female: 30</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes in communication</td>
<td>Male: 25 Female: 18</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Socialization</td>
<td>Male: 1 Female: 1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Societal growth domain</td>
<td>Benefit for the society</td>
<td>Male: 22 Female: 19</td>
<td>41</td>
<td>164</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improvement</td>
<td>Male: 28 Female: 25</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>New value system</td>
<td>Male: 25 Female: 20</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes in education</td>
<td>Male: 6 Female: 5</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes in politics</td>
<td>Male: 3 Female: 3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Development of infrastructure</td>
<td>Male: 4 Female: 4</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>
Table 4 was constructed based on the frequencies of the categories spoken about by both genders and the sum of these frequencies for each category. The table summarizes all the judgements which are related to the broad range of consequences, results and influence of social innovation on various aspects and processes in the society from different perspectives of the development of individuals and the society. Based on the meaning of the categories they were grouped into five domains of social innovation impact (see Table 4). The last column was provided with the purpose to give insight into the weights of the five domains which were calculated as the total sum of frequencies of categories involved in each domain; the domains are characterized as follows:

**Intrapersonal development domain.** Changes in attitudes of individuals who participate in social innovation processes, changes in their ways of thinking and in their performance, as well as the getting of satisfaction from what they have achieved made the basis of this domain which focuses on the personality development. The participants of the focus group discussion mentioned the categories of this domain more frequently (n = 301) than the others which speaks of the huge impact of social innovation on the growth of personality.

**Interpersonal interaction development domain.** The categories included in this domain show that in the result of people’s participation in social innovation processes, they change their way of solving problems and establish new types of relationship and communication getting new opportunities for socialization. The weight – that is the sum of the frequencies of the four categories of this domain, is in the second place (n=179).

**Societal growth domain.** The qualitative content analysis showed that social innovation has a great impact on the society as a whole as it gives benefit and brings improvement in different fields, causing positive changes in politics and education. It may promote the development of infrastructure necessary for the realisation of various complex tasks. One of the most significant impacts of social innovation emerged to be the formation of new value system which is an evidence of deep changes which take place in the society in the course of the solution of social problems. Owing to its weight (n=164) the societal growth domain occupies the third place among the other domains of social innovation impact.

**Innovation development domain.** Solution of social problems which makes the heart of social innovation may give rise to the development of broader innovation as it may result in novelty, new products and new technologies. However the categories of this domain (n=62) were mentioned less frequently than the categories of the previous three domains; this can be conditioned by the professional fields represented by the participants of the focus group discussion.

**Work opportunity development domain.** The categories of this domain related to the creation of new workplaces, opportunities for earning money and career growth were pointed out least frequently (n=7); this may be conditioned by a similar reason explained for the case of the innovation development domain.

In order to compare the vision of the impact of social innovation expressed by the representatives of both genders (n_{male}=4, n_{female}=4), the diagram of the distribution of frequencies of categories was constructed (see Figure 2) based on the data taken from Table 4 for the demographic codes ‘Male’ and ‘Female’ organised in the decreasing order of frequencies of categories.
Figure 2. Comparative analysis of the distribution of frequencies of categories related to the effects of social innovation expressed by the representatives of both genders

Source: The authors

Figure 2 shows that the profiles of distribution of the frequencies of the categories related to the effects of social innovation expressed by the representatives of both genders are similar. This similarity speaks for the identical perception and understanding of the impact of social innovation on the society by both genders. However the men were more active than the women and they produced more ideas related to the issues discussed.

4. Conclusions

The research conducted shows that the representatives of the fields of communication, education, entrepreneurship, sport and charity consider that social innovation has significant potential for improving quality of people’s life and their interesting lifestyle in Latvia, at the same time developing both individuals who are involved in the processes of social innovation and the entire society.

They also think that social innovation has the power of serious impact on the sustainable development of the Latvian society as it causes many-sided positive changes at different levels encompassing the development of: personality, intrapersonal interaction, societal growth, innovation, and work opportunities.

Having summarized the results of the research it can be concluded that social innovation may play a considerable role in the promotion of the sustainable development of the contemporary Latvian society.

Acknowledgement

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Abstract. This paper aims to describe and analyse the innovations in the promotion of home-produced products in the market in Latvia. To do this, the authors have carried out a survey of 50 home producers that makes up a 4.5% of home producers and reviewed research studies about marketing strategies of small farmers and home producers. The obtained results reveal that the most important factor in the marketing of home-produced products is the quality and taste of the products. It can be noticed that the market requires not a combination of traditional and often cultural heritage technologies in the development of the product itself, but an open mind and innovative approaches in the marketing and promotion of products in the market. The authors also conclude mainly the products are sold directly to the end user and therefore the communication with the client and mutual cooperation are highly significant.

Keywords: home produced, home producer, product promotion in the market.

Reference to this paper should be made as follows: Pelše, M.; Zēverte-Rivža, S.; Rone, Z. 2015, Sustainable innovations in the promotion of home produced products in the market, Journal of Security and Sustainability Issues 5(2): 259–267. DOI: http://dx.doi.org/10.9770/jssi.2015.5.2(11)

JEL classification: O31

1. Introduction

Home production is one of the forms of micro entrepreneurship and lately this and other forms of small and locally oriented entrepreneurship are acknowledged for promoting self-employment and business involvement of local communities. A home producer is defined as a person who has registered as a food manufacturer in home and small scale manufacturing, processing or manufacturing products using locally sourced raw materials. As home producers have to do several stages of product production and promotion themselves, there is a vast room for innovation in product design, production technologies, marketing and branding of products, product presentation and communicating with consumers. Home producers also use several market channels for selling their production. Traditionally most of the production is sold in local markets and via direct sales to customers, but there are several innovative examples of cooperating with local sales groups, producer cooperatives, eco-stores etc.

Home production has been one of the occupations of households in Latvia for a long time; one could say that home production has been a traditional occupation for many centuries. However, at present, returning to traditional, natural and cultural heritage values in producing and distributing products may be considered an innovation. An increasing number of farmers wish to process part of their agricultural production on their farms, while small farms prefer to process all their agricultural production (Melece 2006). In Latvia, home production
is classified into ten activities: manufacture of meat products and minced meat; manufacture of dairy products; processing of fish products; manufacture of vegetable oils and fats; processing of products of plant origin; manufacture of bread and flour; production of eggs; manufacture of specific food products of animal origin; manufacture of non-alcoholic beverages and ice; and food production under home conditions.

In Latvia, home producers are registered with the Food and Veterinary Service (FVS); in the period from 2010 to 2014 their number rose by 57%. There were 1104 registered home producers in 2014. The number of home producers registered in the FVS database does not match their number if broken down by their registered activities, as there are home producers that are engaged in more than one activity. For example, a home producer produces foods from both milk and plants, and the FVS registers each its activity separately. In home production in Latvia, the most popular activity is the processing of plant products, as the number of entities registered for this activity increases every year; and at the end of 2014 there were 513 such home producers, accounting for more than 40% of all the mentioned activities. More than half or 60% of the home producers were registered as natural persons, while only a fifth was registered as farms and 13% were LLCs. Home production helps to preserve the traditional rural environment and ancient food processing techniques and generates additional revenue. A no less important argument is the rising food prices in the world and an increase in demand for quality organic food that is not chemically treated and transported in long distances. There are several factors that draw consumer attention to local foods such as environmental and geographic dimensions in their food choices – long-distance transport of food or so called food-miles is considered to contribute to greenhouse gas emissions, leads to a large food waste ratio and consumption of nutritionally poor and unified foods. It is also considered that local food is healthier and safer, and consumption of local goods supports local farmers (Guptill and Wilkins 2002; Ilbery and Maye 2005; Pirog 2009; Grīniņa 2011). Urban and rural residents are learning that they like to have direct connections to farmers and farm life. They like knowing where their food comes from and knowing that it was grown by family farmers who take good care of their farmland and their animals. This concern on the part of consumers is opening up more opportunities for farmers to direct marketing, or to sell their products through channels that keep the farmer’s identity connected to the product (Jewett et al. 2007, Pabedinskaite 2013). Martinez (2007) also states that the expansion of local food markets implies that consumers in a particular area are purchasing more of their food from nearby sources, and that more of the money they spend remains in their local community. Hence, local food systems have the potential to positively impact the local economy. Claims of economic development impacts – in the form of income and employment growth – are common in local foods research. The same positive effects are also created by local craftsmen. Both food producers and craftsmen use local knowledge, thus sustaining local cultural heritage and transferring it to everyday utility products. Strengthening and protecting cultural and biological diversity and localised specialty agriculture promotes regional micro-entrepreneurship, thus sustaining local communities.

In the aspect of distribution, local food used to be almost completely linked to direct marketing, where the farmers and consumers had face-to-face contact. Direct marketing is still a very important part of the local food chain, but there are more opportunities now than ever before to sell locally (Jewett et al. 2007). Recent years, home producers have successfully competed with large producers in the food market by choosing a number of sales channels such as farmers’ markets, collective purchase and direct purchase groups, community supporting agriculture initiatives, farm visits, local food supplies to grocery stores etc. (Merrigan 2012, Local and Regional., s.a., Little et al. 2009, Išoraitė 2014; Išoraitė 2015). For rural residents, it is an opportunity to start up their small business, while consumers can use local quality food products daily. Producers have to consider how to offer their products in order for their business to be successful. Just like any food enterprise, home producers too have to ensure their products are safe and of good quality (Vilcāne 2015). The concept of local food may also extend to who produced the food: the personality and ethics of the grower; the attractiveness of the farm and surrounding landscape; and other factors that make up the “story behind the food” (Martinez et al. 2010). Local food is linked to social embeddedness in the sense of social connections, mutual exchange, and trust that is viewed by some as an important feature of direct agricultural marketing (Hinrichs 2000; Sage 2003). Although home production is basing its techniques in traditional and family owned recipes, the attractiveness of the markets, finding the sales channels and the promotion of the produced goods involves several innovative aspects. Innovation is the ability to take new ideas and translate them into commercial outcomes by
using new processes, products or services (Fagerberg, Schumpeter 2003; Laužikas, Dailiudaitė 2013; Rezk et al. 2015; Laužikas et al. 2015). Initially, the term ‘innovations’ had focused on technological innovations, while now non-technological innovations have become equally important. Technological innovations are seen as a process during which new or enhanced technologies are developed and commercialised, it can also involve such elements as marketing, enterprise’s external relations etc. (Volkova 2014). However, non-technological innovations are the new organisational or marketing techniques introduced in an enterprise and contributing to the creation of value for customers and the enterprise itself (Schmidt, Rammer 2007; Rezk et al. 2015). This suggests that both the enterprise and its customers make gains. The scope of non-technological innovations is very broad not only in the field of entrepreneurship but also management. In enterprise management, such non-technological innovations as marketing innovations, eco innovations, brand innovations, business model innovations, service innovations, design-driven innovations, supply chain innovations, financial and other innovations are used more and more extensively. Lately innovations in the use of ICT in marketing and communicating with the customers are the ones increasingly up taken and used by enterprises across EU (Matei, Savulescu 2012; Išoraitė 2014).

2. Materials and methods

Identifying the factors and communication techniques of promotion of goods in the market and the factors affecting consumer choices will give an opportunity to promote home-produced products in the market more successfully. The present research designed a questionnaire and found out the opinions of home producers regarding presenting and promoting their products in the market. The authors have carried out a survey of 50 home producers that makes a 4.5% of the target group of home producers. Promoting products in the market plays a great role in the success of home producers, as its key objective is to extend the knowledge of consumers about the product, to encourage them to try it and to continue consuming the product. Therefore the authors employed a number of marketing analysis methods – to promote goods in the market, in this study the elements of marketing communication were analysed, with the key instruments being: advertising, sales promotion, public relations and publicity, direct marketing, personal selling and events/experience. Applying these key instruments to promoting home-produced products in the market, the values and advantages of a particular product have to be highlighted, compared with similar products. One can illustratively depict the production process of products and their uses, placing information about the products produced in various sources, thus arousing interest in the products. The value and importance of products have to be justified based on how a consumer might perceive the products, and the consumer has to be made to wish to act and purchase the products.

The authors suppose that in order that home producers can successfully promote their products in the market, communication is necessary between the producer and consumers. The AIDA model could be used in communication with consumers – both current and potential ones. The AIDA model is a model of action, in which the effect of promotion emerges at four steps that help to motivate potential customers to purchase or order a good or a service (AIDA model, [s.a.], Gharibi et al. 2012). The model’s purpose is to attract consumers’ attention, to arouse their interest in the product and, consequently, to cause the necessary action/behaviour of the consumers – buying. The model consists of four steps: creation of attraction, interest, desire and action.

An Irish food reviewer, writer John McKenna, characterises home producers and their products as 4 P’s interaction: personality, place, product and passion (Artisan food: Artisan ..., [s.a.]). The authors believe that the interaction of the mentioned 4 P’s highlights the uniqueness of home producers and their products, as such products are produced under home conditions, adding them value and specific characteristics. Home producers have to examine consumers’ desires, use various sales opportunities, popularise their goods, placing information in various social networks, as well as place actual information on the label, which tells about the origin, values and uniqueness of the product. The production process would need to involve creativity, innovative ideas (Mačerinskienė, Bulygina 2013; Tvaronavičienė, Černevičiūtė 2015) and diverse ways have to be sought, for example, food products may be packaged in original packaging or designed as souvenirs, a legendary story may be added or it may involve other interesting ideas that could also attract tourists from other countries who would wish to buy home-produced food products.
3. Results and discussion

Home producers sell their products via direct sales and, the authors suppose a great role is played by the ways of presenting the products and informing about them and by communication with consumers. To identify the opinions of registered home producers on these matters, the authors developed a questionnaire. The number of respondents in a survey conducted within the present research was 60 or 5.4% of the target population. The survey was carried out in the spring of 2014. The respondents represented all the regions of Latvia; 70% of them did their home production activities in rural areas, while 30% in urban areas. Of the total respondents, 26% were home producers for less than a year, while 22% were engaged in home production for more than one year.

To identify the ways of sales by home producers, the respondents gave replies to the question “Where do you sell your home-produced products?” The highest proportion of replies – 72% – related to sales at local government-held fairs and delivery to customers on request. Specialty stores and market places were outlets for 36% and 46% home producers, respectively. Of the surveyed home producers, 48% sold their products on their farm or at their production place. Others sold them at the Kalnciema street market in Riga, direct sales groups, via post, via the Internet, at small fairs and stores or during various social events.

More than half (64%) of the surveyed home producers sold their homemade food products themselves, and almost half or 24 of them retailed their products 1-2 days a week. The authors assume it was done on weekends. Of the surveyed home producers, 16% sold their products 3-4 days a week, while only 8% of them did that all week long. The authors wish to emphasise that a third of them sold their products even less frequently, which might be explained by the fact large fairs or social events, in which home producers wanted to participate, did not take place every week. The reason was also the fact that part of their products was seasonal, for example, gingerbread and pickled vegetables, as such products were mainly purchased in winter.

In selling home producer products, the authors believe, a great role is played by the way the products are presented and by the product design. According to the surveyed home producers, the most important factor in marketing home-produced products was their quality and taste; it was stressed by 90% of the respondents. To ensure it, home producers have to have good recipes and technologies, so that the quality and taste of their products do not change. This factor is supplemented with an opportunity to taste the product, and consumers may be attracted in this way – they taste the product and decide whether to buy the product. However, only 26% admitted that in marketing products, it was important to indicate the place of production. Price tag and its placement were mentioned as unimportant factors in marketing products. The replies of the surveyed home producers concerning important factors in marketing home-produced products are presented in Figure 1.

![Figure 1](image)

**Fig. 1.** Percentage distribution of the home producers’ replies regarding marketing their products by importance of various factors.

When marketing their products to consumers, sellers have to be honest and show personal respect, as 70% of the respondents emphasised that it was important to be able to attract the attention of buyers and to communicate with them. Their sales place is also important. To contribute to the recognition of their products, home producers have to provide additional information about themselves and their products in various ways. It was
mentioned as an important factor by 68% of the respondents. More than half of the surveyed home producers spread information on themselves and their products via the Internet and social networks. On their websites, 34% of the home producers updated information at least once a week. Of the respondents, 30% provided a summary of information on their products at their sales place several times a week by using leaflets produced in advance; 18% placed information on their products in their local newspaper. Banners, which were placed at their sales places, had been created by 12% of the home producers, and they used their banners at their sales places at least once a month. Only 14% admitted that there was no need to spread information about them and their products, as their consumers found them themselves. More than a third spread information on themselves and their products in a different way – by telling their acquaintances, their permanent customers popularised their products to others or information was spread to consumers through home producer associations. Trips to the place of production, which was an innovative way of marketing goods, helped to spread information on their products, as well as stories told on radio and television were effective. Regardless of the activities done by the surveyed home producers, 54% admitted that the available information on themselves and their products was insufficient.

More than 80% of the respondents admitted that they used to evaluate the way of presenting and the design of products made by other home producers. The authors identified the situation with the surveyed home producers with regard to the way of presenting and the design of their products (Figure 2). When starting to sell products, appropriate labels have to be developed; 78% of the surveyed home producers had already developed and introduced labels. A great deal of the respondents had also created logos, which meant that the recognition of their products by customers increased, although some 20% of the home producers believed they did not need a logo. Packaging was considered an important factor in marketing products by 56% of the respondents. Of the surveyed home producers, 68% had developed business cards. More than half of the respondents believed that banners or large billboards were not necessary, although 48% of the home producers already had them or planned to create them. The authors assume that before starting designing business cards and labels, uniforms and booklets, a single style and colours have to be selected for the product to be produced and the way of presenting and the design of it. Of the home producers, 56% had a single style and certain colours had been used in designing both a product and a sales place; therefore, such techniques could attract potential buyers and raise the buyers’ interest in their products.
The authors’ summary on the best sales techniques shows that they resemble the steps of the AIDA model. There are only small changes or it is done in a different way, but the mentioned model’s idea is reflected in the activities presented in Figure 3. Everything begins with attracting the buyer’s attention, which can be achieved with an attractive seller, a smile, by speaking straight to the buyer in the form of invitation, as well as with an opportunity to taste the product. An additional interest in home producers’ products can be created by the unique and appropriate visual design of both their sales places and their products. One may not consider that the seller’s appearance plays no role; the appearance (the uniform, harmony with the rest of the designs) have to be considered. Impressions are also made by the placement of products and their packaging, which are noticed by consumers. For example, candied berries and fruits are colourful, their packaging has to be transparent, so that consumers can see what they look like; the same situation is with bread, natural teas and other products. In contrast, there are some products the appearance of which is not appealing – then an effect has to be created by means of packaging. For example, the appearance of cannabis butter (fried, ground hemp seeds) – a grey, soft and grainy paste – might not make the buyer interested in it. In this case, the packaging has to be attractive and informative about the good properties of the product.

Home producers use an opportunity to highlight their product’s values and uniqueness by creating and telling stories about it. There are products that can be evaluated by tasting them or feeling their aroma. To make consumers interested in them, their advantages have to be used and presented to potential and current consumers, for example, spice mixtures – aromatic, vegetable and fruit products – fresh, just as cooked at home. The authors believe that communication is necessary to make consumers interested in; it is particularly important to home producers, as they sell their products via direct sales – at the market place, fairs, exhibitions and anywhere where there is direct contact with potential and current consumers. Communicating and speaking with buyers arouses a desire in them. Sellers have to speak straight to their buyers; they have to be honest and unobtrusive. Otherwise, it can create an opposite effect – the buyer is discouraged. Sellers have to tell about their product’s quality and origin and identify their buyers’ desires during the conversation in order to satisfy their desires. When communicating with buyers, sellers have to serve them in a polite and friendly way. The final – fourth – step in the AIDA model involves action or making a purchase, while the summarised opinions of home producers refer to the flow and availability of information on the part of both home producers and buyers. This manifests itself as mutual exchange of information about successful purchases, customer recommendations and comments after purchases have been made. However, home producers have to be active and provide information about themselves in social networks in order to increase their sales. An opportunity to visit the place of production, which is created for interested individuals, results in additional recognition and future actions – making purchases.
When selling their products, home producers might face not only positive attitudes from their consumers and competitors. When speaking with potential buyers, they might be faced with reluctance and no desire to listen to the offer. Individuals have to be aware of the value of local products in order to buy them. Demand for home producers’ products is volatile, depending on various circumstances – the place of sales, weather conditions and human attitudes and, of course, the population’s purchasing power. Home production is often an additional occupation, along with paid employment; therefore, it is difficult for individuals to combine all their duties – to work, to produce and to sell their products themselves. It is difficult to compete with small home producers who have not registered themselves and sell their products illegally. For this reason, they have no additional costs in relation to product safety tests, sales places and taxes; in the result, the prices of products supplied by officially registered home producers are higher. The authors suppose that promoting home producer products in the market is of great importance in order to highlight their values. An invariably important condition is to maintain the quality of products. The majority of the respondents considered the presentation and offering of their products. Since home producers usually do their work themselves, the replies regarding informative materials and visual aids were positive. The importance of spreading information was acknowledged by the majority of the home producers, and it was important that the information was placed in various sources, for example, in social networks where it was possible to create a free-of-charge informative profile on products; however, not all of them used this opportunity. Activities for attracting consumers and arousing interest in them to buy a product are diverse; it may be achieved by both visual elements and personal attitudes.

4. Conclusions and proposals

Home production is one of the ways of starting up one’s own business if an individual wants to produce and sell food products, initially, in small quantities. However, at present in Latvia, there is no single definition regarding what is home production, although already 1104 home producers had been registered at the end of 2014, and their number grows from year to year, while the proportion of unregistered home producers is still high.

Promoting products in the market is an important key element in marketing home-produced products, and a great role is played by communication with consumers. Home producers have to be able to arouse interest and desire in consumers for their products. For this reason, studying and assessing the steps of consumer behaviour is important to be able to offer products and information about them in the way consumers wish it.

Of the surveyed home producers, 72% marketed their products in their local community and delivered them to customers upon request. The products were also marketed in specialty shops and sold directly on the farm or production facility. Of the respondents, 68% had noted that it was necessary to promote product awareness and provide sufficient information to the customers through the Internet and social networks, thus acknowledging the necessity of innovation in communication with the customers.

To contribute to the availability of local products and their recognition by consumers, home producer cooperation groups have to be established. To achieve a greater sphere of influence and to educate the public about the role of local products, all the home producer associations have to cooperate. The initiative to start cooperation has to be assumed by the association “Latvijas Mājažotāji” (Latvian Home Producers). The association has to hold joint events, thereby speaking to individuals of various ages and social groups. It has to also focus on school-age children, telling them about the value of local products and the necessity to support local producers. As a result, foundations would be laid for the idea that choosing local products provides support to the local population already during their teenage years.

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The competitive advantage of national companies in international markets is one of the main conditions of the economic development, enhancement of life quality and successful realization of national priority programmes. The resolution of these issues is hardly possible without effective use of results of the fundamental scientific research and developments in the commercial sector of an economy (see e.g. Krejci et al. 2015; Kozubíková et al. 2015, Ignatavičius et al. 2015; Tvaronavičienė, Černevičiūtė 2015). Competitive advantage in innovative economy is mainly determined by efficient commercialization of innovations and the right usage of knowledge. Therefore, the process of creation of new technologies needs to be considered and studied well (Howitt 2004; Tvaronavičienė 2014; Rezk et al. 2015).

The realization of new ideas in the real economy is encompassed by both positive and negative factors that affect the formation of candidate innovations. If a breakthrough technology exists in a too adverse environment,
its progress can stop. On the other hand, a moderate competitive environment can give growth to potential technologies at the same time eliminating futureless projects (Geroski 1990; Matetskaya 2015; Tunčikienė, Drejeris 2015).

Consequently, it is important to study the role of prolific environment, under which we consider a system that includes all objects and their surroundings, both functioning as one unit. A prolific innovative environment assumes presence of a creative entrepreneurial atmosphere, research institutions working in cooperation with business, start-ups’ research and development (R&D) state support and the access to venture capital etc. (Abrhám et al. 2015; Laužikas, Mokšeckienė 2013; Tunčikienė, Drejeris 2015).

2. The start-up phenomenon and the reasons of their failure

As the global practice shows, big corporations are not able to grasp all the spectrum of emerging innovative technologies even in their own area of business. Having poor opportunities to pursue emerging innovative technologies and new trends, they are bound to seek other ways of development, one of which is acquisition of smaller innovative companies or purchase of their shares.

A start-up is an immature company that after its creation gets to an eco-surrounding, which as a rule functions under rigorous rules of market competition (Bruton and Rubanik 2002; Mesnard and Ravallion 2006; Grubicka, Matuska 2015; Pather 2015). This can be compared based on the analogy of biological systems where a baby of some animal starts living in an ecosystem and he faces multiple attacks from other species of the same system. Often such animals die during their first moments of life.

The survival rate of start-ups during their first few years is very low (see e.g. Morril 2015; Laužikas et al. 2015). The reasons for that are manifold. According to CB Insights (2015), that has carried out a study of the main reasons of start-ups’ failure during their first four years of existence, the main reasons are as follows (Figure 1).

Figure 1. The main reasons of start-up failure (percentage)

The statistical date on start-up failure shows that the older a company is the more chances it has to fail. For example, on the tenth year there are only 29% start-ups still functioning (Figure 2).

The Figure 1 indicates that start-ups have low success rate mainly because of lack of capital and business expe-
rience. As a result of existence of such factors in a certain ecosystem, the potential of innovative start-ups is not used effectively; also commercially unsuccessful start-ups can be better utilized instead of letting them go off.

The analysis of investment practice into start-ups indicates the following problems:

i) The number of investments on the 1st round (seed investments) exceeds the number of 2nd round investments five times. This results in supply and demand misbalance.

ii) More than half of start-ups cannot find venture capital after the 1st round and die within the first three years. [1]

iii) Consequently, venture capitalists’ investments are misapplied.

![Figure 2. Start-up failure by year](source: Brain (2015))

Therefore, the aforementioned problems condition the need to design a multi-agent model of interaction between start-ups, venture capitalist and big corporations (start-up-investor-corporation model) aimed at finding the optimal parameters of the system.

3. Start-up-venture investor-corporation model

Aiming at optimizing both global and individual parameters of the system in hand, we propose the following principal scheme of cooperation of agents in the ecosystem (see Figure 3).

The simulation has an information field where agents move in random directions with random speed and have limited information about the whole system (and other agents) showed as a radius of their field of vision. Thus, the agents-investors have a certain probability to meet suitable start-ups and invest in them at any time step.

The venture investors can invest in start-ups at the early stages by buying shares in start-ups’ capital. The corporations can both invest by buying shares and also acquire start-ups. The model allows to simulate and study long life-cycle of start-ups that consists of several stages of investment; the last stage, at favorable conditions, can be a start-up’s Initial Public Offering (IPO) and thereby the transformation of a start-up into a corporation. Below we give a more detailed description of the agents’ parameters, functions and their algorithms of behavior at different stages of their development. Global model parameters can be presented as follows:

- \( t \) – period of simulation;
- \( S(t) \) – number of start-ups;
- \( C(t) \) – number of corporations;
- \( V(t) \) – number of venture investors;
The start-up's increment function at every period of simulation is as follows:

\[ S_t = S_{t-1} \cdot (1 + \Theta) \]  

(1)

**Figure 3.** Cooperation scheme between agents: start-ups, venture investors and corporations

**Start-up class parameters:**

- \( A_S \) – a start-up’s capital; set randomly from the equal distribution (min; max) at the time of creation of this agent;
- \( B \) – a start-up’s number of employees; set randomly from the equal distribution (min; max) at the time of creation of this agent;
- \( \gamma \) – a start-up’s idea attractiveness coefficient, available for other agents; set randomly from the equal distribution (min; max) at the time of creation of this agent;
- \( \delta \) – a start-up’s innovative potential coefficient, unknown for other agents; set randomly from the equal distribution (min; max) at the time of creation of this agent;
- \( M_S \) – the mean of the normal distribution of a start-up’s profit, which is found the following way:

\[ c(t) = \text{invmormal}(dRate(t)) \] – the probability distribution of profit of dead start-ups in the inverted normal
distribution, where \( dRate(t) \) is the proportion of died start-ups in the period \( t \) (see Figure 2);

The collected mean value of profit adjusted for the initial capital is denoted by the following formula:

\[
m(t) = -A_0 - c(t) \cdot r(t)
\]

where \( A_0 \) – the initial capital, \( r(t) \) – collected mean value of the mean-square deviation found by the following formula:

\[
r(t) = \sqrt{r^2(t-1) + \sigma(t)}
\]

The mean-square deviation of profit in the period \( t \), where \( \nu \) - the coefficient of deviation increment, which is found by the following formula:

\[
\sigma(t) = \sigma(t-1) \cdot \nu
\]

The mean value of profit of a start-up in the period \( t \) is found by the following formula:

\[
M_S(t) = m(t) - m(t-1)
\]

\( \alpha(t) \) – the coefficient of capital increment in the period \( t \), belongs to the normal distribution with the deviation \( \sigma(t) \) the mean value \( M_S(t) \). in each period \( \alpha \) is recalculated;

The functions are the following: firstly, the profit \( P_S \) for the time period \( t \) is calculated by the formula (6). The profit is affected by the start-up’s attractiveness \( \gamma \), potential \( \delta \) and the rate of competition between start-ups \( \frac{A_S}{S(t)} \)

\[
P_S(t) = \alpha(t) \cdot \frac{A_S}{S(t)} \cdot \gamma \cdot \delta
\]
Then taxes a paid from the profit $P_S(t)$:

$$T(t) = P_S(t) \cdot T_S$$  \hspace{1cm} (7)

where $T_S$ – tax rate for start-ups.

A start-ups capital $A_S$ increases by the current profit $P_S(t)$ excluding the taxes:

$$A_S = A_S(t-1) + P_S(t) \cdot T_S$$  \hspace{1cm} (8)

In every time period (t) of the simulation a start-up’s innovation potential decreases by 5%:

$$\delta(t) = \delta(t-1) \cdot 0.95$$  \hspace{1cm} (9)

In every time period a start-up’s capital gets checked – if $A_S < 5000$, this start-up is removed. Start-up’s algorithms and stages of development:

\textbf{Figure 4.} The algorithm of search of seed investments

\hspace{1cm} \begin{center}
\begin{tikzpicture}
\node[decision] (start) {Stage 1 Search of seed investments};
\node[decision, below of=start] (stage1) {Capital > 5000};
\node[decision, below of=stage1, xshift=-2cm] (stage1a) {No};
\node[decision, below of=stage1, xshift=2cm] (stage1b) {Yes};
\node[decision, below of=stage1b, xshift=-2cm] (stage1b1) {Angel\_i};
\node[decision, below of=stage1b, xshift=2cm] (stage1b2) {Sum of proposal};
\node[decision, below of=stage1a, xshift=-2cm] (stage1a1) {Removal of the agent};
\node[decision, below of=stage1a, xshift=2cm] (stage1a2) {Capital > 5000};
\node[decision, below of=stage1a2, xshift=-2cm] (stage1a2a) {No};
\node[decision, below of=stage1a2, xshift=2cm] (stage1a2b) {Yes};
\node[decision, below of=stage1a2b, xshift=-2cm] (stage1a2b1) {Receiving an investment proposal};
\node[decision, below of=stage1a2b, xshift=2cm] (stage1a2b2) {Sum of investment > Capital / 2};
\node[decision, below of=stage1a2a, xshift=-2cm] (stage1a2a1) {Registering in the database};
\node[decision, below of=stage1a2a, xshift=2cm] (stage1a2a2) {Choosing the biggest proposal};
\node[decision, below of=stage1a2b1, xshift=-2cm] (stage1a2b11) {Accepting};
\node[decision, below of=stage1a2b1, xshift=2cm] (stage1a2b12) {Successful investment};
\node[decision, below of=stage1a2b11, xshift=-2cm] (stage1a2b111) {Increasing of the mean profit coefficient $M_S(t) = M_S(t) + E$};
\node[decision, below of=stage1a2b11, xshift=2cm] (stage1a2b112) {Go to stage 2};
\node at (0,0) {Source: Own results};
\end{tikzpicture}
\end{center}
1) «Searching seed investments»: all initial parameters and the status “looking for an angel investor” (see Figure 4).

2) «Search of venture capital»: an angel has already invested and the start-up has an opportunity to market its products (see Figure 5).

![Figure 5. The algorithm of search of next venture capital](image)

Source: Own results

Then start-up searches a corporation in order to attract additional investments or to be acquired by the corporation (see Figure 5). If some corporation invests or acquires, it refunds previous venture investors’ shares in the start-up:

$$A_V = A_V + A_S \cdot Share$$  \hspace{1cm} (10)

where $A_V$ – venture capitalist’s capital, $A_S$ – start-up’s capital.

3) «Steady growth»: if on the previous time period no corporation acquired this start-up, then if the start-up’s capital reaches a high point: $A_S > 50,000,000$ the start-up gets transforms into a corporation (IPO) (see Figure 6).
Figure 6. The algorithm of steady growth and IPO of a start-up

In case of IPO, the start-up refunds to venture investors as well as to corporations that had invested in previous time periods. The refund calculates the capital increment as well:

\[ A_C = A_C + Share \times A_S \]  \hspace{1cm} (11)

where \( A_C \) – a corporation’s capital.

The refund to a venture capitalist is carried out by the formula (10). Venture capitalist class has the following parameters:

- \( A_W \) – an investor’s initial capital; set randomly from the equal distribution (min; max) at the time of creation of this agent;
- \( A_W S \) – an investor’s invested capital calculated as a sum of shares in start-ups, in which the investor has invested;
- \( R \) – radius of field view of the investor, set randomly from the equal distribution (min; max) at the time of creation of this agent;
- \( \omega \) – «entrepreneurial wisdom» of the investor, the ability to see a start-up’s innovative potential, set randomly from the equal distribution (min=0; max=1);
The functions are the following: the invested capital for the period $t$ calculated as a sum of shares in start-ups that got investments:

$$A_{VS}(t) = \sum_{j=1}^{n} A_{Sj}(t) \cdot Share_j$$  \hspace{1cm} (12)

where $n$ – number of start-ups received investments, $t$ – time period of simulation, $j$ – a start-up from investor’s collection, $A_{Sj}(t)$ – capital of j-th start-up. $Share_j$ – shares in j-th start-up.

Figure 7. Venture investor’s algorithm of investment process

Source: Own results
1. Search of start-ups in radius R;
2. If \( \gamma_j > 0 \), then investment \( I \) into a start-up – random value from the equal distribution, which depends on investor’s own capital \( A_V \):
   \[
   I = (\min = 10\% \cdot A_V; \ max = 35\% \cdot A_V)
   \]
(13)
3. If the entrepreneurial wisdom is high \( \omega > 0.5 \), the investor is able to see a start-up’s potential:
   a. If a start-up has a positive innovative potential \( \delta > 0 \), then the investor send an investment proposition to a start-up;
   b. If a start-up accepts an investment proposition, then investment of the sum \( I \):
   \[
   A_S = A_S + I
   \]
(14)
Subtraction of investment sum from investor’s own capital:
   \[
   A_V = A_V - I
   \]
(15)
c. Else – denial of investment.
4. If the entrepreneurial wisdom is low \( \omega \leq 0.5 \), then sending an investment proposition without checking for potential; is a start-up accepts, then investment of the sum \( I \) by formulas (13) (14),
5. In case of investment:
   a. entrepreneurial wisdom of investor increases by 5% \( \omega = \omega \cdot 1.05 \)
b. the information about investments is registered in a database \( sList \), where the share in the company is calculated by the formula (16):
   \[
   \text{CapShare} = \frac{\max - \min}{\text{inv} + 20 - \frac{30\min}{\max - \min}}
   \]
(16)
where \( j \) – a selected start-up for investments from the whole collection within the radius R; min and max are limitaly values of investment sum determined in the formula (13);

If \( A_{VE}(t) + A_V < 5000 \), then this agent is removed.

Corporation class is coded by the following parameters:
\( \delta \) – a corporation’s innovative potential coefficient, unknown for other agents; set randomly from the equal distribution (min; max) at the time of creation of this agent;
\( M_S \) – mean value of the profit;
\( A_C \) – a corporation’s capital; set randomly from the equal distribution (min; max) at the time of creation of this agent;
\( A_{CS} \) – a corporation’s capital calculated as a sum of shares in start-ups, in which the investor has invested;
\( R \) – radius of field view of the corporation, set randomly from the equal distribution (min; max) at the time of creation of this agent;
\( \omega \) – «entrepreneurial wisdom» of the corporation, the ability to see a start-up’s innovative potential, set randomly from the equal distribution (min=0; max=1);
\( \epsilon = \delta + \alpha \) – «innovation hunger» of the corporation (the lower it is the higher is the hunger – the need in new start-ups to be acquired).

The functions are the following: firstly, profit \( P_C \) is calculated for the period t by the formula (17); the profit is affected by the innovative potential \( \delta \) and the competition intensity among corporations \( \frac{\Lambda_{C}}{C(t)} \) where \( \Lambda_{C} \) – liminal number of corporations that the market can hold, \( C(t) \) – number of corporations in the period \( t \):
\[
P_C(t) = \alpha(t) \cdot \frac{\Lambda_{C}}{C(t)} \cdot \delta
\]
(17)
Then taxes from profit $P_C(t)$ are refunded:

$$T(t) = P_C(t) \cdot T_c$$

where $T_c$ – tax rate for corporations.

**Figure 8.** Corporation’s algorithm of choosing start-ups

Corporation’s capital $A_C$ increases by the current profit $P_C(t)$ excluding the taxes:

$$A_C = A_C(t-1) + P_C(t) \cdot T_c$$

Every time period $t$ the innovation potential decreases by 5%:

$$\delta(t) = \delta(t-1) \cdot 0.95$$
Invested capital for the period $t$ is calculated as a sum of shares in start-ups that got investments:

$$A_C(t) = \sum_{j=1}^{n} A_S(t) \cdot \text{Share}_j$$  \hspace{1cm} (21)

where $n$ – number of start-ups that have been invested, $t$ – time period, $j$ – start-up form the investment collection, $A_S(t)$ – capital of $j$-th start-up, $\text{Share}_j$ – shares in the $j$-th start-up’s capital. The algorithm of action is in Figure 8.

1. Check for innovation hunger: if $\varepsilon < 0.1$, then
2. Search of all start-ups in the radius $R$;
3. If the capital of start-up is within the range $500000 > a(t) > 1500000$ and number of employees $\beta > 10$, then determining the sum of investment ($I$) – random value from the equal distribution and depending the its own capital - $A_C$:

$$I = \left( \min = 10\% \cdot A_C; \ max = 35\% \cdot A_C \right)$$  \hspace{1cm} (22)

4. If the entrepreneurial wisdom is high enough $\omega > 0.5$ then it see the start-up’s potential:
   a. If a start-up has a positive potential ($\delta > 0$), then sending the investment proposition to a start-up;
   b. If the start-up accepts the proposition, then investing the sum $I$ by the formulas (22) \& (23):

$$A_S = A_S + I$$  \hspace{1cm} (23)

Subtraction of investment sum from the capital:

$$A_C = A_C - I$$  \hspace{1cm} (24)

c. Else – refusal of investment.
   The share in start-up’s capital is calculated by the formula (21).
5. If the entrepreneurial wisdom is low ($\omega <= 0.5$), then sending the investment proposition without checking the start-up’s potential; if the start-up accepts the proposition, then investing the sum $I$ by the formulas (22) \& (23).
6. If the start-up’s profit is high $a_j > 1500000$ and it has enough employees $\beta > 10$, then the corporation acquires the start-up after checking the potential (depending on the entrepreneurial wisdom) analogous to n.4.
7. Then refund of previous investments to their holders – investors and corporations:

$$A_{v_j} = A_{v_j} + A_S \cdot \text{Share}_{v_j}$$  \hspace{1cm} (24)

where $A_{v_j}$ – capital of investors that had previously invested, $A_S$ – capital of the start-up, $\text{Share}_{v_j}$ – this investor’s share in the start-up’s capital.

$$A_{c_j} = A_{c_j} + A_S \cdot \text{Share}_{c_j}$$  \hspace{1cm} (25)

where $A_{c_j}$ – capital of corporations that had previously invested, $A_S$ – capital of the start-up, $\text{Share}_{c_j}$ – this corporation’s share in the start-up’s capital.

Then the acquiring corporation subtracts the sum of the acquired start-up’s capital from its own:

$$A_C = A_C - A_S$$  \hspace{1cm} (26)

The innovation potential of the start-up is transferred to the acquiring start-up (divided by 5):

$$\delta_c = \delta_c + \frac{\delta_S}{5}$$  \hspace{1cm} (27)

where $\delta_c$ – corporation’s potential, $\delta_S$ – start-up’s potential. Then the start-up agent is removed. If a corporation’s capital $A_C <= 5000$, then it’s removed.
4. Software for simulation of the model

For approbation of the multi-agent model described above we designed a special software. It allows to visualize the interaction between agents in real-time mode: movement in random directions in the information field, the field of vision of the agents, the process of investment and acquisition of one company by another, the process of IPO. Agents corporations are represented by pink square pictograms, venture investors – by blue square pictograms, start-ups – by green circles (on the seed stage), by blue circles (on the 2-nd stage) and by blue circles (on the 3-rd stage). In case of IPO, the start-up is transformed into a corporation and changes its pictogram. If a corporation acquires a start-up it get removed from the field. The visualization of the simulation is presented on Figure 9.

Figure 9. The visualization of the model start-up-investor-corporation

The analysis of the simulation results is possible through a function of visualization of main systems indicators: population of agents, aggregate capital of each agent-type, sum of taxes collected from start-ups and corporations, number of investments from venture capitalists and corporations, number of acquisitions and IPOs and also the number of died start-ups that had positive potential but could not find venture investments.

In order to find the most efficient model mode we stood out parameters that could be changes in real economy by the government regulator. (See Table 3).

Table 3. Changeable parameters of the model

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Model variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax rate for start-ups</td>
<td>$T_s$</td>
</tr>
<tr>
<td>Tax rate for corporations</td>
<td>$T_c$</td>
</tr>
<tr>
<td>The intensity of start-up births</td>
<td>$\Theta$</td>
</tr>
<tr>
<td>Donation rate</td>
<td>Rate</td>
</tr>
<tr>
<td>Field of vision</td>
<td>$R$</td>
</tr>
</tbody>
</table>

Source: Own results
The following parameters have been chosen for the objective function:
1) The collected taxes for all modelling time period (to maximize) – Tax\_sum;
2) Mean value of the aggregate capital of corporations and start-ups for each period (to maximize) – CapS\_mean and CapC\_mean;
3) The number of potentially innovative start-ups died (to minimize) – dRate\_p;

Based on the set parameters of the model we carried out simulations with different input parameters. Each simulation lasted for 120 time periods. Taking into account large number of random probabilistic values and events in the simulation we did 5 replications for each set of parameters. The parameter values and the objective functions are presented in Tables 4-8.

### Table 4. Real parameter values in Moscow (2014)

<table>
<thead>
<tr>
<th>No.</th>
<th>Tax-rate_S</th>
<th>Tax-rate_C</th>
<th>sBirth-Rate</th>
<th>Don-Rate</th>
<th>R</th>
<th>Tax_sum</th>
<th>CapS_mean</th>
<th>CapC_mean</th>
<th>deaths_p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>1984 k</td>
<td>566727   k</td>
<td>1506277 k</td>
<td>128</td>
</tr>
<tr>
<td>2</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>2387 k</td>
<td>682027   k</td>
<td>144108 k</td>
<td>122</td>
</tr>
<tr>
<td>3</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>2297 k</td>
<td>619039 k</td>
<td>1845190 k</td>
<td>133</td>
</tr>
<tr>
<td>4</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>2193 k</td>
<td>580636 k</td>
<td>1983972 k</td>
<td>122</td>
</tr>
<tr>
<td>5</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>2197 k</td>
<td>674004 k</td>
<td>1310207 k</td>
<td>137</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2211 k</td>
<td>624486 k</td>
<td>1357950 k</td>
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</tr>
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</table>

Source: Own results

### Table 5. Real parameter values in Moscow (2014) with increased start-up birth rate

<table>
<thead>
<tr>
<th>No.</th>
<th>Tax-rate_S</th>
<th>Tax-rate_C</th>
<th>sBirth-Rate</th>
<th>Don-Rate</th>
<th>R</th>
<th>Tax_sum</th>
<th>CapS_mean</th>
<th>CapC_mean</th>
<th>deaths_p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15%</td>
<td>20%</td>
<td>18%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>4887 k</td>
<td>1576345 k</td>
<td>1067842 k</td>
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</tr>
<tr>
<td>2</td>
<td>15%</td>
<td>20%</td>
<td>18%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>4388 k</td>
<td>1760646 k</td>
<td>1568228 k</td>
<td>355</td>
</tr>
<tr>
<td>3</td>
<td>15%</td>
<td>20%</td>
<td>18%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>4580 k</td>
<td>2060823 k</td>
<td>1517132 k</td>
<td>364</td>
</tr>
<tr>
<td>4</td>
<td>15%</td>
<td>20%</td>
<td>18%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>4108 k</td>
<td>1530313 k</td>
<td>2364935 k</td>
<td>277</td>
</tr>
<tr>
<td>5</td>
<td>15%</td>
<td>20%</td>
<td>18%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>4662 k</td>
<td>2230833 k</td>
<td>839104 k</td>
<td>399</td>
</tr>
<tr>
<td>Mean</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>4525 k</td>
<td>1831792 k</td>
<td>1465448 k</td>
<td>357</td>
</tr>
</tbody>
</table>

Source: Own results

### Table 6. Real parameter values in Moscow (2014) with decreased start-up tax rate and increased corporation tax rate

<table>
<thead>
<tr>
<th>No.</th>
<th>Tax-rate_S</th>
<th>Tax-rate_C</th>
<th>sBirth-Rate</th>
<th>Don-Rate</th>
<th>R</th>
<th>Tax_sum</th>
<th>CapS_mean</th>
<th>CapC_mean</th>
<th>deaths_p</th>
</tr>
</thead>
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<td>0.7%</td>
<td>0.5%-7%</td>
<td>2086 k</td>
<td>673025 k</td>
<td>1703158 k</td>
<td>145</td>
</tr>
<tr>
<td>2</td>
<td>10%</td>
<td>25%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>1966 k</td>
<td>698954 k</td>
<td>1745054 k</td>
<td>133</td>
</tr>
<tr>
<td>3</td>
<td>10%</td>
<td>25%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>1780 k</td>
<td>569953 k</td>
<td>1473101 k</td>
<td>129</td>
</tr>
<tr>
<td>4</td>
<td>10%</td>
<td>25%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>1883 k</td>
<td>616753 k</td>
<td>1923129 k</td>
<td>127</td>
</tr>
<tr>
<td>5</td>
<td>10%</td>
<td>25%</td>
<td>6%</td>
<td>0.7%</td>
<td>0.5%-7%</td>
<td>1801 k</td>
<td>508193 k</td>
<td>1459331 k</td>
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<tr>
<td>Mean</td>
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<td></td>
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<td></td>
<td></td>
<td>1903 k</td>
<td>613375 k</td>
<td>1660754 k</td>
<td>136</td>
</tr>
</tbody>
</table>

Source: Own results

### Table 7. Real parameter values in Moscow (2014) with increased donation rate

<table>
<thead>
<tr>
<th>No.</th>
<th>Tax-rate_S</th>
<th>Tax-rate_C</th>
<th>sBirth-Rate</th>
<th>Don-Rate</th>
<th>R</th>
<th>Tax_sum</th>
<th>CapS_mean</th>
<th>CapC_mean</th>
<th>deaths_p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>5%</td>
<td>0.5%-7%</td>
<td>2247 k</td>
<td>953150 k</td>
<td>1628824 k</td>
<td>127</td>
</tr>
<tr>
<td>2</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>5%</td>
<td>0.5%-7%</td>
<td>2601 k</td>
<td>1063912 k</td>
<td>1953251 k</td>
<td>140</td>
</tr>
<tr>
<td>3</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>5%</td>
<td>0.5%-7%</td>
<td>2327 k</td>
<td>945497 k</td>
<td>2071220 k</td>
<td>129</td>
</tr>
<tr>
<td>4</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>5%</td>
<td>0.5%-7%</td>
<td>2733 k</td>
<td>1218323 k</td>
<td>1386803 k</td>
<td>117</td>
</tr>
<tr>
<td>5</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>5%</td>
<td>0.5%-7%</td>
<td>2046 k</td>
<td>731092 k</td>
<td>1624013 k</td>
<td>128</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2390 k</td>
<td>982394 k</td>
<td>1732822 k</td>
<td>128</td>
</tr>
</tbody>
</table>

Source: Own results
Table 8. Real parameter values in Moscow (2014) with increased field vision

<table>
<thead>
<tr>
<th>No.</th>
<th>Tax-rate S</th>
<th>Tax-rate C</th>
<th>sBirth-Rate</th>
<th>Don-Rate</th>
<th>R</th>
<th>Tax(\mu_{S})</th>
<th>Cap(S_{max})</th>
<th>Cap(C_{max})</th>
<th>deaths (_{S})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0,7%</td>
<td>40-60%</td>
<td>1828 k.</td>
<td>502179 k.</td>
<td>1280191 k.</td>
<td>103</td>
</tr>
<tr>
<td>2</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0,7%</td>
<td>40-60%</td>
<td>2294 k.</td>
<td>682439 k.</td>
<td>1465406 k.</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0,7%</td>
<td>40-60%</td>
<td>2209 k.</td>
<td>680757 k.</td>
<td>1301137 k.</td>
<td>89</td>
</tr>
<tr>
<td>4</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0,7%</td>
<td>40-60%</td>
<td>2055 k.</td>
<td>538525 k.</td>
<td>2326815 k.</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>15%</td>
<td>20%</td>
<td>6%</td>
<td>0,7%</td>
<td>40-60%</td>
<td>2219 k.</td>
<td>606240 k.</td>
<td>2073544 k.</td>
<td>98</td>
</tr>
<tr>
<td>Mean</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>2121 k.</td>
<td>602228 k.</td>
<td>1689418 k.</td>
<td>97</td>
</tr>
</tbody>
</table>

*Source: Own results*

5. Conclusions

The designed multi-agent model and its simulation in the specially created software enabled to analyze different modes of system action in time and to get the following practical results. Firstly, the carried out approbation using the statistical data on the area of research showed that by regulating the level of state interference through changing the input parameters given in table 3 we can elicit better scenarios of system action.

Second, it must be stated that for maximization or minimization of each objective function different modes are suited:

i) for maximization of aggregated taxes the increment of start-up birth rate by 3 times proved to be more effective. The growth of aggregated taxes was 111% for 120 time periods of simulation.

ii) the least effective modes was when differentiating tax rates – for start-ups decreased from 15% to 10% and for corporations increased from 20% to 25%. Herewith, the aggregated tax amount was lower than with other modes. It can be shown that the aggregated capital of start-ups and corporations increased by 13%.

iii) the increased donation rate mode proved to be effective: despite the increased fund allocation for start-up donation 7 times, the aggregated taxes grew by 8%, aggregated corporations’ capital grew by 28%, aggregated start-ups’ capital grew 57% with the same level of innovative start-ups death rate.

iv) the fifth mode with increased field vision radius and all other parameters on the initial level proved to be effective for the growth of aggregated corporations’ capital by 24% and the innovative start-ups death rate decreased by 32%.

Therefore, each of the 4 carried out modes has its own advantages depending on what kind of interference on the system will be chosen by the government with the consideration of different regions’ peculiarities and what kind of administrative, financial and personnel resources the state has. The further research on the topic is going to be devoted on the collection of various statistical data of different countries and regions and on the study of their differences and on comparison of their innovative strategies.

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SOCIAL SECURITY ISSUES: THE EFFICIENCY OF THE LATVIAN PENSION SYSTEM

Konstantins Kozlovskis¹, Julija Bistrova²

¹,²Riga Technical University, Kalnciema iela 6 – 502, LV-1018, Riga, Latvia
Emails: ¹konstantins.kozlovskis@rtu.lv, ²julija.bistrova@rtu.lt

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Abstract. Pension system efficiency is very sensitive topic to every citizen of the country. It is very common to criticize established pension systems in search for better solutions. The authors in the present research paper attempt to find out whether the criticism is deserved by evaluating the efficiency of Latvian pension system from the future pensioner’s point of view in the context of the state pension financed from two sources: state pension and state funded pension. Additionally, the authors highlight a number of aspects of pension system the sustainability in Latvia. Private pension is not considered.

Keywords: Latvian pension system, state funded pension, efficiency, sustainability

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JEL Classifications: J32, H55

1. Introduction

The paper addresses the efficiency of Latvian pension system focusing on the 1st (state pension) and 2nd (state funded pension) pillars. The main aim is to find out the efficiency of pension system operation assessing how well it complies with the pension system’s main principles. Pension indexation is being compared to the inflation, life expectancy and G coefficient are being put in the context of demographic situation and pension payments. The authors also consider the efficiency of Latvian pension capital management institutions, which jointly managed 1.6 bn EUR (as of 31.08.2015) – pension capital of 1.2 mn pension funds’ participants. The investment performance of the funds is compared to the inflation rate and to the peers.

2. Main assumption and measurement of efficiency

There can be at least two points of view on the efficiency of the pension system: the government can estimate how efficiently a pension system works according to state social policy, while a private person can estimate efficiency taking into account own interests. In this paper, the authors follow the main assumption that the pension system has to protect the interests of tax payers, therefore, efficiency of the Latvian pension system is estimated from a private person’s point of view.

From a private person point of view, the authors can define the following parameters, which can be used for the estimation of the functioning of the pension system:

- protection against inflation. The main interest of a private person in the context of the pension system is related to accumulation of pension capital keeping its purchasing power at least at the same level. Thus, pension capital growth should be compared to the inflation rate.
accessibility of the pension system to the taxpayers. The existence of the pension system is not sufficient condition to ensure old age in the future. It is possible that the pension system can eliminate the opportunity to get the benefits of the pension system, i.e. to take advantage of accumulated pension capital. To check this statement it is necessary to compare pension age and duration of life in the country.

distributive justice. The pension system might work against the interests of future pensioners, and previously accumulated capital is paid out unfairly. To answer this question, pension payments should be compared with accumulated pension capital and its availability for a pensioner.

3. Brief description of Latvian pension system

Latvian pension system is based on three pillars giving an opportunity to accumulate pension capital divided into state and private:

• 1st pillar is compulsory for all taxpayers and financed by a part of the state social security mandatory contributions (in 2015 it constituted 15% of gross income). This capital is not physically accumulated but used to finance today’s pensioners. A special record in the State Social Insurance Agency compiles the statistics on contributions over the whole taxpayer life. Based on this information state pension is calculated. Thus, the first pillar works as solidarity program when today’s tax payers finance today’s pensioners, and further the future tax payers will finance the future pensioners according to their state social security mandatory contributions made today. This pillar is regulated by the Law “On State Pensions”. The accumulated capital in the first pension pillar is not heritable.

• 2nd pillar is compulsory for all taxpayers and also financed by a part of the state social insurance mandatory contributions (in 2015 it constituted 5% of gross income). This amount of money is transferred from the state budget to the account of a licensed pension fund chosen by a taxpayer who has the right to change the pension fund each six months and asset manager – once a year. The main idea of this pillar is to help the taxpayers to accumulate more by investing in financial instruments with the help of the pension fund. This pillar is regulated by the Law “On Funded State Pensions”. The accumulated capital in this pillar is not heritable.

• 3rd pillar is voluntary and financed only by future pensioner’s capital. He has the right to receive back the rate of the tax on personal income (in 2005 - 23%) of committed payments but not more than the one tenth of the annual gross income. This pillar is regulated by the Law “On Private Pensions”. The accumulated capital in the third pension pillar is heritable.

4. The efficiency of the 1st pension pillar

a. Protection against inflation

The 1st pension pillar works since 1996 and, as it was mentioned above, it is financed by the state social insurance mandatory contributions to ensure state pensions for today’s pensioners. According to the law, accumulated capital in the 1st pension pillar is indexed to cover inflation costs. To check the hypothesis whether the indexation covers inflation, it is needed to compare annual indexes, which are changed on annual basis, with inflation rate. The Figure 1 shows the dynamics of indexation of pension capital accumulated in the 1st pension pillar against inflation rate in Latvia from 1996 to 2014.
It is clearly seen that there are some periods with higher and lower inflation rates. To finance budget deficit during the financial crisis in 2008 the government set the negative indexes.

To compare indexation and inflation mathematically, it is necessary to compare geometric means of indexation and inflation calculated by the following formula:

\[
\mu = \sqrt[n]{\prod_{i=1}^{n} (1 + \eta_i) - 1}
\]  

(1)

where \( \mu \) – the geometric mean;
\( \eta \) – the rate of changes in the \( i^{th} \) year;
\( n \) – the number of years.

Applying the formula (1) to the statistical data on indexation and inflation, the authors got the following results (see in the Table 1). As seen in the Table 1, the indexation works well and covers the inflation rate in Latvia as well as in the EU and euro area (for comparison).

### Table 1. Average inflation and rate of return from 1997 to 2015

<table>
<thead>
<tr>
<th></th>
<th>Latvia</th>
<th>Euro area</th>
<th>European Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average inflation rate</td>
<td>4.31%</td>
<td>1.85%</td>
<td>1.98%</td>
</tr>
<tr>
<td>Average rate of return through indexation</td>
<td>5.83%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: authors’ calculations*

From this point of view, the 1\(^{st}\) pension pillar works effectively without considering the personal income tax which is used for taxation of state pension over 235 EUR per month. The personal income tax for pension over monthly 235 EUR is 23%, which was created to finance the budget deficit after the financial crisis in 2008. In average, this tax decreases the efficiency of the 1st pension pillar down to negative value. The higher number of state pensions exceeds 235 euros per month, the less efficient is the first pension pillar system. Solving the problems of the social budget directly at the accumulated capital’s expense can stimulate tax payers to optimize their tax payments, thus, developing the shadow economy. Transparency and honesty of the pension system in the context of accumulated capital has an impact on the level of confidence in the pension system. This might
lead to the decrease in level of social protection, which can stimulate the shadow economy (Caurkubule, Rubanovskis 2014). More accurate impact of the personal income tax on the state pension can be estimated in further research.

\textit{b. Accessibility}

Statistics on life expectancy can be used to test the accessibility of the 1\textsuperscript{st} pension pillar to the taxpayers. According to \textit{EuroStat} data (see in Table 2 and 3) the average age of men is about 68.7 years and for women – 78.3 years, and both values grow constantly. In comparison with the EU and euro area these values lag behind average expectancy by ca. 10 years (Figure 2).

In the context of accessibility of the 1\textsuperscript{st} pension pillar to the population of Latvia, there are two different situations across men and women. The pension age in Latvia from 2025 is 65 years, and the current pension age is being constantly increased each year by 6 month to the final 65 years. In these circumstances men can use the benefits of the 1\textsuperscript{st} pension pillar only during 3-4 years, but women – 13-14 years (Figure 3). It is clearly seen that the 1\textsuperscript{st} pension system is not very favourable for the male population in Latvia as they are not able to use the larger part of the accumulated capital. Women have better access to the pension capital as they live longer than men by 13-14 years.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Life expectancy for men in Latvia, EU and euro area from 2002 to 2013}
\label{fig:life_expectancy}
\end{figure}

\textit{Source: EuroStat}

More accurate analysis of the accessibility of the 1\textsuperscript{st} pension pillar in the context of population group separation can be performed in further research.
**c. Distributive justice**

According to the Law on the state pension, the state pension is calculated by the following formula:

\[
P = \frac{K}{G}
\]

where  
- \( P \) – the annual state pension;  
- \( K \) – the accumulated capital in the 1\textsuperscript{st} and 2\textsuperscript{nd} pension pillars;  
- \( G \) – special coefficient which is recalculated each year according to demographic forecasting.

The main idea is to check how much of the accumulated capital in the 1\textsuperscript{st} pension pillar a taxpayer can use through getting the state pension. This analysis corresponds to the insight discussed earlier when the life expectancy was used to check the accessibility of the 1\textsuperscript{st} pension pillar to the population.

According to the rules of the cabinet of the ministers of Latvia the coefficient \( G \) was equalled as follows (Table 2). The minimal record of service must be 20 years to get the state pension. It is clearly seen in the Table 2, that a man can use a very small part of the accumulated capital because his life expectancy is about 68-69 years (see in the Figure 2), but a woman can use her capital almost completely because her life expectancy is about 78-79 years (Figure 3).

**Table 2. Coefficient \( G \) according to the age when the state pension is calculated in 2014**

<table>
<thead>
<tr>
<th>Age</th>
<th>( G )</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>16.45</td>
</tr>
<tr>
<td>66</td>
<td>15.81</td>
</tr>
<tr>
<td>67</td>
<td>15.16</td>
</tr>
<tr>
<td>68</td>
<td>14.52</td>
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<tr>
<td>69</td>
<td>13.87</td>
</tr>
<tr>
<td>70</td>
<td>13.23</td>
</tr>
<tr>
<td>71</td>
<td>12.61</td>
</tr>
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<td>72</td>
<td>12.00</td>
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<td>73</td>
<td>11.38</td>
</tr>
<tr>
<td>74</td>
<td>10.77</td>
</tr>
<tr>
<td>75</td>
<td>10.16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>( G )</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td>9.59</td>
</tr>
<tr>
<td>77</td>
<td>9.03</td>
</tr>
<tr>
<td>78</td>
<td>8.47</td>
</tr>
<tr>
<td>79</td>
<td>7.91</td>
</tr>
<tr>
<td>80</td>
<td>7.35</td>
</tr>
<tr>
<td>81</td>
<td>6.90</td>
</tr>
<tr>
<td>82</td>
<td>6.45</td>
</tr>
<tr>
<td>83</td>
<td>6.00</td>
</tr>
<tr>
<td>84</td>
<td>5.56</td>
</tr>
<tr>
<td>85</td>
<td>5.11</td>
</tr>
<tr>
<td>86</td>
<td>4.76</td>
</tr>
</tbody>
</table>

---

*Figure 3. Life expectancy for women in Latvia, EU and euro area from 2002 to 2013*

*Source: EuroStat*
5. The efficiency of the 2nd pension pillar

a. Pension funds vs. the Benchmark

The efficiency of the state funded pension scheme can be evaluated by comparing the returns of the pension plans among each other or comparing to the relevant benchmark. Unfortunately, the benchmark is not set by the pension funds’ managers. However, a number of asset management companies charge performance fee comparing the fund performance to the benchmark set in the Republic of Latvia legislation - 3M Euribor, which appears to be a questionable measure particularly considering 30% allocation to equities in case of active pension plans.

Common practice in the asset management is the comparison of the reported investment returns to the consumer prices index. Pension plan participants have to be sure that their pension capital is not eroded by the inflation rate, increasing the importance of the positive real returns.

The authors of the research made a short insight into the relative performance of the pension funds managed by the foreign asset managers, concluding that in many cases the pension funds tend to underperform.

G. Impavido (2008) in his extensive study of the pension system in Bulgaria notes that gross real returns were not increasing challenged by the high inflation increase, but notes that the Bulgarian pension funds performed better than the funds in most other countries considered in the review (e.g. Hungary, Estonia, Poland, Croatia) and were comparable to the funds managed in Latin America.

The research on Dutch pension fund (Huang, Mahieu 2012), which employed z-score as risk-adjusted performance measure, proved that the pension funds are not able to consistently beat their self-selected benchmarks. Besides, it was discovered that the largest funds tend to outperform the smallest pension funds.

Large geography coverage regarding the pension funds investment performance is provided by the OECD paper (Antolin 2008). Analyzing the investments results of the pension funds in Latin American and CEE countries as well as several developed nation, the author comes to the conclusion that in the majority of cases excess returns of nominal benchmarks returns are negative.

Ammann and Zing (2008) proved that Swiss pension managers possess superior skill in selecting and right timing of investments in international bonds, but they state that other asset classes underperform the risk-adjusted benchmark returns.

Aiming to assess the performance results and therefore the management skills of Latvian pension fund managers, the authors of the present research conducted comparative analysis of Latvian pension funds, which covers last 9 years from 1.09.2006 to 31.08.2015, therefore including also the financial crisis and post-recovery period. Another period analyzed was last 5 years to understand the performance character in the after-crisis phase. Main investment risk and return ratios were calculated according to the standardized calculation methodology of performance evaluation ratios.

b. Real return and risk profile of pension plans

Pension Funds’ Returns

Most popular according to the number of participants and asset base are active plans. In the long-term these plans are supposed to provide the highest returns compared to the less risky peer funds – balanced and conservative. However, in the last 9 years only half of them managed to beat inflation, providing average performance below the consumer price index in Latvia during this period: 3.6% vs. 3.7% p.a. (Figure 4). During more recent period, which excludes abnormally high consumer price inflation in Latvia and setback caused...
by crisis, the asset managers provided returns by more than two times exceeding inflation: 3.7% vs. 1.4% p.a. (Figure 5).

Balanced plans are not very popular among the asset managers and the asset providers in Latvia as there are only 4 plans and they are not that crowded by the assets and the number of the participants despite the lower fees of 1%-1.5% as require less active management. Similar to the case with the active funds, only half of the fund managers were able to exceed the rate of inflation for the last nine years.

Conservative plans possibly seem to be the best investment choice during the longer term period analyzed as the performance in average was better compared to the performance of the active and balanced funds (4.1% vs. 3.6% and 3.7% respectively) supported by the lowest management fees of ca. 1% and conservative investment strategy, which provided a certain hedge during the total sell-off in 2008. In the shorter time period of 5 years, conservative funds perform very well versus the inflation rate, while the conservative funds average annual performance is not significantly different from the performance of the more aggressive investment plans: 3.1% (conservative) vs. 3.5% (balanced) vs. 3.7% (active).
Pension Plans’ Risk Profile

The riskiness profile of the active pension funds does not look dramatic in absolute figures. The largest active pension fund obviously suffered significantly during the financial crisis, and therefore has annual volatility of 7.1%, while beta is 1.6 in case the benchmark is the active fund sample (Table 4, Appendix). It is worth noticing that despite its not very appealing risk-return characteristics, the fund is the leader in terms of the asset base indicating that the future Latvian pensioners are not very active in monitoring their assets managed. This might be an indication of inertia, which is status quo bias - a behavioural bias very common for the defined contribution (DC) plan participants. Majority of US investors in DC plans make no fund switches as found by Samuelson and Zeckhauser (1988) and Ameriks and Zeldes (2000).

Average volatility figures of the balanced pension plans naturally are lower. In case of the balanced funds BF 1 has the most attractive performance indicators – alpha, Sharpe ratio and Information ratio, making it a viable investment choice.

The volatility of the conservative plans, indeed, is rather low. Only for half of the conservatively managed pension funds (CF4, CF5, CF6) information ratio appeared to be in the positive zone, indicating the consistency of the outperformance of the funds (Table 6-9, Appendix).

<table>
<thead>
<tr>
<th>Pension Plans</th>
<th>9 Years</th>
<th>5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual performance</td>
<td>Annual volatility</td>
</tr>
<tr>
<td>Active</td>
<td>3.6%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Balanced</td>
<td>3.7%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Conservative</td>
<td>4.1%</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

(Sharpe ratio risk-free rate for 9Y is 0.3%; for 5Y is 0.2%)

Considering the risk-return characteristics of the available second pillar pension funds, the reasonable investment choice is offered by the conservative pension plans as the returns are not significantly different from the active or balanced strategies, but the associated risks are significantly lower benefitting the clients during the market downturns. Sharpe ratios as indicated in Table 3 are the highest for the conservative pension plans for both periods analyzed.

To sum up, it might be stated that the global financial crisis was a painful probe for the majority of the second pillar pension funds managers as some funds posted drastic declines, which obviously should have been minimized in the pension fund management. The abnormally high inflation in Latvia and financial crisis caused a significant drag on the performance of the pension funds, causing them to generate negative real returns.

Overall two problems can be associated with the pension plan management in Latvia – absence of the comparable benchmark and rather high fees. The main reason of selecting the benchmark stated in the legislation (3M Euribor), is common understanding of the index. However, it does not comply with the majority of criteria for the valid index: investable, appropriate, reflective of current investment opinion and accountable (Fong, Guin 2015). The recommended benchmark is not comparable to the pension funds’ returns considering the composition of the pension plans’ portfolios. D. Blake (2003) mentions several possibilities of benchmarks for the pension funds:

- market index,
- other pension fund managers (the aim is to be in the first quartile of performance),
- inflation (not to deteriorate the dedicated capital of the future pensioners),
- wage inflation.
The second problem associated with the pension fund management in Latvia – relatively high fees, taking into account the fact that active management (equity investing), which requires the largest effort and, therefore, charges the highest price, is minimized. For example, Latvian state-funded scheme were criticized in the FT article (September 27, 2015) for charging very high fees and therefore generating negative returns despite very positive equity and bond markets. On average Latvian pension fund managers charge 1.5% per annum. To compare, BrightScope/ICI (2014) provided data shows that US retirement plan fees are ca. 0.4% for plans over 500 mn USD, while for funds having assets below 50 mill USD plan costs are 0.85%. The issue on costs charged by the Latvian pension fund managers needs to be studied further to get a more objective view, but it is obvious now that they have to become as efficient as possible to provide higher returns to future Latvian pensioners.

6. Sustainability of the Latvian pension system

Sustainability of the pension system plays a significant role in economic security and social sustainability that are faced by the European Union (Mačiulis, Tvaronavičienė, 2013). As it was mentioned above, the state pension in Latvia is formed from two financial sources decreasing the total risk of the sustainability of the pension system. The funded part of the state pension is represented by the real accumulating capital managed by a licensed pension fund outside the state budget. In this case the situation with the state budget does not have any impact on this capital. On the other hand, non-funded part of the state pension has the largest weight in the total state pension. This capital is represented by the virtual accumulating capital, which exists as a special record in the state data center. Today’s pensioners are financed by collected taxes from today’s tax payers. Despite of the rising demographic and economic risks for the state budget there are a lot of instruments for the government to strengthen the sustainability of the pension system:

- Retirement age is usually used to make the social budget balanced. The increase of the retirement age decreases the number of potential pensioners; therefore, the social budget deficit is being decreased.
- Minimal social insurance period is also widely used by the government to stimulate taxpayers to work more.
- Pension taxation is an innovation in Latvian taxation, which also stabilizes the social budget by decreasing paid out pensions almost by 23%.
- Capital indexation also can be changed by the government in the force majeure situations as it was experienced by the pensioners in 2008 and 2009 during the financial crisis.
- Coefficient G is being changed each year to follow the demographic situation in the country. This coefficient, as a key variable in pension formula, has direct impact on the state pension.
- Change in the state social insurance mandatory contributions is commonly used by the government to stabilize the social budget by decreasing the proportion, which is transferred to the licensed pension funds outside the state budget.
- The rate of the state social security contributions is another way how to balance social budget.

7. Conclusions

1. Latvian pension system provides an opportunity to all tax payers to accumulate pension capital for the pension age. The volume of the state pension largely depends only on the income of a tax payer.
2. In the context of keeping the purchasing power of the accumulated pension capital the first pension pillar works efficiently because capital indexation covers the inflation rate both in Latvia and lower inflation rate in the Eurozone, too. The second pension pillar does not cover the inflation rate in long-term perspective, yet.
3. In the context of the accessibility of the state pension to the population of Latvia, the pension system works more efficiently for female citizens than for the males due to the longer women life expectancy in Latvia. According to the pension calculating formula, the accumulated capital must be spent during 19 years. In this case, one might discuss the possibility of demographic discrimination.
4. Implementation of the pension taxation significantly decreases efficiency of the pension system for those Latvian inhabitants who have state pension over 235 euros per month.
5. To be able to more objectively judge the efficiency of the pension capital management by the private asset managers, it would be necessary to discuss the possibility of the relevant customized benchmark creation.
The fees level charged by the pension fund managers in Latvia are obviously among the highest in Europe, so it could be another important topic for further research.

Acknowledgements

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References


Period: 1.09.2006-31.08.2015; BM – benchmark

### Table 4. Active Funds

<table>
<thead>
<tr>
<th>Name of pension fund</th>
<th>Total performance</th>
<th>Annual performance</th>
<th>Annual Volatility</th>
<th>Sharpe ratio</th>
<th>BM - Average performance</th>
<th>BM - Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Alpha</td>
<td>Beta</td>
</tr>
<tr>
<td>AF 1</td>
<td>26.8%</td>
<td>2.7%</td>
<td>7.1%</td>
<td>-0.14</td>
<td>0.0%</td>
<td>0.86</td>
</tr>
<tr>
<td>AF 2</td>
<td>33.7%</td>
<td>3.3%</td>
<td>4.4%</td>
<td>-0.09</td>
<td>0.1%</td>
<td>0.81</td>
</tr>
<tr>
<td>AF 3</td>
<td>43.4%</td>
<td>4.1%</td>
<td>4.0%</td>
<td>0.11</td>
<td>0.1%</td>
<td>0.81</td>
</tr>
<tr>
<td>AF 4</td>
<td>28.9%</td>
<td>2.9%</td>
<td>4.6%</td>
<td>-0.17</td>
<td>0.0%</td>
<td>0.86</td>
</tr>
<tr>
<td>AF 5</td>
<td>46.7%</td>
<td>4.3%</td>
<td>4.7%</td>
<td>0.15</td>
<td>0.1%</td>
<td>0.98</td>
</tr>
<tr>
<td>AF 6</td>
<td>43.6%</td>
<td>4.1%</td>
<td>3.8%</td>
<td>0.12</td>
<td>0.1%</td>
<td>0.83</td>
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<tr>
<td>Average Performance</td>
<td>37.3%</td>
<td>3.6%</td>
<td>4.2%</td>
<td>-0.02</td>
<td></td>
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<tr>
<td>Inflation</td>
<td>38.9%</td>
<td>3.7%</td>
<td>2.4%</td>
<td>0.02</td>
<td>0.3%</td>
<td>-0.09</td>
</tr>
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</table>

### Table 5. Balanced Funds

<table>
<thead>
<tr>
<th>Name of pension fund</th>
<th>Total performance</th>
<th>Annual performance</th>
<th>Annual Volatility</th>
<th>Sharpe ratio</th>
<th>BM - Average performance</th>
<th>BM - Inflation</th>
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<td></td>
<td></td>
<td>Alpha</td>
<td>Beta</td>
</tr>
<tr>
<td>BF 1</td>
<td>46.7%</td>
<td>4.4%</td>
<td>3.1%</td>
<td>0.23</td>
<td>0.1%</td>
<td>0.87</td>
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<tr>
<td>BF 2</td>
<td>40.2%</td>
<td>3.8%</td>
<td>3.5%</td>
<td>0.05</td>
<td>0.0%</td>
<td>0.96</td>
</tr>
<tr>
<td>BF 3</td>
<td>31.7%</td>
<td>3.1%</td>
<td>3.9%</td>
<td>-0.14</td>
<td>-0.1%</td>
<td>1.21</td>
</tr>
<tr>
<td>BF 4</td>
<td>37.7%</td>
<td>3.6%</td>
<td>3.2%</td>
<td>-0.01</td>
<td>0.0%</td>
<td>0.97</td>
</tr>
<tr>
<td>Average performance</td>
<td>39.2%</td>
<td>3.7%</td>
<td>3.0%</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>38.9%</td>
<td>3.7%</td>
<td>2.4%</td>
<td>0.02</td>
<td>0.3%</td>
<td>-0.11</td>
</tr>
</tbody>
</table>

### Table 6. Conservative Funds

<table>
<thead>
<tr>
<th>Name of pension fund</th>
<th>Total performance</th>
<th>Annual performance</th>
<th>Annual Volatility</th>
<th>Sharpe ratio</th>
<th>BM - Average performance</th>
<th>BM - Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Alpha</td>
<td>Beta</td>
</tr>
<tr>
<td>CF 1</td>
<td>41.8%</td>
<td>4.0%</td>
<td>2.0%</td>
<td>0.15</td>
<td>0.1%</td>
<td>0.78</td>
</tr>
<tr>
<td>CF 2</td>
<td>38.8%</td>
<td>3.7%</td>
<td>3.6%</td>
<td>0.02</td>
<td>-0.1%</td>
<td>1.30</td>
</tr>
<tr>
<td>CF 3</td>
<td>32.0%</td>
<td>3.1%</td>
<td>3.2%</td>
<td>-0.16</td>
<td>-0.2%</td>
<td>1.38</td>
</tr>
<tr>
<td>CF 4</td>
<td>49.5%</td>
<td>4.6%</td>
<td>2.2%</td>
<td>0.42</td>
<td>0.1%</td>
<td>0.85</td>
</tr>
<tr>
<td>CF 5</td>
<td>51.9%</td>
<td>4.8%</td>
<td>1.7%</td>
<td>0.63</td>
<td>0.2%</td>
<td>0.71</td>
</tr>
<tr>
<td>CF 6</td>
<td>43.5%</td>
<td>4.1%</td>
<td>2.1%</td>
<td>0.21</td>
<td>0.0%</td>
<td>0.97</td>
</tr>
<tr>
<td>Average Performance</td>
<td>43.0%</td>
<td>4.1%</td>
<td>1.8%</td>
<td>0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>38.9%</td>
<td>3.7%</td>
<td>2.4%</td>
<td>0.02</td>
<td>0.4%</td>
<td>-0.16</td>
</tr>
</tbody>
</table>
Period: 1.09.2010-31.08.2015; BM – benchmark

Table 7. Active Funds

<table>
<thead>
<tr>
<th>Name of pension fund</th>
<th>Total performance</th>
<th>Annual performance</th>
<th>Annual Volatility</th>
<th>Sharpe ratio</th>
<th>BM - Average performance</th>
<th>BM - Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Alpha</td>
<td>Beta</td>
</tr>
<tr>
<td>AF 1</td>
<td>25.4%</td>
<td>4.6%</td>
<td>4.9%</td>
<td>0.45</td>
<td>0.0%</td>
<td>1.14</td>
</tr>
<tr>
<td>AF 2</td>
<td>16.9%</td>
<td>3.2%</td>
<td>4.8%</td>
<td>0.16</td>
<td>-0.1%</td>
<td>1.13</td>
</tr>
<tr>
<td>AF 3</td>
<td>19.5%</td>
<td>3.6%</td>
<td>3.5%</td>
<td>0.34</td>
<td>0.1%</td>
<td>0.72</td>
</tr>
<tr>
<td>AF 4</td>
<td>13.3%</td>
<td>2.5%</td>
<td>2.6%</td>
<td>0.04</td>
<td>0.1%</td>
<td>0.46</td>
</tr>
<tr>
<td>AF 5</td>
<td>24.5%</td>
<td>4.5%</td>
<td>5.5%</td>
<td>0.37</td>
<td>0.0%</td>
<td>1.31</td>
</tr>
<tr>
<td>AF 6</td>
<td>17.7%</td>
<td>3.3%</td>
<td>3.9%</td>
<td>0.23</td>
<td>0.0%</td>
<td>0.90</td>
</tr>
<tr>
<td>AF 7</td>
<td>22.3%</td>
<td>4.1%</td>
<td>5.7%</td>
<td>0.30</td>
<td>-0.1%</td>
<td>1.34</td>
</tr>
<tr>
<td>Average Performance</td>
<td>20.0%</td>
<td>3.7%</td>
<td>4.1%</td>
<td>0.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>7.3%</td>
<td>1.4%</td>
<td>1.6%</td>
<td>-0.65</td>
<td>0.1%</td>
<td>0.06</td>
</tr>
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</table>

Table 8. Balanced Funds

<table>
<thead>
<tr>
<th>Name of pension fund</th>
<th>Total performance</th>
<th>Annual performance</th>
<th>Annual Volatility</th>
<th>Sharpe ratio</th>
<th>BM - Average performance</th>
<th>BM - Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Alpha</td>
<td>Beta</td>
</tr>
<tr>
<td>BF 1</td>
<td>22.6%</td>
<td>4.2%</td>
<td>3.7%</td>
<td>0.47</td>
<td>0.0%</td>
<td>1.26</td>
</tr>
<tr>
<td>BF 2</td>
<td>16.8%</td>
<td>3.2%</td>
<td>1.7%</td>
<td>0.42</td>
<td>0.1%</td>
<td>0.47</td>
</tr>
<tr>
<td>BF 3</td>
<td>19.4%</td>
<td>3.6%</td>
<td>3.2%</td>
<td>0.37</td>
<td>0.0%</td>
<td>1.04</td>
</tr>
<tr>
<td>BF 4</td>
<td>15.4%</td>
<td>2.9%</td>
<td>3.5%</td>
<td>0.14</td>
<td>-0.1%</td>
<td>1.23</td>
</tr>
<tr>
<td>Average performance</td>
<td>18.6%</td>
<td>3.5%</td>
<td>2.7%</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>7.3%</td>
<td>1.4%</td>
<td>1.6%</td>
<td>-0.65</td>
<td>0.1%</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Table 9. Conservative Funds

<table>
<thead>
<tr>
<th>Name of pension fund</th>
<th>Total performance</th>
<th>Annual performance</th>
<th>Annual Volatility</th>
<th>Sharpe ratio</th>
<th>BM - Average performance</th>
<th>BM - Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Alpha</td>
<td>Beta</td>
</tr>
<tr>
<td>CF 1</td>
<td>16.9%</td>
<td>3.2%</td>
<td>1.9%</td>
<td>0.39</td>
<td>0.0%</td>
<td>1.05</td>
</tr>
<tr>
<td>CF 2</td>
<td>12.5%</td>
<td>2.4%</td>
<td>1.7%</td>
<td>-0.02</td>
<td>0.0%</td>
<td>0.81</td>
</tr>
<tr>
<td>CF 3</td>
<td>19.9%</td>
<td>3.7%</td>
<td>1.7%</td>
<td>0.73</td>
<td>0.1%</td>
<td>0.79</td>
</tr>
<tr>
<td>CF 4</td>
<td>17.8%</td>
<td>3.3%</td>
<td>1.9%</td>
<td>0.48</td>
<td>0.1%</td>
<td>0.60</td>
</tr>
<tr>
<td>CF 5</td>
<td>21.0%</td>
<td>3.9%</td>
<td>2.0%</td>
<td>0.71</td>
<td>0.0%</td>
<td>1.07</td>
</tr>
<tr>
<td>CF 6</td>
<td>17.1%</td>
<td>3.2%</td>
<td>2.1%</td>
<td>0.37</td>
<td>0.0%</td>
<td>1.18</td>
</tr>
<tr>
<td>CF 7</td>
<td>11.1%</td>
<td>2.1%</td>
<td>2.9%</td>
<td>-0.10</td>
<td>-0.2%</td>
<td>1.50</td>
</tr>
<tr>
<td>Average Performance</td>
<td>16.6%</td>
<td>3.1%</td>
<td>1.7%</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>7.3%</td>
<td>1.4%</td>
<td>1.6%</td>
<td>-0.65</td>
<td>0.1%</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Konstantins KOZLOVSKIS, Dr.oec., studied economics at the Riga Technical University, where he became interested in financial markets and investment management. Since then, he has more than 10-year experience in trading different financial instruments, building and managing investment portfolios. The main field of research is related to financial market analysis, investment management, portfolio building and data analysis.

Julija BISTROVA, Dr.oec, received PhD from Riga Technical University, Faculty of Engineering Economics and Management in 2014. At the moment she is managing a team of financial analysts at CE Services SIA, having more than 10 years’ experience in the investment analysis of the global stock markets. Her research interests include corporate governance, shareholder theory, factors influencing stock performance in Central and Eastern European markets.

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Abstract. Russian economic reforms of the 1990s triggered off the massive economic transformation that went hand in hand with worsening of the life prospects of the population, rising of unemployment, inflation, personal debts and creating social unrests among other security issues. The new economic perspectives offered by the free and open market created the previously unthinkable incentives for many people. Borrowing and lending became fully legal endeavors and the new economic order offered unprecedented opportunities and a variety of consumer goods and services that were previously unavailable. One of the outcomes of this process was the sharp increase in the number of debts and personal insolvency issues. It appears that many Russian citizens lacked the financial literacy and healthy judgement in their financial management that led to the problems of economic insolvency debt. This paper focuses on the issue of personal economic and financial security in Russian federation. We analyze the available data before and after the economic crisis of the 2007-2009 and the recent sanctions to demonstrate the patterns of borrowing behavior of the Russians. Our results show that borrowing decreased in the recent months following the introduction of economic sanctions which can be explained by the overall feeling of uncertainty and the fear of economic collapse of various households. We argue that good financial literacy might increase the basic economic awareness and contribute to the better security in the everyday life in the Russian Federation.

Keywords: personal economic security, finances, debt, insolvency, transition, contingency, Russian federation

Reference to this paper should be made as follows: Kalyugina, S.; Strielkowski, W.; Ushvitsky, L.; Astachova, E. 2015. Sustainable and secure development: facet of personal financial issues, Journal of Security and Sustainability Issues 5(2): 297–304. DOI: http://dx.doi.org/10.9770/jssi.2015.5.2(14)

JEL Classifications: J01, G21, G38, P24

1. Introduction

Sustainable and secure development has become an urgent issues of contemporary societies in various countries (Kriviņš 2015; Štitilis, Klišauskas 2015; Munteanu; Tamošiūnienė 2015; Caurkubule; Rubanovskis 2014; Demir et al. 2014; Rakauskienė 2014; Vasiliiūnaitė 2014; Baikovs, Zariņš 2014; Mačiulis, Tvaronavičienė 2013; Prakash 2013.).

Personal economic and financial security can be mostly viewed as a matter of personal decision and common sense. Nowadays, when the surrounding world is globalized and diversified to such extent that the majority of economic agents act in accordance with what is called “rational inattention” (see Sims 2006), personal debt and economic freedom became the key elements of every society (Starineca, Voronchuk 2015; Rakauskienė 2014; Vasiliiūnaitė 2014, Prakash 2013; Tvaronavičienė, Grybaitė 2012; Dubauskas 2011, 2012; Radović Marković 2011; Šileika, Bekerytė 2013).
Stavins (2000) points out that throughout the 1990s personal bankruptcy rates increased in the United States despite the strength of the local economy. While some authors blame the credit card borrowing system that allows people to get their hands on easy cash (see e.g. Lawrence 1995; or Gross and Souleles 2002), others argue that many households in the US are unfamiliar with even basic economic concepts of required to make saving and investments decisions (Shepard 1984; Chen and Volpe 1998; McDaniel et al. 2002; Lusardi and Mitchell 2007a, 2007b; Lusardi et al. 2010; or Van Rooij et al. 2011). It might as well be that human covetousness and short-sightedness were largely responsible for the world’s economic and financial crisis of 2007-2008 (Garškaitė-Milvydienė 2012; Giřinčas et al. 2013; Fuschi, Tvaronavičienė 2014). Easy access to credits and formalized rules for borrowing, as well as playing with financial instruments on global markets led to the unprecedented crash that influenced the economies all around the globe and undermined the principles of financial and economic security (Tang 2015; Stasytytė 2015; Demir et al. 2014). With regard to the above, it has to be noted that it was a group of transition economies led by Russia that laboriously struggled to adjust their economies to the new standards of the free market and the new world order. The transformation went hand in hand with worsening of the life prospects of the population, rising of unemployment, inflation, personal debts and creating social unrests among other security issues. As a result, life satisfaction in post-Soviet Russia and other former USSR countries does not appear to be that good (see Abbott and Sapsford 2006; or Gaddy and Ickes 2010). Many people vent their desperation and disappointment into uncontrolled spending on consumer goods and services which often leads to the increase in the number of debts and personal insolvency issues.

Our paper focuses on the issue of personal economic and financial security in Russian Federation. We analyze the available data before and after the world’s economic crisis of the 2007-2009 as well as the recent economic downturn created by the drop of the oil prices and Western sanctions to demonstrate the patterns of borrowing behavior of the Russian population. We look into the spending behavior of the Russians and analyze the current situation with debt and insolvency in order to draw implications for the maintaining of the economic and financial personal security and self-sustainability. To our mind, this paper provides a novel insight that has not been previously described in the research literature. We provide a new analysis of the personal financial and economic security and employ the econometric model for identifying the determinants of credit and borrowing among the Russian population.

This paper is structured as follows: Section 2 provides a literature review and discusses the problems and financial implications of modern-day Russia. Section 3 briefly outlines the principles of borrowing and lending in Russian Federation. Section 4 describes the data that are used in the consecutive empirical model. Section 5 presents the formal empirical model and runs its estimations, as well as explains its main results and implications. Finally, section 6 concludes the paper and outlines its main findings, which is supported by drawing overall conclusions and policy implications.

2. Economic and financial security: a literature review

The Russian economic reforms of 1990s gave a powerful impetus for its transformation. Along with the positive democratic initiatives in the country, the negative processes in the economy and the social sphere intensified. There was a sharp decline in living standards, rising unemployment, etc. With regard to the above, many authors argue that the absence of high rates of economic growth is the most obvious sign of the critical state of the economic security of the country as a whole and its citizens, in particular (see e.g. Mikhalev 1996; Bilan et al. 2012; Tsyganov et al. 2014; or Hendley and Murrell 2015). The same trends could be observed in other transition economies, e.g. the countries of the former Soviet bloc (see e.g. Clowes and Bilan 2014; Zhuk 2015; or Crhova et al. 2015; Tvaronavičienė 2014).

The latter aspect is becoming increasingly important, since in recent years of market reforms increasingly acute problem of the economic protection of the individual in the absence of effective public policies in the field of the personal economic security arise. Personal economic security represents a bundle of social and economic conditions of a person, where the material conditions are guaranteed to protect the vital interests of its prin-
principal, achieving social development and its social security. The urgency of ensuring the economic security of the individual lending is associated with rapid development of the banking sector, causing numerous threats to individuals (Halman 1993; or Karas et al. 2013, Smaliukienė 2014; Ciemleja et al. 2014)

For the first time, the credit bureaus appeared at the beginning of the 20th century in the United States when New York traders decided to meet their clients and began to release their products on credit. About 50 years later there were three and a half thousand bureaus in operation. Current situation in Russia is provided in Fig.1.

![Figure 1: Dynamics of home credits borrowing in RUB and foreign currency (2005-2014)](image)

*Source:* Own results

The undoubted convenience “of living in debt” was at first appreciated in the West and in post-Soviet Russia, but as time had passed, the Russians began to feel less prejudiced against loans provided by banks. In Russia, the first private bank was established in 1864, and only with the collapse of the Soviet Union and the spread of Western banking systems the consumer loans were introduced with the loans provided to individuals and mainly for the purchase of household items (washing machines, vacuum cleaners, coffee makers, etc.). Nowadays, credit is very popular in Russia and constitutes of the most popular banking services. Credit and financial organizations in Russia developed a wide range of specialized credit products, not only for small and medium businesses, but also for individuals. Figure 1 shows the dynamics of home credits borrowing in Russia in RUB and foreign currency between 2005 and 2014.

One can see the growing dynamics that was hampered by the 2007-2008 economic crisis that was followed by the rise up until 2014 (the recent data from the 2015 reveal that the economic sanctions finally set in and caused the borrowing and spending behavior of Russian to reverse).

3. Borrowing and lending in Russia

In general, Russian banks provide loans to individuals, both independently and in collaboration with its partners, it can be car dealers, construction companies, universities, medical clinics, etc. These loans can be classified into four main groups:

- Consumer loans, which include loans to buy home appliances and electronics, loans for urgent needs, furniture, for treatment, education, etc.
- Auto loans allocated in a separate category, a feature of which is that to get money to buy a new car is easier than supported
- Mortgage loans are related to long-term loans (credit terms may be tens of years), as a rule, issued
for the purchase of housing.

- Finance leases, implying the acquisition of property ownership and the subsequent surrender of its temporary possession and use.

With every passing year, a variety of types of credit products for individuals is increasing and, consequently, leading to the increase in the risks to the personal economic and financial security. According to our own survey embedding a total sample of 320 respondents, which was conducted by us in the spring of 2015, about 40% of respondents do not use the credit, 28% use the credit and declare their intentions to apply for the credit, while 32% of respondents used credit, but are not planning to do so in the nearest future. All in all, it seems that people familiar with mortgages and credits, do not feel safe about using them in the future. This negative experience stemming from experiencing the credit and borrowing is mildly alerting. We see that more than 50% of respondents used credit, but half of them refused to take it again. The reasons for refusing might be multiple but one of the most obvious ones are the following: high interest rates, banking tricks, or insolvency (bankruptcy) of individuals.

All of these reasons represent threats to the economic security of the individual lending in Russia. Let us consider each of them separately: First of all, it is high interest rate. In Russia, the interest rate is much higher than abroad. For example, the average fixed rate deals in rubles at the level of 17.03%, and in dollars at the level of 13.89%. For comparison: in Canada it is 3.6-6.2%, in the US the rate is in the range between 4.5 and 6%, in France - 3.75 to 4%, and in the UK from 1.89 to 7.69%, in Greece - 6.25%, and Germany - 4.5% (Karas et al., 2013). A dangerous development for the banking sector was to increase the key rate, which lead to an increase in fees for the individual loans. This year, the Russian Central Bank raised the rates three times. While credit institutions did not announce an increase in interest rates, this measure might occur at any time which is widely disseminated by the analysts.

One has to remember that banking tricks still prevail. The main objective of any bank is earning money and generating the wealth. However, banks are trying very hard to convince the customers that they care about their welfare, property and living standards. Some citizens still fall for the advertising tricks and become victims of imposed products. Some of them include: interest-free loan, non-payment of the loan, ban on the early repayment of the loan, unilateral change in the contract, commission for the loss of the credit card, expensive insurance, unpredictable mortgages, ban on early repayment of the loan, etc. Insolvency (bankruptcy) of an individual in Russia became possible after October 1, 2015. The procedure is governed by the Law on Bankruptcy of individuals which regulates the procedure in cases of inability to self-repayment of debts on loans to individual entrepreneurs and ordinary citizens of Russia. This practice corresponds with similar regulations in other parts of the world (Wang and White, 2000).

In accordance with this law, any citizen who owed to official institutions (and this is documented by the contract) more than 500 thousand rubles and do not pay on the loan for more than three months can begin with bankruptcy proceedings. In order to initiate the procedure for recognition of being bankrupt, the creditors, the bank that issued the credit and even the tax office might also act as initiators. In any case, the first step is filing out the application to the court and claiming to be recognized for bankruptcy. Bankruptcy proceedings can be started no more than one time in five consecutive years.

4. Data.

Our data that are to be fed into the empirical model consists of 10 yearly observations for the group of indicators describing the nominal value of mortgages and home credits in both RUB and foreign currencies, Russian GDP, population, employment, average wage per country as well as average statistical salary.

The data have been obtained at the Russian Statistical Office and represent macroeconomic indicators describing the main trends and patterns of the Russian economy.
5. Empirical model of personal financial security

Following the literature review and the problems outlined in the previous sections, we are now ready for drawing an empirical econometric model of personal financial security. The model can be written in the following form:

\[ Y_i = \alpha + \beta_1 \text{accom} + \beta_2 \text{gdp} + \beta_3 \text{popul} + \beta_4 \text{emplpopul} + \beta_5 \text{avwage} + \beta_6 \text{avsalary} + \epsilon_i \]  

where \( Y_i \) is the dependent variable representing the sum of borrowings (mortgages and home credit) in millions of Russian rubles and the right-hand independent variables are represented by the following factors:

Accommodation – average square meter price of first-hand market accommodation in Russia (in thousands of rubles);

GDP – general domestic product in Russia (in market prices);

Population – the current size of populations in Russia (in thousands of people);

Employment – the number of economically active populations (in thousands of people);

Average wage – average monthly personal income (in thousands or rubles);

Average salary – average nominal individual monthly salary (in thousands of rubles);

\( b \) are the coefficients and \( \epsilon \) is the error term.

We employ the OLS linear regression with robust standard errors (due to the detected heteroscedasticity) and run the empirical model. The results are depicted in Table 1.

| variable         | coef.  | robust std. err. | p>|t| |
|------------------|--------|------------------|-----|
| Accommodation    | 29468.87 | 13495.09 *    | 0.117 |
| GDP              | 65.77077 | 14.47057 **   | 0.020 |
| Population       | 134123.8 | 65287.76      | 0.132 |
| Employment       | -341690.6 | 189531.6    | 0.169 |
| Average wage     | -120906.7 | 160007.2    | 0.505 |
| Average salary   | 9861.709  | 141044.3     | 0.949 |
| Constant         | 4720818   | 2.17e+07     | 0.842 |
| R²               | 0.98     |                 |      |
| N                | 10       |                 |      |

Note: Significance levels: * 0.05 < p < 0.10; ** 0.01 < p < 0.05; *** p < 0.01.

Source: Own results

The modal has a good, nearly perfect fit. Our results show that only the two factors – accommodation (borderline significance) and GDP – come through as positive and significant indicating that the increase in the overall wealth (the rise in GDP) and in the price of the square meter of accommodation lead to the increase in borrowing behavior. It is surprising to find out that both the employment and the average wage come through as negative (although insignificant). These results might be explained by the fact that the increase in salaries and earnings leads to the decrease in borrowing. Quite logically, people with more money do not need to borrow and can be self-sufficient in their financial decisions.

Our results indicate that the increase in the monetary base and the printed currency does not necessarily lead to worsening the economic conditions. On the contrary, the rise in the prices of accommodation might push economic agents to make abrupt investments and borrow more financial assets from financial institutions. Al-
though our empirical model employs a very limited time series comprising observations for just ten years (and therefore its results should be taken with great care), it sets up the underlying trends and explains the causality behind the borrowing behavior and personal financial security of the Russians.

6. Conclusions and policy implications

Overall, it seems that ensuring economic security of the personal lending and borrowing can be achieved by a system of strict measures of economic and organizational nature. However, one should not forget that the key element in this puzzle is the person herself or himself.

For the economic security of the person who borrows the money, the system cannot do without systematization of threat assessments. Threats in this area often tend to be hidden, and it seems to be very important to identify them in a timely manner. It is advisable to tighten the supervision of banks, to review the penalty in the field of fraud and, of course, the most important thing, to expand the awareness of citizens in the media about possible frauds and the ways for improving their economic security.

Thus, one can conclude that in order to achieve and to maintain personal economic security a plethora of internal resources should be activated. These sources are likely to be the key to success. The personal economic and financial security depends not only on the state or the society in which the person lives, but also on the person herself or himself. The issues of lending and borrowing require a serious and balanced approach that can be formed on the basis of the well-established and well-governed institutions of financial literacy. Russian Federation is undergoing harsh economic downturn. In these conditions it seems important to strengthen the financial controls and literacy and to promptly act on ensuring personal economic and financial security of the population, especially the most vulnerable groups represented by the youth and the elderly.

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