UNIVERSITY OF LJUBLJANA
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# THE ROLE OF INTANGIBLE CAPITAL IN DEVELOPING COUNTRIES: THE CASE OF INNOVATION ACTIVITY IN SLOVENIA AND WESTERN BALKAN REGION

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# AUTHORSHIP STATEMENT

The undersigned Marija Drenkovska, a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), declare that I am the author of the doctoral dissertation entitled THE ROLE OF INTANGIBLE CAPITAL IN DEVELOPING COUNTRIES: THE CASE OF INNOVATION ACTIVITY IN SLOVENIA AND WESTERN BALKAN REGION, written under supervision of Prof. Janez Prašnikar, Ph.D.

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## SUMMARY

The aim of my research is to explore the intangible capital in developing country and its links to innovation, competitiveness, and economic growth. My dissertation is composed of three chapters/essays that on more specifically tackle the topics of innovation abilities, intangible assets, internal corporate characteristics, competencies, and capabilities from an evolutionary perspective, internal and external sources of knowledge, export orientation, as well as the dynamics of the learning process that occurs as a result of these aspects. Central in my study are the developing economies of the Western Balkan region where the research questions addressed are especially important, as they are of key importance in their faster growth and successful convergence.

In the first chapter, I propose an extended approach to surveying innovation (predominately for the purposes of innovation studies in developing countries). The proposed questionnaire is based on the Community Innovation Survey (CIS), but carefully constructed in a way that aspires to address the above-mentioned issues of non-comparable, non-reliable and often non-existing data, following the recommendations of the Oslo manual. Using survey data of Slovenian sample of companies supplemented with their six years financial statements data, I examine the innovation's impact on productivity (for which I use value added per worker as proxy) using pooled quantile regression. The results speak in favour of the inclusion of the proposed aspects in innovation surveying. More specifically, the results confirm the importance of competences and capabilities, as well as the corporate strategic orientation towards R&D and reveal a specific relationship between productivity and exports.

Chapter 2 also supports the inclusion of the investigation of corporate competencies and capabilities, relating them on one side with the internal characteristics (processes, cultrues, and policies), and the external sources of innovative ideas, and with innovation performance, on the other. Drawing from a wide range of theories and literature (including trade theory, evolutionary economics, strategic management and dynamic capabilities theory, open innovation paradigm), I use PLS structural equation model to examine the circumstances under which the technological followers companies from a small open economy, pursuing the export led model of growth, are seizing the learning opportunity offered by external markets. The results reveal that not all companies exploit the 'learning by exporting' opportunity and that the ability to learn is related to genetic material of the firm and the existing competences and capabilities. External sources of ideas, genetic material, competences, and capabilities build into a positive spiral that ends in a more innovative company. To the best of my knowledge, this link was studied in such a manner for the first time. Moreover, the study uses a unique dataset and its results contribute to the knowledge on innovation and corporate behaviour in an export-led developing country

The third chapter presents a comparative study that investigates the intellectual capital of firms of two emerging markets from the Western Balkan region (Albania and Republika Srpska of Bosnia and Herzegovina) and Slovenia, a more developed country, already an EU member. More specifically, I analyse the link between the intellectual capital, innovation, and export volume of the companies in the three samples. Using unique survey data sets for these countries, I set structural models to examine the hypotheses. The results suggest that possessing intellectual capital does not suffice for firms' global competitiveness and that higher presence on global markets may offer exposure to higher quality knowledge that companies lack in their domestic markets.

**Keywords:** intangible capital, innovation, developing countries, export, added value

# POVZETEK

Glavni namen disertacije je prispevati k poglobljenemu razumevanju neotipljivega kapitala v državah v razvoju, predvsem njegove vloge pri krepitvi inovativnosti, konkurenčnosti in gospodarske rasti. Disertacija je sestavljena iz treh poglavij, ki bolj podrobno obravnavajo teme notranjih značilnosti podjetij, predvsem njihovega neotipljivega kapitala, sposobnosti in kompetenc podjetij nasploh, njihovih inovacijskih sposobnosti, uporabljenih notranjih in zunanjih virov znanja, izvozne usmerjenosti ter dinamike učenja, ki se pojavi kot posledica navedenih procesov. V raziskavi sem se osredotočila na razvijajoča se gospodarstva Zahodnega Balkana. Za te države so zastavljena raziskovalna vprašanja še posebej pomembna, saj so ključnega pomena za krepitev gospodarske rasti ter hitrejšo konvergenco.

Prvo poglavje predlaga razširjen pristop k preučevanju inovacij z anketnim vprašalnikom, kjer je bila posebna pozornost namenjena značilnostim inovacijskega procesa v državah v razvoju. Predlagani vprašalnik temelji na standardiziranem mednarodnem vprašalniku "Community Innovation Survey (CIS)", vendar je na osnovi lastnih raziskovalnih izkušenj pri preučevanju neotipljivega kapitala v državah v razvoju prilagojen in razširjen, predvsem z namenom rešitve problema nezanesljivih in pogosto težko dosegljivih značilnosti inovacijskih procesov, sploh v državah v razvoju. Pri prilagoditvah so bila upoštevana tudi priporočila t.i. "Oslo Manual" ter široka literatura iz zgoraj navedenih področij (inovacije, kompetence, itd.).

Na podlagi anketnih podatkov za podjetja iz treh držav, ki so bili dopolnjeni z bilančnimi podatki za obdobje od leta 2006 do 2011, preučujem vpliv inovacij na produktivnost s pomočjo kvantilne regresije. Rezultati govorijo v prid vključitve predlaganih elementov v inovacijska anketiranja. Natančneje, rezultati potrjujejo pomen analize vpliva kompetenc, sposobnosti, strateške usmerjenosti R&R ter razkrivajo specifično povezanost med ustvarjeno dodano vrednostjo ter izvozno usmerjenostjo podjetja.

V drugem poglavju je še bolj natančno preučena dinamika inovacij v podjetju v povezavi z izvozno usmerjenostjo. Rezultati govorijo v prid vključevanja sposobnosti in kompetenc v analizo inovativnosti podjetij. Ta je namreč na eni strani določena z notranjimi značilnosti podjetij (genetski material), na drugi pa z izpostavljenostjo izvoznim trgom. Na podlagi različnih teorij in idej (kot so teorija mednarodne menjave, učenje z izvozom, evolucijska ekonomija, strateško upravljanje, teorija dinamičnih konkurenčnih kompetenc ter 'odprtega modela inovacije') s sturkturnim modeliranjem preučujem kdaj podjetja, t.i. tehnološki sledilci (technological followers) iz majhnih in izvozno usmerjenih gospodarstev, izkoristijo priložnosti učenja, ki ga ponuja prisotnost na tujih trgih. Rezultati kažejo, da vsa

podjetja ne izkoriščajo priložnosti "učenje z izvozom", pri čemer ima ključno vlogo njihov genetski material. Genetski material ima namreč velik vpliv na izboljšavo obstoječih kompetenc in sposobnosti, ki potem vplivajo na inovativnost podjetij. Zunanji viri, genetski material, kompetence in veščine predstavljajo tako pozitivno spiralo, katere končni rezultat je večja inovativnost. Drugo poglavje tako hkrati predstavi nov pristop k analizi povezave med izvozno usmerjenostjo, notranjim okoljem v podjetju (genetski material) ter inovativnostjo podjetij.

V tretjem poglavju primerjam intelektualni kapital v gospodarstvih Zahodnega Balkana (Albanija in Republika Srbska) ter Slovenije, ki predstavlja bolj razvito državo s tega območja in hkrati tudi članico EU. Natančneje, analizirala sem povezavo med intelektualnim kapitalom, inovativnostjo in izvozno usmerjenostjo podjetij v teh treh državah. S pomočjo strukturnega modeliranja sem pokazala, da je razpolaganje z ustreznim intelektualnim kapitalom potrebni, ne pa tudi zadostni pogoj za konkurenčnost podjetij na globalnem trgu. Bolj odprto gospodarstvo in večja prisotnost podjetij na zunanjih trgih pomeni večjo izpostavljenost do visokokakovostnega znanja, ki ga primanjkuje na domačih trgih.

**Ključne besede:** neotipljivi kapital, inovacije, države v razvoju, konkurenčnost, izvoz

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# Introduction

## Description of the dissertation topic scope and the issues it addresses

### Intangible capital, innovation and knowledge based growth

The role of tangible assets has been indisputably recognised as a factor of economic growth through the history. The characteristic that unmistakably makes them 'capital' is that they have been created by utilising existing resources with an end goal to increase future production and consumption. However, Corrado, Hulten and Sichel (2009) point out that this characteristic is shared by every other expenditure that is incurred in the process of product innovation and/or market development (which include, but are not limited to R&D expenditures), training of employees, and organizational development. That being said, economists and policy-makers are faced with the significant challenge of measuring the contributions of intangibles to economic performance.

From a macroeconomic perspective, the investments in knowledge and its creation through investments in intangible capital, and improving innovation, has a final purpose in increasing the future output, the same as the investments in equipment and machinery. Especially for an economy that is increasingly concerned with economic growth, and international competitiveness, intellectual capital may be the key production factor for achieving these goals. In macroeconomic terms, as argued by Augier and Teece (2005), the creation and use of intangible assets is the key to wealth creation.

From a microeconomic aspect, firms based on material assets have become unable to achieve further economies of scale and consequently unable to gain competitive advantage solely on the basis of tangible capital. They have two approaches in addressing this issue: to outsource activities that do not give them competitive advantage; and to innovate. Innovation is a complex process, whose strategy is to successfully offer new products to the market or develop new processes that would increase the firm's competitiveness on the market. It is therefore of key importance that the firm has or obtains valuable knowledge at the right moment. Knowledge is the key resource that properly managed leads to business success. In other words, innovation represents a way to create more value in a firm enabling it to achieve sustainable competitive advantages. In this respect, it is the key factor for growth (Cheng and Tao, 1999).

Ever since the economists and the policy-makers have recognised the importance of knowledge assets for economic growth, they have been facing some challenges with respect to capturing and measuring the inputs and outputs of this "equation". The link between investing in knowledge creation and the outcome of this investment has shown to be not as straightforward as it had appeared at first and the understanding of this link still remains incomplete. The two main challenges remain to be (1) how to measure the

investments in knowledge creation, and (2) how to accurately estimate the contribution of these investments to the stock of knowledge capital and the foundation of the future research lies in understanding of these two links.

That being said, it is not surprising that innovation and intangible capital are in the centre of policy discussions and are also increasingly gaining wind in academic research. In my dissertation I attempt to address some of these challenges with a main focus on the developing countries of the Western Balkan region.

**Technological leaders and technological followers**

Countries differ with respect to their different endowments in terms of labour, capital and the stock of knowledge. This is reflected in the fact that they differ with respect to their technological development, and consequently, the level of innovation, and type and intensity of R&D.

This fact is recognised also by Forbes and Wield (2000) who suggest that followers[1] rely more on incremental innovation, rather than radical innovation. Similarly, given the industrial development stage of the technology-follower country, the process innovation will often be more important than product innovation (Kline, 1991), especially if the follower is developing cost advantages. On the other hand, organisational, cultural, and managerial innovations can help the companies build the environment (internal and external) in which incremental innovation can continuously spread.

Furthermore, technological followers' R&D expectedly has a rather limited role in technology. Forbes and Wield (2000) recommend that it needs to fulfil a different role[2] than the one of the technological leaders. The authors' rationale behind this argument is that no developing country (even the technologically advanced ones) can match the R&D effort of the major industrial nations or the largest corporations. Therefore the followers should set their innovation activities in a way that they would lead them to the technological frontiers as efficiently as possible, and set their innovation goals in a way that would help them moving higher in the value-chain of global production by increasing productivity and making products with higher added value. This *special* role of the followers' of the R&D should help these firms to increase their absorptive capacity and consequently be able to use knowledge from external sources of innovative ideas and knowledge. Cohen and Levinthal (1990) highlighted that organizations must develop absorptive capacity in order to benefit from external knowledge flows. Also, as pointed out

[1] According to Forbes and Wield (2000), a technological follower is any firm from newly industrialising countries who do not define the state-of-the-art in technology.

[2] The authors' rationale behind this argument is that no developing country (even the technologically advanced ones) can match the R&D effort of the major industrial nations or the largest corporations.

by Mowery (1984), an organization is far better equipped to absorb the output of external R&D if it is also performing some amount of R&D internally.

The differences between countries in innovation levels and growth also reflect the efficiency of their respective national innovation systems, i.e. the producers, users, suppliers, public authorities and scientific institutions. It is the interaction between the actors on the market, and in general, of the innovation system, that results in new and commercially useful knowledge.

Therefore, it is very important to make the distinction of the different institutional, economical, and technological settings where innovation can thrive and recognise that there are different innovation processes in technological followers and technological leaders. Only in that way we could hope to gain deeper understanding of the phenomenon and its potential to push the economy up. Measuring empirically these innovation processes then, remains to be challenge in itself.

**Open innovation**

A successful innovation depends on the development and integration of new knowledge into the innovation process. Part of this knowledge will reach the firm from external sources (Cassiman and Veugelers, 2006) and part from internal. This is related to the open innovation paradigm (Chesbrough, 2003), which stresses the importance of utilising both internal and external sources of innovative ideas in building strong foundations for long-term competitiveness.

From the perspective of intellectual capital, organizations need to develop it first in order to be able to recognise, assimilate and utilise external knowledge of the (more competitive) export markets. And the other way around, firms that operate globally devote more resources to assimilating knowledge from abroad and generate more innovations and productivity improvement (Criscuolo et al., 2005). Using the intellectual capital to absorb, and assimilate knowledge solely at home is not enough for building sustainable competitiveness on the global market. Even more so, having more diversified external sources of innovative ideas becomes increasingly important to radical innovation (McLaughlin et al., 2008).

Finally, closing a full circle of knowledge flows between the external and internal environment of an organisation, the communication between these two is closely linked to the level of communication among the sub-units of the firm and distribution of expertise within it (competencies). According to Cohen and Levinthal (1990), firm's absorptive capacity depends on the individuals, who stand either at the interface of the firm and the external environment or at the interface between sub-units within the firm. Emerging from

these ideas, I introduce in my studies also firm's competences and capabilities, which are s a crucial link in the innovation value chain of a technology follower (figure 1).

Figure 1. Innovation value chain


Open innovation model together with dynamic view of capabilities development offers a unique view on how internal and external sources of knowledge can favourably complement each other and consequently contribute to competitiveness of a company.

**Export-led growth**

Export-led growth is a development strategy aimed at growing productive capacity by focusing on foreign markets (Grossman and Helpman, 1991a; Boltho, 1996; Palley, 2011). The positive relationship between export and productivity has been demonstrated empirically by, for example, Girma et al.(2004), Altomonte et al. (2011), De Loecker (2007), Aw, Roberts, and Xu (2008), Melitz (2003), Melitz and Constantini (2008). There are two main mechanisms behind the apparent higher productivity of exporting firms. The first is the idea of self-selection i.e. that only the already highly productive more are capable in competing on foreign competitive markets[3]. And the second is the 'learning-by-exporting' hypothesis, which claims that by entering new market, the firm gains new knowledge and expertise which allows them to improve their efficiency level[4]. According to some authors, exporting firms also may gain access to technical expertise from their buyers, which non exporters do not have[5]. No matter what is the underlying mechanism, there is an expectance for productivity raise in the exporting firms.

On a country level, the exposure to more technically developed markets may facilitates technology transfer and knowledge spill-over, which has been shown to improve the growth rates of developing countries (Haug, 1992; Mayer, 2001; Crispolti and Marconi, 2005; Javorcik and Spartaneu, 2011). Additionally, Blalock and Gertler (2004) argue that the learning by exporting scope is greater for firms from less developed countries (through trade with developed countries) than for firms from developed countries

[3] Empirical contributions that reveal that exporters are more productive than non-exporters include Roberts and Tybout (1996), Clerides, Lach and Tybout (1998), Bernard and Jensen (1999), Van Biesebroeck (2006), Alvarez and Lopez (2004). Theoretical contributions include Melitz (2003) and Bernard et al. (2003).
[4] Evidence that firms experience significant productivity increases after entering the export market are found in Aw, Chung and Roberts (2000) for Korea, Van Biesebroeck (2006) for Côted'Ivoire, and De Loecker for Slovenia, have documented that.
[5] For empirical evidence see Evenson and Westphal (1995), Westphal (1990), Grossman and Helpman (1991) and World Bank (1993).

As the "quality" of externally available knowledge depends on the development and complexity of the economic environment of the environment in which the companies operate (OECD/Eurostat, 2005), availability of rich external knowledge sources and extensive networking opportunities are proportional to the benefits they offer (Roper et al., 2008). The idea of different quality of knowledge sources is also related to the Helpman, Melitz, and Yeaple (2004) claim that firms exporting to more demanding markets are faced by fiercer competition. This means that that market conditions that firms operate in influence the general behaviour of the firm and primarily affects the firm's development of capabilities (also capabilities to innovate)[6]. For Slovenian manufacturers' case this is confirmed by De Loecker (2007) that discovers that there are higher productivity gains for firms shipping their products to relative developed regions.

Many (transitioning) economies have been successful in pursuing the export–led model of growth, which has been empirically supported by the cases of the four East Asian Tiger economies (South Korea, Hong Kong, Singapore, and Taiwan). Others yet still rank low on indicators such as trade openness and international connectedness, like Albania and Bosnia and Herzegovina (IMF, 2012a, 2012b). The questions that arise in these countries include whether their corporate sectors can carry the burden of internalisation; and what is the potential of their corporations for sustaining competitiveness in the global market and hence in succeeding in export–driven growth. This thesis is an attempt at addressing some of these questions and providing further discussion on these economic issues in these relatively under-researched emerging markets.

## Research questions addressed in the dissertation

### Measuring innovation in developing countries

Innovation, largely determinant by knowledge and intellectual capital, has been unanimously recognised as a major driver of growth, employment and competitiveness (Geroski et al., 1993; Freel and Robson, 2004; Roper et al., 2008). However, the attempts to measure the investments in intangibles and their impacts at macro-, sectoral- and firm-level have often faced conceptual and applicative difficulties (Aralica, Račić and Radić, 2008), among them primarily data availability and quality. The intangible nature of these investments is responsible for the number of fundamental measurement issues most

[6] Helpman et al., (2004) developed a simple multi-country model with the multiple monopolistically competitive sectors of firms that may either serve domestic and/or foreign markets. The novelty of their approach is in the assumed heterogeneity of firms in terms of total factor productivity, which is reflected in marginal costs, prices and profits. The assumptions of firm heterogeneity consequently leads to the heterogeneity of fixed costs of supplying different markets through different channels and causes differences in trade costs. As a result, the least productive firms find it profitable to only supply the domestic market; firms with intermediate productivity supply both the domestic and foreign markets through exports and the most productive firms supply the domestic market and foreign markets through foreign affiliates

empirical studies of the impact of R&D on productivity face, which needs to be born in mind when interpreting their empirical estimates.

Innovation input (R&D expenditures, number of employed researchers) or output measures (number of patents) are commonly used as innovation intensity indicators in either microeconomic or macroeconomic studies the impact of innovation on either productivity or growth. Seminal macroeconomic studies (Sveikauskas, 1981; Bernstein-Nadiri, 1988; 1991; Nadiri, 1993; Mansfield et al., 1977; Goto-Suzuki, 1989; Terleckyj, 1974; Scherer, 1982; McMorrow and Röger, 2009) use macroeconomics models to explain (endogenous) growth and follow the idea of technological progress placing investments in R&D as central.

Microeconomic studies also use these same measures to capture firm innovativeness. Studies of innovation impact on firm productivity rely on the study of the actual R&D's contribution to productivity growth (from Griliches, 1980; Pakes and Griliches, 1980; Hall and Mairesse, 1995; Coe and Helpman, 1995; to the more recent work of Wakelin, 2001; and Griffith, Redding, and Van Reenen, 2004). But the limitation of these indicators is widely recognised and R&D is admittedly a narrow definition of intangible capital. A significant amount of innovation and product and process improvements comes from design improvements and/or learning-by-doing. The R&D activity is just a part of more complex innovation activities that has longer-term effects and in that sense, the traditional R&D based indicators (R&D expenditures, R&S personnel, etc.) may easily underestimate the innovation activities of the firm.

And while there are empirical studies that succeed in establishing a positive relationship between R&D on productivity, most of them fail to explain the actual mechanism of how innovation inputs (R&D expenditure, number of researchers, etc.) are linked to innovation output (product or process). This leads to inability to essentially explain innovation as a TFP increasing event, and inability to answer questions such as, why some countries/firms are more innovative than others, while having the same investment patterns in innovation?

The current study of innovation has been substantially improved by the innovation surveys, which have provided more precise and comprehensive measures of both innovative inputs and outputs. Survey data has been quite successful in linking innovation and productivity, similarly as to the aggregated data studies. A number of papers have successfully linked innovation survey data to firm level productivity using the Crepon, Duquet & Mairesse (1998) or a similar approach. And although survey methodology definitely offers a more detailed analysis potential, they still face areas of improvement. One such area is their standardisation, which while useful for comparative empirical analyses, neglects the relevant aspects of innovation, which might be specifically important for developing

countries or technological followers (countries or industries), which differ in terms of attained economic development or structure.

This methodological debate is in the core of my first research question *RQ1 – What aspects of innovation and intangibles that are especially important for developing countries should be included in innovation surveys?* The attempt to address this question, as well as the issues pertaining to availability and reliability of innovation data in developing countries, is portrayed in the careful development and testing of a questionnaire that follows the recommendations of the Oslo Manual and the existing literature on innovation surveys. Justification and support for this exercise are found in the chapters of this dissertation.

**An evolutionary approach to an export-led model of growth**

Small open economies often rely on the export-led paradigm of growth (Palley, 2011, Borgersen and King, 2012). The presence in foreign markets is part of the strategy of 'learning-by-exporting', which is expected to drive productivity and innovation. Companies are compelled to improve their innovativeness under the pressure of the more demanding competition and consumers, but are also presented with access to advanced technology, and knowledge (Tabrizy and Trofimenko, 2010; Wagner, 2007; Helpmanet al., 2004), which would otherwise remain inaccessible. However, it is important to note that the learning process depends on corporate motivation and ability to absorb and use the available information.

While the neoclassical theoretical literature treats the intangible capital as an input with static effects only, the foundations of the evolutionary school lie in on the cognitive abilities of employees interacting in organisations and has developed concepts such as "economic competence" (Eliasson, 1990), or "absorptive capacity" (Cohen and Levinthal, 1990). These concepts can help to explain differences in performance between firms (Ballot, Fakhfakh and Taymaz, 2001).

Adopting the Nelson and Winter's term *genetic material* to capture all the processes in the organisation, relationships, cooperation, knowledge flows, I model the mechanism through which the firms benefit from the exposure to external, more developed sources of knowledge and innovative ideas. In Chapter 2 I tackle the second research question - *RQ2: How is exposure to (more advanced) external sources of knowledge related to the formation of corporate genetic material, which in turn propels companies' competitiveness in the global market?* In doing that, I draw from a wide range of theories and literature including innovation theory, export-led growth, open innovation, evolutionary economics, and dynamic capabilities theory.

**Intellectual capital, innovation and export-led growth: comparative study**

Building and sustaining advantage in this globalised world can no longer rely on physical or financial resources, which are necessary but not sufficient conditions for a competitive economy (Gonzales-Loureiro and Pita-Castello, 2012). Globalization, new (information) technologies, and increased competition have led to an era of knowledge or intellectual capital domination (Chaharbaghi and Cripps, 2006). In these times of the "third industrial revolution", knowledge is the main source of differences between organizations.

One of the prime determinants of firm competitiveness, value added and growth is the innovativeness of an entity (Sveiby, 1997; Ramezan, 2011; Kramer et al., 2011; González-Loureiro and Pita-Castelo, 2012). Firms' innovation activity aims at successfully offering new products to the market and/or developing competitiveness increasing processes. It is in that respect that possessing a valuable knowledge at the right time is of key importance.

Drawing on two main bodies of literature, I first examine the relationships between the knowledge-based resources and firms' innovativeness in three markets from the Western Balkan region. To answer the first research question of this chapter *RQ3a: Does the IC in the firms in the examined developing countries have the potential to driving their innovativeness?* I rely on the field of intellectual capital management; the IC components and their interrelatedness affect positively innovation and performance (Lev, 2003; Chen, Zhu and Xie, 2004; González-Loureiro and Pita-Castelo, 2012). I then relate these concepts to trade theory, and international marketing literature that suggest that more innovative companies are more likely to be more export oriented (Wagner, 1996; Wakelin, 1997; Weifens et al., 2000; Griffith et al., 2006) and tackle the second research question *RQ3b: Does presence of interrelated intellectual capital suffice for firms' foreign markets competitiveness expressed as presence on foreign markets?* This study is first of its scope to investigate the relationships from the research questions in settings specific to developing countries.

## Structure and contents of the dissertation

The aim of my research is to explore the intangible capital in developing country and its links to innovation, competitiveness, and economic growth. My dissertation is composed of three chapters/essays that on more specifically explore the topics of innovation abilities, intangible assets, internal corporate characteristics, competencies, and capabilities from an evolutionary perspective, internal and external sources of knowledge, export orientation, as well as the dynamics of the learning process that occurs as a result of these aspects. Central in my study are the developing economies of the Western Balkan region where the research questions addressed are especially important, as they are of key importance in their faster growth and successful convergence.

Chapter 1 deals with the overview of methodological issues in measuring innovation in developing countries and proposes a modified approach that leads to a more comprehensive and detailed explanation of the innovation activity in a technology-follower country. Chapter 2 examines the internal characteristics of a firm (competences and genetic material) and links them in a novel way to its innovative performance, exposure to external sources of knowledge in an all-connected circular flow. This chapter, in addition to the first, speaks in favour of the proposed methodological approach discussed in Chapter 1. In Chapter 3, I investigate the intellectual capital of firms in three emerging economies from the Balkan region in a comparative study and their relation to innovation, and export orientation. The concluding remarks, discussion, and limitations are covered in the section General discussion and conclusion.

# 1 MEASURING INNOVATION (IN DEVELOPING COUNTRIES) USING A MODIFIED CIS QUESTIONNAIRE: APPLICATION TO SLOVENIA[7]

**Abstract**. Although innovation is perceived as an important element of economic growth, its dynamics often seems only partially understood, especially regarding developing countries. And even though it has been recognised that the preconditions to innovation and the nature of innovation in developing and developing countries differ, the propensity to innovate relies greatly on the commitment and knowledge of the companies, regardless of the national development level. To overcome selected loose ends in innovation measurement, we propose a new methodology, which in comparison to the standardized international approaches studies also firm level attitudes towards R&D, the development of the R&D, firm capabilities and competencies. Inclusion of these aspects allows better interpretation of the innovation characteristics, limitations and the link to productivity. The methodology is applied to a sample of firms in Slovenia. The results confirm the relevance of methodological extensions for the study of productivity.

**Keywords**: innovation, methodology, competencies, capabilities, developing countries, productivity

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[7] This paper was co-authored with Prof. Dr. Janez Prašnikar and Prof. Dr. Tjaša Redek.

## 1.1 Introduction

After a decade of methodological debate about measuring innovation activity and its role in growth,[8] the innovation surveys have become the prevailing source of innovation data. Standardized international surveys, for example the Community Innovation Survey (CIS in continuation), have facilitated the study of innovation as well as its link to numerous management and economic categories (see Guellec and Pattinson, 2002). The standardization of these questionnaires, while welcomed in comparative studies, often fails to capture the phenomena of innovation in developing countries (technology followers[9]) due to their innovation specifics (Forbes and Wield, 2000; Mairesse and Mohnen, 2010; OECD, 2005; Mytelka et al., 2004, etc.). Additionally, the narrow selection of questions does not provide sufficient grounds for an in-depth interpretation of results. This is especially problematic from policy perspective.

We propose an extended approach to surveying innovation based on the CIS approach. The questionnaire is substantially supplemented, primarily to capture in detail (1) the elements facilitating process or product innovation (competencies and capabilities, sources of knowledge, exposure to developed markets), and (2) the specific characteristics of innovation in developing countries. Additionally, we introduce the cascading technique in innovation surveying (initially applied by Miyagawa et al., 2010, which allows for a more sophisticated statistical analysis.

Using a dataset for Slovenia, we show that the suggested approach leads to a comprehensive explanation of the innovation activity in a developing (technology-follower) country, confirming that the firms' innovative activity is closely linked to its competencies and capabilities, which, on the other hand, are related to the quality exposure. Subsequently the questionnaire was modified and tested in Albania and Republika Srpska of Bosnia and Herzegovina and yielding also satisfactory results (Prašnikar and Knežević Cvelbar, 2012; Prašnikar, Memaj, and Redek, 2012).

This chapter is structured as follows. Section 2 summarizes briefly a selection of methodological and data challenges pertaining to innovation studies. Section 3 discusses the proposed methodology and its contributions. The empirical results for the sample of Slovenian companies are presented in Section 4. The chapter concludes with a discussion of implications.

[8] For discussion on the innovative input–output relationship, see Griffith et al. (2006), Parisi, Schiantarelli, and Sembenelli (2006), Hall et al. (2008, 2009). The recent literature recognizes the nonlinearity between R&D as inputs and patents as output. For a debate on the advantages and disadvantages of innovation surveys see Arundel and Garrfels (1997), Archibugi and Pianta (1996), Arundel et al. (1998), OECD (1996), Sirilli and Evangelista (1998), Smith (1998), Tomlinson (1997).

[9] According to Forbes and Wield (2000), a technological follower is any firm from newly industrialising countries who do not define the state-of-the-art in technology.

## 1.2 Challenges to studying innovation: literature review

To discuss the motivation for our questionnaire, we first discuss the problems of the existing (prevailing) methodology, particularly: (1) the scope of the questionnaire in terms of the definition of innovation, its causes and consequences, (2) the appropriateness of the standardized questionnaire for developing countries and (3) data quality, related to the scope of the questionnaire.

### 1.2.1 Innovation measurement in empirical studies

Innovation input (e.g. R&D expenditures, number of employed researchers) or output measures (e.g. number of patents) are commonly used as innovation intensity indicators in microeconomic and macroeconomic studies of the impact of innovation on productivity or growth. Studies modeling economic growth rely on R&D expenditure as an indicator of innovation/technological change (McMorrow and Röger, 2009; Hulten, 2012; Greenwood, Hercowitz, and Krusell, 1997). For example, to explain the discrepancy between the EU and US economic performance and the differences between the laggard Mediterranean countries and the Nordic group, the European Commission (2009) links aggregate growth to R&D expenditures (in addition, patent data, number of researchers and other variables were studied). Microeconomic studies also heavily rely on R&D indicators using either time series or cross-sectional data to assess the impact of R&D on productivity at firm, industry or economy-wide level growth (from Griliches, 1980; Pakes and Griliches, 1980; Hall and Mairesse, 1995; Coe and Helpman, 1995; to the more recent work of Wakelin, 2001; Griffith et al.; 2004, Damijan, Kostevc and Rojec, 2011).

But none of these studies examines the actual mechanism of (1) how innovation inputs (R&D expenditure, number of researchers, etc.) are linked to actual innovation output (product or process), (2) and consequently fails to explain how and why innovation is linked to growth or productivity and (3) and how come some countries/firms are more or less innovative regardless of their similar levels of innovation investments. The main reason for these underperformances is that the R&D indicators (R&D expenditure, number of employed in R&D departments, number of patents, number of new products, etc.) represent only a part of the innovative activity of the firm. Additionally, an innovation could be a consequence of accidental luck, hard work or copy-cat activities. Consequently, estimation bias due to the ‘undermeasured’ or ‘overmeasured’ innovation (using traditional innovation inputs) is a reasonable threat.

### 1.2.2 Scope of innovation surveys

In the past decade, innovation research has been relying greatly on innovation surveys, such as the OECD or EU surveys, national surveys or individual researchers’ attempts to capture innovation. Survey data has shown to be quite successful in linking innovation and

productivity (for example, using the Crepon-Duquet-Mairesse (1998) approach). Innovation surveys provide more detailed data and contribute towards better understanding of innovation activities and the link to corporate performance. For example, the CIS database offers data on the sources of information, or data on type and location of innovation partnerships. Such data has been used by trade scholars (Kostevc, Rojec and Damijan, 2014) to model the probability of innovation. Furthermore, innovation surveys have clearly demonstrated that R&D expenditures are merely one element of firm's overall expenditure on innovation, especially the case market-service industries, and using them as the sole input in the equation will lead to biased conclusions.

Regardless of the numerous improvements that the survey methodology has offered to the study of innovation, there are yet areas for improvement. One such area is the standardization of the internationally administered innovation surveys, which tends to neglects relevant aspects of the innovation process that takes place in, but not limited to, developing countries or technological followers (countries or industries). This is also an important obstacle to solid interpretation of comparative country or industry-level studies, which, for example, differs in terms of attained economic development or structure. As many studies have already called to attention (Mairesse and Mohnen, 2010; OECD, 2005; Mytelka et al., 2004 etc.), survey questionnaires, given their attempt to be simplistic, standardized, and comparative, often risk to only partially capture the phenomenon, especially in technology-follower countries, and often neglect aspects of innovation that might be important for (just) developing countries. The firms in developing countries are more inclined towards incremental rather than radical innovation and more towards process than product innovation (Forbes and Wield, 2000). Furthermore, research has more of a limited role in technology-follower countries, given that the firms there conduct research mainly with a purpose of increasing the absorptive capacity (for utilizing the 'free' knowledge available outside the firm). Nevertheless, strategic orientation towards R&D is for a number of reasons such as: (1) complementing shop-floor innovation; (2) intangible spin-off benefits for the entire organization; (3) increasing learning capability of the R&D teams, and (4) the notion that moving up the value-chain to more attractive markets depends on a firm's ability to develop proprietary product-designs. And although the last two aspects (capabilities and competencies) represent the actual link between innovation inputs, acquisition, utilization and creation of knowledge, and innovation output, they have been neglected in the standardized questionnaires. We include them in our questionnaire and propose indicators for their measuring.

### 1.2.3 Data collection and data quality

In our experience in innovation and related studies in the developing countries (especially those of the Western Balkans), the quality and the reliability of the survey data is rather low. Careful examination of the filled questionnaires by Slovenian firms submitted to the

statistical authorities (within the standard innovation measurement) revealed a number of problems, like incomplete data and, in some, cases also illogical responses. Possible causes for these irregularities may include misunderstanding of (some of) the questions and/or lack of interest/time to fill in the survey questionnaires. At first glance the existing CIS questionnaire may seem rather short (11 innovation questions, 6 organizational innovation questions, 5 on marketing, 1 on knowledge management), but each of these questions has up to 7 sub-questions on its own. The noise in the data due to the obstacles discussed above causes low reliability in empirical researches. To address this issue we introduce the cascading approach in innovation surveys. It allows us to capture many aspects of different innovation phenomena, but at the same time keep the questionnaire manageable for the respondent.

## 1.3 Suggested methodology[10]

To challenge the perceived limitations of the prevailing standardized methodologies, we gradually developed the proposed questionnaire by relying on (1) innovation theory, (2) existing questionnaires (primarily CIS) and (3) questionnaire testing (conducted via personal interviews with relevant decision-makers). In our opinion, the suggested approach offers warranted solutions pertaining to the scope of the innovation surveys, appropriateness of the questionnaire for innovation studies in developing countries, and the reliability of the data. The questionnaire,[11] which in total comprises 24 question sets, has ten sections: (i) target markets and characteristics of the industry (*q1*); (ii) types of new products (*q2* to *q6*, *q16*), (iii) types of new processes (*q6* to *q8*), (iv) technology development as a source of innovative products (*q9*), (v) innovation linkages and sources (*q10* to *q12*), (vi) organization of R&D activity and R&D expenditure (*q13* to *q15*), (vii) examination of competencies (*q17* to *q19*), (viii) examination of capabilities (*q20* to *q22*), (ix) specific data about the performance of the company and its R&D (*q23*), and (x) external financial support to innovation (*q24*).

In table 1, we outline the most important differences between our suggested and the CIS (IV) questionnaire (our benchmark was CIS IV as it was the latest available one at the time we started developing the proposed questionnaire). These modifications, combined with the introduction of the cascading approach to measurement, provide a solid research foundation for innovation studies (in developing countries).

[10] The data obtained have been used in several empirical papers, which all by giving results with solid interpretation indirectly confirm that we have made at least some appropriate changes. Please, see Prašnikar and Knežević Cvelbar (eds.) (2012); Prašnikar et al., (eds.) (2012); Prašnikar et al. (2010).

[11] The designations *q1* to *q24* represent sets of question on a same topic. The number of questions within a set varies and is at most eleven, apart from the cascading sets where the number of questions is always three. Some of the sets are discussed in greater and follow the discussion on the main *modifications* in respect to the CIS questionnaire.

Table 1. Comparison between the CIS IV and our proposed questionnaire

| Variable | CIS IV | Cascading questionnaire |
|---|---|---|
| **Definition of innovator** | New or significantly improved product, process, organisational method, or marketing method;<br>Innovators/Non-innovators | New or significantly improved product, process, capabilities and competencies;<br>Only innovators |
| **Geographic market** | YES<br>4 markets | YES<br>5 markets added WB (ex-YU) markets (this captures the different developmental level of the markets companies export to) |
| **Novelty of innovation (product/service)** | Measurement: dummy<br>Two levels of novelty:<br>1. New to the firm<br>2. New to the market<br><br>Share in sales of innovative products | Measurement: cascade<br>Three levels of novelty:<br>1. New to the firm<br>2. New to the market<br>3. Globally new<br>Share in sales of innovative products |
| **Relevance of types of innovation (products)** | NO | YES[12]<br>Measurement: scale 0-3 |
| **Types of innovation (processes)** | YES<br>Three different types<br>Measurement: YES/NO | YES<br>Three different types<br>Measurement: YES/NO |
| **Competitive environment** | NO | YES<br>- in terms of introducing new goods/services:<br>Measurement: cascade (perceptional)<br>- in terms of different performance aspects<br>Measurement: Likert scale (1-5) (perceptional) |
| **Collabouration innovation practice** | YES<br>Separate dummies for products and for processes | YES<br>Separately cascading questions for products and for processes |
| **Collabouration innovation** | YES<br>2 set of questions:<br>1. Type of partners (7)<br>2. Location of partners (5) | YES<br>2 set of questions:<br>1. Type of partners (8)<br>2. Location of partners (5) |
| **Sources of information** | YES<br>10 sources; measurement: scale 0-3 | YES<br>11 sources; measurement scale 0-3 |
| **Technological core of products (revenues)** | NO | YES<br>Measurement: cascade |
| **Role of R&D department** | NO | YES<br>Measurement: dummy set |
| **Type of innovation activities** | YES<br>Dummies for in-house R&D; external R&D; acquisition of machinery, equipment and software; acquisition of external knowledge; training for innovative activities; market introduction of innovations; other | PARTIALLY*<br>On in-house R&D; market introduction of innovation |
| **The perception of R&D expenditure** | NO | YES<br>Measurement: cascade |
| **Knowledge base enhancement** | NO | YES<br>Cascade set : environment to company; strategic |

[12] In terms of product innovation, we feel it is not only important to determine whether there have been new products introduced by the company, but also the importance that innovation represents for the company in terms of competitiveness and it technological (and organizational complexity).

| Variable | CIS IV | Cascading questionnaire |
|---|---|---|
| | | partnerships; selling IPR |
| **Capabilities** | NO | YES<br>Cascades for three types: technological, marketing, complementary |
| **Competencies** | NO | YES<br>Likert scale 1-5 three types: technological, marketing, complementary |
| **Basic information** | YES<br>total turnover; total number of employees | YES<br>R&D expenditure; employees in R&D department; number of patents |
| **Innovations with environmental benefits** | YES | NO* |

*Note.** HRM, eco-capital IT, branding, organizational-, structural, and relational were capital addressed in separate questionnaires within the broader intangibles study (Prašnikar (ed.), 2010).

### 1.3.1 Competences and capabilities

A key extensions of our questionnaire is the inclusion of measures for firm's competencies and capabilities, Both of these aspects are closely related to the collective learning and sharing of knowledge and are crucial for the innovation process, especially for technological followers, as we have found, The measures proposed are founded on the definitions first used by (Day, 1994; Li and Calantone, 1998; Prahalad and Hamel, 1990). According to them, a firm is competent to perform a task when it possesses required knowledge and skills. Capabilities are narrower. They refer not only to having knowledge or possessing skills and qualifications, but, also, as Grant (1991) suggests, to using them to actually solve a problem.

We examine three types of corporate competencies – technological, marketing, and complementary. Technological competencies are related to the firm's ability to generate, assimilate, transform and use the obtained knowledge (Zahra and George, 2002). Marketing competencies refer to the possession of comprehensive information about the customer needs dynamics, knowledge about competitors and marketing channels, building relations with customers and suppliers, and other related issues. Complementary competencies help integrate different technological specialties, combine different functional specialties in the firm, allow better exploitation of synergies across business units, combine in-house resources with external capabilities required and help integrate the dynamic competence building process for superior performance (Song et al., 2005; also Rajkovič and Prašnikar, 2009; Wang et al., 2004).

The competencies were measured each by three perceptional questions, where the respondents evaluate their competencies in relation to their competitors on a five-point Likert scale ranging from "considerably worse than the main competitors" to "considerably better than the main competitors". The capabilities follow next and are measured with three

cascading questions for each capability (we describe this approach in following) or nine statements in total.

### 1.3.2 Quality of exposure

The quality of the external sources of knowledge and ideas depends on the complexity and development of the market the firm operates in (link through exporting to more developed countries) and cooperation with other firms. According to the open innovation paradigm (Chesbrough, 2004) the company uses external sources and combines this knowledge with the existing one in order to successfully innovate. External sources are especially important for firms, which are still distant from the technological frontier and rely on the 'technology transfer' and 'learning by exporting' approaches Haug, 1992; Mayer, 2001, Crispolti and Marconi, 2005; Javorcik and Spartaneu, 2011).

Our questionnaire has two questions that capture the quality of exposure to knowledge and innovation ideas (*q1* and *q1a*). The questions examine the markets in which the company operates, but in comparison to the CIS we make a distinction between the more and less developed ones. While CIS (IV, *q1.2*.) analyses local, national, EU, and other countries, we distinguish between local, national, markets from EU countries (plus EFTA and candidate ones), Western Balkan markets (addition), and other markets. Given that our exercise was focused on the Western Balkan region, the inclusion of the Western Balkan (if generalized) basically suggests that it is important to divide markets systematically according to the specifics of a country and/or broadly (of preparing an internationally oriented questionnaire). In this way we can capture the different development levels of the main markets and the characteristics of the competition and customers in them. There are substantial differences in both, the type of successful companies in differently developed markets as well the innovation push and pull factors on these markets (see Helpman, Mealitz, and Yeaple, 2004).

The impact of the external influence is captured in the questionnaire through the quality of competition and customers. Companies ranked their performance in comparison to their competitors and the level of novelty of their innovation as new in their relevant markets or new globally (*q2* and *q4*). This provides an understanding of the intensity of innovation activity carried out by the company as well as the level of 'stimulant' environment towards increasing competitiveness through innovation.

### 1.3.3 Knowledge sources

The R&D departments of the technological followers, according to Forbes and Wield (2000) have several important roles. They can (1) act as the 'location for organised learning', (2) be the 'problem-solver of last resort' in production, (3) the 'in-house

knowledge store and (4) gatekeeper'. The gatekeeper[13] role of the R&D department refers to the department's role in increasing company's absorption capacity by constantly monitoring the corporate surroundings and utilising any available external knowledge. However, in the interviews conducted in Slovenian companies, during the testing of the questionnaire testing, many reported issues related lack of even basic activities in their R&D and/or having related activities executed by other departments. To address these circumstances, we examine the role of the R&D department with carefully constructed cascading questions given in table 3 (*q13*).

Innovation can be a result of own internal development, cooperation, outsourcing or backward-engineering. We examine the sources of both, product and process innovation in a company in the questions q6 and q8 shown in table 3.

In addition, we investigate the managements' attitude towards R&D. When R&D is not perceived to be important for corporate performance, the company is less likely to be or strive to become an innovator. First, we examine whether the company believes that R&D can be an important source of competitive advantage (*q15*) and add also the standard question on R&D expenditure, but in cascading form (*q14*).

### 1.3.4 Cascading approach

The cascading approach is, to the best of our knowledge, a novelty in the innovation survey methodology, and it was inspired by Miyagawa et al. (2010), who used the otherwise established marketing approach in their intangible capital research. A typical cascading question is composed of three Yes/No sub-questions (table 2). The Yes/No approach attempts primarily to simplify the answering process, which increases reliability in two foremost ways. First, the statements are straightforward, short and easy to understand. Consequently, the noise stemming from the lack of understanding, lack of interest or lack of time on the part of the respondent is minimized. An alternative structure of the questions, such are the 'choose from a list' questions, may offer a broad choice of answers and 'choosing fast' (which respondents usually do), but can for these very characteristics also impede the reliability of the answer. Second, each consecutive question from the cascading set represents a dimension that is superior to the previous sub-question. The choice of the respondent is thereby limited, as the margin between two sub-questions is wide enough to not allow doubt for the 'category' the company falls with.

The cascading structure of the questions additionally allows us to construct a variable (a factor) on a scale 1-4, with 1 representing the lowest development level and 4 highest. The

[13] Gatekeepers can translate technical knowledge into terms, which are more meaningful to managers and can make technical solutions more appealing to managers. Consequently, their presence in the organization has been found to be positively correlated with performance of development projects (Katz, Tushman, and Allen, 1995).

factor to a question has a value of 1 if the first sub-question is answered 'No', given that any subsequent subquestion (higher category) can only be answered negatively after that. The higher values of the factor begin at 2, for an answer 'Yes' to the first subquestion and it increases for 1 for any subsequent 'Yes' answer.

Table 2. Example of a cascading question: question 9

| **Technological core of products** | **NO** | **YES** |
|---|---|---|
| Majority of our revenue (at least half) comes from products whose technological core is younger than 10 years. | | |
| Majority of our revenue (at least half) comes from products whose technological core is younger than 5 years. | | |
| The technology in our industry changes very fast. Consequently, so does our product structure. | | |

## 1.4 Results

### 1.4.1 Data collection and sample characteristics

The questionnaire development commenced as a result of years of investigation of the characteristics of the development of the Slovenian economy in comparison to the EU, both at an aggregated as well as firm level. The rationale behind it was to understand why Slovenian companies have a lagging growth of value added per product, an aspect which has innovativeness at its core. Slovenia is a good example of a developing (laggard) country within the EU, its development being at the moment at about 80% of the EU average. In addition, its industrial structure is quite divergent. Slovenia has niche industries that are characterized with very high value added, but there are many traditional industries with very low value added as well. Overall, the percentage of high-tech export is only about 5% of total export, which indicates clearly that a strategy for increasing innovation would be crucial for the country's advancement towards the developed group (Eurostat (2014) data).

The survey was conducted during 2010 and 2011. The questionnaire examines the corporate innovation aspects over the period from 2006 to 2010. The decision to investigate a five-year period was partially motivated by the fact that innovation operates with a certain lag, but also by the desire to incorporate pre- and post-crisis period. After a series of testing in 2010 through personal interviews with CEOs, the questionnaires were administered to the 400 largest Slovenian firms, which constituted the country's entire population of firms with 100 or more employees from the manufacturing and the service sector. One hundred surveys were returned, which represents 25% response rate (an average for Slovenia). From the manufacturing sector 77 companies responded, while there were 23 respondents from the services sectors. Two thirds of them (66%) exported at least

20%, while 59% exported at least half of products in the observed period. In terms of employment, the sample consists of 40 medium-sized companies (50-249 employees) and 54 large companies (250 employees or more). Over the entire period, the average company had 603 employees. About half of companies (52%) reported the domestic and/or Western Balkan markets as their main market, while the rest sold the majority of their products to the EU and other foreign markets.

Table 4 summarizes the basic innovation characteristics of the responding companies, measured mainly by cascading questions (except for *q13* and *q7*). The use of cascades allows a finer delineation of the 'complexity' of innovation, which cannot be accomplished by the existing innovation surveys (Radosević, 2005). In addition, the cascading approach allows easier testing of the importance of innovation for corporate performance. The results show that the vast majority of companies did innovate within the observed period – 84% introduced a significant number of new products (*q2*) and 73% made a significant process innovation (*q7*). In both cases (product and process innovation), own innovation activity and cooperation with other partners was the main source of innovation (*q6* and *q8*). These answers are in line with the generally strong economic and investment dynamics in Slovenia before the crisis, largely due to the availability of affordable funding (see Bole, Prašnikar, and Trobec, 2014).

The majority of the companies possess an R&D department (73%) and, on average it has quite advanced responsibilities (*q13*). The companies without a R&D department primarily came from the service sector, which is understandable given the non-technological nature of innovation in services. In such cases, the R&D activities are often found within the marketing departments (see Susman et al., 2006, and also McMorrow and Röger, 2009 for a discussion on alternative determinants of innovation and productivity growth across different sectors).

Table 3. Evaluation of firm competencies, mean answer (Likert scale, 1-5)

| Type of competence | Indicator variable | Respondent's average | Std. deviation |
|---|---|---|---|
| Technological competences | Research and development in the firm is advanced | 3.39 | 0.91 |
| | Number of available technological capabilities inside the firm or through strategic partnership | 3.49 | 0.81 |
| | We are good at predicting technological trends | 3.36 | 0.78 |
| Marketing competences | Obtaining information about changes of customers preferences and needs. | 3.03 | 0.81 |
| | Acquiring real time information about competitors | 3.16 | 0.77 |
| | Establishing and managing long-term customer relations | 3.58 | 0.89 |
| | Establishing and managing long-term relations with suppliers | 3.48 | 0.88 |
| Complementary competences | Good transfer of technological and marketing knowledge among business | 3.35 | 0.78 |
| | The intensity, quality and extent of research and | 3.21 | 0.81 |

| Type of competence | Indicator variable | Respondent's average | Std. deviation |
|---|---|---|---|
| | development knowledge transfer in co-operation with strategic partners | | |
| | Product development is cost efficient | 3.26 | 0.81 |
| | Activities of the BUs are clearly defined in the corporate strategy of our firm | 3.28 | 0.85 |

Questions 20-22 analyse firms' capabilities (table 3) and questions 17-19 address their competencies. The summary statistics show that respondents have on average higher confidence in their technological and marketing competencies, and less so in their complementary ones, which are especially important in strengthening overall innovation capacity of the firm through cooperation and knowledge sharing. An interesting emergence from the examination of the competencies with respect to the main markets is that the firms operating in more developed markets are harsher in evaluating their competencies against their competition, and the other way around. The firms operating primarily in the less developed markets (the domestic and the Western Balkan markets), while significantly lagging behind the former group in innovation performance, showed equal or even higher confidence in their competencies – their perceptions shaped by the (relaxed) competition in their markets (table A2 and table A3). These results verify the importance of the relative market position, the development of the main markets, and the potential of learning (by exporting) for studying innovation and firm performance.

To further evaluate the aptness of questionnaire in examining the impact of innovation activity on firm performance, we observed corporate performance in terms of value added over the period of 2006-2012. This analysis was made on the merged survey data with firms' balance sheet information provided by AJPES (as available from July 2013). While the questionnaire addressed the period from 2006 to 2010, we include longer period of companies' balance sheet data taking into account the lagged effects of innovation.

The companies were first allotted according their value added into quartiles ($25^{th}$ percentile, median and $75^{th}$ percentile were taken as divisions) for each of the analysed years. The value added was defined as the difference between the revenues and the cost of input material and services. Given the sample, the **first** (**lowest value added**) group comprises companies from wood industry, hotel and catering industry, textile and leather industry, transport and electrical companies. The **second** group includes companies primarily from electrical and machinery industry, metal industry, also food and catering industry, transport and retail industry. Public utilities, automotive and machinery industries, and also some transport companies, food processing industries are dominating the **third** group. The **highest value added** group comprises companies from chemical, pharmaceutical, automotive, IT, electrical distribution, automotive, machinery, steel and also food and beverages industry. The reported structure focused on the stable patterns.

Some companies did move between the groups during the examined period, which causes also the changes in innovation performance data over the years.

Table 4. Main innovation characteristics* (% of companies answering 'Yes' to a specific sub-question)

| Question | % Yes | Question | % Yes |
|---|---|---|---|
| **INTRODUCING NEW PRODUCTS** | | **THE ROLE OF R&D DEPARTMENT**** | |
| significant number new to relevant market | 84 | we have R&D department in the company. | 73 |
| majority of them new to the market | 56 | R&D supports solving problems on the shop floor | 71 |
| also novelty in the global markets | 28 | R&D builds the absorption capacity of the company | 66 |
| **RELATIVE PERFORMANCE IN TERMS OF INTRODUCED NOVELTIES** | | R&D sets guidelines for further tech. development | 61 |
| least on a par with peers | 85 | R&D builds ability of independ. industrial design | 30 |
| better than peers | 55 | **R&D EXPENDITURE** | |
| company is among the leading in the industry | 39 | at least 1% of revenue. | 80 |
| **PRODUCT INNOVATION** | | at least 2% of revenue. | 50 |
| NPs primarily NOT developed by imitation | 89 | at least 3% of revenue. | 38 |
| NPs developed primarily in company/group | 71 | **PERCEPTION OF R&D EXPENDITURE** | |
| NPs developed with cooperation | 52 | NOT perceived solely as an unnecessary expenditure | 87 |
| improved support services (maintenance, sales, IT, accounting etc.) | 71 | knowledge transfer among employees is very important | 78 |
| **PROCESS INNOVATION**** | | of strategic importance to the company | 65 |
| introduced process innovation in past 5y | 73 | **TECHNOLOGICAL CAPABILITIES** | |
| improved production processes | 70 | exceed those of average companies in the industry. | 67 |
| improved logistics, delivery, distribution | 58 | developed to an extent that we can claim to be more techn.competent than competitors | 63 |
| improved support services (maintenance, sales, IT, accounting etc.) | 71 | dynamically, outdated tech. capabilities are being continuously replaced by new | 57 |
| **PROCESS INNOVATION** | | **MARKETING CAPABILITIES** | |
| NPcs primarily NOT developed by imitation | 85 | exceed those of average companies in the industry. | 66 |
| NPcs developed primarily in company/group | 73 | have been developed to such an extent that we can claim to be more technologically competent as our competitors | 63 |
| NPcs developed with cooperation | 48 | dynamically, outdated marketing capabilities are being continuously replaced by new. | 57 |
| **TECHNOLOGICAL CORE OF PRODUCTS** | | **COMPLEMENTARY CAPABILITIES** | |
| younger than 10 years | 58 | techn. and market.experts exchange informally relevant techn.and mark.capabilities | 78 |
| younger than 5 years | 28 | the market.and techn.experts cooperate well in all stages of creating and mark. NPs. | 72 |
| technology thus product structure changes very fast | 14 | there are enough new products in the pipeline at all times to be launched to the market | 26 |
| **COMPANY'S KNOWLEDGE BASE IS ENHANCED BY:** | | | |
| from environment into the company | 97 | | |
| strategic partnerships | 75 | | |
| extended outside - selling intellectual property rights | 10 | | |

*Note.** The cascade questions' results indicate that with greater complexity or development of a specific innovation aspect, the percentage of companies achieving a certain level of a cascade is declining. Those that failed to answer 'Yes' to even the first question are excluded from the table

*Note.*** Not a cascade question. The number indicates the percentage of companies that answered 'Yes' to a specific question.

Table 5 presents the average value of the factor, calculated on the basis of the answers to different cascading innovation questions across the four productivity groups for each of the years. The results show that the groups' differences are statistically significant primarily in terms of attitudes towards R&D and firm capabilities. On average, the second and the last group ($25^{th}$ percentile to median class, $75^{th}$ and above class) stand out. In terms of introducing new products, the third group was in general least successful, although the least productive group (first) is not far behind. Given that the third group is quite heavily marked with utilities, this result is not surprising. Additionally this group in general performs most poorly in terms of the complexity of the role of the R&D department and R&D expenditure, which could again be related to the structure of the group. Regardless of the group's low regards towards R&D, the companies here report strong confidence in their capabilities. Once again this could be closely related to their main market position and development – these are utilities and food processing companies with a dominant position and strong brands in domestic and neighbouring (Western Balkan) markets).

The group with highest value added per employee is in general the most confident of its capabilities, and it is also the most innovative in terms of introducing new products and improving processes. These companies place high strategic importance in their R&D departments and exhibit highest R&D. The group comprises some of the most successful Slovenian companies, which are also highly export oriented. Given that the majority of them export mainly to EU and to other foreign markets, it is only expected that they place high importance to innovation and maintaining their competitiveness.

The companies with the lowest value added reported investments mainly in improving their processes, which can be explained by their desire to lower production costs and keep their international competitiveness given that many of these companies (from wood processing, textiles and leather industry) are very export oriented (the mean company exports 51% of sales). They are often parts of international production chains as sub-contractors, contracted partly due to their reputation for quality products, but primarily for the low production costs, which is a valuable advantage in the heavily competitive international markets. This is an example of the so called 'distressed exports' (Prašnikar, Bole, and Ahčan, 2003). Although they are more aware of the importance of R&D and invest slightly more in R&D than the third (utilities and services) group, there is still a significant gap in this aspect between them and the most productive group. It should be noted that a number of companies from the lowest value added group is today facing serious restructuring issues or are struggling to survive, which indicates that their past business models did not result in strong and long-term competitiveness, which is reflected also in their innovation activity.

The second group showed significant activities on average in both product and process innovation. These companies reported high awareness of the importance of R&D and were, in terms of investing in R&D, second behind the most productive group. There are quite a number of highly innovative companies in this group, but they demonstrate lower

performance mostly because many of them act as sub-contractors, primarily in industries like the automotive one, that have suffered significantly and among the first in the crisis.

These general patterns, which can be observed from table 5, are not systematically significant in each of the analysed years. The differences between groups in terms of capabilities are systematic with exception to the year 2011. Evident consistent difference between the groups can be observed also in the attitude towards innovation expenditure (q15). In 2011 the general economic fluctuation and noted downturn in the domestic and the Balkan markets could explain the rupture in the general pattern throughout the years as it shuffled the structure of the groups significantly. Partially, this impact is also present in 2012.

Table 5. Average value of a selected question in each of the productivity groups and statistical significance of the differences in innovation aspects across groups (N=684)

| Year /Obs. | | 1 | 2 | 3 | 4 | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|
| 2006 | q2 Introducing new products | 2.35 | 2.79 | 2.46 | 3.04 | 14.67 | **0.100** |
| | q4 Comparative performance: new products | 2.52 | 2.88 | 2.63 | 3.20 | 10.64 | 0.301 |
| | q6 Product innovation | 3.04 | 3.13 | 3.21 | 3.44 | 8.28 | 0.506 |
| | q8 Process innovation | 3.09 | 2.67 | 3.21 | 3.24 | 14.20 | **0.115** |
| | q12 Knowledge base enhancement source | 2.57 | 3.00 | 2.75 | 2.96 | 12.49 | **0.187** |
| | q13 Role of R&D | 2.52 | 2.79 | 3.17 | 3.52 | 19.06 | 0.388 |
| N=97 | q14 R&D expenditure | 2.39 | 2.67 | 2.46 | 3.12 | 10.48 | 0.574 |
| | q15 Perception of R&D | 3.13 | 3.08 | 3.25 | 3.76 | 10.62 | 0.302 |
| | q20 Technological capabilities | 2.26 | 2.92 | 2.88 | 3.36 | 17.01 | **0.049** |
| | q21 Marketing capabilities | 2.04 | 2.33 | 2.13 | 3.32 | 24.68 | **0.003** |
| | q22 Complementary capabilities | 2.61 | 2.54 | 2.71 | 3.28 | 18.83 | **0.027** |
| | Average value added per employee (euros) | 15134 | 22362 | 30977 | 72272 | 0.00 | |
| 2007 | q2 Introducing new products | 2.68 | 2.64 | 2.56 | 2.89 | 5.96 | 0.744 |
| | q4 Comparative performance: new products | 2.72 | 2.80 | 2.88 | 2.96 | 6.61 | 0.677 |
| | q6 Product innovation | 3.08 | 3.16 | 3.12 | 3.56 | 7.15 | 0.622 |
| | q8 Process innovation | 3.40 | 2.56 | 3.04 | 3.33 | 12.46 | **0.189** |
| | q12 Knowledge base enhancement source | 2.64 | 3.08 | 2.72 | 2.89 | 10.23 | 0.332 |
| | q13 Role of R&D | 3.04 | 2.68 | 2.68 | 3.67 | 23.98 | **0.156** |
| N=98 | q14 R&D expenditure | 2.60 | 2.80 | 2.16 | 3.04 | 12.69 | 0.392 |
| | q15 Perception of R&D | 3.16 | 3.36 | 3.04 | 3.81 | 20.26 | **0.016** |
| | q20 Technological capabilities | 2.48 | 2.36 | 3.08 | 3.48 | 15.33 | **0.082** |
| | q21 Marketing capabilities | 2.24 | 1.96 | 2.40 | 3.19 | 16.81 | **0.052** |
| | q22 Complementary capabilities | 2.56 | 2.72 | 2.76 | 3.15 | 14.27 | **0.113** |
| | Average value added per employee (euros) | 16310 | 24096 | 33386 | 67770 | 0.00 | |
| 2008 | q2 Introducing new products | 2.56 | 2.69 | 2.64 | 2.81 | 3.26 | 0.953 |
| | q4 Comparative performance: new products | 2.40 | 2.85 | 3.08 | 2.92 | 7.38 | 0.598 |
| | q6 Product innovation | 3.16 | 3.20 | 0.96 | 3.50 | 6.55 | 0.684 |
| | q8 Process innovation | 3.36 | 2.58 | 3.08 | 3.35 | 10.51 | 0.311 |
| | q12 Knowledge base enhancement source | 2.44 | 3.08 | 2.84 | 2.92 | 17.41 | **0.043** |
| | q13 Role of R&D | 2.68 | 2.85 | 2.40 | 3.73 | 21.29 | 0.265 |
| N=100 | q14 R&D expenditure | 2.48 | 2.77 | 2.40 | 2.88 | 6.41 | 0.894 |
| | q15 Perception of R&D | 2.84 | 3.46 | 3.12 | 3.58 | 18.83 | **0.027** |
| | q20 Technological capabilities | 2.08 | 2.69 | 3.32 | 3.46 | 18.38 | **0.031** |
| | q21 Marketing capabilities | 1.88 | 2.35 | 2.44 | 3.19 | 19.85 | **0.019** |
| | q22 Complementary capabilities | 2.40 | 2.81 | 2.88 | 3.04 | 14.70 | **0.099** |
| | Average value added per employee (euros) | 14203 | 24894 | 34641 | 60676 | 0.00 | |
| 2009 | q2 Introducing new products | 2.52 | 2.84 | 2.4 | 2.96 | 10.62 | 0.303 |
| N=100 | q4 Comparative performance: new products | 2.44 | 2.96 | 2.72 | 2.92 | 12.39 | **0.192** |

| Year /Obs. | | 1 | 2 | 3 | 4 | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|
| | q6 Product innovation | 3.20 | 3.40 | 2.80 | 3.44 | 8.27 | 0.507 |
| | q8 Process innovation | 3.44 | 2.80 | 2.68 | 3.28 | 12.16 | **0.204** |
| | q12 Knowledge base enhancement source | 2.68 | 2.88 | 2.76 | 2.92 | 8.51 | 0.483 |
| | q13 Role of R&D | 2.88 | 2.84 | 2.52 | 3.72 | 16.47 | 0.560 |
| | q14 R&D expenditure | 2.56 | 2.80 | 2.28 | 3.04 | 10.68 | 0.557 |
| | q15 Perception of R&D | 2.88 | 3.44 | 3.08 | 3.80 | 19.87 | **0.019** |
| | q20 Technological capabilities | 2.48 | 2.76 | 2.68 | 3.44 | 16.20 | **0.063** |
| | q21 Marketing capabilities | 1.68 | 2.64 | 2.08 | 3.36 | 29.37 | **0.001** |
| | q22 Complementary capabilities | 2.16 | 2.96 | 2.64 | 3.28 | 25.61 | **0.002** |
| | Average value added per employee (euros) | 15318 | 24972 | 35416 | 66393 | 0.00 | |
| 2010 | q2 Introducing new products | 2.5 | 2.8 | 2.4 | 2.92 | 17.35 | **0.044** |
| | q4 Comparative performance: new products | 2.71 | 2.64 | 2.76 | 3.04 | 7.65 | 0.569 |
| | q6 Product innovation | 3.08 | 3.36 | 2.88 | 3.50 | 8.04 | 0.530 |
| | q8 Process innovation | 3.17 | 2.92 | 3.04 | 3.13 | 8.85 | 0.451 |
| | q12 Knowledge base enhancement source | 2.71 | 3.00 | 2.60 | 3.04 | 11.96 | 0.215 |
| | q13 Role of R&D | 2.46 | 3.32 | 2.32 | 3.88 | 25.46 | **0.113** |
| N=99 | q14 R&D expenditure | 2.50 | 2.88 | 2.24 | 2.96 | 13.28 | 0.349 |
| | q15 Perception of R&D | 2.88 | 3.40 | 3.08 | 3.83 | 16.56 | **0.056** |
| | q20 Technological capabilities | 2.42 | 2.72 | 3.08 | 3.21 | 12.53 | **0.185** |
| | q21 Marketing capabilities | 1.96 | 2.16 | 2.68 | 3.08 | 18.41 | **0.031** |
| | q22 Complementary capabilities | 2.33 | 2.88 | 2.72 | 3.25 | 18.13 | **0.034** |
| | Average value added per employee (euros) | 17878 | 26424 | 36137 | 70493 | 0.00 | |
| 2011 | q2 Introducing new products | 2.67 | 2.75 | 2.46 | 2.83 | 9.28 | 0.412 |
| | q4 Comparative performance: new products | 2.63 | 3.00 | 2.58 | 2.96 | 10.17 | 0.337 |
| | q6 Product innovation | 3.25 | 3.25 | 3.04 | 3.29 | 7.15 | 0.621 |
| | q8 Process innovation | 3.00 | 2.83 | 3.25 | 3.13 | 11.25 | 0.259 |
| | q12 Knowledge base enhancement source | 2.79 | 3.04 | 2.58 | 2.96 | 13.35 | 0.147 |
| | q13 Role of R&D | 2.71 | 2.75 | 2.58 | 3.96 | 40.55 | **0.002** |
| N=96 | q14 R&D expenditure | 2.71 | 2.67 | 2.38 | 2.92 | 8.32 | 0.760 |
| | q15 Perception of R&D | 3.13 | 3.25 | 3.25 | 3.54 | 4.73 | 0.857 |
| | q20 Technological capabilities | 2.79 | 2.79 | 2.96 | 3.00 | 3.22 | 0.955 |
| | q21 Marketing capabilities | 2.25 | 2.29 | 2.63 | 2.71 | 8.99 | 0.438 |
| | q22 Complementary capabilities | 2.58 | 2.92 | 2.67 | 2.92 | 7.75 | 0.559 |
| | Average value added per employee (euros) | 20392 | 28490 | 38524 | 92318 | 0.00 | |
| 2012 | q2 Introducing new products | 2.63 | 2.67 | 2.48 | 3 | 4.67 | 0.862 |
| | q4 Comparative performance: new products | 2.70 | 2.89 | 2.41 | 3.04 | 8.87 | 0.449 |
| | q6 Product innovation | 3.19 | 3.22 | 3.19 | 3.43 | 12.58 | **0.183** |
| | q8 Process innovation | 2.96 | 3.19 | 3.15 | 3.21 | 15.85 | **0.070** |
| | q12 Knowledge base enhancement source | 2.81 | 2.89 | 2.44 | 3.11 | 12.43 | **0.190** |
| | q13 Role of R&D | 2.44 | 3.19 | 2.44 | 3.93 | 24.41 | **0.142** |
| N=94 | q14 R&D expenditure | 2.48 | 2.56 | 2.70 | 3.04 | 12.71 | 0.390 |
| | q15 Perception of R&D | 3.04 | 3.11 | 3.26 | 3.82 | 12.15 | **0.205** |
| | q20 Technological capabilities | 2.48 | 2.89 | 2.78 | 3.07 | 10.09 | 0.343 |
| | q21 Marketing capabilities | 2.26 | 2.59 | 2.04 | 2.89 | 18.33 | **0.032** |
| | q22 Complementary capabilities | 2.59 | 2.93 | 2.48 | 3.11 | 12.30 | **0.197** |
| | Average value added per employee (euros) | 21378 | 30198 | 39784 | 82445 | | |

### 1.4.2 Impact of innovation on productivity

To examine innovation's impact on firms' productivity we ran a pooled **quantile regression**. The decision for this method was motivated by the distribution of the value added per employee, which is (as evident from table 5) skewed and the intention of describing the relationship between our dependent variable and our regressors at different points in its conditional distribution. Compared to the OLS estimation on the basis on the entire group, the quantile approach allows an 'individualized approach' for each group (quantile). It extends

beyond being merely 'an OLS estimation for each of the groups' since it uses a weighted variance-covariance matrix (the method is explained in more detail in Koenker, 2005). Second, given our summary results by productivity quantiles it is reasonable to expect that the impact of the variables related to productivity might differ in strength across different quantiles (as suggested by Koenker, 2005). There are quite a number of papers that study productivity and innovation using quantile regression (for example, Segarra Blasco and Teruel Carizzosa, 2009; Damijan et al., 2012, etc.).

The value added per employee is our dependent variable. In a quantile regression the conditional quantile is determined as a linear combination of covariates. In our equation (1), which represents a linear model of the $\tau^{th}$ quantile, $y_i$ is the dependent variable, $x_i^\tau$ represents the vector of regressors, $\beta_\tau$ is the vector of regression coefficients for each of the quantile, and $\varepsilon_i$ are the error terms. As opposed to the OLS method, the quantile regression minimizes the sum of absolute deviations.

$$y_i = x_i^\tau \beta_\tau + \varepsilon_i \quad (1)$$

The explanatory variables for the dependent variable (value added per employee) we include in the model are well founded in economic theory and selected on the basis of the exploratory analysis discussed above. According to the production function (*Y=f(K,L)*), the output per worker depends on capital per worker. The choice of the other explanatory variables is based on the variables from the questionnaire. The variable 'innovation' is a composite measure of the perception of R&D in companies (*q15*) and all three types of capabilities (*q20-22*)[14], which demonstrated most systematic trends across the deciles (table 5). The decision to include these variables was made based on several arguments. First, our initial hypothesis was that existing standardized questionnaires could be improved and made better suited for the developing countries by including firms' capabilities and competencies, which could explain why some are more innovative and some less. In addition, the summary statistics show that the attitude towards R&D and innovation in the company is an important indicator of their innovativeness. Unless management is aware of R&D importance, companies are likely to be less innovative in the longer term, less productive and, thus less competitive (Domadenik, Prašnikar, and Svejnar (2008) for Slovenia). The exploratory statistical tests also supported the choice of these variables. Finally, R&D expenditure is often used as an indicator of innovation activity. But the R&D expenditure in developing countries is in general much lower than that in developed or more technologically advances countries[15]), which does not necessarily indicate lower level of innovative activities of firms. Additionally, including R&D expenditures in our calculations would be unadvisable given that a high percentage of this data in the official statistical records is incomplete. In continuation, equal weights were assigned to each of the discussed explanatory variables.

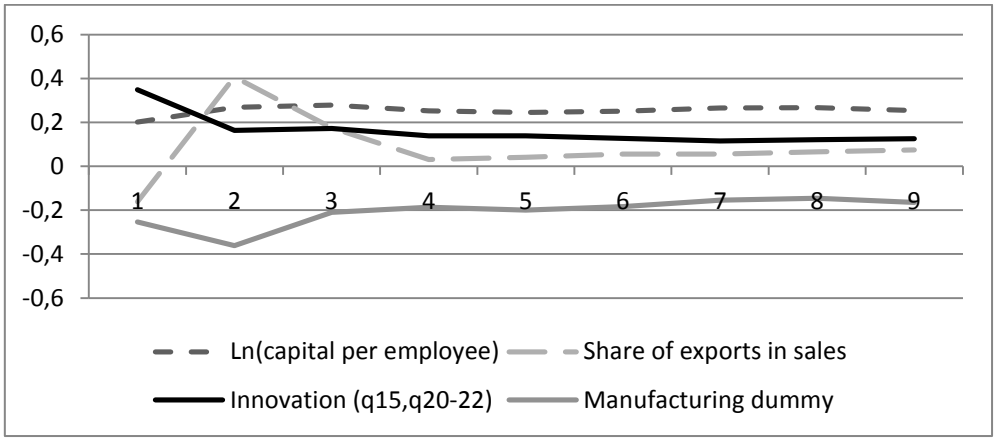
[14] The variable innovation was constructed as an equal-weights linear combination of the factors obtained from the cascading questions on the perception of R&D and the three types of capabilities.

[15] For example, the R&D investments in Slovenia for 2011 amount to 2.47% of GDP, Finland's R&D investments from the same year are 3.78%, and Croatia's – 0.76% of GDP (Eurostat, 2014).

Besides the above explained explanatory variables, we include in the estimation also few other characteristics, including company's export activities, industry, and size. The rationale for including the exports is that it is a concept closely related to innovation and productivity, especially in the trade theory (Wagner, 2006 and 2007; Javorcik and Spatareanu, 2011). In this context we considered two indicators: a dummy variable (with a value of 1 if the firm exports 50% or more of their sales), and an actual export share in sales for each of the observed years. Regarding the industry classification, we control for two broader categories – manufacturing and service companies (a manufacturing dummy). Given that the company's size has been also found to be closely related to productivity (Castany, Lopez-Bazo, and Moreno, 2007; Leung, Meh, and Terajima, 2008; Garicano, Lelarge, and Van Reenen, 2012), we include two different measures for it: the number of employees in a company, and a size class variable, where companies were assigned values 1, 2 and 3 depending on whether they had 10 to 49, 50 to 249 or 250 and more employees respectively. Due to the economic fluctuation within the analysed period, year dummies were also included. The selected regression results with best fit are presented in Table 6, while Fig. 1 provides a quick graphic overview of the analysis.

It is evident from the results that the impact of capital per employee is relatively stable across the different deciles of value added and that it is significant regardless of the decile. Another interesting observation is the impact of the exports. According to theory, the more productive companies are expected to export first (Wagner, 2006 and 2007), which presents them with learning opportunities that can stimulate productivity. Interestingly, the impact of exports is negative and significant in the lowest value added decile, which could imply the presence of the 'distressed exports' within the group. Given that the lowest percentile of added value contains some catering firms and some manufacturing ones (from industries such as wood processing and furniture) the results could be indicating that being an exporter in sub-contracting is detrimental in terms of value added due to cost-based competition strategy.

Figure 2. Impact of selected variables by decile (value of coefficient)



From the perspective of the study, the most important variable is the innovation variable, which was obtained by a linear combination of the perceived importance of R&D and firm technological, marketing and complementary capabilities. Its impact varies by deciles, and it is highest in the lowest value added decile. In general, in the lower deciles of value added the impact of innovation is larger than in the top deciles, although it is insignificant. This seemingly unexpected result can be explained by the structure of the companies. The low value added section is pressed with cost competition and is facing restructuring, which is in part still related to unfinished transitional restructuring and in part it is stimulated by the crisis. In their battle to survive, these companies can only focus at one source of competitiveness at a time and most of the time it is the process innovation. In the higher value added deciles, the impact of innovation becomes again highly significant, although quite stable and not that large. The most productive companies are an interesting mix of highly innovative manufacturing companies as well as some services with strong market position (electric suppliers, for example), which need not place much attention to innovation. In addition, the pooled OLS results provide a significant and positive impact of the innovation variable on value added. This implies that firms with higher value added perceive R&D as more important and have better capabilities, which in turn leads to higher productivity.

If we look at the general sectoral impact we can observe that the manufacturing dummy is negative throughout the sample. This is closely related to the structure of Slovenian manufacturing, which is mostly middle value added (in 2012 hi-tech exports represented only 5.2% of total exports (Eurostat, 2014) (table6). In the highest deciles, this impact becomes significant due to the fact that some of the highest value added companies in Slovenia come from utilities and hi-tech services (electrical distribution, utilities and computer distribution and IT).

Table 6. Quantile regression and OLS estimation

| | **Dependent variable: ln of value added per employee** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Deciles** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **OLS** |
| Ln(capital per employee) | 0.201*** (0.00397) | 0.269*** (0.0602) | 0.278*** (0.0940) | 0.253** (0.0998) | 0.245*** (0.0228) | 0.251*** (0.0188) | 0.265*** (0.0161) | 0.267*** (0.0163) | 0.254*** (0.0128) | 0.266*** (0.000) |
| Share of exports in sales | -0.161*** (0.0156) | 0.407 (0.504) | 0.175 (0.767) | 0.0310 (0.761) | 0.0413 (0.173) | 0.0555 (0.131) | 0.0552 (0.101) | 0.0656 (0.107) | 0.0742 (0.0810) | 0.0169 (0.775) |
| Employment | 6.59e-06** (3.19e-06) | 2.82e-05 (6.20e-05) | 1.64e-05 (6.36e-05) | 5.24e-06 (7.02e-05) | 5.27e-06 (1.63e-05) | 5.68e-06 (1.11e-05) | 6.42e-06 (9.40e-06) | 6.88e-06 (9.18e-06) | 5.39e-06 (6.77e-06) | -1.45e-05 (0.257) |
| **Innovation (q15,q20-22)** | 0.349*** (0.00538) | 0.163 (0.207) | 0.172 (0.222) | 0.138 (0.240) | 0.139** (0.0561) | 0.127*** (0.0392) | 0.116*** (0.0331) | 0.121*** (0.0312) | 0.126*** (0.0239) | 0.114*** (4.27e-08) |
| Manufacturing dummy | -0.253*** (0.0141) | -0.362 (0.481) | -0.210 (0.671) | -0.186 (0.716) | -0.199 (0.174) | -0.183 (0.121) | -0.154 (0.0963) | -0.145 (0.0978) | -0.164** (0.0713) | -0.128** (0.0173) |
| Constant | 4.357*** (0.0444) | 4.704*** (0.944) | 4.655*** (1.430) | 5.173*** (1.585) | 5.280*** (0.327) | 5.264*** (0.246) | 5.193*** (0.206) | 5.144*** (0.209) | 5.311*** (0.155) | 1.712*** (0.000) |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 615 | 615 | 615 | 615 | 615 | 615 | 615 | 615 | 615 | 615 |
| Pseudo $R^2$ | 0.4067 | 0.4635 | 0.5049 | 0.5332 | 0.5542 | 0.5691 | 0.5809 | 0.5912 | 0.6002 | 0.787* |

*Note.*[*] Standard errors in parentheses, ***p<0.01, **p<0.05,*p<0.1
*Note.*[**] Ordinary $R^2$

## 1.5 Discussion and conclusion

One of the main criticisms to the existing questionnaires that study innovation are related to the non-inclusion of measures of the importance of R&D in companies (strategic orientation of firms), as well as lack of attention towards firm competencies and capabilities, that play a crucial role in increasing innovation, and consequently, build competitive advantages. Our results clearly speak in favour of inclusion of these (theoretically supported) aspects in innovation surveys. Furthermore, the results call to attention to several other aspects that deserve careful examination, especially in innovation studies in developing, export-oriented economies. Moreover, we wouldn't limit our recommendations only to technology followers, but we believe that the study of capabilities and strategic position of R&D in companies is highly relevant also for developed economies at industry or firm level (Zupan et. al, 2010; Pisano and Shih, 2013). Furthermore, the results reveal a specific relationship between the value added and the exports. This opens the question about the nature of the linkage between the internal firm organization and the inability (or lack of ambition) to 'learn by exporting'? By extension then these ponderings lead to the question of the endogeneity of capabilities and competencies, and, consequently, the endogeneity of innovation. In conclusion, the development theory has recognized the challenges of learning and adopting technology to be of special importance relevance for developing countries (see Forbes and Wield, 2000) and we have shown that our study successfully addresses these aspects.

The study was limited by the sample size of 100 companies. The sample size does in fact imply a 25% response rate of the biggest companies in Slovenia, but a wider sample would allow a deeper econometric analysis. The biggest challenge for the future is thus the extension of the sample. In addition, the survey was performed only once in Slovenia, although indeed we are expanding it also to other countries (Prašnikar et al. (eds.), 2012; Prašnikar and Kneževič Cvelbar (eds), 2012) and the results from those studies also confirm the relevance of the suggested additions (primarily competencies and capabilities, market orientation) to the study of innovation. To further rationalize the inclusion of these extensions, we would like to make the survey periodical with a similar periodicity as CIS. That would allow capturing the dynamic effects of the studies relationships and would improve the foundations for empirical comparative studies. Although this questionnaire may not offer direct solution for the problem of endogeneity of innovation and business performance, the study of the firm capabilities and competencies certainly provides additional information about the actual process. In extension, the longitudinal studies would facilitate a more advanced econometric treatment, dealing also with endogeneity problem.

# 2 SURVIVAL OF THE FITTEST: AN EVOLUTIONARY APPROACH TO AN EXPORT-LED MODEL OF GROWTH[16]

**Abstract:** Developing countries often rely on the export-led model of growth. Exposure to (developed) foreign markets increases learning opportunities for firms, enhances their competences and capabilities, and facilitates potentially more innovation. The actual benefit differs among firms depending on internal firm characteristics. Using survey data for Slovenia we set a structural model that reveals the links between export orientation, firms' genetic material (internal characteristics and processes), competences and capabilities, and firm's innovative performance. The paper contributes to the literature in several ways, primarily by extending knowledge on innovation and corporate behaviour in an export-led developing country, using firm data.

**Keywords**: open innovation, export-led growth, learning by exporting, external sources of ideas, competences and capabilities, innovation, genetic material.

[16] This paper was co-authored with Prof. Dr. Janez Prašnikar, and Prof. Dr. Tjaša Redek.

## 2.1 Introduction

Small open economies often rely on the export-led paradigm of growth (Palley, 2011; Borgersen and King, 2012). Besides the impact on aggregate demand, the international context of the external stimulus to firm behaviour and innovation became progressively more important (Zhou and Su, 2010). This 'learning by exporting' process is caused by both a threat and opportunity. It is expected to drive productivity and innovation due to larger and more demanding competition and consumers, access to advanced technology, and knowledge (Tabrizy and Trofimenko, 2010; Wagner, 2007; Helpman et al., 2004), which would otherwise remain inaccessible. Exposure also facilitates learning by exporting and innovation in accordance with the Chesbrough (2004) open innovation model. But, note that the learning process depends on corporate motivation and ability to absorb and use the available information. This ability reflects the entire organization, its goals, aspirations, management, people, relationships, cooperation, processes, competences and capabilities, etc., which is best described by the Nelson and Winter (1982) term *genetic material.*[17]

The paper studies the case of Slovenia, a small[18] open economy, pursuing the export led model of growth[19] (Damijan, Kostevc and Polanec, 2011). In 2012, Slovenian output was 24000 US$ GDP per capita; exports represented 72% of GDP (World Bank Database, 2013). At the moment the country is below its *foundational competitiveness*[20] (defined by Delgado et al., 2012), and seizing the learning opportunity offered by external markets would help close the gap, strengthen firm performance, increase firm competitiveness, knowledge, and innovation, and raise aggregate growth. But do Slovenian companies with the ability to penetrate foreign markets actually take advantage of the opportunities offered to them, and if yes, which exactly and why?

Following the ideas of the open innovation model (Chesbrough, 2004), genetic material (Nelson and Winter, 1982) and trade theory (Helpman et al., 2004), *this paper proposes that exposure to (more advanced) external sources of knowledge and ideas made available through exports impacts the formation of corporate genetic material, which in turn propels companies' competitiveness in the global market.*

[17] From Nelson and Winter's "An Evolutionary Theory of Economic Change" (1982): 'Our general term for all regular and predictable behavioral patterns of firms is 'routine.' Routines include technical production techniques, procedures for hiring and firing, administration, responding to high demand. Routines include policies regarding investment, R&D, and advertising. Routines include strategies for diversification, and foreign investment. […] In our evolutionary theory these routines play the role that genes play in biological evolutionary theory. These routines determine the range of behavior and are inherited and are a basis for selection.'

[18] Slovenia has a population of 1.992 million – an estimate for July 2013 (CIA World Factbook, 2013).

[19] Slovenia is a very open economy (exports represents over 2/3 of GDP) and its growth has been export-led throughout transition and is also expected to drive recovery (see Ernest and Young, 2013). According to IMAD (2013) export demand is a crucial element of economic dynamics.

[20] Delgado et al. (2012) define foundational competitiveness as 'the expected level of output per working-age individual that is supported by the overall quality of a country as a place to do business.' This includes social infrastructure and political institutions, monetary and fiscal policy, and the microeconomic environment. The focal point of this article is the microeconomic environment.

This chapter is structured as follows. First, a review of key concepts is provided in order to theoretically link export-orientation, innovation and genetic material. Second, methodology is presented, followed by an empirical analysis based on clustering and structural equations modeling. The article ends with a discussion and conclusions.

The study presented in this chapter contributes to the literature in several ways. First, the empirical results acknowledge that innovation surveys should focus on the study of a firm's competencies and capabilities, its attitudes towards R&D, and the organization of R&D in the company in order to explain the differing innovation performance. Currently, the prevailing OECD and Eurostat methodology does not include these aspects. Second, we extend the management literature by linking corporate genetic material and capabilities as well as competences to the target market of the firm. Third, we extend the management (Grant, 1991; Peteraf, 1993; King and Zeithaml, 2001; Teece, Pisano, and Shuen, 1997), competitiveness (Porter, 1985; Pisano and Shih, 2009; Delgado et al., 2012), and innovation management literature with trade and development theory. Following Helpman et al., (2004), we incorporate the idea that the market conditions under which firms operate influence their general behaviour and primarily affect the general development of capabilities (also capabilities to innovate). The 'learning-by-exporting' (Wagner, 2007; Javorcik and Spartaneu, 2011) and technological transfer (see Forbes and Wield, 2000) is limited by internal firm's characteristics. We show that companies operating in more demanding markets actively increase their absorption capacity by changing the characteristics of their genetic material and, thereby, improve competencies and capabilities as well as innovative performance. The study is to the best of our knowledge the first detailed empirical study of the linkage between exports, genetic material, and innovation at the corporate level in the Western Balkan economies. In addition, the study also broadens knowledge on intangible capital in developing countries, since both innovation and corporate internal characteristics are its constituencies (Corrado et al., 2009; Prašnikar (ed.), 2010).

## 2.2 Theoretical background and hypotheses

Innovation is a complex and systemic phenomenon. It is an interplay and interaction of processes in which knowledge is being created, diffused, and applied. We build on several strands of literature to derive the hypotheses on the relationships between a firm's innovative activity and its exposure to markets, its competencies, and its genetic material.

**Trade and exposure.** Based on theoretical arguments (Baldwin, 1988; Dixit, 1989; Krugman, 1989), penetration of foreign markets assumed within the export-led hypothesis is, in reality, related to (high) sunk cost. Therefore, only the most productive firms can afford to serve foreign markets and serve more foreign markets through foreign affiliates (Helpman et al., 2004), while the less productive firms may be encouraged to invest in low-income countries (Head and Ries, 2003). Consequently, a hierarchy of markets is established: the more productive firms export to more developed countries and serve more markets, whereas

less productive firms serve low(er) income countries and domestic markets. This is especially pronounced in case of domestic market frictions, often existing in developing countries (Aoki, 1999; Gali and Monicelli, 2000; Clarida, Gali and Gertler, 2001).

In testing the hierarchy of markets, Damijan and Kostevc (2006) found that the more productive Slovenian firms operate in more superior markets (primarily the EU, the US, and other developed countries), while less productive companies stick to domestic and ex-Yugoslav markets. However, as observed in Damijan, Polanec and Prašnikar (2007), countries of the former Yugoslavia receive a disproportionately high share of Slovenian firms' investment compared to others countries, and not only by the low productive firms. The proximity (and informational advantages) of neighbouring markets makes these markets appealing also to the more productive Slovenian firms (and by default also to those less productive). In contrast to the clear cut theoretical argument, the less productive Slovenian firms also serve the Western European markets, but primarily as subcontractors in lower value added production (also known as distressed exports, Prašnikar et al., 2004). Sub-contracting is namely an important part, especially of the beginning phases of the export-led strategy (Palley, 2011).

**Sources of innovative ideas.** One of the critical aspects to innovation is the external sources of knowledge. More precisely, successful innovation depends on the development and integration of new knowledge into the innovation process. Part of this knowledge will reach the firm from external sources (Cassiman and Veugelers, 2006) and will contribute to the so-called 'learning-by-exporting' hypothesis. Thus, it is important to once again note that both the nature of ideas and the benefits of the linkages depend on the development of the economic environment in which the companies operate and the intensity and nature of this interaction (OECD/Eurostat, 2005). The availability of rich external knowledge sources and extensive networking opportunities increase the potential benefits (Roper et al., 2008). In accordance with the open innovation model (Chesbrough, 2004), firms are prone to using any external source of innovation, including the so-called 'learning-by-exporting' hypothesis, which can boost their innovation performance and growth. Forbes and Wield (2000) suggest that learning is especially important for the technology-follower countries, where firms rely more on incremental innovation rather than radical innovation.

The communication between the external environment and the organization is closely linked to the level of communication among the sub-units of the firm and the distribution of expertise within it (competencies). According to Cohen and Levinthal (1990), a firm's absorptive capacity depends on the individuals who stand either at the interface of the firm and the external environment, or at the interface between sub-units within the firm. Emerging from these ideas, we introduce to our analysis also a firm's competences and capabilities.

**Firm's competencies and capabilities**. External sources help build companies' competencies and capabilities, which represent a source of competitive advantage. Following

Prahalad and Hamel (1990) and Rajković and Prašnikar (2009), we define competences as collective learning and knowledge. They act as coordination mechanisms that combine individual actions into collective functioning and are the linkages to the environment (suppliers, customers, etc.), and they are revealed in the behavioural and cultural characteristics of the firm. Capabilities are narrower and represent competences' main constituents. They refer not only to having knowledge or possessing skills and qualifications, but also as employing those qualifications, similarly as Grant (1991) suggested.[21] Externally stimulated learning thus enhances both, which is a source of long-run competitive advantage (Peteraf, 1993; King and Zeithaml, 2001; Heene and Sanchez, 1997; Song et. al., 2005). Consequently, competences influence firm performance by affecting the rate and success of innovation (Tidd and Bodley, 2002).

More precisely, we give special attention to the technological, marketing, and complementary competences and capabilities, and measure them in terms of portfolios of respective capabilities. Technological capabilities usually refer to the capacity of a company to utilize scientific and technical knowledge for research and development (R&D) of products and processes, which lead toward greater innovativeness and performance (McEvily, Eisenhardt, and Prescott, 2004). Marketing capabilities, however, represent an integrated system of processes, based on common knowledge and skills, which enable the company to create customer value and to respond to the marketing challenges in a timely and effective manner (Song et al., 2005; Vorhies, Harker and Rao, 1999; Day, 1994). The complementary capabilities refer to the interaction between the remaining two: marketing and technological (Song et al., 2005).

**Firm's genetic material.** The comparative outcome of the innovation process strongly depends on internal, firm specific elements, which Nelson and Winter (1982) term 'genetic material.' While competences and capabilities represent one important aspect of the firm's internal organism, companies are limited in general also by the characteristics of their 'genetic material' (Nelson and Winter, 1982). Their processes and routines, relationships between the stakeholders within the company, decision-making, etc. represent genetic material (e.g. Cassiman and Veugelers, 2006; Tambe, Hitt, and Brynjolfsson, 2012). This implies that genetic material acts as a moderator between the opportunities of the external stimulus and innovation, and additionally also contributes to competences building. Simultaneously, genetic material itself is being developed within the 'learning-by-exporting' context. The argument is in line with the *dynamic capabilities theory* (Teece, et al., 1997), which claims that competitive advantage derives from leveraging managerial and organizational processes (genetic material) within and outside of the firm. It largely depends

[21] Since terms competencies and capabilities are sometimes confused, we make the following distinction among them. Competences spread across multiple functions, products, and markets in a sustainable and synchronized manner. Although they differ from company to company, they represent a wider and a more general concept and are not strictly industry specific. Capabilities, on the other hand, are repeatable patterns of actions in the use of assets to create, produce, and/or offer products to a market. They are industry specific (Rajkovič and Prašnikar, 2009).

on the firm's ability to renew and transform the capabilities in compliance with the changing business environment (see also Lichtenthaler, 2009).

Following the literature review, we believe that exposure to more developed external sources available through exports, impacts the genetic material, helps build the competences, and stimulates innovativeness. Based on this general proposition, we test the following four hypotheses:

*Hypothesis 1: The exposure to more developed markets is positively related to the genetic material of the firm.*

*Hypothesis 2: The exposure to more developed markets is positively related to firm's competences.*

> *Hypothesis 2a: The exposure to more developed markets is positively related to the marketing competences of the firm.*
>
> *Hypothesis 2b: The exposure to more developed markets is positively related to the technological competences of the firm.*
>
> *Hypothesis 2c: The exposure to more developed markets is positively related to the complementary competences of the firm.*

*Hypothesis 3: The exposure to more developed markets is positively related to innovative performance.*

*Hypothesis 4: Firm's genetic material is positively related to firm's competences.*

> *Hypothesis 4a: Firm's genetic material is positively related to marketing competences*
>
> *Hypothesis 4b: Firm's genetic material is positively related to technological competences.*
>
> *Hypothesis 4c: Firm's genetic material is positively related to complementary competences.*

*Hypothesis 5: Firm's genetic material is positively related to innovative performance.*

*Hypothesis 6: Competences are positively linked to innovative performance.*

> *Hypothesis 6a: Marketing competences are positively related to firm's innovative performance.*
>
> *Hypothesis 6b: Technological competences are positively related to firm's innovative performance.*
>
> *Hypothesis 6c: Complementary competences are positively related to firm's innovative performance.*

## 2.3 Methodology

### 2.3.1 Survey design and measures

The survey data used was gathered within a broader intangibles study that included different questionnaires that examine different aspects of intangible capital. The empirical analysis in this study is founded on the survey data from the innovation, "genetic material", and human resources questionnaires. The questionnaires required detailed information about the company in the previous 5 years. The questionnaires were carefully developed and supplemented also through a series of testing interviews.

The innovation questionnaire is founded on the Community Innovation Survey questionnaire, but was adapted and extended following the recommendations from the literature on innovation surveys (OECD/Eurostat, 2005; Mytelka et al., 2004; Mairesse & Mohnen, 2010; Forbes and Wield, 2000), dynamic capabilities theory and existing studies (such as Rajkovič and Prašnikar, 2009), trade theory (Helpman et al., 2004; Wagner, 1996; Wakelin, 1997; Weifens et al., 2000; Griffith et al., 2006), and evidence from previous experience in studying intangible capital in technologically less developed countries. The innovation questionnaire comprised 24 questions: the majority was of the cascading type, some were Likert scale, and some required very specific information on corporate performance (the questionnaire is discussed in more detail in Chapter 1). We first examined the target markets, clearly distinguishing between the developed (EU and other developed global) and less demanding national, local, and regional (Western Balkan) markets. The next section of 5 questions examined product innovation, followed by 2 questions on process innovation. The purpose was to find out primarily the intensity of each of the two types, sources of ideas and performance in comparison to competition (for product innovation). We also examined the technological dynamics of the industry. The section on knowledge spillovers analysed the relevance of four different groups of sources of innovative ideas categorized (internal, market, institutional, other), followed by the geographic location of innovation partners and types of cooperation. Then the attitude of the company towards R&D, organization of the R&D department, and R&D expenditure was carefully studied. All of these represent the foundation for development of technological, marketing, and complementary competences and capabilities, which are particularly important for innovations in developing countries (Forbes and Wield, 2000; Prašnikar et. al, 2008) and, thus, are followed by a section (questions 17-22) directly examining a firm's competences and capabilities. We also examined a firm's perceived performance in comparison to competition. The last question analysed the financing sources for R&D and the role of the state.

The questionnaire on genetic material features measures that were partly adapted from previous studies and partly developed based on theoretical foundations. The included questions examined: 1) decision-making, 2) adjusting employment, 3) wage setting, 4) role of labour unions, 5) participation of workers in risk sharing, 6) participation of workers in

decision-making, 7) internal training, and 8) on-the-job training. First, we addressed the choice about the separation of strategic function (usually given to top management), day-to-day decisions (which are usually in the hands of middle and lower management levels), the control function, which is in the hands of company owners (Wheelen and Hunter, 2010), and related agency problems and relationships between managers, owners, and workers (stakeholders) (Aoki, 1984; Van Essen, Oosterhout, and Heugens, 2012). Related to this, we examine the bargaining process between managers and employees (including bargaining over employment and wages), which also provides information on unions, labour restructuring models, core employees groups, and wage levels (reservation wage, collective bargaining wage, firm's wage level) (Ehrenberg et al, 2011; Estrin, Baghdasaryan and Meyer et al., 2009). We further examine workers' participation in decision-making, its impact on information exchange (Allen and Gale, 2002), cooperation, workers' loyalty, and risk sharing (Freeman and Lazear, 1995; Aoki, 2010; Williamson, 1982). Last, we examine human capital development, primarily internal training and on-the-job training, which are important for competences and capabilities development, represent a source of competitive advantage (Barney, 1991), and are the largest sub-category of human capital investment (Corrado et al, 2009; Fukao et al., 2009).

Methodologically, questionnaires used were based on a cascading approach following Miyagawa et al. (2010). Each question set of the cascading items contains three consecutive Yes/No statements. Each subsequent statement in the question set represents/describes a greater degree of complexity or stage of development, building into a cascading structure.[22] We also collected specific data about individual characteristics of the surveyed firms, such as export orientation, the markets in which the companies operate, ownership type, industry, and legal form.

### 2.3.2 Survey administration and sampling

The survey was conducted in 2010 and 2011. The questionnaires were sent to the 400 biggest Slovenian companies,[23] and one-quarter (100) of the companies responded. The questionnaires were filled out by the companies' CEOs. The sample comprised 100 companies, 81 of which were from the manufacturing sector, with the remainder from the service sector. The sample represents one-quarter of all larger and medium-sized (+100 employees) firms in Slovenia and is, thus, a very good representation of the actual situation in larger companies in Slovenia, which are also the companies that are relevant for the study.[24]

[22] A combination of closed questions directs respondents to a systematic way of thinking about the actual situation in the organization without being biased or too broad. See, Bloom and Van Reenen (2010) for an alternative view.

[23] These are all firms with more than 100 employees in the manufacturing and services sectors.

[24] In addition to sunk cost theory arguments (Dixit, 1989; Krugman, 1989) and arguments by Giovanni and Levchenko (2012) on the importance of size in penetrating foreign markets, the OECD also provides many advantages that are related to technological capabilities, and it is a significant factor in competing effectively, particularly over the long term (see for example Colvin, 1999). Larger companies have been shown to be also

Fifty per cent of companies operated primarily in the business-to-business market, while the rest operated primarily in the final customers market. The vast majority of companies (85%) reported at least some export activities (at least 1%), and 60% of companies reported to export more than one-half of sales. Thirty-nine per cent of companies reported the national market to be their biggest market. The average company had 582 employees in 2010.

## 2.4 Results

Following the research agenda we conducted first an exploratory clustering study based on trade theory to investigate how the development of the firm's biggest target market is related to its genetic material, development of competences and capabilities, and innovativeness. The structural equation modeling is used as a confirmatory method.

### 2.4.1 Target market, competences, capabilities and innovativeness

Following the Helpman et al. (2004) idea that companies that serve differently developed markets differ in their characteristics, we first divide the companies into two groups by their dominant market: exporting globally (Western markets) or selling to proximity markets. The first group consists of firms that declare Western markets (including EU markets) as the main market; the second group proclaims ex-Yugoslav markets as the main market. Ex-Yugoslav markets are considered as 'proximity markets' in our study since the common 'Yugoslav experience' provided Slovenian companies the historically set market position, brand recognition, market knowledge, and also relationship advantages.

Having divided the companies by their main markets (Global developed and Proximity markets groups), hierarchical cluster analysis (Ward method) was used to divide them further, since the variation of companies within each of the market groups was still significant in terms of their innovation characteristics. Eleven cascading variables[25] related to innovation activities were used, because we expect the companies to differ in innovation activity. We identified four clusters of companies, two within each of the above-mentioned groups. Given their characteristics, the clusters are referred to as 'Global-superior' cluster (oriented towards global developed markets) and 'Global–inferior' cluster (companies operating mainly in the EU markets), and 'Proximity–superior' cluster (operating mainly in both ex-Yugoslav and domestic markets), and 'Proximity–inferior' cluster (operating mainly in the domestic market). Table 1 summarizes groups' characteristics.

'indirectly' important for innovation, as one of their approaches to learning is also buying smaller innovative firms (Mandel and Carew, 2011).

[25] These include questions on the degree to which product and process innovations rely on internal research i.e. internal sources, novelty of innovation, company performance, revenues of technologically new products, the knowledge base of the company and how it is being improved and utilized, their R&D expenditures, as well as a company's perception of its marketing, technological, and complementary capabilities.

Table 7. General company information: percentage of companies in a cluster with selected characteristics

| | Global markets | | Proximity markets | |
|---|---|---|---|---|
| | Superior | Inferior | Superior | Inferior |
| **Total number of observations** | **24** | **24** | **24** | **28** |
| Size (250+) (% of all) | 70.80 | 66.70 | 70.80 | 46.40 |
| More than 50% of export (% of all) | 100.00 | 95.80 | 25.00 | 21.00 |
| Manufacturing (vs. services) (% of all) | 95.80 | 91.70 | 70.80 | 53.60 |
| Form (doo) (% of all) | 50.00 | 45.80 | 41.70 | 46.40 |
| B2B (% of all) | 62.50 | 62.50 | 37.50 | 39.30 |

On average, over 90% of sales in the Global group of firms is sold in the Western markets, while domestic markets and ex-Yugoslav markets represent close to 80% of sales in the Proximity group. In addition, the Global group comprises strong manufacturing companies, both from the more propulsive as well as traditional industries, in both cases primarily B2B companies. The first group invests significantly more in R&D[26] and has more advanced technology than the second group (see table 8 for details).

The 'Global-superior cluster' comprises manufacturing companies, which all export most of their products worldwide. This is a cluster of strong Slovenian companies from the steel, construction related, electrical, machinery, and automotive industries. Many of these represent important parts of European or global value chains (62% are B2B). The other cluster in this group, the 'Global-inferior' cluster, services mainly the EU markets. Although the majority of firms reported the EU markets as their most important (85%), and although they are similarly to the first primarily manufacturing firms, the important difference between the two is that these are smaller companies operating in less propulsive and more traditional manufacturing industries (like wood or electrical appliances). This cluster, similarly to the first, mainly comprises manufacturing firms (above 90%). However, these are smaller companies operating in less propulsive and more traditional manufacturing industries (like wood or electrical appliances).[27]

The 'proximity markets' also provided two clusters. The first cluster of 24 companies, dominated by large manufacturing companies, demonstrates superiority to the second in many innovation aspects. The second cluster of 28 companies consists of smaller companies (less than one-half of them have more than 250 employees), many of which are from service industries.

[26] As much as 75% of the 'Global- superior' cluster invests at least 3% of revenue in R&D, and over 40% of companies of the 'Global-inferior' cluster. In the proximity markets group one-third from the more innovative cluster, 'Proximity-superior' invest at least 3% in R&D, while only 7% from the 'Proximity-inferior' cluster do the same.

[27] Quite a few are engaged in the low(er) value added distressed exports ('lohn exports' or subcontracting, see Prašnikar et al., 2004).

Table 8 presents the results on innovative activities across the four clusters of Slovenian firms. Since our fundamental division of the sample into two groups (each further divided into two clusters) was made taking into account main market orientation, we present statistical significances of the association between cluster membership and variables of interest for (1) two clusters in the same market-based group and (2) the two market-based broad groups. The 'Global-superior' cluster (see columns 1-2 for *n* and percentages) had the most intense innovation activity and also most developed 'innovation culture.' Ninety-six per cent of companies introduced new products that were new for the firm. Out of these, 75% introduced at least one product, which was new to its most important market, and 50% of companies introduced also globally new products in the past five years (global niche producers). Ninety-two per cent of companies consider R&D to be strategically important for the company and three-quarters of firms invested at least 3% of revenue in R&D. Ninety-one per cent report that product development was not a result of imitation, but primarily resulted from the work within the company and cooperation with partners (60%). Regarding process innovation, more than 80% of firms stated that they developed processes mainly inside the company and almost 50% in cooperation.[28] Innovation ideas were largely obtained from within the chain (54% of firms compared to only 29% in the 'Global–inferior', (see columns 3-4 for *n* and percentages), which indicates a high dynamics of cooperation in the chain.

The 'Global-superior' cluster is very confident about their capabilities[29] (marketing, technological, and complementary), the advancement of R&D, establishing long-term relationships with customers, and in the within-firm cooperation at all levels (question sets 4-6). This is very important for both absorption and knowledge transfer from the outside and also within the firm.

Table 8. Main characteristics of the 4 clusters: Percentage of companies with an affirmative answer to a specific question

| | **Groups according to market orientation** | | | | | | |
|---|---|---|---|---|---|---|---|
| | Global | | | Proximity | | | |
| **Question/variable** | Superior Obs.=24 | Inferior Obs.=24 | $\chi^2$ | Superior Obs.=24 | Inferior Obs.=27 | $\chi^2$ | Differences Global and Proximity $\chi^2$ |
| | in % | in % | | in % | in % | | |
| **COMPANY'S KNOWLEDGE BASE IS ENHANCED BY:** | | | | | | | |
| from environment into the company | **100.0** | **91.7** | 0.149 | **100.0** | **96.4** | 0.350 | 0.470 |
| strategic partnerships | **83.3** | **70.8** | 0.303 | **75.0** | **71.4** | 0.772 | 0.409 |
| extended outside - selling intellectual property rights | **12.5** | **20.8** | 0.439 | **8.3** | **3.6** | 0.463 | 0.770 |
| **R&D EXPENDITURE** | | | | | | | |
| at least 1% of revenue. | **100.0** | **83.3** | 0.037 | **79.2** | **53.6** | 0.053 | 0.001 |
| at least 2% of revenue. | **91.7** | **58.3** | 0.008 | **45.8** | **10.7** | 0.004 | 0.000 |
| at least 3% of revenue. | **75.0** | **41.7** | 0.019 | **33.3** | **7.1** | 0.017 | 0.000 |
| **PERCEPTION OF R&D** | | | | | | | |

[28] A detailed analysis of data on cooperation in new product and new processes development (additionally collected in our survey) show that this is done primarily within the value chain, where buyers and suppliers are more important sources of ideas compared to the 'Global-inferior' cluster.

[29] Here capabalities are used as part of a cascading questionnaire. Since capabilities are firm specific, there is no possibility to compare them among firms, except if we look for a comparison with competitors in the industry.

| Question/variable | Groups according to market orientation: Global Superior Obs.=24 in % | Global Inferior Obs.=24 in % | Global $\chi^2$ | Proximity Superior Obs.=24 in % | Proximity Inferior Obs.=27 in % | Proximity $\chi^2$ | Differences Global and Proximity $\chi^2$ |
|---|---|---|---|---|---|---|---|
| **EXPENDITURE** | | | | | | | |
| NOT solely as an unnecessary expenditure | **100.0** | **87.5** | 0.074 | **95.8** | **67.9** | 0.011 | 0.050 |
| knowledge transfer among employees is very important | **95.8** | **79.2** | 0.081 | **87.5** | **53.6** | 0.008 | 0.024 |
| of strategic importance to the company | **91.7** | **66.7** | 0.033 | **75.0** | **32.1** | 0.002 | 0.004 |
| **TECHNOLOGICAL CAPABILITIES** | | | | | | | |
| exceed the average companies' in industry | **91.7** | **41.7** | 0.000 | **100.0** | **39.3** | 0.000 | 0.557 |
| are more technologically competent as competitors | **79.2** | **37.5** | 0.003 | **100.0** | **39.3** | 0.000 | 0.235 |
| tech. capab. are dynamically replaced by new | **79.2** | **29.2** | 0.001 | **95.8** | **28.5** | 0.000 | 0.364 |
| **MARKETING CAPABILITIES** | | | | | | | |
| exceed the average companies' in industry | **95.8** | **4.2** | 0.000 | **87.5** | **25.0** | 0.000 | 0.427 |
| are more competent in marketing as competitors | **91.7** | **4.2** | 0.000 | **87.5** | **17.9** | 0.000 | 0.497 |
| marketing capabilities are dynamically replaced by new | **83.3** | **4.2** | 0.000 | **83.3** | **7.1** | 0.000 | 0.522 |
| **COMPLEMENTARY CAPABILITIES** | | | | | | | |
| experts exchange informally tech. and mark. capabilities | **100.0** | **54.2** | 0.000 | **83.3** | **75.0** | 0.463 | 0.511 |
| experts cooperate in all stages of NP | **100.0** | **41.7** | 0.000 | **83.3** | **64.3** | 0.123 | 0.489 |
| new products in the pipeline at all times | **37.5** | **8.3** | 0.016 | **50.0** | **7.1** | 0.001 | 0.409 |
| **INTRODUCING NEW PRODUCTS** | | | | | | | |
| significant number new to the firm | **95.8** | **87.5** | 0.296 | **95.8** | 0.003 | 0.040 | 0.040 |
| majority of them new to the market | **75.0** | **50.0** | 0.074 | **83.3** | 0.000 | 0.145 | 0.145 |
| also novelty in the global markets | **50.0** | **29.2** | 0.140 | **41.7** | 0.000 | 0.021 | 0.021 |
| **PRODUCT INNOVATION** | | | | | | | |
| NPs primarily NOT developed by imitation | **91.7** | **72.9** | 0.220 | **100.0** | **85.7** | 0.054 | 0.218 |
| NPs developed primarily in company/group | **62.5** | **70.8** | 0.064 | **100.0** | **64.3** | 0.001 | 0.577 |
| NPs developed with cooperation | **45.8** | **62.5** | 0.768 | **70.8** | **21.4** | 0.000 | 0.078 |
| **COMPANY PERFORMANCE COMPARED TO COMPETITORS** | | | | | | | |
| least on a par with peers | **91.7** | **72.2** | 0.220 | **95.8** | **75.0** | 0.038 | 0.568 |
| better than peers | **62.5** | **33.3** | 0.043 | **87.5** | **39.3** | 0.000 | 0.122 |
| one of the leaders in industry | **45.8** | **20.8** | 0.066 | **79.2** | **14.3** | 0.000 | 0.181 |
| **PROCESS INNOVATION** | | | | | | | |
| NPcs primarily NOT developed by imitation | **87.5** | **83.3** | 0.683 | **95.8** | **75.0** | 0.038 | 0.568 |
| NPcs developed primarily in company/group | **83.3** | **62.5** | 0.104 | **95.8** | **53.6** | 0.001 | 0.581 |
| NPcs developed with cooperation | **45.8** | **45.8** | 1.000 | **70.8** | **35.7** | 0.012 | 0.342 |
| **FIELDS OF PROCESS INNOVATION IN THE LAST FIVE YEARS** | | | | | | | |
| introduced process innovation in past 5y | **95.8** | **79.2** | 0.081 | **70.8** | **50.0** | 0.127 | 0.002 |
| improved production processes | **87.5** | **70.8** | 0.155 | **83.3** | **42.9** | 0.003 | 0.044 |
| improved logistics, delivery, distribution | **70.8** | **37.5** | 0.020 | **75.0** | **50.0** | 0.065 | 0.293 |
| improved support services (maintenance, sales, IT, accounting etc.) | **79.2** | **45.8** | 0.017 | **85.8** | **64.3** | 0.005 | 0.057 |

The ‘Global-inferior’ cluster invests a smaller percentage of revenues in R&D and places considerably less strategic importance on R&D than the ‘Global-superior’ cluster. In that sense it is not surprising that merely one-half of them reported introducing a product that is a

novelty in their main market. These companies primarily rely on simpler types of innovation, like improving existing products, and fall behind the first cluster in this group especially with regard to new product lines and extensions to existing product lines. Similarly, considerably fewer firms regard their capabilities better than those of the other companies in the industry, especially when it comes to marketing capabilities. These, and consequently the complementary capabilities, are evaluated worst in the entire sample (only 1 company believed it exceeded the average compared to 95% of the Global – superior and 87% of the Proximity-superior cluster).

The **'Proximity-superior'** cluster reported more cooperation with other companies or institutions in the innovation processes (columns 6-7 for *n* and percentages). Interestingly, these companies graded their capabilities second highest in the whole sample, ranking far above the second cluster in the 'Global' group of companies. Their confidence in technological capabilities was especially evident. Namely, they all believed to exceed their industry competitors. However, this perception could be largely determined by the complexity of their target market. Many of the firms in this cluster are well positioned in the markets of ex-Yugoslavia, where proximity and historically conditioned knowledge of the competition are sources of comparative advantage. On the other hand, global markets are more competitive. This relative position impacts the self-perception of firms in both groups. The confidence is further evident in the comparison of the two broad market-based groups (Global and Proximity group, each identified by its two clusters). The insignificant difference between the main market-based groups (Global and Proximity) can be attributed to the 'Proximity-superior' cluster's results of the evaluation of capabilities and performance relative to competition. On the other hand, the difference between the two clusters within the groups is significant (column 11 for comparison of just two groups, columns 5 and 10 for comparison of clusters within groups). Otherwise, the 'Proximity-superior' cluster was quite innovative, 96% of companies introduced new products, and as much as 42% reported the products were novelties not only for the firm, but also new for their main market. Seventy-nine per cent believed to be leaders in the industry in terms of innovation in their target market.

The fourth subgroup of companies, or the second cluster in the second group, the '**Proximity–inferior**' cluster, placed least strategic importance on R&D and had the lowest share of revenues invested in R&D among the four subgroups (only 7% of firms spent 3% or more on R&D activities). Indeed, the cluster ranks lowest regarding the innovative performance in comparison to the other subgroups. None of the companies in the cluster introduced a globally novel product in the past five years, and only 21% of them introduced a novelty to the market, which does not predict a bright future. Regarding the perception of their capabilities, they significantly fall behind the 'Proximity-superior' cluster. But

interestingly, these companies rank their marketing and complementary capabilities higher than the second cluster in the Global group (the Global-inferior cluster).[30]

The results consistently show the innovative superiority of the Global-superior cluster: the anticipated result. On the other hand they reveal also the solid performance of the Proximity-superior cluster, while both groups leave the two inferior clusters behind. As hypothesized, the explanation could be found partially in firms' genetic material.

### 2.4.2 Target market, innovativeness and genetic material

Table 9 presents the differences in the genetic material between the clusters. The Chi-square test of independence is presented (1) for pairs of clusters that constitute two groups of firms (columns 5 and 10) and (2) for the two broad groups.

The results illustrate higher coordination between owners, managers, and workers in decision-making in the 'Global-superior' cluster than in the companies of the 'Global-inferior' cluster. The other two clusters are also trailing behind the 'Global-superior' in this indicator. The 'Global-superior' cluster also included more often at least 50% of workers in internal training, empowered workers more, and had higher transfer of knowledge among employees. Their workers are more loyal and have higher inclination towards risk than in the 'Global-peripheral' cluster.

Table 9. Main characteristics of firms' genetic material by clusters Main characteristics of firms' genetic material by clusters

| | **Groups according to market orientation** | | | | | | |
|---|---|---|---|---|---|---|---|
| | Global | | | Proximity | | | |
| **Question/variable** | Superior Obs.=24 in % | Inferior Obs.=24 in % | $\chi^2$ | Superior Obs.=24 in % | Inferior Obs.=27 in % | $\chi^2$ | Differences Global and Proximity $\chi^2$ |
| **DESISION MAKING** | | | | | | | |
| operation/strategic management separation | **87.5** | **70.8** | 0.155 | **79.2** | **81.5** | 0.835 | 0.879 |
| managers and owners act unanimously | **87.5** | **50.0** | 0.005 | **70.8** | **74.1** | 0.796 | 0.678 |
| owners, managers and workers coord. | **75.0** | **50.0** | 0.074 | **58.3** | **63.0** | 0.735 | 0.861 |
| **DECISIONS ON EMPLOYMENT** | | | | | | | |
| short term adjust. to shocks | **100.0** | **100.0** | 1.000 | **91.7** | **96.3** | 0.483 | 0.088 |
| achieving desired level of employment | **79.2** | **87.5** | 0.439 | **75.0** | **70.4** | 0.712 | 0.197 |
| core group of employees | **54.2** | **70.8** | 0.233 | **37.5** | **37.0** | 0.973 | 0.012 |
| **DECISIONS ON WAGES** | | | | | | | |
| operation/strategic management separation | **79.2** | **54.2** | 0.066 | **75.0** | **59.3** | 0.234 | 1.000 |
| managers and owners act unanimously | **58.3** | **25.0** | 0.019 | **45.8** | **29.6** | 0.232 | 0.653 |
| owners, managers and workers coord. | **20.8** | **20.8** | 1.000 | **33.3** | **0.0** | 0.001 | 0.507 |

[30] Since this cluster incorporates a number of service firms, it should be noted that innovation in the service sector differs from innovation in production. Due to their intangible nature and diversity, innovation processes in services require less R&D investments and can, more often than not, even be pursued without a structured R&D department. Therefore, the mutual co-operation with customers when developing services is often the most important source of knowledge among the many sources that service providers can find in their environment (Johne and Storey, 1998; Tidd and Hull, 2003; Edvardsson et al., 2000).

| Question/variable | Groups according to market orientation | | | | | | |
|---|---|---|---|---|---|---|---|
| | Global | | | Proximity | | | |
| | Superior Obs.=24 in % | Inferior Obs.=24 in % | $\chi^2$ | Superior Obs.=24 in % | Inferior Obs.=27 in % | $\chi^2$ | Differences Global and Proximity $\chi^2$ |
| **THE UNION ROLE** | | | | | | | |
| workers organized in unions | **91.7** | **83.3** | 0.383 | **91.7** | **96.3** | 0.483 | 0.252 |
| one union organization | **54.2** | **58.3** | 0.771 | **54.2** | **81.5** | 0.036 | 0.203 |
| unions concerned with a firm's success | **12.5** | **16.7** | 0.683 | **16.7** | **18.5** | 0.863 | 0.679 |
| **WORKERS INCLINATION TOWARDS RISK** | | | | | | | |
| prepared to do "more" for the firm | **87.5** | **79.2** | 0.439 | **95.8** | **77.8** | 0.061 | 0.683 |
| would stay with the firm in bad times | **54.2** | **45.8** | 0.564 | **75.0** | **44.4** | 0.027 | 0.378 |
| willing to make finan. invest. in a firm | **25.0** | **20.8** | 0.731 | **37.5** | **14.8** | 0.064 | 0.765 |
| **WORKERS PARTICIPATION** | | | | | | | |
| workers are informed | **91.7** | **83.3** | 0.383 | **91.7** | **88.9** | 0.739 | 0.670 |
| open dialog with managers | **83.3** | **70.8** | 0.303 | **83.3** | **81.5** | 0.863 | 0.514 |
| workers are members of gov. bodies | **50.0** | **41.7** | 0.562 | **50.0** | **59.3** | 0.507 | 0.367 |
| **INTERNAL TRAINING** | | | | | | | |
| existence of organized forms in the firm | **100.0** | **100.0** | 1.000 | **90.0** | **94.4** | 0.612 | 0.081 |
| more than 50% of workers participate | **80.0** | **52.9** | 0.080 | **60.0** | **55.6** | 0.782 | 0.387 |
| other methods of evaluation than survey | **60.0** | **58.8** | 0.942 | **65.0** | **38.9** | 0.107 | 0.551 |
| **ON-THE-JOB TRAINING** | | | | | | | |
| existence of organized forms in the firm | **100.0** | **100.0** | 1.000 | **95.0** | **100.0** | 0.336 | 0.321 |
| knowledge transfer among employees | **95.0** | **70.6** | 0.045 | **85.0** | **72.2** | 0.335 | 0.591 |
| successors for most of key employees | **40.0** | **17.6** | 0.138 | **60.0** | **33.3** | 0.100 | 0.117 |

In terms of genetic material, the ‘Global–inferior’ cluster reports the least cooperation in decision-making among all four clusters (columns 3 and 4 for *n* and *percentages*). Similarly, wages were lowest, as only 25% reported having higher wages than those determined by the collective agreement (compared to 60% of the ‘Global-superior’ cluster and 46% of the ‘Proximity-superior’ cluster). Workers in this cluster are on average the least involved in decision-making relative to the other clusters. The companies from this cluster seem also to perform poorly in terms of internal training and on-the-job training. Namely, only 53% of companies offered training to at least one-half of employees compared to 80% of the ‘Global–superior’ cluster, 60% in the ‘Proximity– superior’ cluster, and 56% in ’Proximity–inferior’ cluster companies. The lack of cooperation, trust, and investment in human capital could also explain the poor evaluation of capabilities compare to competition, which definitely is a strong deficiency of the group both in terms of absorption and innovation.

When comparing the two clusters in the second group of firms (Proximity group), the ‘Proximity–superior’ excels the ‘Proximity–inferior’ cluster in two sets of questions: workers inclination towards risk and decisions on wages. Both could be interrelated: higher wages could imply higher loyalty of workers (risk takers). However, the ‘Proximity–superior’ cluster reports higher loyalty also in comparison to the two clusters in the Global group. Due to the high values ‘for on-the-job training’ variables, this cluster (besides the ‘Global-superior’ cluster) has the highest potential of genetic material. However, there are two observations to be made here. First, the ‘Global-superior’ cluster is exposed to the developed global markets and the ‘quality of knowledge and ideas’ can be expected to be higher and more stimulating to innovation. In addition, the confidence of the ‘Proximity–superior’ firms

in their capabilities stems from their focus on less demanding markets. This could have a detrimental impact on their motivation to invest and their consequent long-run growth. In general, a similar remark can be made as in the case of innovation: the performance and confidence of the 'Proximity-superior' firms causes the insignificance of the Chi-squared test for the two broad market based groups.

The 'Proximity–inferior' cluster seems to be quite strong regarding 'cooperation in strategic decision-making,' with 63% of companies reporting relying on coordination among all three stakeholders. It only falls short of the 'Global-superior' cluster. In addition, compared to the 'Proximity–superior' cluster the workers are more unionized, but have lower wages. Also their inclination to risk is lower, and is, in fact, the lowest among all clusters.

Overall, it seems that in Slovenia genetic material works in favour of innovative activities of firms, especially in the 'Global-superior' cluster of firms. What sets this cluster most obviously apart from the other is its focus on innovation and its export-orientation. The 'Global-superior' cluster in the majority of aspects leads the other three, although the 'Proximity-superior' cluster does possess much confidence and quite solid genetic material. Also its innovative capabilities in terms of new products are quite high compared to their respective competitors. On the other hand, the nature of the market in which these firms operate should not be overlooked. These are less demanding markets with less fierce competition and lower purchasing power. Therefore, their innovative capabilities are most likely overestimated. The 'Global–inferior' cluster is lagging behind the 'Global-superior' cluster in many aspects of genetic material. Finally, 'Proximity – inferior' firms are mainly exposed to the domestic markets. Poor investment in human capital, combined with the already weak evaluation of capabilities, shows that they lag behind. As the 'Proximity – inferior' cluster encompasses the highest proportion of services firms among the four clusters, and given that those services are mainly belonging to the non-tradable sector i.e. 'serve' the domestic market, the results indicate that this can actually represent an obstacle to the general economic development (Aoki, 1999; Gali and Monaceli, 2000; Clarida, Gali, and Gertler, 2001).

### 2.4.3 Measurements

In continuing, structural modeling is used to investigate the main proposition of the study in this chapter, stating that exposure to more developed markets and external sources of knowledge and ideas impact the formation of corporate genetic material, which in turn improves the overall innovative performance. We analysed our theoretical model using partial lest squares structural equation modelling PLS[31]. The main choice of the PLS method is based on its practicality in exploratory theory-building research (Gefen, Straub and Boudreau, 2000; Chin, Marcolin and Newsted, 2003). Additionally, this method has been

[31] We generated our estimates using the Smart PLS software (Ringle, Wende, and Will, 2005).

shown to be appropriate when dealing with non-normal and small samples' data, as well as to be effectively managing the low possible causal relationships between the constructs.

The exploratory clustering analysis revealed the divergent effect of the market orientation: besides the innovative firms, the less innovative, cost-competing firms also serve foreign developed markets.[32] Survival is the main innovation motivator, and innovation is primarily process-oriented. To capture the impact of the availability of quality ideas and information from foreign markets, but also avoid this complication of two 'very open, but very different in quality' clusters, we abstain from including a construct of export and rather examine the concept of external influence through the external sources of information and ideas. These, naturally, are very closely related to the quality of the served markets.

The model comprises five constructs. As a dependent variable the construct '*Innovative performance*' is used. It includes three indicators: (1) an indicator for the variety of new products in the firm (NUM_NP); (2) an indicator that determines the comparative time-efficiency in adapting products to changed demand and is according to the theory also an indicator of incremental innovation efficiency (TIME_ADPT); and (3) an indicator of the time-effectiveness of new product development (TIME_DVLP), which is considered also a measure of radical innovation and its efficiency.[33]

To evaluate the sources of information we develop a construct '*External sources*', which is based on items measured on a three-point Likert scale (from low = 1 to high = 3). The external sources construct comprises buyers, competitors and other companies in the field, and scientific, commercial, and technical journals. The choice[34] was based on the evaluation and validation phases of the model; the construct was revisited and only these items that produced the most optimal construct reliability were retained (see table B1 in the appendix B for full list of indicators). From the perspective of the hypotheses, it should be noted that those that serve more developed markets cooperate more deeply and with more innovative and technologically advanced suppliers, and deal with fiercer competition, etc. (on average,).

The '*Genetic material*' construct was built using variables with a dichotomous scale (yes = 1; no = 0). The combination of the indicators that measure the strategic decision-making process, the role of the workers, and the transfer of knowledge revealed best construct

[32] As mentioned before, these are but primarily subcontracting firms involved in lower value added production that does not hold strategic orientation towards innovation, and are still in the beginning phases of the export-led strategy. Also Prašnikar and Voje (2013) find that the cost-competing firms, which are less innovative, managed to penetrate developed markets due to favourable pre-crisis economic conditions.

[33] According to Rajković (2011), the time needed to adapt existing products to new/changed market demand is also an indicator for incremental innovation and consequently also of the "efficiency of improving products" in the firm. The variable "Time needed to develop a completely new product" is perceived as an indicator for radical innovation and thus "effectiveness for developing new products."

[34] Namely, on this scale firms rated the importance of externally available information that included: 1) suppliers of equipment; 2) suppliers of materials, components, and program equipment; 3) buyers; 4) competitors and other companies in the field; 5) consultants, private research, or R&D facilities; 6) universities or other higher education institutions; 7) government or public research institutions; 8) conferences, market fairs, exhibits; 9) scientific, commercial, and technical journals; and 10) industrial associations and chambers.

reliability (Table 10). This combination of indicators seems consistent with the actual behaviour of Slovenian firms. Anecdotal evidence points to the lack of successful practices and cohesion in many failed firms. In addition, Prašnikar and Voje (2013) find that the first, most innovative cluster was the one that had most consistently used profit-maximizing behaviour, while the rest of the clusters had a much higher bargaining power of workers. Consequently, more attention was paid to wages. In the long run such (non-profit-maximizing) behaviour results in the loss of competitiveness, growth, and finally wages and employment, which can be observed in Slovenia at the moment.

The items of the constructs '*Technological competences,*' '*Marketing competences,*' and '*Complementary competences*'[35] are measured on a five-point Likert scale[36]. Interviewees were asked to evaluate their perceived performance with respect to their competitors' in the areas of interest. Technological competences were measured by the perceived performance in the development of R&D, the contribution of strategic partnership, and the ability to predict technological trends. Marketing competences were measured by the perceived success in knowing the consumers and managing suppliers and customers. Complementary competences were captured through a set of questions examining transfer of knowledge between businesses, strategic partners, cost-efficiency of product development, and the clarity of business units' activity division (table 10). The complete list of measures is given in table B1 in the appendix B.

Table 10. Questions for indicator variables

| Construct | Indicator abbreviation | Question for the indicator variable |
|---|---|---|
| **External sources** | BYRS | Buyers |
| | COMPS | Competitors and other companies in the field |
| | JOURN | Scientific, commercial, and technical journals |
| **Genetic material** | SYS_TRANS | Do you systematically induce knowledge transfer among employees? |
| | DIALOG | Is there an established open dialog with the workers about key decisions for the firm? |
| | COORD | Are the basic strategic decisions in the firm coordinated among owners, managers and workers |
| **Technological competences** | RD_ADVNC | Research and development in the firm is advanced |
| | TECH_CAP | Number of available technological capabilities inside the firm or through strategic partnership is quite large. |
| | PRED_TRND | We are good at predicting technological trends |
| **Marketing competences** | INFO_CUST | Obtaining information on changes of customer preferences and needs |
| | INFO_COMP | Acquiring real time information about competitors |
| | CUST_REL | Establishing and managing long-term customer relations |
| | SUPP_REL | Establishing and managing long-term relations with suppliers |

[35] Here we observe a firm's competencies captured through a portfolio of respective capabilities. Following Rajkovič and Prašnikar (2009), we are able to construct competencies that are comparable among different industries. Due to different observed aspects in each group of competencies (technological, marketing, and complementary), the variability between them increases.

[36] 1 – "considerably worse than the main competitors" to 5 – "considerably better than the main competitor"

| Construct | Indicator abbreviation | Question for the indicator variable |
|---|---|---|
| **Complementary competences** | KNOL_TRANS | Good transfer of technological and marketing knowledge among businesses |
| | RD_COOPER | Intensity, quality and extent of R&D knowledge transfer in co-operation with strategic partners |
| | COST_EFF | Product development is cost efficient. |
| **Innovation performance** | NUM_NP | Number of new, adapted or completely new products |
| | TIME_ADPT | Time needed to adapt existing products to new/changed market demand |
| | TIME_DVLP | Time needed to develop a completely new product |

The analysis was done on a sample of 73 companies with a complete dataset. We first assessed the measurement model and then tested for significant relationships in the structural model. Reflective measurement models should be assessed with regard to their reliability and validity (Hensler et al., 2009). For the construct reliability we look at the Composite Reliability column in table 11. According to Nunnally and Bernstein (1994), values of 0.60 to 0.70 in exploratory research and values from 0.70 to 0.90 in more advanced stages of research are regarded as satisfactory. Next, in order to determine the convergent validity, we look at the average variance extracted (AVE) by each construct. According to Fornell and Larcker's (1981) criterion, an AVE value of 0.50 and higher indicates a sufficient degree of convergent validity, meaning that the latent variable explains more than one-half of its indicators' variance.

Table 11. Statistic summary for the model

| Construct | Indicator | Loadings | AVE | Composite Reliability | Cronbach's Alpha |
|---|---|---|---|---|---|
| External sources | | | 0.5661 | 0.8004 | 0.5751 |
| | BYRS | 0.8627 | | | |
| | COMPS | 0.7422 | | | |
| | JOURN | 0.6559 | | | |
| Genetic material | | | 0.5348 | 0.7715 | 0.5354 |
| | KNOL_TRANS | 0.8020 | | | |
| | DIALOG | 0.8021 | | | |
| | COORD | 0.5653 | | | |
| Marketing competences | | | 0.7122 | 0.9078 | 0.7122 |
| | INFO_CUST | 0.8349 | | | |
| | INFO_COMP | 0.7455 | | | |
| | CUST_REL | 0.8875 | | | |
| | SUPP_REL | 0.8990 | | | |
| Technological competences | | | 0.7898 | 0.9182 | 0.7892 |
| | RD_ADVNC | 0.9206 | | | |
| | TECH_CAP | 0.8763 | | | |
| | PRED_TRNDS | 0.8673 | | | |
| Complementary competences | | | 0.6465 | 0.895 | 0.7402 |
| | KNOL_TRANS | 0.8040 | | | |
| | RD_COOPER | 0.9061 | | | |
| | COST_EFF | 0.8679 | | | |
| Innovation performance | | | 0.5477 | 0.8829 | 0.7155 |
| | NUM_NP | 0.8766 | | | |

| Construct | Indicator | Loadings | AVE | Composite Reliability | Cronbach's Alpha |
|---|---|---|---|---|---|
| | IMPROV_PR | 0.8225 | | | |
| | TIME_DVLP | 0.8375 | | | |

In addition to composite reliability, the reliability of constructs is confirmed under the Cronbach's Alpha column where all values are above the minimum requirement of 0.5. The discriminant validity of the research instruments was also established using the Fornell-Larcker Criterion according to which the average variance extracted (AVE) of each latent construct should be higher than the construct's highest squared correlation with any other latent construct.

Summary statistics (table 11) reveal that confidence was gained with respect to the measurement model assessment and signifies we can move on to evaluation of the structural model and test its associated hypotheses. PLS relies on bootstrapping techniques to obtain t-statistics for the path coefficients and hypothesis tests. To obtain these statistics, the number of cases was increased twice and re-sampled 400 times. We have additionally performed several tests to rule out the presence of common method bias. The detailed discussion is moved in appendix B.

### 2.4.4 Structural model

The results of the analysis of the structural model and the hypotheses are presented in Figure 3.

Figure 3. Results of the analysis of the structural model

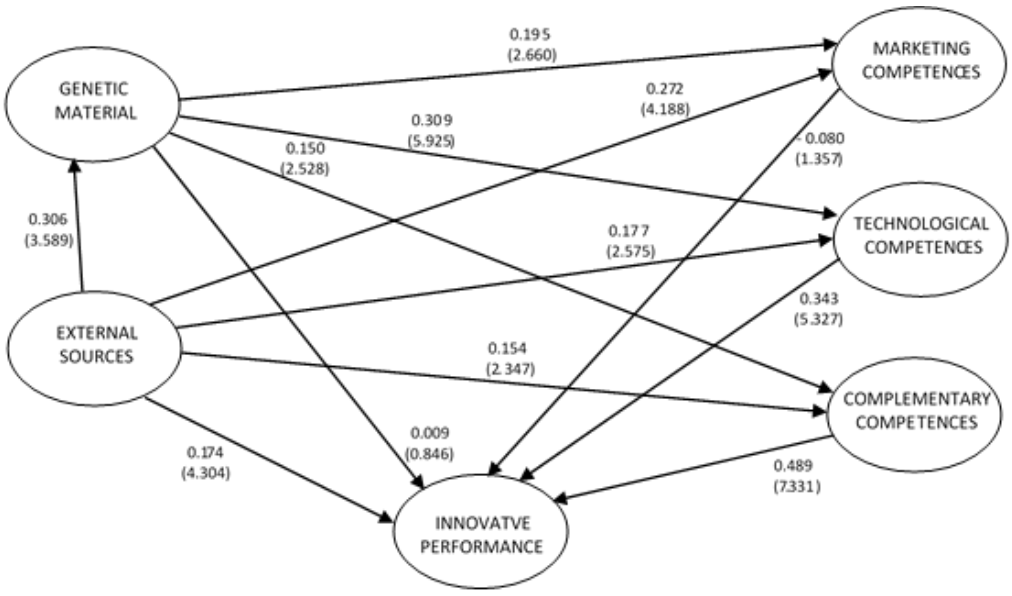



Figure 3 reveals the estimated path coefficients and corresponding t-values in brackets. As many studies have long argued, firms do not operate or innovate in isolation, but rather

through enduring inter-relations with other firms, institutions, and even buyers (see for example Håkansson, 1987; Freeman, 1991; Harland, 1996; Gulati, Nohria and Zaheer, 2000; Coombs, Harvey and Metcalfe, 2003). Our results confirm hypothesis 3 revealing a positive and significant link between the external sources of innovative ideas and the company's innovative performance. In this case the external environment acts as innovation-generating informal exchanges and learning. The external sources of innovative ideas further reveal a positive impact on genetic material (hypothesis 1). As a firm's environment is captured partly with the notion of genetic material and partly with its competences, the results confirm the proposition that firms with developed genetic material tend to benefit more from utilizing external sources of innovative knowledge. This only confirms that genetic material (or 'routines' as referred to in Cohen et al., (1996)'s definition[37]) is collective (usually, organization) level constructs that embody prior learning and are environmentally activated and selected.

The communication between the external environment and the organization is closely linked to the level of communication among the sub-units of the firm and distribution of expertise within it (competences). According to Cohen and Levinthal (1990), the firm's absorptive capacity depends on the individuals who stand at the interface of both the firm and the external environment, or at the interface between sub-units within the firm. Our results confirm hypothesis 2 and reveal a positive influence of the external sources on the firm's competences. As competences are processes and include interconnected sharing of knowledge, the path coefficients support the notion that this learning is enhanced by information incoming from the environment. The more developed the competences, the better translation of the knowledge into the innovation process. This is typically confirmed in the paths that lead from the competences to the innovative performance (hypothesis 6). The complementary competences have the strongest impact, followed by the technological competences. The interlocked influence of marketing and technological competencies on innovative performance is mirrored through complementary competencies, which demonstrate the strongest effect. This is especially true for the manufacturing companies, where new products must first offer new technological solutions and must only then obtain a market valuation with the product being the combined 'result' of all three types. Technological competencies exhibit a strong and significant impact, as expected. The deviation from the hypothesized link in the case of marketing competences can be attributed to several reasons. First of all, the Global – inferior cluster reported extremely poor marketing competences. On the other hand, innovation, driven by survival need, was quite vibrant despite reliance on simpler types of innovation and process innovation (cost-competitors). For example, only 1 company believed its marketing competences exceed the average of the industry, while 87.5% introduced new products. In addition, quite a number of companies in the sample (23%) are service companies. These are much less innovative than the average (primarily captured in the fourth cluster), and innovation is also not strategically very

[37] The authors define a routine as ''an executable capability for repeated performance in some context that has been learned by an organization in response to selective pressures'' (Cohen et al., 1996, p. 683).

important. But, they have strong marketing sections in comparison to the average company and especially B2B companies. Additionally, it should be noted that technological competences are also more important for innovation from customers' point of view, since through practical application of scientific knowledge they yield new or adapted (to customers' needs) goods and services (Arguelles, Miravitlles and Nueno, 1990).

A firm's competences not only directly affect innovative performance, but can also serve as important complements to each other enhancing effectiveness and driving the firm's competitive advantage (Lokshin, Van Gils, and Bauer, 2009). In that direction the results show consistency with the stream of research that perceives learning as taking place through participation in communities-of-practice (Lave and Wenger, 1991; Wenger, 1998). In the estimated structural model the genetic material is not directly related to the innovative performance, but it rather impacts innovative performance through its positive influence on a firm's competences (technological, marketing, and complementary). The notions of competences (and dynamic capabilities) serve as higher level, meta- or second-order routines (Winter, 2003), a notion already anticipated in Nelson and Winter's (1982) treatment of 'dynamic routines.' Such routines (embodied in the genetic material) reflect the ability of the organization to reflexively revisit what it routinely does, particularly in the dynamic, changing environments (Felin and Foss, 2009). We find that there is a full mediation effect of the genetic material in the relationship between the innovation performance and both, marketing and technological competencies, and a partial one between innovation performance and complementary competencies (appendix B). The mediation effect of all three constructs of competences between genetic material and a firm's innovative performance was confirmed through the Sobel test for mediation (1982, 1986). The statistics reveal a full mediation in the case of the technological and marketing competences, and partial in the case of complementary competences.

The fact that genetic material has the strongest impact on technological competences would perhaps not be expected. But since technological competences depend largely on the quality of general processes in the firm, such a result should not be surprising with the flow of information inside and from the outside of the firm (which also impacts genetic material). The result also supports the idea that the general organization of the firm, cooperation, cohesion, and investment in workers (transfer of knowledge) matter for innovativeness, as they create a stimulating environment.

An important conclusion of the model is the fact that sources of information impact the creation of genetic material, competences, and innovativeness. Presence in global (developed) markets implies that the linkages with buyers, competitors, or other sources of information (like scientific, commercial, and technical journals) will be sourced from more developed (better ideas) and consequently more demanding markets (additional stimulus). This idea is captured in hypotheses 1-3. The direct impact on innovativeness is small, but the indirect impact through genetic material and competences is very obvious, as these linkages

are strong and significant. Also, they are in line with our theoretical propositions, where sources of information help build competences and genetic material.

In general terms, the structural model confirms the results anticipated by the exploratory analysis using the clustering approach. The importance of the results is displayed primarily in the revealed relation between innovativeness and genetic material. The firms with "healthier" genetic material more successfully recognize and utilize knowledge from external sources and are more innovative. The caveat to the robustness of such a conclusion is the sample size; however, this sample is representative of a typical large, Slovenian corporation's structure. Additionally, a comparative analysis of the link between export orientation and innovativeness with other developing countries is a challenge for the future.

## 2.5 Conclusion

Many studies have attempted and confirmed the link between innovativeness and export orientation and productivity. But from the perspective of the management, the main questions are 'why and how' the link operates at the firm level. What should be changed to become a more export-oriented firm that, in the longer run, is more innovative, paying higher wages, and more productive? According to our results, genetic material and competences/capabilities capture the essence of a firm's evolution and competitiveness, and provides the missing link.

We examined the situation in a sample of large companies from a developing country, Slovenia. As argued, export orientation is very important for such economies. Besides increased demand, export markets, especially those more advanced in comparison to that of the country of origin, it should be seen as a learning opportunity. But not all companies actually exploit the 'learning-by-exporting' hypothesis. First, we showed that the ability to learn is related to genetic material of the firm and existing competences and capabilities. External sources of ideas, genetic material, competences, and capabilities build into a positive spiral that ends in a more innovative company. To the best of our knowledge, this link was studied in such a manner for the first time, and the results carry an extremely important message to the management of all companies, not just for those from developed countries. The learning opportunities are less likely to be exploited unless the firm is involved in a gradual nurturing of a suitable environment - by the management and in cooperation with all stakeholders.

Second, the results also speak in favour of studying competences and capabilities within innovation studies. First, they possess a significant amount of explanatory power and are also at the heart of absorption power, building a bridge between the availability of external information and the actual absorption and transfer into own products. Actual absorption is furthermore impacted by the attitudes towards building own resources from the available outside information and general focus and dedication towards progress in the firm, which is captured by the genetic material. Therefore, innovation survey methodology should also try

to incorporate them into the standardized questionnaires. Although the study was performed in a developing country, all economies are characterized by a great diversity of companies. Regardless of a company's development level, both leaders and followers can learn and grow by the same pattern as suggested here, and both would find these results relevant.

# 3 Intellectual capital, innovation and export-led growth: empirical comparative study of Slovenia and the Western Balkans[38]

**Abstract:** In the face of progressing globalisation and liberalisation of the markets, innovation is the minimum necessary requirement for companies and countries to be globally competitive, and knowledge is the key input. In a comparative study we investigate the intellectual capital of a sample of firms from the Western Balkans and Slovenia, and analyse the link between intellectual capital, innovation, and export volume. Using unique survey data sets for these countries, we propose a structural model to examine our hypotheses. The results suggest that possessing intellectual capital does not suffice for firms' global competitiveness and that higher presence on global markets may offer exposure to more advanced knowledge that firms cannot obtain in their domestic markets.

**Keywords:** intellectual capital, innovation, competitiveness, export

[38] This paper was co-authored with Prof. Dr. Tjaša Redek.

## 3.1 Introduction

There is a consensus among both, scholars and policymakers on the growing role played by intangible assets on firms' productivity and, consequently, on the performance of local economies. And while this is true in the industrialised countries where competition is predominately based on ideas and innovations, technologically less developed countries need to strategically nurture their intangibles and learning capabilities in order to be able to benefit from the existing knowledge and spur innovation.

From a firm's perspective, the intangibles are crucial for transitioning to and competing in the today's knowledge-based economy. The reason that they are so valuable in building and sustaining the firm's competitive advantage resides in their characteristics – they are valuable, rare, and extremely difficult to imitate and substitute for (such are, for example organizational history, culture, learning, and other human dimensions of organizations). There are multiple sources of knowledge creation within companies and their examination has shown that the knowledge base on which innovating firms found their activities has become broader and more complex (Canibano et al., 2001). The conversion and utilisation of this knowledge is closely related to the different aspects of firms' intangible capital (human capital, structural capital, relational capital) and the investment in them.

In this study we model the impact of the firm's intangible capital (IC) on its innovative culture, which in turn is related to the export activity. Based on the dominant stream in the literature, we adopt the following three basic components of intangible capital: (1) human capital, which includes learning, know-how, and skills; (2) structural capital, which contains organizational (and at times, also technological) elements that pursue integration and coordination within the firm, and (3) relational capital, which gathers the value of the relationships that the firm maintains with external agents (business activity close by or with other more distant social agents) (de Castro and López Sáez, 2008, p. 26).

Drawing from the overarching literature on innovation, intangible capital, and trade literature, we examine the existing knowledge in firms (captured by the state of the intangible capital), the potential it has in driving their innovativeness (how human capital, structural capital, and relational capital relate to innovation) and, consequently, how innovation relates to firms' competitiveness on foreign markets (reflected in their export volume). We propose that the more the firm's intellectual assets are interconnected, the more its management values radical innovation, which then builds the firm's success in the export markets. On a basis of a larger survey on intangible capital conducted in Albania, Republika Srpska of Bosnia and Herzegovina, and Slovenia, we test these hypothesised relationships by using structural equation modeling. The study analyses the role of intangible capital in the manufacturing companies from a region that ranks relatively low in technological development, low in intangible investments and, with limited openness to foreign markets, and compares it to the

state of the manufacturing sector from an economy that has already built a significant presence on the international market.

The paper is structured as follows. Section 2 offers a general overview of the economic and innovation development of the Western Balkan economies and of Slovenia. In section 3 we discuss the conceptual framework for our hypotheses, review the definitions and examples of the different aspects of the corporate intangible capital, and innovation as their function, and finally discuss the evidence in the trade literature about the relationship between innovation and exports. Section 4 discusses the methodological framework, and section 5 presents the results from the empirical analysis. The study concludes with a discussion in section 6.

The contribution of this paper is severalfold. First, this study represents the first empirical study of the linkage between intellectual capital, innovation, and exports at a corporate level in the Western Balkan economies. Expanding it to a comparative study with a more developed economy that has already completed its transition from a shared history it offers additional insights in the discussion on bridging the development gap through export-led growth strategy. The present study uses original firm-level survey data and proposes firm-level measures for human, structural, and relational capital, and reveals which indicators of firm's knowledge-based assets are significant in the studied countries. Finally, the stylised findings of this study suggest that possessing intellectual capital does not suffice for firms' foreign market competitiveness, which is an insight that may inform future policy decisions.

## 3.2 Overview of economic and innovation development in Western Balkans and Slovenia

The present study examines the cases of two emerging economies from the Western Balkans (Albania and Republika Srpska of Bosnia and Herzegovina) on one hand, and Slovenia, on the other, which is a more developed country from the Balkan region and an EU member from 2004[39] (see table 11).

Table 12. Selected macroeconomic indicators related to the state of economy and innovation

| | **Albania** | **Bosnia and Herzegovina** | **Slovenia** |
|---|---|---|---|
| **Economy & Growth Indicators** | | | |
| *GDP per capita (current US$)* | 4,256.0 | 4,409.6 | 22,488.4 |
| *GDP growth (annual %)* | 1.6 | -1.2 | -2.6 |
| *Exports of goods and services (% of GDP)* | 33.3 | 30.9 | 73.2 |
| **Innovation and S&T Indicators** | | | |

[39] Slovenia and Albania are independent countries, while Republika Srpska of Bosnia and Herzegovina is part of the federation with Bosnia and Herzegovina. Given the lack of representative data for the entire country, we focus on the market of Republika Srpska of Bosnia and Herzegovina (Republika Srpska in continuing) for which a representative sample was obtained in a company level survey conducted in 2011.

| | Albania | Bosnia and Herzegovina | Slovenia |
|---|---|---|---|
| *High-technology exports (% of manufactured exports)* | 0 | 2 | 6 |
| *Research and development expenditure (% of GDP)* | n/a | n/a | 2.80 |
| **Financial Sector Indicators** | | | |
| *Domestic credit to private sector (% of GDP)* | 39.0 | 63.0 | 85.7 |
| *Foreign direct investment, net inflows (BoP, current US$)* | 920,080,650 | 334,821,080 | -227,373,077 |

Source: World Bank, 2012

All three countries are small, open economies that pursue the export led model of growth (IMFa, IMFb, IMFc, 2012). Slovenia has been successfully following the export-led strategy for growth throughout the entire transition period. It is a very open economy (exporting two thirds of its GDP) with a highly export-oriented manufacturing sector that places roughly 85% of its products abroad (Damijan and Kostevc, 2006). On the other hand, Bosnia and Herzegovina and Albania have embarked on a growth model that emphasizes exports only recently, predominately as a response of the global financial crisis of 2008 (World Bank, 2013a, 2013b). The export intensity of Albania is at a similar level as that of Bosnia and Herzegovina (31% of GDP). Since 2003 the Albanian economy has witnessed an increase in the share of export in its GDP by 10 percentage points, while the export orientation of Bosnia and Herzegovina has remained almost unchanged (a rise of only 1 percentage point since 2003) (World Bank Database, 2014). According to IMF (2012a, 2012b) boosting the exports remains one of the main development challenges for Bosnia and Herzegovina as well as for Albania. IMF (2012a) warns that especially the export sector in Albania is relatively undiversified (comprised primarily of traditional industries, like textiles, with some reorientation to oil and minerals in the past period). Both countries have experienced a decline, in the already limited exports due to the financial crisis, while the sharp increases in imports, particularly capital goods, have led to large and growing trade deficits (World Bank, 2013a, 2013b).

According to Schwab (2012), both Albania's and Bosnia and Herzegovina's economies are currently at the stage of efficiency-driven development. On the other hand, Slovenia at present is an economy that has already transitioned to the third stage, the stage of innovation-driven development. The innovation performance of the Western Balkans economies is overall low, by international standards. According to the Global Innovation Index[40] Rank of 2012, Bosnia and Herzegovina is 72 out of 125 countries, and Albania's is 90, which is well

[40] The Global Innovation Index (GII) score is calculated as the simple average of the Input Sub-index (an average of elements of the included national economies that enable innovative activities, such as institutions, human capital and research, infrastructure, market sophistication, and business sophistication) and the Output Sub-Index (an average of innovation output measures including knowledge and technology outputs, and creative outputs). For more detailed clarification of the calculation of the GII and its objectives, refer to INSEAD, WIPO (2012).

below the average of other countries of the Western Balkan region (60). Slovenia, for comparison, has an innovation rank of 49.9, which is still above the Europe's average ranking of 47.9 (INSEAD, WIPO, 2012).

The major problems facing the current innovation systems in the Western Balkan economies are the weak R&D capabilities in both, public and private sector, and the marginal government funding, (Silajdzic (2012) and Bartlett et al. (2012)). This context is emphasized by the lack of effective policy measures for innovation or cohesion between industrial and innovation policy. Nonetheless, improving innovation is to large extent in the hands of the companies and the way to achieve it is closely related to strengthening their intangible capital and the utilisation of knowledge. The present study offers an insight in the current state of these aspects and examine and the potential of an export-led model of growth by relating the estimates with the exporting activity of the manufacturing sectors.

## 3.3 Conceptual Framework and Hypotheses

The present work proposes a model that relates the existing intangible capital in the companies (the human capital, structural capital, and relational capital and the dynamism among them), and their relation to innovation, and, consequently, the export volume. Integrating the literature on intellectual capital, we propose that the intangible capital components and their interrelatedness affect innovation positively (Lev, 2003; Chen, Zhu and Xie, 2004; González-Loureiro and Pita-Castelo, 2012). Following evidence in trade theory, and the international marketing literature that more innovative companies are more likely to be more export oriented (Wagner, 1996; Wakelin, 1997; Weifens et al., 2000; Griffith et al., 2006), we further propose that the between innovation and the export volume is positive. In other words, the present study examines, in a comparative approach, how intangible elements in the studies economies are related to their innovation orientation and how that is reflected in the share of output that they export. In continuation we discuss the model and set the hypotheses. The hypothesised model is illustrated in figure 4.

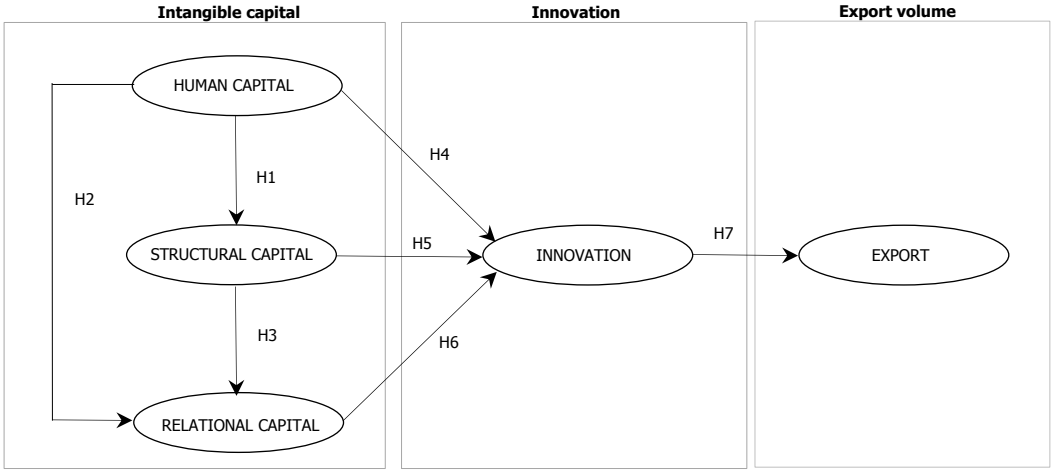
Figure 4. Proposed conceptual model

### 3.3.1 Definition of Intangibles and Their Interconnectedness

As there are different definitions for intangible capital, the literature provides different nomenclatures for its constituent elements as well. The variety of disciplines that are interested in studying intangibles (such as economics, organisation, strategy, management, finance and accounting) as well as different participants (including academics, standard setters, professional bodies, government agencies, and consultants) has used a plethora of measurements and classification of intangible capital. But the most widely used classification (Roos, Pike, and Fernström, 2005; Wall, Kirk, and Martin, 2004; Sullivan, 1999; Tayles, Pike, and Sofian, 2007; Marr, 2008), which we also employ in this study, is into these following three components: human capital (HC), structural capital (SC), and relational capital (RC). At a basic level, the conceptual separation of these three aspects of intellectual capital is evident from how each aspect accumulates and distributes knowledge differently: either through (1) individuals, (2) organizational structures, processes, and systems, or (3) relationships and market knowledge. In continuation we discuss these aspects separately.

***Human capital*** represents the individual tacit knowledge embedded in the mind of the employees. It has been identified as a foundational source of innovation, strategic renewal of a company, which can be used to realize and create value in the knowledge-based economy. According to the resource-based school of thought, human capital is recognised as an important source of competitive advantage and a firm's ability to adapt in volatile environments (Barney, 1991; Judge et al., 2009).

We follow the definition used by Chen et al. (2004) who define human capital as a combination of employee's competence, attitude and creativity. Examples of human capital elements are knowledge, expertise, skills, experience, competence, creativity, teamwork capacity, training and education, problem-solving capability, attitude, loyalty and the




motivation of people (Cohen and Kaimenakis, 2007; Hormiga, Batista-Canino and Sanchez-

Medina, 2011; Hsu and Fang, 2009; Jacobsen, Hofman-Bang and Nordby, 2005; Johanson, 2005). The knowledge and know-how, which are created by and stored in its people, are central to creating the organizational capability to achieve the firm's strategic goals. Human resources and human resource management activities are strategically important because they are potentially valuable, rare, and difficult to imitate and substitute for. This, as Buller and McEvoy (2012) put forward, is particularly important when firms face competition based on possessing, communicating, and creating superior knowledge, human capital, and social capital versus having superior land, capital, or technology.

Intangible capital scholars have used different definitions and measures for the ***structural capital***. Many of them refer to it also as organisational capital, and others - as *process capital* or *processes* (see table C1 in appendix C). In general, among the identified indices for structural capital there are "soft" aspects such are the corporate culture, management processes, routines, support and cooperation between employees; share of knowledge; power and responsibility structure; and those that represent the non-human aspects of the structural capital such as the institutionalized knowledge utilized through databases, manuals, structures, systems, and processes. And from an evolutionary perspective (Nelson and Winter, 1982), the structural capital is created, preserved and enhanced through structured, repetitive activities. These include the company's structures and processes, or clearly mandated procedures and rules for retrieving, sharing, and utilizing knowledge.

In our study we define structural capital as the aspect of the intangible capital that deals with the mechanisms and structures of the organization that can help to support employees in their quest for optimum intellectual performance and therefore overall business performance (Chen et al., 2004). In order for the intellectual capital to reach its fullest potential, a company needs to have favourable systems and procedures in place. According to Chen et al. (2005), a company with strong structural capital will create favourable conditions to utilize human capital and allow human capital to realize its fullest potential, and subsequently also boost customer capital (Chen et al., 2004).

***Relational capital*** has been mostly used in literature to define the knowledge about customers and the relationships with them, and has been long known under the term of *customer capital* or *market capital*. However, the developments in the field of intangible capital has widened its definitional scope and has been referring to it as relational capital since (for example see Lynn, 1998; Choo and Bontis, 2002; etc.). Besides the organisation's relationships with its customers, relational capital incorporates also relationships with other parties, such as suppliers, other companies in the market/industry, competitors, and different stakeholders where applicable (see Jacobsen, Hofman-Bang and Nordby, 2005; Marr, Schiuma, and Neely, 2004; Payne et al., 1995; Roos and Roos, 1997).

There is already a pool of evidence that confirms that firms' market knowledge competences facilitate the design and development of innovative and successful products and have a

positive impact on the overall firm performance (Hurley and Hult, 1998; Li and Calantone, 1998). That being said, in our study, we adopt the examples of relational capital stated above and follow the definition of relational capital that Chen et al. (2004) put forward. According to them, relational capital is an essential part of intangible capital and presents "the value embedded in the marketing channels and relationships that a company develops by conducting business". Market intensity, the ultimate expression of customer capital, refers to the current state of market building and its potential (Chen et al, 2004).

***Interconnectedness of intangibles.*** Managerial activities related to intellectual capital should complement each other. Edvinsson and Malone (1997) point out that human, structural, and customer capital reciprocally circulate and affect each other. According to Chen et al. (2004), structural capital is subject to human capital, since human capital is a determinative factor of the organizational form. Moreover, structural capital and human capital enable enterprises to form, develop, and use innovation capital and customer capital in a coordinated way.

Hsu and Fang (2009) concede this reasoning positing that the collaboration of the elements of intellectual capital in generating knowledge value creates synergy. It is when human capital, structural capital, and relational capital complement and support each other, that intellectual capital will be most effective (Stewart, 1997). The higher the interactions among the IC components, the greater the effect on the performance of the intangible stock of a company (Chen et al, 2004). This interconnectedness of the knowledge stock is also mentioned by Teece (1987), which Arrighetti et al. (2014) consider is the reason for the inverse relationship between the level of intangible assets a company possesses and the marginal costs of further investments in them (higher level of intangible assets is associated with a lower marginal cost of investing in the further extension of the asset stock, as argued by Knott et al. (2003))

In our study we examine whether there is a dynamism between the different aspects of the intangible capital and weather they have the potential to create value for the company. In that respect our model tests the following hypotheses:

*Hypothesis 1: HC proxy variables are directly and positively related to SC proxy variables.*

*Hypothesis 2: HC proxy variables are directly and positively related to RC proxy variables.*

*Hypothesis 3: SC proxy variables are directly and positively related to RC proxy variables.*

### 3.3.2 Intangibles and innovation[41]

To build upon the previous hypotheses, we emphasise that intellectual capital is more than simply the sum of the human, structural and relational resources of the firm. But it is rather

[41] Some include innovation capital as part of the intangible aspects of a firm (table C1 in appendix C). However, as Chen et al. (2004) has pointed out, the origination and development of "innovation capital" are based on the conjoint effects of human, structural, and relational capital.

an indicator of how the knowledge of a firm is put to work in creating value for the organisation (Roberts, 1998). The different aspects of intellectual capital, both individually and jointly utilise the corporate knowledge which is essential for innovation. This conversion of the knowledge and its utilisation for new products and processes is the link between intangible capital and innovation.

Each of the aspects of intangible capital (in our model) is associated with the different types of knowledge within the company. The *tacit knowledge* is embedded in the expertise, know-how, and the experience of individuals (human capital); the *explicit* or *rule-based knowledge* is embedded in the corporate's internal processes, rules, and routines (structural capital); and the *relational* (sometimes called *cultural*) knowledge is expressed through the assumptions and beliefs used by members to assign value and significance to new information or knowledge (relational capital). To create knowledge, companies convert tacit to explicit knowledge, integrate and combine knowledge, and acquire or transfer knowledge across boundaries (Choo and Bontis, 2002). Or, as Nonaka and Takeuchi (1995) put it, in the process of new knowledge creation, the organization continuously converts the personal, tacit knowledge of individuals who develop a creative insight to the shared, explicit knowledge by which the organization develops new products and innovations.

Innovation is a collective achievement (Van de Ven, 1986) as companies assimilate and integrate knowledge by facilitating its communication, sharing, and transfer among individuals and by encouraging interactions in groups and networks (Allen, 1977). The intangibles in a company collectively determine its ability to rapidly respond to environmental change and achieve new and innovative forms of competitive advantage and superior performance outcomes (Teece, Pisano, and Shuen, 1997).

From a strategic point of view, it is important that the intangibles that a company nurtures are strongly related to the company's strategic objectives. When a company identifies its critical intangibles, they become the key drivers to the value creation process of the firm. They embrace the core competencies of the company as well as the present abilities that the company possesses, or needs to leverage in order to attain those objectives (Canibano et al, 2001).

There is substantial evidence that intangibles that facilitate innovation are key determinants of firm competitiveness, value added, and growth (Sveiby, 1997; Ramezan, 2011; Kramer et al., 2011; González-Loureiro and Pita-Castelo, 2012). And since innovations essentially draw upon the knowledge deployed by such intangibles, finding an association between their various aspects and the organisation's innovation orientation would hardly be surprising. In our study we use the perception that CEOs hold about the importance of innovation for the company as a proxy for innovation. Given that the proxy indicators consist of perceptional measures, the concept intrinsically reflects the strategic orientation of the management towards innovation. To examine the ability of the intangibles to contribute towards

innovation, we examine the relation between each aspect of intangible capital and the innovation construct.

*Hypothesis 4: HC proxy variables are directly and positively related to the innovation proxy variables.*

*Hypothesis 5: SC proxy variables are directly and positively related to the innovation proxy variables*

*Hypothesis 6: RC proxy variables are directly and positively related to the innovation proxy variables.*

### 3.3.3 Intangible capital, innovation and export

Many poor countries has chosen to follow the export-led model of economic growth where external demand determines the dynamics of growth. Some countries - most of them in East and South-East Asia - have even achieved unprecedented rates of growth through exports. Others, on the other hand, have tried, but failed to follow the same route (The World Bank, 1993). The successful examples of export-led economic growth are the countries whose exporting sectors were national developmental priorities. Their countries' competitive strengths were systematically developed (e.g. Japanese industrial policy) primarily by strengthening the manufacturing sectors (Grossman and Helpman, 1991a; Boltho, 1996; Palley, 2011). An export–oriented manufacturing sector is crucial for building favourable internal environment and fuelling the external demand, which in turn have the potential to push the economic standards upwards.

The divergent success in building and maintaining an international competitiveness of countries, regions, and firms is directly related to their knowledge and intellectual capital (Edvinsson and Bounfour, 2004). In the context of the organisational learning idea, the intangible capital of a firm enables the knowledge acquisition, knowledge sharing, and knowledge utilisation within a firm. The knowledge acquisition and creation can be internal or external. Internal learning happens within the firm when through in-house research and development new knowledge is being generated and distributed. External knowledge generation (on which the industries of Albania and Republika Srpska predominately rely (World Bank, 2013a, 2013b)) involves the acquisition of new knowledge through observation and assimilation of external information (Bierly and Chakrabarti, 1996). In practice there may not be a clear distinction between internal and external learning, and some studies have suggested that for successful product innovation and attaining competitive advantage internal and external innovation need to be integrated (Iansiti and Clark, 1994).

In that sense, for both technologically advanced and those less technologically advanced organisations, the key components that create and sustain competitiveness are (1) their intangible capital, and (2) the structure of the environment/market where they operate, which

includes the pool of available knowledge, and the development level of the market (institutions, competitors, customers, etc.)

The innovation that is a product of the knowledge created and transformed by the intangible capital facilitates the development of competitive advantage of the company (Barney, 1991; Peppard and Rylander, 2001). International trade literature has found evidence that the more innovative companies are also more present in foreign markets (Wagner, 1996; Wakelin, 1997; Weifens et al., 2000; Griffith et al., 2006; Cassiman and Golovko, 2007) and they export more as they are better established on those markets. In the increasingly global world, innovation is the minimum necessary requirement for countries to be competitive. The examination of the link between innovation and export in our two models weal reveals insight weather innovation (created through knowledge transformation by the intangible capital) is sufficient for reaching competitiveness on the global market (hypothesis 7).

*Hypothesis 7: Innovation proxy variables are directly and positively related to the export volume.*

The above postulated hypotheses are represented with arrows in the conceptualised research model in figure 4.

## 3.4 Methodological framework[42]

The data used in our study was collected in a wider research project on intangibles in firms from the Western Balkans region. The psychometric questions that the survey consisted of are founded in theory. Additionally, the questionnaire was tested in each separate country in order to confirm its suitability.

The survey targeted the companies from the manufacturing and service sectors. The selection of the company was not random, but a stratified sample was composed based on size, industry and location. The surveys were conducted in the second half of 2010 in Slovenia and in the beginning of 2011 in Albania and Republika Srpska of Bosnia and Herzegovina. In total 198 (100 from Slovenia, 40 from Albania, and 58 from Republika Srpska) effective responses were collected, which amounts to an overall response rate of 22.4%.

### 3.4.1 Sample

The empirical analysis in this study focuses on the surveyed companies from the manufacturing sector in all three countries. This criterion was placed given that in our model we examine radical innovation for which investments in R&D are key (Tether et al., 2002) and it is more likely that the manufacturing companies are engaged in more significant R&D. In that respect, the manufacturing subsample is deemed a more homogenous and relevant

[42] For a more detailed discussion about the survey and the measures used in the model, please refer to appendix C – section Methodology, data collection and description.

group of companies to include in our analysis. Table 12 provides the basic descriptive statistics of the samples, while the firms' characteristics according to answered questions pertaining to intangible capital and innovation are shown in tables C3-C5 in appendix C.

Table 13. Structure of respondent companies in each of the countries*

| ***Dataset*** | ***Slovenia*** | ***Pooled**** |
|---|---|---|
| Number of respondents | (N = 73) | (N =52 ) |
| *Size (Number of employees)* | | |
| Small <50 | 7.4 % | 50.9 % |
| Medium 50-100 | 16.7 % | 32.1 % |
| Large >250 | 75.9 % | 17.0 % |
| *Export orientation* | | |
| More than 25% | 77.8 % | 37.7 % |
| More than 50% | 72.2 % | 17.0 % |
| *Other characteristics* | | |
| Form: Ltd. vs. plc** | 41 % | 30.2 % |
| B2B (vs B2C) | 56 % | 37.7 % |

* Pooled data set from the surveys in Albania and Republika Srpska of Bosnia and Herzegovina
** Limited liability company vs. Public limited company

### 3.4.2 Measures for the model variables

The primary data was acquired through a psychometric type of questionnaire distributed to senior managers and addressed the intangible investments and characteristics of firms. The proxy indicators for all of the intellectual capital elements in the model have been adapted from or developed on the foundations of innovation literature, strategic management, and literature on intangible capital and growth. The complete list of indicators is given in table C2 in appendix C.

The various aspects of intangible capital are not always found in companies in neat, separate "packages". Out of the survey data we identified the indicators that were comparable in each of the geographic models and that proved adequate to capture the explanatory potential of the complex variables of the firms' intangible capital. The proxies used in the models are shown in table 13.

All of the latent variables in the model are first-order constructs. The latent variable *human capital (HC)* is constructed of four items i.e. proxies, which are evaluated on a dichotomous scale (yes = 1; no = 0). The managers were asked to state whether "the company provides regular on-the-job training", and whether "the knowledge transfer is systematically induced among employees". These two indicators refer to the investment in the relevant technical and professional knowledge of the employees. The other two proxies of human capital reflect the incentive practice that a company has in place for its employees. In that respect, the managers were asked to state whether "performance measure system can distinguish between different

performing employees", and whether the higher performing employees are differently rewarded than the average performers.

*Structural capital (SC)* is a construct whose proxies are also assessed on a dichotomous scale and include aspects related to the: management's influence in decision making, workers' participation in the workplace, the worker's participation in the risk-sharing, and their involvement in the decision-making process. The first two aspects correspond to what Chen et al. (2004) refer to as the organizational structure pertaining to the formal power relationships and control system. In the respect the respondents were asked to answer "do top managers and owners make strategic decisions unanimously", and whether there is "an established open dialog with the workers about key decisions for the firm". The remaining two aspects refer more to the less formal relationships pertaining to the work culture in the company and existing identification of employees' goals with those of the company. In that sense, respondents gave answers to the questions that asked whether "cooperation in different teams in individual department a common form of workers' operation", and whether "workers engage in additional training for the good of the firm (not considering training organized by the firm)". The company's culture under the guidance of a favourable managing philosophy is a valuable asset. Only under the strong culture can a company give full play to its employees' competence and motivate them to serve the company and customer heart and soul. (Chen et al, 2004).

The proxies with which we measure the latent variable *relational capital (RC)* examine the firm's market knowledge competences and are assessed on a 5-point Likert scale. The respondents evaluate the company's competences in comparison with competitors (with 1 being "considerably worse than the main competitors" and 5 – "considerably better than the main competitors"). The set of measures include questions about company's knowledge about "customers' preferences and needs", "obtaining real time information about competitors", and establishing and managing long-term relations with both customers and suppliers.

*Innovation (INN)* is an endogenous latent variable and a function of the three latent variables of intangible capital. The model examines the relations between the different aspects of intangible capital and the 'perceived importance of radical innovation' as a proxy for the innovation variable. The indicators for the construct of innovation incorporated in our model are conceptualised as the significance that the managers place in different types of radical innovation for the company. There are two aspects that these measures reflect – the focus on radical innovation, and the importance with which senior managers perceive the types of radical innovation.

In the context of the first aspect, we decide to focus on radical innovation given that our study analyses manufacturing companies (i.e. companies where R&D investments are most likely to occur, which is of key importance for radical innovations). And although both incremental

and radical innovation are important for building and maintaining competitiveness, there is a closer linkage of long-term growth to radical innovation (Morone, 1993). Prašnikar and Kotnik (2006) in their study of technological leaders and followers further posit that as soon as a company develops new technologies, it ceases to be a follower and moves closer to the technological frontier.

The perceived importance of the different types of radical innovation, on the other hand, reflects the official strategic goals of the company related to innovation; it is an indicator of the management's innovation culture and aspirations. And while companies may or may not succeed in achieving their innovation objectives (which may be related to products, markets, efficiency, quality, or the ability to learn and to implement changes), the innovative activities may nonetheless have other or additional effects than those that initially motivated their implementation (OECD/Eurostat, 2005). Methodologically, it could be argued that capturing the objectives may have its flaws since actual effects may differ substantially from expectations. On the other hand, the effects of the (recent) innovation (output) may not be felt within the time period of the survey because of the lagging effect of innovation. Provided that our study relies on cross-sectional data, we opt for examining the objectives for innovation by measuring the perceived importance of radical innovations by the company's management.

The ranks placed in the different types of radical innovation are used as indicators of the strategic orientation of the firm in terms of innovation. In general, such examination may reveal whether the firm is engaging its intangible capital towards its innovative activities.[43] The construct Innovation (INN) is built from three indicators of radical innovation, all measured on a three-point Likert scale. Respondents mark the relevance of the suggested types of new products (radical innovations) in the company from 1 = low to 3 = high.

The dependent variable *Export Volume (Export)* is measured by a dummy variable on the reported percentage of output that companies sell on foreign market. For the respondents in Albania and Republika Srpska of Bosnia and Herzegovina it has value 1 if company exported more than 25% of their products and 0 otherwise. For Slovenia, it has a value 1 if the company exported above 50% of its output and 0 otherwise[44]. The amount, or volume, that a company sells in foreign markets is an indicator of the success of the company's internationalisation through innovation and its external competitiveness, which are very important in any export-led economy.

[43] Ajzen (1985) has demonstrated that the intention for action depends on one's belief and motivation. Organizations valuing innovation put structures and incentives in place to cultivate an innovative climate. By focusing on innovation (and perceived high importance of producing novel products), firms boost their competitive advantage and reinforce their market leadership during an economic crisis (Guellec and Wunsch-Vincent, 2009).

[44] The different breakpoint level in the delineation between exporters and non-exporters used in the studied countries comes from the fact that Albania and Republika Srpska of Bosnia and Herzegovina are at the moment still much less export oriented than Slovenia. This reflects their considerably slower transition process due to political reasons, and hence, the slower firm restructuring and strategic reorientation. Consequently, the majority of firms in these countries are still operating primarily in domestic markets.

Table 14. Validated measurement items

| Constructs | Item | Abbreviation |
|---|---|---|
| **Structural capital** | *Workers' participation in the workplace:* Is cooperation in different teams in individual department (not exclusively performing tasks in the same workplace) a common form of workers' operation? | CooperTeams |
| | *Workers' participation in decision making:* Is there an established open dialog with the workers about key decisions for the firm (workers have the right to information, giving suggestions, debate, protest)? | OpenDialogue |
| | *Workers participation in risk sharing:* Do workers engage in additional training for the good of the firm (not considering training organized by the firm)? | AddTraining |
| | *Management influence in decision making:* Did top managers and owners make strategic decisions unanimously in the last five years? | UnanDecMaking |
| **Human capital** | Does your company provide regular on the job training (e.g. apprenticeship, mentorship, job rotation)? | OTJTrain |
| | Do you systematically induce knowledge transfer among employees? | KnowTrans |
| | Do you measure performance in such a way that you can clearly distinguish between high and low performers? | MeasPerf |
| | Are better performers better rewarded for their work than average performers? | Rewards |
| **Relational capital** | Obtaining information about changes of customer preferences and needs. | InfoCust |
| | Acquiring real time information about competitors. | InfoComp |
| | Establishing and managing long-term customer relations. | LongtermCust |
| | Establishing and managing long-term relations with suppliers. | LongtermSupp |
| **Innovation** | Extensions to existing product lines / services. | Extensions |
| | New product lines / services. | NewLines |
| | : New products / services that are novelties also in global markets. | GlobalNovelties |
| **Export volume** | A dummy variable: 1 if the company exports above 50% (25% for the less developed economies) of its output, 0 if otherwise | Above50 |

## 3.5 Results

### 3.5.1 Statistical technique

We analysed our theoretical model using structural equation modelling SEM, which identifies the simultaneous relationship between the variables in our model. Partial Least Square is a non-parametric SEM technique described as second generation multivariate analysis (Fornell, 1987). It is most suitable in studies with non-normal data, small sample size, and focus on prediction (Hair et al., 2012). It is also recognised as the most appropriate technique for

relatively complex models, with low theoretical information, and when the measures are not well established. This method can also effectively manage the high number of variables in the model and the low possible causal relationships between the constructs (Longo and Mura, 2011).

The basic PLS algorithm[45] for reflective models is given below.

The estimation of inner relationships in the measurement model (weights of indices in a block for a latent variable) is given by:

$$v_{ji} = \begin{cases} sign\ cov\ (Y_j; Y_i) & \text{if } Y_j \text{ and } Y_i \text{ are adjacent} \\ 0 & \text{otherwise} \end{cases}$$

$$\tilde{Y}_j \coloneqq \sum_i v_{ji} Y_i$$

while the structural equation for estimation of outer relationships of the structural model (path coefficients between latent variables) are the following:

$$y_{kjn} = \tilde{w}_{k_j} \tilde{Y}_{jn} + e_{k_{jn}}$$

$$Y_{jn} \coloneqq \sum_{k_j} \tilde{w}_{k_j} y_{k_{jn}}$$

The symbols used in the equations are explained below:

| Variables: | Indices: |
|---|---|
| y = manifest variable (index) | i = 1,…,I for blocks of manifest variables |
| Y = latent variable (construct) | j = 1,…,J for latent variables |
| e = outer residuals | $k_j$ = 1,…,K for manifest variables counted within block j |
| | n = 1,…,N for observational units |

The analysis and interpretation of a PLS model is a two-stage process - first, the reliability and validity of the measurement model are evaluated, and then next the structural model is assessed and hypotheses are tested. This sequence ensures that the constructs' measures are valid and reliable before attempting to draw conclusions regarding relationships among constructs (Barclay, Higgins, and Thompson, 1995). Thus, the measurement model in PLS is assessed in terms of individual item reliability, construct reliability, convergent validity, and discriminant validity. The complete model validation procedures are moved in appendix C (tables C6 – C17).

[45] For further details and debate about the PLS SEM technique please see Lohmöller (1989)

### 3.5.2 Reliability and validity of the measurement model

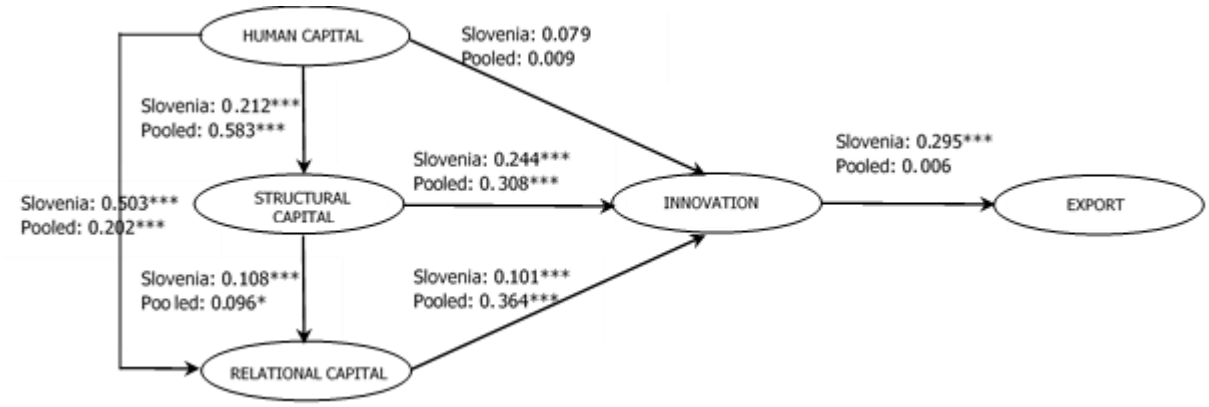
We examine two similar models (for Slovenia and for the pooled data set of Albania and Republika Srpska of Bosnia and Herzegovina). We make a distinction between these two data sets because of two reasons. First, Slovenia is a more developed and more export oriented economy. The higher development level also impacts the behaviour and the structure of the companies and the importance of the intangibles for the organisation. On the other hand, Albania and Republika Srpska are similarly developed economies and share common issues at corporate level also with respect to the state and investments in intangible capital (see Prašnikar et al. (eds.), 2012; Prašnikar and Knežević Cvelbar (eds.), 2012). And second, by pooling the data for the two less developed economies, we increase the sample size which can lead to more reliable estimates. Taking into consideration their similarities, we feel that the increased sample and the estimation reliability outweighs the potential problems of country specific effects.

To establish factorial validity and reliability for the measurement model, we followed the PLS validation procedures outlined by Gefen and Straub (2005). The complete procedure of model validation is moved to appendix C. Furthermore, given that the measures for the dependent and independent variables were taken from the same instrument, we perform four tests to overcome the concern of common method bias in the survey design. First, Harman's one-factor test was done to see whether one factor accounted for the majority of variance in the data (Podsakoff et al. 2003). Then the Pavlou, Liang and Xue (2007) test was used. Additionally, the latent variable correlations were examined (tables C12 and C13). Finally, a more rigorous test of common methods bias test suggested by Podsakoff et al. (2003) and adapted to PLS analysis by Liang et al. (2007) was performed. Common method bias is observed when a single factor emerges from the analysis or when one general factor accounts for the majority of the covariance in the interdependent and dependent variables. As each of the principal constructs explained approximately equal variance, the data did not indicate common method bias. The results from the common method bias test are found in appendix C.

### 3.5.3 Hypotheses testing - results and discussion

Once unidimensionality, reliability, and construct validity for the measurement models were demonstrated, the structural model fits and proposed hypotheses concerning the main and mediating effects were tested. In particular this study tests the relationships between the elements of intellectual capital in the samples of manufacturing firms and the relationship between each of them with the innovation attitudes of the managers, and consequently, the link between innovation and the volume of export of these firms. The results of our theoretical model testing are depicted in figure 5.

Figure 5. Results*




*'Slovenia' values provide the result obtained from the sample of manufacturing firms in Slovenia, while the 'Pooled' values provide result for the combined sample of manufacturing firms from Albania and Republika Srpska of Bosnia and Herzegovina.

The hypotheses pertaining to the interrelatedness of the IC dimensions were found to have significant positive effect in both of the models. Namely, we find that human capital positively affects both structural and relational capital, thus supporting the hypotheses **H1** and **H2**. Structural capital, innovation capital, and relational capital are affiliated to human capital. On one hand, human capital can convert knowledge into market value by converting the other three capitals. On the other hand, human capital can determine the operational forms of the other three capitals and by that convert immaterial knowledge and information into material output and benefit (Chen et al., 2004).

In the case of Slovenian manufacturing firms, the human capital was shown to have largest significant impact on the relational capital (β .503; $p < .001$). This may be suggesting that the processes in the Slovenian companies are more focused to translating human capital into market-related capital, as it is more important for maintaining the competitiveness in their more developed and diversified markets. While in the case of the pooled dataset from Albania and Republika Srpska, the human capital is more heavily related to the structural capital (β .583; $p < .001$), which reveals the cultural and institutional significance of the nature of their structural capital that is important for companies from these two countries[46] The results show that, as expected, the indicators for the construct human capital are closely related to the 'softer' aspects of the structural capital in the firm i.e. the culture and the processes. The human capital has a transient nature and organisations are encouraged to, wherever possible, convert it to structural and relational capital. By doing so, i.e. moving from human capital to structural and relational capital, the embedded knowledge will become more independent of people. It will consequently remain based in organizational systems, structures and technologies and, thus, become potentially easier to control. Our path analysis confirms that this process is more pronounced in the Slovenian companies, which in its own suggests that these are more innovative, better-learning, more competitive companies. With

[46] Companies where there is collaboration between owners and managers are more oriented towards value–enhancing activities (Aoki, 2010; Prašnikar et al., 2014).

this type of knowledge creation (by converting it from one kind to another) they bridge the gaps in the organization's existing knowledge which can stand in the way of solving a problem, developing a new product, or taking advantage of an opportunity (see Choo and Bontis, 2002).

Additionally, the literature suggests that that human capital significantly affects customer i.e. relational capital in all industries (e.g. Bontis, Keow, and Richardson, 2000). Higher quality employees were shown to be more skilled in acquiring, distributing, and utilising more information regarding customers and business partners towards building long-term relationships with them. In other words, human capital positively affects relational capital (Hsu and Fang, 2009). The relation between structural capital and relational capital (**H3**) is somewhat weaker, but nonetheless significant in both models (β 0.108; $p < .001$ and β 0.096; $p < .005$ respectively).

The hypotheses **H4**, **H5**, and **H6** are considering the effects of the three intellectual capital dimensions (SC, HC, RC) on the perceived importance of radical innovation in the company. In Slovenia, the structural capital has the most significant impact on innovation (β 0.244; $p < 0.001$), while in the pooled case (Albania and Republika Srpska of Bosnia and Herzegovina), the relational capital had strongest impact on the perceived importance of innovation (β 0.364; $p < 0.001$).

The different aspects of intellectual capital accumulate and process knowledge differently. Therefore it is possible that each of them and their interrelationships may influence the company's innovation in different ways. We tested the mediating effects of the constructs structural capital and relational capital on the influence of human capital on innovation. The estimated paths in the case of Slovenia indicate a mediation effect of human capital on innovation. The performed bootstrapping reveals a full mediation when the intervening construct is structural capital and a partial mediation when the intervening variable is relational capital in both models. The assumptions behind the tested mediation are in the expectations that companies that are actively engaged in training their employees (and encouraging learning and knowledge sharing) also encourage learning and innovative cultures. Furthermore, employee abilities affect firm's relations to outside parties, and contribute to ideas and knowledge assimilation. The latter can be later enmeshed in the innovation processes.

Table 15. Path estimates – path coefficients and t-values

| **Hypothesis** | **Slovenia** | | **Pooled** | |
|---|---|---|---|---|
| H1: HC→ SC | 0.212 | (4.265)*** | 0.583 | (20.773)*** |
| H2: HC→ RC | 0.503 | (12.762)*** | 0.202 | (3.979)*** |
| H3: SC→ RC | 0.108 | (2.465)*** | 0.096 | (1.725) ** |
| H4: HC→ INN | 0.079 | (1.374) ** | 0.009 | (0.182) |
| H5: SC→ INN | 0.244 | (1.697) ** | 0.308 | (6.684)*** |

| | | | | |
|---|---|---|---|---|
| H6: RC→ INN | 0.101 | (3.972)*** | 0.364 | (7.626)*** |
| H7: INN →Export | 0.295 | (6.875)*** | 0.006 | (0.119) |

***p<0.001
**p<0.05

Finally, we examine the relation of the innovation construct to firm's export orientation (**H7**). In the case of Slovenia, the link is positive and significant (β 0.295; $p < 0.001$)[47], while in the pooled case (Albania and Republika Srpska of Bosnia and Herzegovina), it is insignificant. These results are in line with the findings of Prašnikar et al. (eds.) (2012) and Prašnikar and Cvelbar Knežević (eds.) (2012) in the studies of intangible capital in Albania and Republika Srpska of Bosnia and Herzegovina, respectively. The study on the intangible capital in Albania revealed a predominant inward orientation of the companies and focus on the domestic market. Those Albanian companies that do compete in the global markets exploit their cost competitiveness. Similarly, the study in the Republika Srpska found that most of the (manufacturing) companies are very marginally present elsewhere but at home. This inward orientation, may be limiting the learning opportunities that the more developed and more competitive markets offer. On the other hand, Slovenian companies are very export oriented. A large proportion of Slovenian exports is destined for the highly competitive EU-15 markets (Damijan et al., 2011), and this increases the scope for benefits from either positive spill-overs in the exporting markets or by raising the innovation of exporting firms (learning-by-exporting). Although the reverse relationship between exporting and innovation is beyond the scope of our empirical analysis, the results in the present study show a significant path-coefficient between the constructs innovation and export volume within the Slovenian sample.

The results of the study show that although there is an indication that there is some investment in intangible assets present in the manufacturing companies of Albania and Republika Srpska, it is only a part of the story behind the restructuring and the growth of these two developing economies. First, the Western Balkan countries lack the capacities to undertake scientific and applied industrial research, and to transfer, adapt and assimilate new technologies into economic structures and diffuse them into society (World Bank, 2013a, 2013b). And second, the lack of exports is a serious threat to future development, alongside the low competitiveness, relatively high public debt, and the consequent current account deficit (EBRD, 2011). Therefore, the national efforts in these economies should be directed towards strengthening of their research and innovation capacity, which in turn will increase their competitiveness on the global market.

In conclusion, the estimated paths from our hypothesised models confirm not only the interconnectedness of IC elements, but also support the hypotheses about their contribution to innovation culture in the firm. This is important since the corporate strategy guides the entire

[47] As confirmed by Domadenik et al. (2008) for a study made on a Slovenian sample, companies whose management was more R&D oriented, were more likely to be more innovative in the longer term, more productive and, thus more competitive.

organisation and identifies the path that all departments and functions need to pursue (Alcaniz, Gomez-Bezares, and Roslender, 2011). The literature agrees that the intellectual capital resources are often performance drivers[48] and, hence, there must be a causal relationship between those resources and value creation. They must be interrelated to create more value (Marr, 2005). Our analysis confirms not only that there is a positive relationship between the elements of intellectual capital and innovation, but also that there is a positive relationship between innovation and the export volume of the firms. The latter linkage, however, holds only for the Slovenian manufacturing companies, which corroborates previous findings that the most innovative Slovenian firms are exhibiting global competitiveness, exporting to a number of global markets (not only the proximity markets of ex-Yugoslavia, but EU and outside of EU markets (Prašnikar et al., 2012)).

The insights from the intangible capital literature show that key factors in acquiring and utilising knowledge in a company are its investments in different types of intangibles. The sequential theory of internalisation, on the other hand, holds that the internationalisation process is a path dependent learning process in which the acquisition of knowledge and the commitment of resources are fed back mutually (Andersen, 1993). In that respect, firms go through a gradual process in acquiring knowledge through their own experience, and as they begin competing on foreign markets, they do so in a gradual way, first in countries culturally and geographically close to the country of origin (Johanson and Vahlne, 1977; Davidson, 1980; Benito and Gripsrud, 1992) and subsequently in other countries. This learning process will be, of course, additionally influenced by the development of the markets where the companies export. For a sample of Slovenian companies, De Loecker (2007) and Damijan and Kostevc (2006) find that, by exporting to advanced markets, firms can learn more due to the higher quality, technical, safety and other standard requirements of those markets, as well as due to the tougher competition. In that sense, the Western Balkan economies, have the potential to eventually, by following the Slovenian path of economic development, become more competitive in the global market.

## 3.6 Concluding remarks

### 3.6.1 Contributions and limitations

Our study contributes to the existing literature in several ways. First, it represents a contribution towards the IC valuation models (cf. Sveiby, 2001) in a way that we are able to calculate measures of the different aspects of intangible capital (human capital, structural capital, and relational capital) in the developing economies from the Western Balkans and

[48] It is interesting to note that this is not the first time a direct link has not been observed between a construct of human capital and performance, and that the main relation that explains the dependent variable (innovation) is the relation human capital – structural capital. This was also found in a similar study by González-Loureiro and Pita-Castelo (2012) on 140 innovative SMEs from Galicia, Spain. In their case the dependant variable was the firm's marketing performance (a composite variable of turnover and value added). This occurrence speaks in favour of the higher impact of transformed knowledge (for which a well-established knowledge creation mechanism needs to be in place) on the company's success.

Slovenia using an original data set, which represents a novelty. Furthermore, we relate the intangibles present in the manufacturing firms to their innovation and consequently to their export intensity, which is first empirical study of its kind to explore these links on data from these countries. Additionally, exploring the linkage in a comparative study between the Western Balkans (Albania and Republika Srpska of Bosnia and Herzegovina) and the European Union (Slovenia), this study offers additional insights to policy-makers and practitioners as well.

Using a unique dataset of firm-level data, the paper is extending the knowledge on innovation, corporate behaviour, and competitiveness in foreign markets through the volume of export. The results support the idea that the relationship between the IC components affects innovativeness in technological-follower companies, but reveal a divergent effect of the innovation proxy measures to the volume of export in the different data sets. Clearly the capacity to innovate is closely related to the firm's intangible capital (the ability to transform and utilise knowledge for the purposes of innovation). But the international literature recognises that the export behaviour of firms is influenced by a mix of different factors. These factors range from structural ones (size, R&D intensity etc.), through management factors (attitudes towards risk, education of decision makers, etc.) to, finally, incentives and obstacles in the process of internationalisation (competitive pressure, negative domestic trends, availability of information, etc.). As the companies we analyse come from economies that differ with respect to endowments in terms of labour, capital, and the stock of knowledge, these aspects influence the level of their innovation, and consequently its contribution to the level of competitiveness on foreign markets.

The differences between countries in innovation levels also reflect the efficiency of their respective national innovation systems, i.e. the producers, users, suppliers, public authorities and scientific institutions that constitute them. It is the interaction between the actors on the market, and in general, of the innovation system, that results in new and commercially useful knowledge. Therefore, it is very important to make the distinction of the different institutional, economical, and technological settings where innovation can thrive and recognise that there are different innovation processes in technological followers and technological leaders. Only in that way we could hope to gain deeper understanding of the phenomenon and its potential to push the economy up.

Policy-makers around the globe have recognised investments in intangible capital as a major driving force behind the 'new economy' growth model. The successful stories of Asian and European economies have demonstrated that own product development, and global market penetration with innovative products and own brands are key to ensuring stable growth. The current low value-added exports that represent the majority of exports of the Western Balkan manufacturing companies is a strategy that lacks the potential to bring sustainable competitiveness in foreign markets. A previous study (Prašnikar and Knežević Cvelbar, (eds.) 2012) shows that companies that invest more in intangible assets are on one hand more

export-oriented and on the other hand (seemingly paradoxically) less productive than companies oriented towards the domestic market. But the lower productivity of export-oriented firms is in fact an indicator of the superior competition in the global market. On the other hand, high productivity in domestic markets reveals the lack of competition at home and consequent higher economic rents. Therefore, the increasing openness of domestic markets will further increase competition and lower these, momentarily high, rents. Continuous investment in intellectual capital and innovation are the only long term solution to growth.

Furthermore, the present study generates a number of practical implications for the study of global competitiveness of the companies in the technology-follower countries. From practitioners' point of view, the study proposes measures for human, structural, and relational capital in the manufacturing companies. By measuring, reporting, and managing their intellectual capital effectively, companies can improve their competitive advantage. It is by identification of all the assets at their disposal (tangible and intangible), that companies will be able to operate at their full potential by making maximum use of their asset pool. Appropriate management activities in that direction can create new knowledge sources or, improve the value of existing ones.

The study faces some limitations, mainly pertaining to the sample size and thus generalisation of the results. First, given the non-random sample from the population of larger firms in Albania and Republika Srpska of Bosnia and Herzegovina, the results should be interpreted bearing this caveat in mind. Additionally, a larger sample size could improve the predictive accuracy of the models, and contribute to more robust estimates. Future studies can also benefit from an extension of the sample that would incorporate other industries and economies from the Western Balkans, which would provide broader generalization of the obtained results. Finally, the present study relies on cross-sectional data, which limits the examination of the causality between the variables. Therefore, a repeated (longitudinal) study is one of the more important future challenges.

Overall, given the good fitting of the models, we feel that this study offers some insights from environments with very poor and even deteriorating national support and policies for human development, as well as national innovation systems, and puts them vis-à-vis the perspective from a more developed "neighbour". With that, the present study paves the way for future studies that would examine the role played by the intangible factors in these economies and how their effectiveness is affected by the other productive inputs and by environmental factors.

### 3.6.2 Conclusion

The paper examines the relation between the intangible capital (human, structural, and relational capital), innovation, and export orientation in the manufacturing sector. Using a unique survey data set on Slovenia, Albania, and Republika Srpska of Bosnia and

Herzegovina, we propose two theoretical models that reveal the relevance of the IC elements in two different settings: a pooled model of a sample of manufacturing companies from Albania, and Republika Srpska vis-a-vis a comparable Slovenian model.

The results seem to highlight that the human capital is the basic starting point in knowledge creation in the firms as the estimated paths show that it positively affects both, structural capital and relational capital, and that, consequently, structural capital positively affects relational capital. The main link for explaining the high importance of innovation, however, is the HC – SC relationship. This is in-line with the resource–based view of firms, where human capital is recognised as the primary important source of both firm's competitive advantage as well as its ability to adapt to volatile environments (Barney, 1991; Judge, Naoumova and Douglas, 2009). Subsequently, many researchers identified the firm-specific human and structural resources as the largest subcategory of businesses' intangible investments (Van Ark et al., 2009, for US and UK; Fukao et al. 2009, for Japan; Bloom and Van Reenen, 2010).

The results from the estimated models reveal that the manufacturing firms in Albania and Republika Srpska of Bosnia and Herzegovina possess intangible capital and that the elements that it is consisted of can be, in fact, measured. However, this is only the first step towards building competitiveness on foreign markets, as these companies have still very limited export orientation (which was confirmed by the insignificant link between the innovation (as a function of the intangible capital) and the export volume variable. Unlike the pooled model, Slovenian companies are exporting more heavily, which implies their higher competitiveness and success on the global markets.

# General discussion and conclusion

In this chapter I offer a general discussion on the findings, limitations and future research arising from the chapters of this dissertation. The research reported in this thesis has investigated the intangible capital and innovation activity in developing countries, proposing and testing a methodology for their measurement. It has largely focused on the economies of the Western Balkan region. The chapter is structured as follows. I first summarise briefly the findings in each of the chapters of the dissertation and provide a systematic overview of them. In continuation I discuss the main overarching theoretical and methodological contributions that are followed by discussion of limitation and suggestions for future research. I conclude with a brief overarching conclusion of the dissertation.

## Summary of findings and results

Building upon the methodological debate in the innovation studies, in Chapter 1 I propose an extended approach to surveying innovation based on the Community Innovation Survey (CIS). The development of the methodology followed recommendation from the existing theory on innovation surveys (OECD/Eurostat, 2005; Mytelka et al., 2004; Mairesse and Mohnen, 2010). The proposed questionnaire, on one hand, directly addresses the existing challenges pertaining to obtaining data in developing countries where the accessibility and quality is often questionable. On the other hand, it addresses the issue of standardization present in the existing innovation surveys, which while convenient for comparative empirical analyses, often fails to capture the specifics of the technological, structural, and economic development in these countries, which, ultimately impact their innovation and R&D. The most important modifications and extensions in comparison to the existing CIS questionnaire (IV) are examination of firm's competencies and capabilities as a foundation for both absorption (linked to knowledge sources) and innovation, quality of exposure and knowledge sources. These, combined with the introduction of the cascading approach to measurement, provide a solid research foundation.

In this study I use a dataset for Slovenia (which was matched with information available from the AJPES dataset retrieving five years of usable balance sheet information for each surveyed firm, from 2006 to 2011) to show that the suggested approach leads to a comprehensive and detailed explanation of the innovation activity in a developing (technology-follower) country. The results confirm primarily that the firms' innovative activity is closely linked to its competences and capabilities. To what extent is this issue related to internal firm organization and/or the inability (or lack of ambition) to benefit from the learning by exporting? This further opens the question of the endogeneity of capabilities and competencies and consequently innovation, which I aim to address in the following chapter.

In Chapter 2 using the survey data obtained through administering the proposed questionnaire in Slovenia, I test the working hypotheses through a theorised structural model and analyse it

using partial lest squares structural equation modeling (PLS-SEM). The results show that not all companies actually exploit the 'learning by exporting'. Ability to learn is related to genetic material of the firm and the existing competences and capabilities. External sources of ideas, genetic material, competences, and capabilities build into a positive spiral that ends in a more innovative company. Learning opportunities cannot be exploited if the firm does not nurture a suitable environment - gradually by the management in cooperation with all stakeholders. Finally, the results of this study confirm that market orientation is important, and that presence in global (developed) markets implies that the linkages with buyers, competitors or other sources of information (like scientific, commercial and technical journals) will be sourced from a more developed (better ideas) and consequently more demanding markets (additional stimulus).

Chapter 3 contributes to the scarce empirical knowledge of intellectual capital in developing economies. To meet this study's goals, I conduct a comparative study of two emerging markets from the Western Balkan region (Albania and Republika Srpska of Bosnia and Herzegovina) and Slovenia, a more developed country, already an EU member (RS in continuing). All three countries are small, open economies that pursue the export led model of growth (Damijan, Kostevc and Rojec, 2012; Prašnikar and Knežević Cvelbar, 2012; IMF, 2012). The study proposes firm-level measures for human, structural, and relational capital, and reveals which indicators of firm's knowledge-based assets are significant in the studied countries. Second, I model the impact of the firm's human, structural, and relational capital on its innovative culture and its export orientation. The analyses show that that the more the firm's intellectual assets are interconnected, the more its management "values" radical innovation. However, the findings suggest that possessing intellectual capital does not indicate firms' presence on foreign markets in the cases of Albania and Republika Srpska of Bosnia and Herzegovina. Possessing intellectual capital is only a part of the story behind the restructuring and the growth of these two developing economies. As EBRD (2011) has pointed out, lack of exports is one of the threats to future development (together with the low competitiveness, relatively high public debt, and consequent current account deficit).

In table 16, I summarize and systematically presented the main findings in terms of research questions, the theories they were founded on, the results that were obtained, and their aim to contribute to theory.

Table 16. Summary of main findings and results

| **Chapter (Title) and research questions** | **Overarching theories** | **Study type (methodology/design/analysis)** | **Main findings** | **Contributions (theoretical)** |
|---|---|---|---|---|
| Chapter 1: Measuring innovation (in developing countries)<br>*RQ1*: What aspects of innovation and intangibles that are especially important for developing countries should be included in innovation surveys? | Innovation theory<br>Dynamic capabilities theory | Methodological<br>Primary data from field survey merged with secondary balance sheet data of the companies; Summary statistics, quantile regression | Identification of companies according to their added value per worker<br>Preliminary examination of the impact of innovation on productivity | Proposed methodological approach for measuring innovation technology-follower countries; for increasing reliability in answers. |
| Chapter 2: Survival of the fittest - An evolutionary approach to an export-led model of growth<br>RQ2: How is exposure to (more advanced) external sources of knowledge related to the formation of corporate genetic material, which in turn propels companies' competitiveness in the global market. | Innovation theory<br>Export-led growth<br>Open innovation<br>Evolutionary economics<br>Dynamic capabilities theory | Field study – firm-level data of 100 companies in Slovenia; hierarchical cluster analysis; partial least squares structural equation modeling (PLS-SEM) | Not all companies actually exploit the 'learning-by-exporting' opportunity<br>The ability to learn is related to genetic material of the firm and existing competences and capabilities. | Novel study of the link between sources of knowledge and innovative performance through the genetic material<br>Confirmed importance of studying competences and capabilities in innovation studies |
| Chapter 3: Intellectual capital, innovation and export-led growth: comparative study of Albania, Republika Srpska of Bosnia and Herzegovina, and Slovenia<br>RQ3a: Does the IC in the firms in the examined developing countries have the potential to driving their innovativeness?<br>RQ3b: Does presence of interrelated intellectual capital suffice for firms' foreign markets competitiveness expressed as presence on foreign markets? | Intellectual capital theory<br>Innovation theory<br>Trade theory | Field study – firm-level data of 170 companies in three economic entities: Slovenia, Albania, and Republika Srpska of Bosnia and Herzegovina; partial least squares structural equation modeling (PLS-SEM) | The manufacturing sector in Albania and Republika Srpska exhibits some investments in IC, but the lack of exports is one of the threats to future development. | First comparative study to measure and model IC elements and their relation to innovation and consequently export activities in less developed region of the Western Balkans and an EU member-country (Slovenia). |

## Overarching theoretical and methodological contributions

Empirical evidence all over the world confirms that knowledge-based resources and intangible capital increases value added, productivity and growth on macro, industry, and firm level. However, lack of study on intangibles and innovation in developing countries, especially those from the Western Balkan region, has left a gap in the understanding these relations in such settings (Aralica et al., 2008; Radošević, 1999). One of the key reasons for this gap is the fact that micro-level data, both financial and survey data, is very hard to obtain for number of developing countries. In my dissertation I attempt to address this issue first with a methodological contribution (Chapter 1) and then with empirical ones (Chapter 2 and 3).

A key methodological contribution of this thesis is the careful and well-thought development, testing, and implementation of a methodology that offers an extended approach to surveying innovation based on the Community Innovation Survey (CIS). The questionnaire is substantially supplemented, primarily to capture in detail (1) the elements that can lead/cause more process or product innovation (primarily competences and capabilities, sources of knowledge, exposure to developed markets (see Grossman and Helpman 1991a and 1991b, Aw et al. 2008)) and to (2) adapt the methodology to the characteristics of innovation in developing countries (technology followers and the role of incremental innovation), although challenges with accounting for the firm divergence exist in every economy.

That the inclusion of these specific aspects in the innovation survey is important, speak the results presented at the end of each of the chapters of the dissertation. Specifically, Chapter 1 speaks in favour of including the strategic orientation towards R&D, as well as the corporate competences and capabilities in productivity studies. Chapter 2 reinforces the notion for studying corporate competences as the communication between the external environment and the organization is closely linked to the level of communication among the sub-units of the firm and distribution of expertise within it (competences).

During the period 2010-2011, three surveys were conducted in Albania, Bosnia and Herzegovina, and Slovenia. This resulted in a detailed database on innovation indicators in these three countries from the Western Balkan region. This dataset represents first of its kind and has allowed for comprehensive study of the intangible capital and innovation of the region. In future, the survey is intended to be extended to other countries, regions, and sectors from the Western Balkan region and ideally introduce it in periodical waves.

Another theoretical contribution of my dissertation is the added discussion of the export-led growth of the developing countries in its focus through the lenses of evolutionary economic. This is most apparent in Chapter 2 where the results support Schumpeter's (1947) later proposition that the inclusion of the characteristics of the system as a key

factor in determining the actual outcome of the agent's behaviour. This resonates with the new understandings of technological change, led by the economic complexity school of thought, according to which it is a process that is shaped and explained by the interactions between the individual agents and the organization and structure of the economic system.

The empirical analyses in Chapter 2 reveal that there is a feedback relationship between the internal and external environment in shaping the innovation behaviour of the firm. On one hand, I show that the ability to learn is related to the internal processes of the firm, captured under the term *genetic material* and the firm and existing competences and capabilities which directly influence the innovative performance. On the other, I show that the internal organizational characteristics also fundamentally shaped by the organization's external environment that influences specific patterns in which innovation processes are embedded (Kaiser and Prange, 2004).

The contribution of the study in Chapter 3 is threefold and incorporates important contributions to the field of intellectual capital and innovation literature, with special focus on emerging markets. At the outset, this study proposes measures for human, structural, and relational capital of the manufacturing firms of Albania, Slovenia, and Republika Srpska of Bosnia and Herzegovina. This provides the managers across these developing countries with guidelines how to track the corporate IC components. Based on their analyses they can adopt different strategies to acquire, build and exploit their IC. It also provides them an interesting starting point to answer an important question: what is the level of resources firm should be committed to activate and increase its IC (Seleim, AshourandBontis, 2004)? Furthermore, this study is the first comparative study of the relationships among different aspects of intellectual capital in developing countries, their linkage to innovativeness, and consequently to exports at corporate level in the Western Balkan economies. It is moreover, first that models this link using firm level survey data and structural modelling.

Finally, the results from the estimated models reveal that although the manufacturing firms in Albania and Republika Srpska of Bosnia and Herzegovina possess stocks of intellectual capital, this is only the first step towards sustainable economic growth. Striving towards higher presence on foreign markets is key in increasing their global competitiveness and, eventually, sustainable economic development.

## Limitations and directions for future research

Despite the aforementioned contributions, this dissertation is not without limitations. Many open questions call for further studies and additional research.

One of the concerns is directed towards the cross-sectional data that was the basis for the main part of the study. Such data is recognised to have an inherent limitation in asserting causality of the relations between the studied variables. However, there are several

attempts at mitigating this drawback. One attempt of capturing the dynamics between the innovation activities and output is embedded in the design of the proposed questionnaire where the questions concern the period between 2006 and 2010. Another approach in the same direction, especially when linking innovation to productivity, was the matching of the survey data with usable balance-sheet information (Chapter 1). However, the latter was only possible to for the Slovenian sample, given the difficult access to balance sheet data for the Albanian companies and the companies from the Republika Srpska of Bosnia and Herzegovina sample. Therefore, the biggest challenge for the future studies would be to extend the samples and expanding it also to other countries of the region. Ideally, the research would be promoted in a periodical one with similar periodicity as CIS for the purposes of comparative analyses. That would additionally allow for efficient observation of the dynamic changes efficiently and detection of the causal relations.

An additional limitation in this study may be the relatively small samples, especially from Albania and Republika Srpska of Bosnia and Herzegovina, which can be restricting for deeper econometric analyses and robust estimates. This limitation, however, is directly related and determined by available budget and time resources that were available for the study. Future studies would use larger samples which can obtain much more robust results. However, the results obtained in my dissertation may be the best we can currently obtain in the attempt of understanding the intellectual capital, innovativeness, and export orientation, at least in the case of the emerging economies of Albania and Republika Srpska of Bosnia and Herzegovina. As the initially obtained samples over-represented the manufacturing companies, another prospect for future studies is expanding the study onto different sectors in the separate countries. This would provide the basis for further generalization of the results.

Regarding the measures for different concepts in the studies in Chapter 2 and 3, future studies may include other factors that would have a more explanatory power in the relationships. For example, the measures used in the comparative study in Chapter 3 were those that were found to be relevant and comparable across the three samples. Thus, the hypothesized relationships here open the path towards investigation of other measures of IC elements in different sectors and contexts.

The study in Chapter 3 relies on cross-sectional data, which limits the examination of the causality between the variables. Therefore, a repeated (longitudinal) study is one of the more important future challenges. Additionally, a larger sample size could improve the predictive accuracy of the models, and contribute to more robust estimates. Future studies can also benefit from an extension of the sample that would incorporate other industries and economies from the Western Balkans, which would provide broader generalization of the obtained results. given the good fitting of the models, we feel that this study offers some insights from environments with very poor and even deteriorating national support and policies for human development, as well as national innovation systems, and puts them vis-à-vis the perspective from a more developed “neighbour”. With that, the present study

paves the way for future studies that would examine the role played by the intangible factors in these economies and how their effectiveness is affected by the other productive inputs and by environmental factors.

## Conclusion

In conclusion, this dissertation demonstrates the importance of correctly identifying and measuring the intangible, as well as the market factors that foster innovation within small open-economies as a key source of growth. The study proposes and successfully tests a methodology that aims to explain in depth the innovation phenomenon in Slovenia and two developing economies from the Western Balkans. On the basis of the results of the study, it is safe to say that innovative activities of firms depend not only on their internal characteristics, processes, and capabilities, but they are also fundamentally shaped by the firm's environment that influences specific patterns in which innovation processes are embedded. Whether causality flows from exports to economic growth or the other way around, or there is a feedback relationship, the open innovation approach is especially important for technologically underdeveloped economies and firms. The abilities to absorb and utilise knowledge are the single most important factor for a successful company to maintain its competitive edge. There is no simple recipe for overcoming technological underdevelopment. Each country needs to find its own way based on the existing institutional and structural settings that are in place and this dissertation is one of the pioneering studies one that opens these questions for the region in focus.

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# APPENDICES

**LIST OF APPENDICES**

# Appendix A: Chapter 1

Table A1. Innovation questionnaire

| Number | Item | List of response options | | | |
|---|---|---|---|---|---|
| 1 | **Please, mark, in which of the following markets did your company sell products/services in 2009?** | | NO | YES | % sales |
| | Local/regional market in Slovenia? | | | | |
| | National (whole Slovenian) market? | | | | |
| | Other European markets (except countries of Western Balkan)? | | | | |
| | Western Balkan markets? | | | | |
| | Other markets? | | | | |
| 1b | **Which of the above markets was your biggest market in terms of company income?*** <br> *The market will be referred to as 'the relevant' market as we continue. | | | | |
| 2 | **Introducing new products** | | | NO | YES |
| | The company introduced a significant number of new products in our relevant market in the past few years. | | | | |
| | The majority of those products were not new only for the company, but were also new to the market we work in. | | | | |
| | We introduced also products that were a novelty in the global markets, non-existent earlier. | | | | |
| 3 | **Please, mark the relevance of the following types of new products in your company.** | High | Med | Low | Not Used |
| | Repositioning | | | | |
| | Improving existing products | | | | |
| | Extensions of existing product lines | | | | |
| | New product lines | | | | |
| | New products that are novelties also in global markets | | | | |
| 4 | **If comparing company performance in terms of introducing new products in the past 5 years with the performance of our competitors, we can say that:** | | | NO | YES |
| | We performed at least on a par with peers. | | | | |
| | We performed better than peers. | | | | |
| | We were one of the leading companies in the industry. | | | | |
| 5 | **What was the contribution of the following types of new products to your total revenue in 2009?** | | | NO | YES |
| | From innovation to goods and services that were new to your market (your company introduced the new product/service) before competitors in your market, although the | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | product might have been available already in other markets). | | | | |
| | From innovation to goods and services that were new to your company, but the product was already available in other markets). | | | | |
| | Products that were not changed, existing products (including re-sale of products purchased from other companies) | | | | |
| **5b** | **Was the contribution of new products to your total revenue much different in the period between 2006 and 2008?** | | | | |
| **5c** | **If so, please, explain why and provide data.** | | | | |
| **6** | **Product innovation** | | | NO | YES |
| | New products were primarily NOT developed by imitation | | | | |
| | New products were developed primarily in our company (group). | | | | |
| | New products were developed by our company with cooperation of other companies and institutions. | | | | |
| **7** | **Process innovation** | | | NO | YES |
| | Did you introduce any significant process innovation in the past five years? | | | | |
| | Did you significantly improve the production process(es)? | | | | |
| | Did you significantly improve the logistics, delivery, distribution of inputs and outputs (products and services)? | | | | |
| | Did you significantly improve support services like maintenance, sales, IT, accounting and other processes in the company? | | | | |
| **8** | **Process innovation** | | | NO | YES |
| | New products were primarily NOT developed by imitation | | | | |
| | New products were developed primarily in our company (group). | | | | |
| | New products were developed by our company with cooperation of other companies and institutions. | | | | |
| **9** | **Technological core of products** | | | NO | YES |
| | The majority of our revenue (at least half) comes from products whose technological core is younger than 10 years. | | | | |
| | The majority of our revenue (at least half) comes from products whose technological core is younger than 5 years. | | | | |
| | The technology in our industry changes very fast. Consequently, so does our product structure. | | | | |
| **10** | **Please, mark the relevant sources of information, which supported and/or stimulated your innovation activity and evaluate their importance** | High | Med | Low | Not used |
| | **Internal sources:** | | | | |
| | Inside the company | | | | |
| | **Market sources** | | | | |
| | Suppliers of equipment | | | | |
| | Suppliers of materials, components and programme equipment | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Buyers | | | | | |
| | Advisors, private research or R&D facilities | | | | | |
| | Competitors and other companies in the field | | | | | |
| | **Institutional sources** | | | | | |
| | Universities or other higher education institutions | | | | | |
| | Government or public research institutions | | | | | |
| | **Other** | | | | | |
| | Conferences, market fairs, exhibits | | | | | |
| | Scientific, commercial and technical journals | | | | | |
| | Industrial associations and chambers | | | | | |
| **11** | **Please, provide the type and location of partners in your innovation activity, if partners exist.** | SLO | EU | nonEU | USA | Other |
| | Other companies in the group | | | | | |
| | Suppliers of equipment | | | | | |
| | Suppliers of materials, components, programme equipment | | | | | |
| | Buyers | | | | | |
| | Competitors and other companies in the field | | | | | |
| | Advisors, private research or R&D facilities | | | | | |
| | Universities or other higher education institutions | | | | | |
| | Government or public research institutions | | | | | |
| **12** | **The company's knowledge base is enhanced by:** | | | | NO | YES |
| | The company's knowledge base is enhanced by the information that flow from the environment into the company (integration of suppliers, clients or customers and external sources of knowledge). All this contributes to innovation activity in the company. | | | | | |
| | Strategic partnerships with competitors, buyers, suppliers, research institutions are also very important for our innovation activity. | | | | | |
| | Our knowledge base is also extended outside the company and expands thereby knowledge base of other companies.. The company markets own research results by selling intellectual property rights | | | | | |
| **13** | **The role of R&D department** | | | | NO | YES |
| | We have R&D department in the company. | | | | | |
| | R&D department systematically supports solving of problems that arise on the shop floor | | | | | |
| | R&D builds the absorption capacity of the company (gather technological information from the environment (gatekeeper), to store them in the company (storage) and spread them through the company) | | | | | |
| | R&D department sets guidelines for further technological development of the company and plays the role of the agent of change | | | | | |
| | R&D builds the ability of independent industrial design | | | | | |
| | Other. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **14** | **R&D expenditure** | | | | NO | YES |
| | In 2009 R&D expenditure amounted to at least 1% revenue. | | | | | |
| | In 2009 R&D expenditure amounted to at least 2% revenue. | | | | | |
| | In 2009 R&D expenditure amounted to at least 3% revenue. | | | | | |
| **14b** | **Was R&D expenditure in the period from 2006 to 2008 significantly different?** | | | | | |
| **14c** | **If yes, please, explain by how much and why.** | | | | | |
| **15** | **The perception of R&D expenditure in the company** | | | | NO | YES |
| | We do NOT perceive R&D expenditure solely as an unnecessary expenditure. | | | | | |
| | R&D expenditure is very important, because innovation is a source of competitive advantage and growth. | | | | | |
| | R&D expenditure is of strategic importance to the company, we try to invest more every year (in absolute terms), this is also in line with company strategy. | | | | | |
| **16*** | **Evaluate performance of your company compared to your main competitors in the following aspects on a scale from 1 to 5 (see the explanation below the table):** | 1 | 2 | 3 | 4 | 5 |
| | Number of new, adapted or completely new products | | | | | |
| | Time needed to adapt existing products to new/changed market demand | | | | | |
| | Time needed to develop a completely new product | | | | | |
| | Our firm substantially contributes to world trends in the industry | | | | | |
| | We make quality products (from the viewpoint of use) | | | | | |
| | *Evaluate performance of your company compared to your main competitors<br>1=considerably worse than the main competitors<br>2=worse than the main competitors<br>3=same as main competitors<br>4=better than the main competitors<br>5=considerably better than the main competitors | | | | | |
| **17** | **Technological competences** | 1 | 2 | 3 | 4 | 5 |
| | Research and development in the firm is advanced | | | | | |
| | Number of available technological capabilities inside the firm or through strategic partnership | | | | | |
| | We are good at predicting technological trends | | | | | |
| **18** | **Marketing competences** | 1 | 2 | 3 | 4 | 5 |
| | Obtaining information about changes of customers preferences and needs. | | | | | |
| | Acquiring real time information about competitors | | | | | |
| | Establishing and managing long-term customer relations | | | | | |
| | Establishing and managing long-term relations with suppliers. | | | | | |
| **19** | **Complementary competences** | 1 | 2 | 3 | 4 | 5 |
| | Good transfer of technological and marketing knowledge among business | | | | | |
| | The intensity, quality and extent of research and development knowledge transfer in co-operation with strategic partners | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Product development is cost efficient | | | | |
| | Activities of the business units are clearly defined in the corporate strategy of our firm. | | | | |
| **20** | **Technological capabilities** | | | NO | YES |
| | Our technological competencies exceed those of average companies in the industry. | | | | |
| | Technological competencies have been developed to such an extent that we can claim to be more technologically competent as our competitors. | | | | |
| | Dynamically, outdated technological competences are being continuously replaced by new. | | | | |
| **21** | **Marketing capabilities** | | | NO | YES |
| | Our marketing competencies exceed those of average companies in the industry. | | | | |
| | Technological competencies have been developed to such an extent that they have become routine and we can claim to be more in marketing more competent as our competitors. | | | | |
| | Dynamically, outdated marketing competences are being continuously replaced by new. | | | | |
| **22** | **Complementary capabilities** | | | NO | YES |
| | Technologists and marketing experts exchange informally relevant technological and marketing competences. | | | | |
| | In our company, the marketing and technology experts cooperate well in all stages of creating and marketing new products. | | | | |
| | There are enough new products in the pipeline at all times, which can be, if needed launched to the market. | | | | |
| **23** | **Please, provide the following data** | 2006 | 2007 | 2008 | 2009 |
| | R&D expenditure | | | | |
| | No. of employees in R&D department | | | | |
| | Number of patents | | | | |
| **24** | **Did your company in the past five years received any financial assistance for innovation activities from public institutions at the following levels:** | | | NO | YES |
| | Local government | | | | |
| | State (including public agencies and ministries) | | | | |
| | EU | | | | |

Table A2. Main innovation characteristics by main markets

| **Innovation characteristic** | **Development of main market*** | | |
|---|---|---|---|
| | Low Obs. 52 | High Obs. 48 | $\chi^2$ |
| **Introducing new products** | | | |
| significant number new to relevant market | 52.4% | 47.6% | 0.040** |
| majority of them new to the market | 46.4% | 53.6% | 0.154 |
| also novelty in the global markets | 34.5% | 65.5% | 0.021** |
| **Relative performance in terms of introduced novelties** | | | |
| least on a par with peers | 51.8% | 48.2% | 0.568 |
| better than peers | 58.2% | 41.8% | 0.122 |
| company is among the leading in the industry | 59.0% | 41.0% | 0.181 |
| **Product innovation** | | | |
| NPs primarily NOT developed by imitation | 53.9% | 46.1% | 0.218 |
| NPs developed primarily in company/group | 51.9% | 48.1% | 0.577 |
| NPs developed with cooperation | 44.2% | 55.8% | 0.078* |
| **Process innovation**** | | | |
| introduced process innovation in past 5y | 42.5% | 57.5% | 0.002*** |
| improved production processes | 45.7% | 54.3% | 0.044** |
| improved logistics, delivery, distribution | 55.2% | 44.8% | 0.293 |
| improved support services (maintenance, sales, IT, accounting etc.) | 57.7% | 42.3% | 0.057** |
| **Process innovation** | | | |
| NPcs primarily NOT developed by imitation | 51.8% | 48.2% | 0.563 |
| NPcs developed primarily in company/group | 52.1% | 47.9% | 0.581 |
| NPcs developed with cooperation | 55.1% | 44.9% | 0.342 |
| **Technological core of products** | | | |
| younger than 10 years | 36.2% | 63.8% | 0.000*** |
| younger than 5 years | 35.7% | 64.3% | 0.035** |
| technology thus product structure changes very fast | 28.6% | 71.4% | 0.054** |
| **Company's knowledge base is enhanced by:** | | | |
| from environment into the company | 52.6% | 47.4% | 0.470 |
| strategic partnerships | 50.7% | 49.3% | 0.409 |
| extended outside - selling intellectual property rights | 27.3% | 72.7% | 0.077* |
| **Role of R&D dept**** | | | |
| we have R&D department in the company. | 42.5% | 57.5% | 0.002*** |
| R&D supports solving problems on the shop floor | 45.1% | 54.9% | 0.025** |
| R&D builds the absorption capacity of the company | 43.9% | 56.1% | 0.020** |
| R&D sets guidelines for further tech. development | 44.3% | 55.7% | 0.041** |
| R&D builds ability of independ. industrial design | 36.7% | 63.3% | 0.036** |
| **R&d expenditure** | | | |
| at least 1% of revenue. | 43.6% | 56.4% | 0.001*** |
| at least 2% of revenue. | 28.0% | 72.0%*** | 0.000*** |
| at least 3% of revenue. | 26.3% | 73.7%*** | 0.000*** |
| **Perception of R&D expenditure** | | | |
| knowledge transfer among employees is very important | 48.3% | 51.7%*** | 0.054** |
| of strategic importance to the company | 46.2% | 53.8%** | 0.027** |
| of strategic importance to the company | 41.5% | 58.5%*** | 0.005*** |
| **Technological capabilities** | | | |
| exceed those of average companies in the industry. | 52.2% | 47.8% | 0.557 |
| have been developed to such an extent that we can claim to be more technologically competent as our competitors | 55.6% | 44.4% | 0.235 |
| dynamically, outdated technological capabilities are being continuously replaced by new. | 54.4% | 45.6% | 0.364 |
| **Marketing capabilities** | | | |

| | | | |
|---|---|---|---|
| exceed those of average companies in the industry. | 53.8% | 46.2% | 0.427 |
| have been developed to such an extent that we can claim to be more technologically competent as our competitors | 53.1% | 46.9% | 0.497 |
| dynamically, outdated marketing capabilities are being continuously replaced by new. | 51.2% | 48.8% | 0.522 |
| **Complementary capabilities** | | | |
| experts exchange informally relevant technological and marketing capabilities | 52.6% | 47.4% | 0.511 |
| experts cooperate well in all stages of creating and marketing new products. | 52.8% | 47.2% | 0.489 |
| there are enough new products in the pipeline at all times, which can be launched to the market. | 56.0% | 44.0% | 0.409 |

$^{***}p<0.010$; $^{**}p<0.050$; $^{*}p<0.100$

*The companies from the group High reported as their main markets either markets from the European Union or other developed foreign markets. The companies from the group **Low** has reported the local, national or the markets from the Western Balkans.

Table A3. Evaluation of firm competencies by main markets, ANOVA comparison of means

| | | **Mean** | **Std. Dev.** | **95% Confidence Interval for Mean** | |
|---|---|---|---|---|---|
| Type of company's competencies | Development of main market* | | | Lower bound | Upper bound |
| **Technological competencies** | | | | | |
| Research and development in the firm is advanced | **Low** | 3.46 | .896 | 3.21 | 3.71 |
| | **High** | 3.31 | .926 | 3.04 | 3.58 |
| Number of available technological capabilities inside the firm or through strategic partnership | **Low** | 3.58 | .825 | 3.35 | 3.81 |
| | **High** | 3.40 | .792 | 3.17 | 3.63 |
| We are good at predicting technological trends | **Low** | 3.40 | .748 | 3.20 | 3.61 |
| | **High** | 3.31 | .829 | 3.07 | 3.55 |
| **Marketing competencies** | | | | | |
| Obtaining information about changes of customers' preferences and needs. | **Low** | 3.17 | .706 | 2.98 | 3.37 |
| | **High** | 2.88 | .890 | 2.62 | 3.13 |
| Acquiring real time information about competitors | **Low** | 3.25 | .738 | 3.04 | 3.46 |
| | **High** | 3.06 | .810 | 2.83 | 3.30 |
| Establishing and managing long-term customer relations | **Low** | 3.58 | .848 | 3.34 | 3.81 |
| | **High** | 3.58 | .942 | 3.31 | 3.86 |
| Establishing and managing long-term relations with suppliers. | **Low** | 3.54 | .896 | 3.29 | 3.79 |
| | **High** | 3.42 | .871 | 3.16 | 3.67 |
| **Complementary competencies** | | | | | |
| Good transfer of technological and marketing knowledge among business | **Low** | 3.46 | .753 | 3.25 | 3.67 |
| | **High** | 3.23 | .805 | 3.00 | 3.46 |
| The intensity, quality and extent of research and development knowledge transfer in co-operation with strategic partners | **Low** | 3.33 | .785 | 3.11 | 3.55 |
| | **High** | 3.08 | .821 | 2.84 | 3.32 |
| Product development is cost efficient | **Low** | 3.27 | .770 | 3.05 | 3.48 |
| | **High** | 3.25 | .863 | 3.00 | 3.50 |
| Activities of the business units are clearly defined in the corporate strategy of our firm. | **Low** | 3.35 | .711 | 3.15 | 3.54 |
| | **High** | 3.21 | .988 | 2.92 | 3.50 |

# Appendix B: Chapter 2

Table B1. Complete list of indicators for measuring each construct in the theoretical model from the original questionnaire

| Constructs | Item | Abbreviation |
|---|---|---|
| External sources 1 | Suppliers of equipment | SuppEquip |
| | Suppliers of materials, components and programme equipment | SuppMat |
| | Buyers | **Buyers** |
| | Competitors and other companies in the field | **Companies** |
| | Consultants, private research or R&D facilities | Consultants |
| | Universities or other higher education institutions | Unis |
| | Government or public research institutions | PublicR&D |
| | Conferences, market fairs, exhibits | ConferExhib |
| | Scientific, commercial and technical journals | **ScientOutlets** |
| | Industrial associations and chambers | IndustAssoc |
| Genetic material: influence on decision-making | Is the decision making process about strategic questions of the firm separated from the operational decision making process at different levels of the firm? | DecMakingSep |
| | Did top managers and owners make strategic decisions unanimously in the last five years? | UnanDecMaking |
| | Are the basic strategic decisions in the firm coordinated among owners, managers and workers? | **CoordDecMaking** |
| Genetic material: Workers participation in risk sharing | Are most of workers prepared to do "something more" for the firm? | SmtMore |
| | Do you believe most workers would stay with the firm even if they were offered better employment somewhere else (for example if they were offered a better paid employment)? | StayInFirm |
| | Are most workers willing to accept a part of business risk (for example financial investment in the firm or deferred payment in the case of profit sharing)? | AcceptRisk |
| Genetic material: Workers' participation in the workplace | Do workers engage in additional training for the good of the firm (not considering training organized by the firm)? | AddTraining |
| | Is there a great need for workers to work in work groups because of the nature of the work processes? | WorkInGroups |
| | Is cooperation in different teams in individual department (not exclusively performing tasks in the same workplace) a common form of workers' operation? | CooperTeams |
| | Is there a strong presence of workers' cooperation between different departments and forming of interdepartmental teams? | CooperDepart |
| Genetic material: Workers' participation in decision making | Are workers informed about key decisions for the firm (workers have the option of giving comments that are then regarded or not. | InfoKeyDecis |
| | Is there an established open dialog with the workers about key decisions for the firm (workers have the right to information, giving suggestions, debate, protest)? | **OpenDialogue** |
| | Are the workers' representatives in your firm members of the governing bodies (for example the supervisory board and its comities) and are involved in the decision making process? | RepresGovern |

| Constructs | Item | Abbreviation |
|---|---|---|
| Genetic material: motivation | Does your company provide organized training of your employees based on identified needs of the company? | OrgTrain |
| | Do you involve more than half of your employees in your training programs annually? | MoraHalf |
| | Do you measure training effectiveness with other methods than conducting a survey at the end of a training program? | MeasTrain |
| | Does your company provide regular on the job training (e.g. apprenticeship, mentorship, job rotation)? | OTJTrain |
| | Do you systematically induce knowledge transfer among employees? | **KnowTrans** |
| | Do you have successors for most of your key employees, so that they could effectively take on their positions in a short period of time? | Successors |
| Innovative performance | Number of new, adapted or completely new products | Num_np |
| | Time needed to adapt existing products to new/changed market demand | Improv_pr |
| | Time needed to develop a completely new product | Time_dvlp |
| | Our firm substantially contributes to world trends in the industry | Wrld_trnds |
| Technological competences | R&D in the firm is advanced | **RD_advnc** |
| | Number of available technological capabilities inside the firm or through strategic partnership | **Tech_cap** |
| | We are good at predicting technological trends | **Pred_trnds** |
| Marketing competences | Obtaining information about changes of customer preferences and needs. | Infocust |
| | Acquiring real time information about competitors. | **Infocomp** |
| | Establishing and managing long-term customer relations. | **Longtermcust** |
| | Establishing and managing long-term relations with suppliers. | **Longtermsupp** |
| Complementary competences | Good transfer of technological and marketing knowledge among businesses | **Knol_trans** |
| | The intensity, quality and extent of research and development knowledge transfer in co-operation with strategic partners | **RD_cooper** |
| | Product development is cost efficient. | **Cost_eff** |
| | Activities of the business units are clearly defined in the corporate strategy of our firm. | **Clr_act** |
| Innovative Performance | Number of new, adapted or completely new products | **Num_np** |
| | Time needed to adapt existing products to new/changed market demand | **Improv_pr** |
| | Time needed to develop a completely new product | **Time_dvlp** |
| | Our firm substantially contributes to world trends in the industry | Wrld_trnds |
| | We make quality products (from the viewpoint of use) | Qual_prod |

Note: Upon examination of the fit of the pre-specified model and in determining its convergent and discriminant validities, the indicators that were retained are given in bold type in the above table.

## Model validation: Reliability and validity

Given that factorial validity is important in the context of establishing the validity of latent constructs, we followed the PLS validation procedures by Gefen and Straub (2005) and Straub et al. (2004) to examine it as well as establish reliability for the measurement model.

The convergent validity was tested by performing a bootstrap with 400 resamples after which the t-values of the outer model loadings were examined. A convergent validity is detected when each of the measurement items loads with a significant t-value on its latent construct. Our test shows that the loadings on all indicators that are significant at the .001 level (see Table B2), denoting strong convergent validity.

Table B2. T-statistics for Convergent Validity

| Construct | Indicator | T-statistic |
|---|---|---|
| External Sources | Buyers ← ES | 11.0213*** |
| | Companies ← ES | 6.0553*** |
| | ScientOutlets ← ES | 5.0848*** |
| Genetic Material | KnowTrans ← GM | 7.2341*** |
| | OpenDialogue ← GM | 15.1307*** |
| | CoordDecMaking ← GM | 6.9344*** |
| Marketing Competences | InfoCust ← MC | 29.6723*** |
| | InfoComp ← MC | 17.7328*** |
| | LongtermCust ← MC | 63.5306*** |
| | LongtermSupp ← MC | 94.7732*** |
| Technological Competences | RD_advnc ← TC | 93.6531*** |
| | Tech_cap ← TC | 40.7146*** |
| | Pred_trnds ← TC | 53.2314*** |
| Complementary Competences | Knol_trans ← CC | 22.7438*** |
| | RD_cooper ← CC | 87.0458*** |
| | Cost_eff ← CC | 49.9858*** |
| Innovative Performance | Num_np ← INN | 67.8751*** |
| | Improv_pr ← INN | 26.9834*** |
| | Time_dvlp ← INN | 40.029*** |

***p<0.001
**p<0.05

Convergent validity is also examined by measuring the average variance extracted (AVE), a measure of variance explained by a latent construct for the variance observed in its measurement items. According to the test put proposed by Fornell and Larcker (1981) the value of AVE is required to be at least .50 or higher. Table B3 contains the AVE values of this test from which we can conclude a high degree of convergent validity.

Table B3. AVE Scores

| Construct | AVE |
|---|---|
| ES (External Sources) | 0.5751 |
| GM (Genetic Material) | 0.5354 |
| MC (Marketing Competences) | 0.7122 |
| TC (Technological Competences) | 0.7892 |
| CC (Complementary Competences) | 0.7402 |
| INN (Innovative Performance) | 0.7155 |

Next, we evaluate discriminant validity by performing two tests. In the first one, we examine the cross-loadings of measurement items on latent constructs were examined. Comparing the loadings across the columns in the matrix in Table B4 we the discriminant validity is established by the fact that an indicator's loadings on its own construct are in all cases higher than all of its cross loadings with other constructs.

Gefen and Straub have suggested a difference in loadings of .10 and above, although some other scholars instruct that the difference in loadings should be at least 0.2 (Henson and Roberts, 2006; Park et al., 2002). The results of this test are moved in Table B4 where all items show great discriminant validity.

Table B4. Cross Loadings of Measurement Items to Latent Constructs

| Construct | Item | ES | GM | MC | TC | CC | INN |
|---|---|---|---|---|---|---|---|
| **ES** | Buyers | **0.8627** | 0.3105 | 0.3825 | 0.3027 | 0.2419 | 0.3117 |
| **ES** | Companies | **0.7422** | 0.1576 | 0.1148 | 0.19 | 0.0411 | 0.1613 |
| **ES** | ScientOutlets | **0.6559** | 0.1676 | 0.1381 | 0.0469 | 0.0837 | 0.2711 |
| **GM** | KnowTrans | 0.1543 | **0.802** | 0.3734 | 0.2585 | 0.2405 | 0.1752 |
| **GM** | OpenDialogue | 0.3396 | **0.8021** | 0.1441 | 0.3478 | 0.1315 | 0.2262 |
| **GM** | CoordDecMaking | 0.156 | **0.5653** | 0.0053 | 0.1445 | -0.0146 | 0.1847 |
| **MC** | InfoCust | 0.2595 | 0.2224 | **0.8349** | 0.4378 | 0.5361 | 0.3264 |
| **MC** | InfoComp | 0.2052 | 0.203 | **0.7455** | 0.4537 | 0.5799 | 0.4503 |
| **MC** | LongtermCust | 0.3523 | 0.2911 | **0.8875** | 0.3885 | 0.6518 | 0.4342 |
| **MC** | LongtermSupp | 0.2916 | 0.2185 | **0.899** | 0.4252 | 0.6535 | 0.478 |
| **TC** | RD_ADVNC | 0.1978 | 0.3033 | 0.4282 | **0.9206** | 0.5208 | 0.583 |
| **TC** | TECH_CAP | 0.2893 | 0.2831 | 0.4131 | **0.8763** | 0.4981 | 0.5239 |
| **TC** | PRED_TRNDS | 0.2402 | 0.3729 | 0.4891 | **0.8673** | 0.6059 | 0.6253 |
| **CC** | KNOL_TRANS | 0.0844 | 0.0985 | 0.4983 | 0.3953 | **0.804** | 0.4365 |
| **CC** | RD_COOPER | 0.2309 | 0.2436 | 0.6872 | 0.6628 | **0.9061** | 0.6739 |
| **CC** | COST_EFF | 0.1696 | 0.1375 | 0.648 | 0.4781 | **0.8679** | 0.5974 |
| **INN** | NUM_NP | 0.3314 | 0.2765 | 0.5474 | 0.596 | 0.6235 | **0.8766** |
| **INN** | IMPROV_PR | 0.3399 | 0.1264 | 0.3744 | 0.4336 | 0.4803 | **0.8225** |
| **INN** | TIME_DVLP | 0.2041 | 0.2407 | 0.3504 | 0.6079 | 0.6014 | **0.8375** |

In the second test of discriminant validity we compare the AVE score for each of the constructs and determine whether the square root of a given construct's AVE is larger than the correlations of the given construct with any other construct in the model (Chin 1998). The results moved in Table B5 are satisfactory and show a good discriminant validity.

Table B5. Correlations of the Latent Scores with the Square Root of AVE

| | **CC** | **GM** | **INN** | **MC** | **ES** | **TC** |
|---|---|---|---|---|---|---|
| **CC** | **0.5478** | 0 | 0 | 0 | 0 | 0 |
| **GM** | 0.197 | **0.2866** | 0 | 0 | 0 | 0 |
| **INN** | 0.6784 | 0.2609 | **0.5119** | 0 | 0 | 0 |
| **MC** | 0.7225 | 0.2789 | 0.5057 | **0.5072** | 0 | 0 |
| **ES** | 0.1998 | 0.3062 | 0.3409 | 0.3323 | **0.3307** | 0 |
| **TC** | 0.6138 | 0.3632 | 0.6536 | 0.5022 | 0.2721 | **0.6228** |

The reliability of the measurement items is shown in the computed Cronbach's α's and the composite reliability scores (Fornell and Larcker, 1981) in Table B6 below. All composite reliabilities are well above 0.7 and all of the Chronbach's alpha values are above the acceptable level of 0.65 (see Nunnally 1967). Although Cronbach's alpha is often used in measuring the internal consistency reliability, Henseler et al. (2009) argue that composite reliability is a better criterion to be used than Cronbach's alpha because composite reliability takes into account the different indicator loadings, which is consistent with PLS algorithm.

Table B6. Reliability Scores

| **Construct** | **Composite Reliability** | **Cronbach's α** |
|---|---|---|
| ES | 0.8004 | 0.6764 |
| GM | 0.7715 | 0.5881 |
| MC | 0.9078 | 0.8639 |
| TC | 0.9182 | 0.8665 |
| CC | 0.895 | 0.8273 |
| INN | 0.8829 | 0.8021 |

## Tests for Common Methods Bias

While several techniques exist for controlling common method variance in CBSEM, they are generally not directly applicable to PLS path modelling. In order to avoid incorrect conclusions may be drawn about relationships between constructs, we perform several different tests to complement the ruling out of the existence of this bias. Common methods bias is "variance that is attributable to the measurement method rather than to the constructs the measures represent" (Podsakoff et al. 2003, p. 879) and is a major contributor to systematic measurement error (Bagozzi and Yi 1991).

We first perform the Harman's one-factor test. Using an unrotated exploratory factor analysis where all the items are inputted, we can determine whether there is an emergence of a single factor, that is, whether a single factor accounts for the majority of the variance. In our test for the pooled model, 19 factors emerge, the largest of which accounts for 38 per cent of the variance. Both results indicate that common methods bias is not an issue in this study.

Table B7. SPSS output from the factor analysis

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 7.209 | 37.941 | 37.941 | 7.209 | 37.941 | 37.941 |
| 2 | 1.953 | 10.281 | 48.222 | 1.953 | 10.281 | 48.222 |
| 3 | 1.414 | 7.444 | 55.666 | 1.414 | 7.444 | 55.666 |
| 4 | 1.272 | 6.693 | 62.359 | 1.272 | 6.693 | 62.359 |
| 5 | 1.081 | 5.689 | 68.048 | 1.081 | 5.689 | 68.048 |
| 6 | .907 | 4.774 | 72.822 | | | |
| 7 | .746 | 3.928 | 76.750 | | | |
| 8 | .720 | 3.788 | 80.538 | | | |
| 9 | .644 | 3.389 | 83.928 | | | |
| 10 | .581 | 3.056 | 86.983 | | | |
| 11 | .513 | 2.698 | 89.681 | | | |
| 12 | .450 | 2.370 | 92.051 | | | |
| 13 | .364 | 1.916 | 93.967 | | | |
| 14 | .281 | 1.480 | 95.447 | | | |
| 15 | .265 | 1.396 | 96.843 | | | |
| 16 | .183 | .963 | 97.806 | | | |
| 17 | .181 | .955 | 98.761 | | | |
| 18 | .149 | .786 | 99.547 | | | |
| 19 | .086 | .453 | 100.000 | | | |

*Extraction Method: Principal Component Analysis.

Additionally, a test by Pavlou et al. (2007) examines the construct correlation matrix as calculated by PLS (reported in Table B5) to determine whether any constructs correlate extremely highly (more than 0.90). Our results show that none of the constructs were too highly correlated, which also indicates that there is no threat of common methods bias. Subsequently we apply the CMB test suggested by Podsakoff et al. (2003) as a more rigorous one, which was adapted for PLS analysis by Liang et al. (2007). The purpose of this technique (explained in more detail by Siponen and Vance (2010), pp. 141) is "to measure the influence of common methods bias on indicators vis-à-vis the influence of the theorized constructs in the model."

This technique is performed in a way that for each indicator in the measurement model a single-indicator construct is created. Subsequently, each of the constructs is linked to the single-indicator constructs for the indicators that it comprises, and finally, a construct representing the method is created. The method represents a reflective construct built by all indicators of the instrument. The

loadings are represented by λ in the table B8 and are measured by the coefficient of the paths between the method construct and each single-item construct. To assess the common method bias, we examined the statistical significance of the loadings of the method construct and compared the variance of each indicator (the variance that is explained by the individual and method factors). The squares of the loadings of the individual as well as the method construct represent the percentage of indicator-explained variance. The common method bias is said to have inconsequential effect when the variance of the indicator explained by the individual constructs is substantially greater than the variance explained by the method construct.

After performing this procedure, we observe that the variance of indicators due to individual constructs is substantially greater than that due to the method construct (see Table B8). The average variance captured in the individual constructs is 69 per cent versus 3 per cent for the method constructs. The interpretation of such result is that the influence due to the method factor is considerably smaller than the influence due to the individual factors. Majority of the loadings of the method factor are insignificant. In light of our previous tests, as well as the results obtained in this procedure, we can conclude that our results reflect a negligible influence due to common methods bias, and it is, therefore, not a concern.

Table B8. Common Method Bias analysis

| **Construct** | **Item** | **Individual Factor Loading ($\lambda_n$)** | **Variance Explained ($\lambda_n^2$)** | **Method Factor Loading ($\lambda_m$)** | **Variance Explained ($\lambda_m^2$)** |
|---|---|---|---|---|---|
| **ES** | Buyers | 0.610*** | 0.372 | 0.223*** | 0.050 |
| | Companies | 0.903*** | 0.815 | -0.120 | 0.014 |
| | ScientOutlets | 0.819*** | 0.671 | -0.090 | 0.008 |
| **GM** | KnowTrans | 0.745*** | 0.555 | 0.092 | 0.008 |
| | OpenDialogue | 0.727*** | 0.529 | 0.038 | 0.001 |
| | CoordDecMaking | 0.756*** | 0.572 | -0.155*** | 0.024 |
| **MC** | InfoCust | 0.970*** | 0.941 | -0.143*** | 0.020 |
| | InfoComp | 0.596*** | 0.355 | 0.175*** | 0.031 |
| | LongtermCust | 0.893*** | 0.797 | -0.013 | 0.000 |
| | LongtermSupp | 0.894*** | 0.799 | -0.001 | 0.000 |
| **TC** | Rd_advnc | 1.000*** | 1.000 | -0.102*** | 0.010 |
| | Tech_cap | 0.964*** | 0.929 | -0.095 | 0.009 |
| | Pred_trnds | 0.687*** | 0.472 | 0.203*** | 0.041 |
| **CC** | Knol_trans | 0.845*** | 0.714 | -0.395 | 0.156 |
| | Rd_cooper | 0.604*** | 0.365 | 0.331*** | 0.110 |
| | Cost_eff | 1.175*** | 1.381 | 0.019 | 0.000 |
| **INN** | Num_np | 0.173*** | 0.030 | 0.196*** | 0.038 |
| | Improv_pr | 1.022*** | 1.044 | -0.221*** | 0.049 |
| | Time_dvlp | 0.816*** | 0.666 | 0.010 | 0.000 |
| Average | | 0.799*** | **0.686** | -0.003 | **0.032** |

***p<0.001

**p<0.05

**Testing For Mediation Effects**

Figure B1. The mediating effect of Technological Competences in the relationship between Genetic Material and Innovative Performance

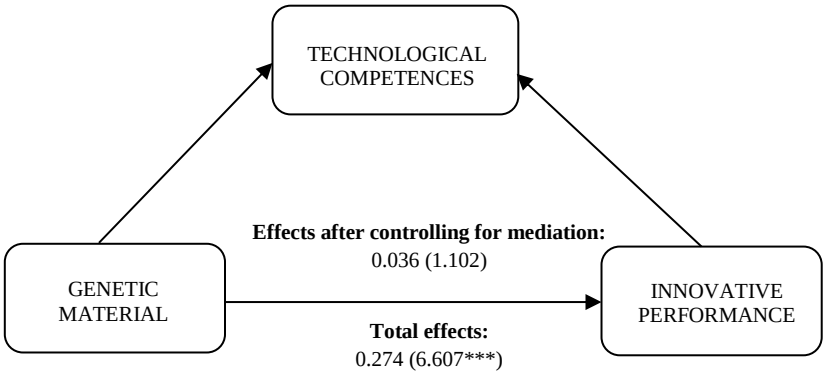



Figure B2. The mediating effect of Marketing Competences in the relationship between Genetic Material and Innovative Performance

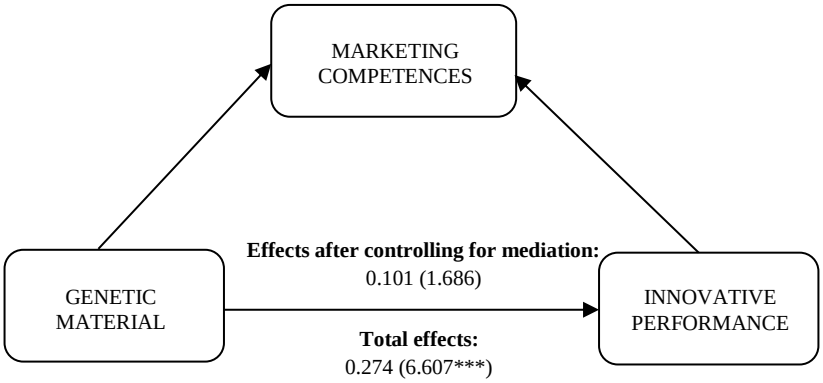
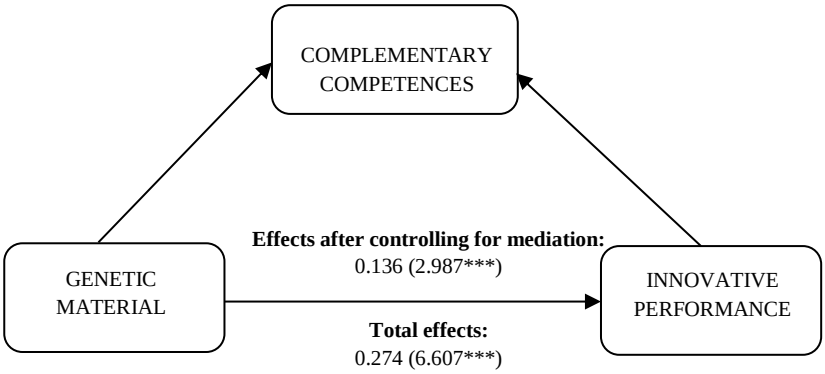



Figure B3. The mediating effect of Complementary Competences in the relationship between Genetic Material and Innovative Performance



# Appendix C: Chapter 3

Table C1. Summary of classifications used for Intangible Capital employed by major players in IC measurement*

| **Roos, Roos & Edvinsson (1997) (UK)** | **Bontis et al (2000) (Canada)** | **Roos, Roos & Edvinsson (1997) (UK)** | **Sveiby (1997) (Sweden)** | **Subramaniam & Youndt (2005) (USA)** | **Edvinsson and Malone (1997) (Denmark)** | **New Guideline (2003) (Denmark)** | **Cañibano et al. (2001) (MERITUM Project)** | **Chen et al. (2004) (Taiwan)** |
|---|---|---|---|---|---|---|---|---|
| *Human capital* Competence, attitude and intellectual agility | *Human capital* The individual-level knowledge that each employee possesses | *Human capital* Competence, attitude and intellectual agility | *Human capital* Employee know-how, education & qualifications, work-related knowledge & competency, entrepreneurial spirit | *Human capital* Knowledge, skills, and abilities residing with and utilized by individuals. | *Human capital* Competence matrix. Number of professionals, total staff, temps | E*mployees* Employees' skills, competencies, experience, education, motivation, commitment. | *Human capital* Knowledge, skills, experiences and abilities of people | *Human capital* Employees' knowledge, skill, capability, and attitudes in relation to fostering performances |
| *Organisational capital* All organisational, innovation, processes, intellectual property and cultural assets | *Structured capital* Non-human assets or organisational capabilities used to meet market requirements | *Organisational capital* All organisational, innovation, processes, intellectual property and cultural assets | *Internal capital* Management philosophy, Corporate Culture, management processes, Information & networking systems, financial relations, IP | *Organisational capital* Institutionalized knowledge and codified experience residing within and utilized through databases, patents, manuals, structures, systems, and processes. | *Process capital* Average throughput time of invoicing. Average throughput of monthly reporting | *Processes* Knowledge embedded in stable procedures, innovation processes quality procedures, management & control processes, mechanisms for handling info. | *Structural capital* Pool of knowledge that stays with the firm at the end of the working day. It comprises the organisational routines, procedures, systems, cultures, databases, etc. | *Structural capital* The system and structure; business routines; company's culture; support and cooperation between employees; share of knowledge; power and responsibility structure etc. |
| *Relational capital* Relationships | *Relational capital* Customer | *Relational capital* Relationships | *External capital* Brands | *Social capital* Knowledge embedded | *Customer capital* Service-based | *Customers* Customer mix; relations to | *Customer capital* All resources | *Customer capital* The value |

| **Roos, Roos & Edvinsson (1997) (UK)** | **Bontis et al (2000) (Canada)** | **Roos, Roos & Edvinsson (1997) (UK)** | **Sveiby (1997) (Sweden)** | **Subramaniam & Youndt (2005) (USA)** | **Edvinsson and Malone (1997) (Denmark)** | **New Guideline (2003) (Denmark)** | **Cañibano et al. (2001) (MERITUM Project)** | **Chen et al. (2004) (Taiwan)** |
|---|---|---|---|---|---|---|---|---|
| which include internal and external stakeholders Renewal and development capital New patents and training efforts. | capital is only one feature of the knowledge embedded in organisational relationships | which include internal and external stakeholders | Customers, Distribution channels Business collaborations | within, available through, and utilized by interactions among individuals and their networks of interrelationships. | sales spread. Percentage of key clients | customers, the degree of co-operation with customers and users in product and process development | linked to the external relationships of the firm such us customers, suppliers or R&D partners | embedded in marketing channels and relationships that an enterprise develops by conducting business |
| *Renewal and development capital* New patents and training efforts. | *Intellectual property* Unlike IC, IP is a protected asset and has a legal definition | *Renewal and development capital* New patents and training efforts. | | *Incremental innovative capability* and *Radical innovative capability* | *Innovation capital* Current innovation areas; staff deployable in these areas | *Technologies* Technological support of the other three knowledge resources. IT systems esp. intensity usage. | | *Innovation capital* competence of organizing and implementing R&D, bringing forth the new technology and the new product to meet the demands of customers |

* Adapted and extended from Hunter et al. (2005)

## Methodology, data collection and data description

The data used in our study was collected in a wider research project on intangibles in firms from the Western Balkans region[49]. The main purpose was to address the conceptual and applicative issues that current empirical studies on intangible capital and innovation in developing economies face (Aralica et al., 2008; OECD/Eurostat, 2005; Mytelka et al., 2004; Mairesse and Mohnen, 2010). The conceptualisation of the questions, which indicators we deemed appropriate to for constructing the latent variables in our model(s) are founded in theory.

*Human capital measures*

The human capital and motivation indicators concern the internal corporate **training** practices and policies, as well as the on-the-job training. The questions aim to identify the company's intention to make collaborative efforts by asking about the provision of organised training based on identified needs of the company. Next, the questions establish the firm's dedication to measuring the effects of training. Firms that also measure training effectiveness with other methods, rather than solely by conducting a survey at the end of a training programme, are considered more dedicated. The questions examining the **on-the-job training** aim to identify whether the company actually provides regular on-the-job training (e.g. apprenticeship, mentorship, job rotation etc.) and if it actively promotes spreading knowledge among its employees. If a firm considers on-the-job training an important factor in the promotion of key employees, it will foster successors for most of its key employees, allowing for quick and efficient replacements. As put forward by Chen et al. (2004), human capital is the foundation of the companies' intangible capital, and refers to such factors as "employees' knowledge, skill, capability, and attitudes in relation to fostering performances which customers are willing to pay for and the company's profit comes from".

*Structural capital measures*

The proxies for measuring the latent variable structural capital include management's influence on decision-making, the workers' participation in risk sharing, workers' participation in decision-making, and their role in the workplace. These were measured through adapted psychometric questions, developed and tested by Bloom and Van Reenen

[49] For more details on the comprehensive survey on intangible capital in the developing countries of the Western Balkan, please see Prašnikar et al. (eds.) (2012) and Prašnikar and Knežević Cvelbar (eds.) (2012).

(2007). They are organised in cascading set of closed questions, an approach first used by Miyagawa et al. (2010)[50].

The proxies for the **management's role in decision-making** examine the "power and responsibility in the managing process" (Cheng et al., 2004), or the use of existing resources belongs to managers. The separation of strategic functions (given usually to top management) and day-to-day decisions (which are usually in the hands of middle and lower management) reveals the level of cooperative behaviour of the corporate governance. The literature explains that employee involvement in decision–making may foster the elimination of post–contractual information asymmetry (Freeman and Lazear, 1995), increase investments in human capital (Furubotn, 1988; Furubotn and Wiggins, 1984) and enable the controlling owners to pursue **value–enhancing quality management and innovative strategies** (Kraft et al., 2011). This power and responsibility structure is according to Chen et al. (2004) one of the expressions of structural capital.

The questions on **workers' participation in risk sharing**, examine the willingness of employees to do "something more" for the firm, or whether they would voluntarily, outside their working hours, invest themselves in the benefit of the company. Further, questions from this section of the questionnaire examine the workers' long-term personal vision within the company; their "loyalty" towards the firm reflected through their willingness to stay with the firm even if they had been offered better (paid) employment elsewhere, and lastly their propensity to financially participate in the firm and take financial risks. The **workers' participation in the work place**, or the internal cooperation, is examined by questions on the nature of the corporate processes and weather they encourage work in groups; whether it is common for teams to cooperate within same departments, as well as interdepartmentally. These aspects reveal the on one side the softer properties of the structural capital, the organisational culture, reflected through the employees' attitude about themselves and the firm (Chen et al., 2004). "Company culture under the guidance of a favourable managing philosophy is a valuable asset. Only under the strong culture can a company give full play to its employees' competence and motivate them to serve the company and customer heart and soul."

In order to study the effect of **workers' participation in the decision–making** process on firm performance, the survey categorises this participation into levels or degrees. Clarke et al. (1972) distinguishes between participation concentrated on work tasks (work–centred participation) and participation concentrated on the distribution of power (power–centred participation). This set of questions are modelled according to Bernstein (1982), who

[50] The cascading approach directs respondents to a systematic way of thinking about the actual situation in the organisation without being biased or thinking too broadly about it. It also increases the reliability of the data by using a set of three simple and clear consecutive 'Yes/No' statements. Each consecutive statement in a question set represents a greater degree of complexity of the selected phenomenon, building into a cascading structure, and also allowing empirical testing (more in Prašnikar et al., 2014).

distinguishes between different degrees of workers' control, and namely: employee consultation, which represents the lowest degree of participation, where workers merely provide written or oral suggestions to management, which can choose to ignore or act on them; employee co–influence, which involves discussions between workers and management, where workers have the right to be informed, discuss their interests, protest, and offer suggestions, but management still makes the final decision; and joint management, or co–determination, where both parties have the right to veto decisions and form joint decision committees. The most advanced degree, self–management, which enables full participation of all members of the firm, with workers having total control over the decision–making process, was left out from the questionnaires, given that the Republika Srpska of Bosnia and Herzegovina and Albanian normative frameworks do not support workers' participation. The first question, 'Are workers informed about key decisions for the firm?' reflects employee consultation. The second question, 'Is there an established open dialogue with the workers about key decisions for the firm?' expresses employee co–influence. The last question about workers being members of governing bodies includes joint management or codetermination.

The above described indicators are inline with Chen et al. (2004) definition of structural capital according to which this concept deals with the system and structure of a company. They postulate that a company "with strong structural capital will create favourable conditions to utilize human capital and allow human capital to realize its fullest potential, and then to boost its innovation capital and customer capital".

*Relational capital measures*

The innovation questionnaire of the survey on intangible capital in developing countries is heavily based on the Community Innovation Survey (CIS), but adapted to capture the specifics of the innovation activities in technology follower countries. The adaptations in the innovation questionnaire follow the recommendations from the literature on innovation surveys (OECD/Eurostat, 2005; Mytelka et al., 2004; Mairesse and Mohnen, 2010). The indicators we derive to build the latent construct of relation capital in their core examine the firm's market knowledge competences. The four proxies are measured on a 5-point Likert scale where CEOs evaluate their company's competences in comparison with competitors (from 1 - considerably worse than the main competitors to 5 - considerably better than the main competitors). The set of questions include information on company's knowledge about customers' preferences and needs, about competitors, and establishing and managing long-term relations with both customers and suppliers.

*Innovation measures*

Technical innovation (product and process innovation) is the most used measure for innovation in companies from the manufacturing sector, which is the type of companies

our sample consists of. The proxies we looked into for measuring the construct of innovation in our structural models are conceptualised as opinion on the relevance on the different types of innovation for the company. This question was added in the CIS based questionnaire and was the measures were adapted from the survey used by Rajkovič (2011). Given that this survey was prepared to address the needs of measuring innovation in technological followers (see Prašnikar, Redek and Drenkovska., 2014), it acknowledges the importance to determine not only whether there have been new products introduced by the company, but also the significance that a particular type of innovation holds for the company in terms of competitiveness and it technological (and organizational complexity). CEOs were asked to rate the following types of innovations on a 3-point Likert scale where 1 means low relevance and 3 means high relevance: repositioning; improving existing products; extensions to existing product lines; new product lines. The first three types represent incremental innovations, while the last three – radical innovations.

Tables C6 and C8 list the items we selected and tested as measures for the intangible constructs in the hypothetical model.

The survey conducted in the three economic entities also collected data about individual characteristics of the surveyed firms, such as export orientation (share of revenues made abroad), ownership type (state or private, domestic or foreign, and dispersed or concentrated), industry (service or manufacturing), and legal form (limited liability company or joint stock company). In each country, we pilot-tested the questionnaire in order to confirm its suitability. During the process we asked managers to complete the questionnaire and indicate any ambiguity in the phrasing of questions.

**Sampling and data collection**

The questionnaires were mainly sent by post to the CEO's and/or senior managers in charge of corporate R&D, HR, and other relevant departments as they possess comprehensive operational and strategic knowledge on firms, which was required by the questionnaire. The initial correspondence included a covering letter that explained the purpose of the research and provided assurance of anonymity and confidentiality. Subsequently, the managers were contacted by phone and, referring to the covering letter were, were notified that a questionnaire will be sent on their email account. Once the postal questionnaires were sent, detailed follow-up where necessary was conducted, by phone, or email one week latest.

The questionnaires in Slovenia were administered to the 400 largest Slovenian firms, which constituted the country's entire population of firms with 100 or more employees from the manufacturing and the service sector.

The surveys in Albania and Republika Srpska of Bosnia and Herzegovina were conducted with the assistance of the research teams from the University of Tirana, and the University of Banja Luka, respectively. The surveys were conducted in two waves for both the companies from the manufacturing industries and the companies from the service industries. The start of the survey in Slovenia was the autumn of 2010, and for Albania and Republika Srpska of Bosnia and Herzegovina - the beginning of 2011. Each wave of the survey was separated by three to four weeks. After the completion of the survey, 198 (100 from Slovenia, 40 from Albania, and 58 from Republika Srpska) effective responses were collected, amounting to an overall response rate of 22.4%.

**Sample descriptions**

The Slovenian sample finally consisted of mainly companies from the manufacturing sector (77%), while the rest were service companies. Two thirds of them (66%) exported at least 20%, while 59% exported at least half of products in the observed period. In terms of employment, the sample consists of 40 medium-sized companies (50-249 employees) and 54 large companies (250 employees or more). Over the entire period, the average company had 603 employees. About half of companies (52%) reported the domestic and/or Western Balkan markets as their main market, while the rest sold the majority of their products to the EU and other foreign markets.

The Albanian sample consists of 12 joint stock companies and 28 companies with limited liability. Some 25% (10 companies) are from the construction industry, 37.5% (15 companies) are from the manufacturing sector, while 37.5% are from the tertiary sector: 15% (six companies) are from trade and 22.5% (nine companies) are from service activities other than trade. The sample also justly represents the size structure. The average company in the sample employed 148 people in 2010.

Among the respondents from the Republika Srpska of Bosnia and Herzegovina sample 61.4% were manufacturing firms the sample, 22.4% are state-owned firms, 15.5% are owned by foreigners, and 94.8% had concentrated ownership. In 2011, they generated 8.7% of total income and employed 5.4% of employees among all firms registered in Republika Srpska of Bosnia and Herzegovina.

Table C2. Complete list of indicators for measuring intellectual capital constructs in the theoretical model (as obtained from the questionnaire)

| **Constructs** | **Item** | **Abbreviation** |
|---|---|---|
| **Structural capital** Management's influence on decision-making | Is the decision making process about strategic questions of the firm separated from the operational decision making process at different levels of the firm? | DecMakingSep |
| | Did top managers and owners make strategic decisions unanimously in the last five years? | UnanDecMaking |
| | Are the basic strategic decisions in the firm coordinated among owners, managers and workers? | CoordDecMaking |
| | Are most of workers prepared to do "something more" for the firm? | SmtMore |
| **Structural capital** Workers participation in risk sharing | Do you believe most workers would stay with the firm even if they were offered better employment somewhere else (for example if they were offered a better paid employment)? | StayInFirm |
| | Are most workers willing to accept a part of business risk (for example financial investment in the firm or deferred payment in the case of profit sharing)? | AcceptRisk |
| **Structural capital** Workers' participation in the workplace | Do workers engage in additional training for the good of the firm (not considering training organized by the firm)? | AddTraining |
| | Is there a great need for workers to work in work groups because of the nature of the work processes? | WorkInGroups |
| | Is cooperation in different teams in individual department (not exclusively performing tasks in the same workplace) a common form of workers' operation? | CooperTeams |
| | Is there a strong presence of workers' cooperation between different departments and forming of interdepartmental teams? | CooperDepart |
| **Structural capital** Workers' participation in decision making | Are workers informed about key decisions for the firm (workers have the option of giving comments that are then regarded or not. | InfoKeyDecis |
| | Is there an established open dialog with the workers about key decisions for the firm (workers have the right to information, giving suggestions, debate, protest)? | OpenDialogue |
| | Are the workers' representatives in your firm members of the governing bodies (for example the supervisory board and its comities) and are involved in the decision making process? | RepresGovern |
| **Human capital and motivation** Training and knowledge transfer | Does your company provide organized training of your employees based on identified needs of the company? | OrgTrain |
| | Do you involve more than half of your employees in your training programs annually? | MoraHalf |
| | Do you measure training effectiveness with other methods than conducting a survey at the end of a training program? | MeasTrain |
| | Does your company provide regular on the job training (e.g. apprenticeship, mentorship, job rotation)? | OTJTrain |
| | Do you systematically induce knowledge transfer among employees? | KnowTrans |
| **Human capital** Motivation | Do you have successors for most of your key employees, so that they could effectively take on their positions in a short period of time? | Successors |
| | Do you measure performance in such a way that you can clearly distinguish between high and low performers? | MeasPerf |
| | Are better performers better rewarded for their work than average performers? | Rewards |
| | Do you apply any other warning sign than oral reprimand for low performers to let them know of their substandard performance? | Warning |
| | Is goal-setting a part of you set of leadership practices? | GoalSetting |

| Constructs | Item | Abbreviation |
|---|---|---|
| | Are individual goals set for more than half of your employees? | IndGoalSetting |
| | Do you systematically measure if goal-setting is contributing to improved performance for the majority of your employees? | MeasGoalSetting |
| | Do you provide regular performance feedback to your employees? | PerfFeedback |
| | Do you conduct annual performance-review meetings for at least key employees? | PerfMeetings |
| | Are annual performance-review meetings conduced effectively and thus significantly contribute to improved performance? | ImproPerf |
| **Relational capital** | Obtaining information about changes of customer preferences and needs. | InfoCust |
| | Acquiring real time information about competitors. | InfoComp |
| | Establishing and managing long-term customer relations. | LongtermCust |
| | Establishing and managing long-term relations with suppliers. | LongtermSupp |
| **Radical innovation** | Mark the relevance of the following types of new products in your company: Extensions to existing product lines / services. | Extensions |
| | Mark the relevance of the following types of new products in your company: New product lines / services. | NewLines |
| | Mark the relevance of the following types of new products in your company: New products / services that are novelties also in global markets. | GlobalNovelties |
| **Exporting volume** | A dummy variable: 1 if the company exports above 50% (25% for the less developed economies) of its output, 0 if otherwise | Export |

Table C3. Intellectual Capital in firms (% that answered positively)

| Question | ***Slovenia*** (N = 73) | ***Pooled*** (N =52 ) |
|---|---|---|
| **Management's influence on decision-making** | | |
| The decision making process about strategic questions of the firm as a whole is separated from the operational decision making process at different levels. | 81 % | 70 % |
| Top managers and owners unanimously reach strategic decisions. | 73 % | 60 % |
| The basic strategic decisions are coordinated among owners, managers and workers. | 63 % | 45 % |
| **Workers' participation in risk sharing** | | |
| Most workers are prepared to do "something more" for the firm | 89 % | 81 % |
| Workers engage in additional training (apart from training organized by the firm) | 70 % | 64 % |
| Most workers would stay with the firm even upon being offered better conditions elsewhere | 59 % | 45 % |
| Most workers are willing to accept a part of the business risk (e.g. financial investment in the firm or deferred payment) | 26 % | 25 % |
| **Workers' participation in the workplace** | | |
| There an increased need for workers to work in work groups given the nature of the work processes | 90 % | n/a |
| Cooperating in different teams within individual departments is common | 77 % | n/a |
| There is a strong presence of workers' cooperation between different departments which results in | 68 % | n/a |

| Question | ***Slovenia*** (N = 73) | ***Pooled*** (N =52 ) |
|---|---|---|
| interdepartmental teams | | |
| **Workers' participation in decision making** | | |
| Workers are informed on key decisions | 92% | 60% |
| There is open dialog with the workers regarding key decisions for the firm | 84% | 51% |
| There are workers' representatives in governing bodies and are involved in the decision making process | 55% | 25% |
| **Human capital and motivation – learning** | | |
| The company provides regular on the job training | 99% | 68% |
| The company systematically induces knowledge transfer among employees | 81% | 75% |
| There are successors for most of the key employees | 38% | 66% |
| **Human capital and motivation – performance** | | |
| Performance is measured in such a way that you it clearly distinguishes between high and low performers | 90% | 87% |
| Better performers are better rewarded than average performers | 93% | 94% |
| Low performers are given different warnings (other than oral reprimand) | 64% | 83% |

Table C4. Intellectual Capital in firms (% that answered positively)

| Question | ***Slovenia*** (N = 73) | | ***Pooled*** (N =52 ) | |
|---|---|---|---|---|
| **Relational capital *** | mean | s.d. | mean | s.d. |
| Obtaining information about changes of customer preferences and needs | 3.00 | 0.85 | 2.98 | 1.57 |
| Acquiring real time information about competitors | 3.14 | 0.82 | 2.98 | 1.42 |
| Establishing and managing long-term customer relations | 3.60 | 0.92 | 3.09 | 1.62 |
| Establishing and managing long-term relations with suppliers | 3.52 | 0.93 | 3.23 | 1.69 |

*Measured on a Likert scale between 1 and 5 (1 - considerably worse than the main competitors to 5 - considerably better than the main competitors)

Table C5. Importance of radical innovation in firms (means and standard deviations)

| Question | ***Slovenia*** (N = 73) | | ***Pooled*** (N =52 ) | |
|---|---|---|---|---|
| **Relevance of types of new products *** | mean | s.d. | mean | s.d. |
| Repositioning of existing products on the market | 1.88 | 0.98 | 1.57 | 1.20 |
| Improving existing products | 2.53 | 0.70 | 1.94 | 1.21 |
| Extensions to existing product lines | 2.10 | 0.77 | 1.72 | 1.66 |
| New product lines | 2.08 | 0.99 | 1.57 | 1.20 |
| New products that are novelties also in global markets | 1.26 | 1.14 | 1.15 | 1.21 |

*Measured on a Likert scale between 1 and 3 (1-low relevance, 2-medium relevance, 3-high relevance)

## Model validation

Table C6. T-statistics for Convergent Validity: Slovenia

| Construct | Indicator | T-statistic |
|---|---|---|
| Human Capital | OTJTrain ← HC | 8.185** |
| | KnowTrans ← HC | 14.989*** |
| | MeasPerf ← HC | 7.150** |
| | Rewards ← HC | 21.528*** |
| Relational Capital | InfoCust ← RC | 45.361*** |
| | InfoComp ← RC | 12.790*** |
| | LongtermCust ← RC | 67.705*** |
| | LongtermSupp ← RC | 76.731*** |
| Structural Capital | CooperTeams ← SC | 6.746** |
| | OpenDialogue ← SC | 9.740** |
| Innovation | Extensions ← INN | 18.469*** |
| | NewLines ← INN | 10.784*** |
| | GlobalNovelties ← INN | 12.481*** |

***p<0.001
**p<0.05

Table C7. AVE Scores: Slovenia

| Construct | AVE |
|---|---|
| HC (Human Capital) | 0.5094 |
| RC (Relational Capital) | 0.7317 |
| SC (Structural Capital) | 0.5713 |
| INN (Innovation) | 0.5700 |

Table C8. T-statistics for Convergent Validity: Pooled Albania and Republika Srpska of Bosnia and Herzegovina

| Construct | Indicator | T-statistic |
|---|---|---|
| Human Capital | OTJTrain ← HC | 21.705*** |
| | KnowTrans ← HC | 24.681*** |
| | MeasPerf ← HC | 15.144*** |
| | Rewards ← HC | 15.449*** |
| Relational Capital | InfoCust ← RC | 109.076*** |
| | InfoComp ← RC | 35.420*** |
| | LongtermCust ← RC | 173.208*** |
| | LongtermSupp ← RC | 221.149*** |
| Structural Capital | AddTraining ← SC | 50.095*** |
| | OpenDialogue← SC | 60.681*** |
| Innovation | Extensions ← INN | 89.772*** |
| | NewLines ← INN | 48.674** |
| | GlobalNovelties ← INN | 37.851*** |

***p<0.001
**p<0.05

Table C9. AVE Scores: Pooled

| Construct | AVE |
|---|---|
| HC (Human Capital) | 0.5239 |
| RC (Relational Capital) | 0.8587 |
| SC (Structural Capital) | 0.7235 |
| RI (Radical Innovation) | 0.7534 |

Table C10. Cross Loadings of Measurement Items to Latent Constructs for Slovenia

| Construct | Item | HC | SC | RC | RI |
|---|---|---|---|---|---|
| HC | OTJTrain | **0.6972** | 0.1378 | 0.3189 | 0.0728 |
| HC | KnowTrans | **0.7161** | 0.4021 | 0.4171 | 0.1427 |
| HC | MeasPerf | **0.5969** | -0.1492 | 0.3001 | 0.1105 |
| HC | Rewards | **0.8262** | 0.0235 | 0.4294 | 0.1833 |
| SC | CooperTeams | 0.0889 | **0.6903** | 0.1811 | 0.1994 |
| SC | OpenDialogue | 0.2193 | **0.8162** | 0.149 | 0.2277 |
| RC | InfoCust | 0.4441 | 0.135 | **0.8458** | 0.2338 |
| RC | InfoComp | 0.1795 | 0.115 | **0.7279** | 0.232 |
| RC | LongtermCust | 0.56 | 0.2277 | **0.9181** | 0.1223 |
| RC | LongtermSupp | 0.4977 | 0.2272 | **0.9158** | 0.1335 |
| INN | Extensions | 0.1396 | 0.3263 | 0.2391 | **0.8253** |
| INN | NewLines | -0.0725 | 0.09 | 0.0266 | **0.7236** |
| INN | GlobalNovelties | 0.2132 | 0.1215 | 0.0784 | **0.7107** |

Table C11. Cross Loadings of Measurement Items to Latent Constructs for polled Albania and Republika Srpska of Bosnia and Herzegovina

| Construct | Item | HC | SC | RC | RI |
|---|---|---|---|---|---|
| HC | OTJTrain | 0.7336 | 0.5122 | 0.2843 | 0.107 |
| HC | KnowTrans | 0.7598 | 0.4181 | 0.2067 | 0.1583 |
| HC | MeasPerf | 0.7073 | 0.4041 | 0.017 | 0.2586 |
| HC | Rewards | 0.6928 | 0.3391 | 0.2059 | 0.3616 |
| SC | AddTraining | 0.4671 | 0.8492 | 0.1373 | 0.4248 |
| SC | OpenDialogue | 0.5239 | 0.852 | 0.2248 | 0.3155 |
| RC | InfoCust | 0.3027 | 0.2629 | 0.9176 | 0.364 |
| RC | InfoComp | 0.0749 | 0.0988 | 0.8818 | 0.3173 |
| RC | LongtermCust | 0.2816 | 0.2282 | 0.9458 | 0.3909 |
| RC | LongtermSupp | 0.2395 | 0.1633 | 0.9596 | 0.3555 |
| INN | Extensions | 0.2607 | 0.4375 | 0.4442 | 0.8998 |
| INN | NewLines | 0.3247 | 0.3914 | 0.2283 | 0.8884 |
| INN | GlobalNovelties | 0.1949 | 0.2781 | 0.3005 | 0.8133 |

Table C12 Correlations of the Latent Scores with the Square Root of AVE Slovenia

| | **HC** | **RI** | **RC** | **SC** |
|---|---|---|---|---|
| **HC** | **0.5094** | 0 | 0 | 0 |
| **INN** | 0.03404 | **0.57** | 0 | 0 |
| **RC** | 0.276571 | 0.038259 | **0.7317** | 0 |
| **SC** | 0.045071 | 0.080089 | 0.046096 | **0.5713** |

Table C13. Correlations of the Latent Scores with the Square Root of AVE Pooled

| | **HC** | **RI** | **RC** | **SC** |
|---|---|---|---|---|
| HC | **0.5239** | 0 | 0 | 0 |
| INN | 0.09018 | **0.7534** | 0 | 0 |
| RC | 0.066203 | 0.150777 | **0.8587** | 0 |
| SC | 0.339539 | 0.189138 | 0.045412 | **0.7235** |

Table C14. Reliability Scores Slovenia

| **Construct** | **Composite Reliability** | **Cronbach's α** |
|---|---|---|
| HC | 0.8039 | 0.6923 |
| INN | 0.7983 | 0.6621 |
| RC | 0.9154 | 0.8798 |
| SC | 0.7258 | 0.2539 |

Table C15. Reliability Scores Pooled

| **Construct** | **Composite Reliability** | **Cronbach's α** |
|---|---|---|
| HC | 0.8147 | 0.6978 |
| INN | 0.9014 | 0.8391 |
| RC | 0.9605 | 0.9454 |
| SC | 0.8396 | 0.6178 |

## Tests for Common Methods Bias

Table C16. Common Method Bias analysis – Slovenia

| Construct | Item | Individual Factor Loading ($\lambda_n$) | Variance Explained ($\lambda_n^2$) | Method Factor Loading ($\lambda_m$) | Variance Explained ($\lambda_m^2$) |
|---|---|---|---|---|---|
| **HC** | OTJTrain | 0.834*** | 0.696 | -0.119 | 0.014 |
| | KnowTrans | 0.223*** | 0.050 | 0.410*** | 0.168 |
| | MeasPerf | 0.874*** | 0.764 | -0.183*** | 0.033 |
| | Rewards | 0.880*** | 0.774 | 0.019 | 0.000 |
| **SC** | CooperTeams | 0.759*** | 0.576 | 0.023 | 0.001 |
| | OpenDialogue | 0.754*** | 0.569 | -0.024 | 0.001 |
| **RC** | InfoCust | 0.854*** | 0.729 | 0.003 | 0.000 |
| | InfoComp | 1.368*** | 1.871 | -0.643*** | 0.413 |
| | LongtermCust | 0.577*** | 0.333 | 0.345*** | 0.119 |
| | LongtermSupp | 0.729*** | 0.531 | 0.185*** | 0.034 |
| **INN** | Extensions | 0.737*** | 0.543 | 0.096 | 0.009 |
| | NewLines | 0.908*** | 0.824 | -0.155*** | 0.024 |
| | GlobalNovelties | 0.663*** | 0.440 | 0.084 | 0.007 |
| Average | | 0.782 | **0.669** | 0.003 | **0.063** |

***p<0.001
**p<0.05

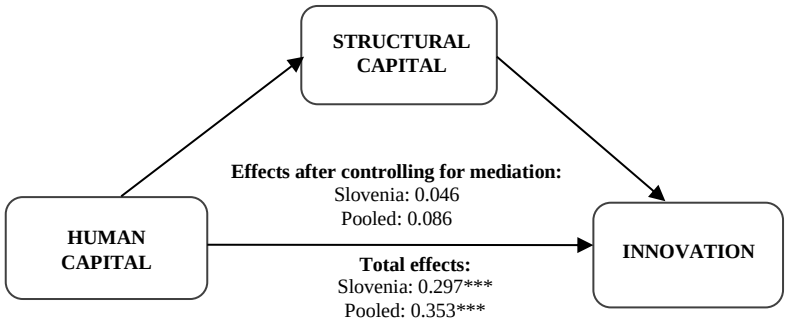
Table C17. Common Method Bias analysis – Pooled

| Construct | Item | Individual Factor Loading ($\lambda_n$) | Variance Explained ($\lambda_n^2$) | Method Factor Loading ($\lambda_m$) | Variance Explained ($\lambda_m^2$) |
|---|---|---|---|---|---|
| **HC** | OTJTrain | 0.652*** | 0.425 | 0.089 | 0.008 |
| | KnowTrans | 0.772*** | 0.596 | -0.020 | 0.000 |
| | MeasPerf | 0.827*** | 0.684 | -0.156*** | 0.024 |
| | Rewards | 0.644*** | 0.415 | 0.089 | 0.008 |
| **SC** | AddTraining | 0.864*** | 0.746 | -0.024 | 0.001 |
| | OpenDialogue | 0.837*** | 0.701 | 0.024 | 0.001 |
| **RC** | InfoCust | 0.818*** | 0.669 | 0.118*** | 0.014 |
| | InfoComp | 1.060*** | 1.124 | -0.199*** | 0.040 |
| | LongtermCust | 0.864*** | 0.746 | 0.095 | 0.009 |
| | LongtermSupp | 0.974*** | 0.949 | -0.022 | 0.000 |
| **INN** | Extensions | 0.741*** | 0.549 | 0.178*** | 0.032 |
| | NewLines | 0.973*** | 0.947 | -0.100 | 0.010 |
| | GlobalNovelties | 0.899*** | 0.808 | -0.083 | 0.007 |
| Average | | 0.840 | **0.720** | -0.001 | **0.012** |

***p<0.001
**p<0.05

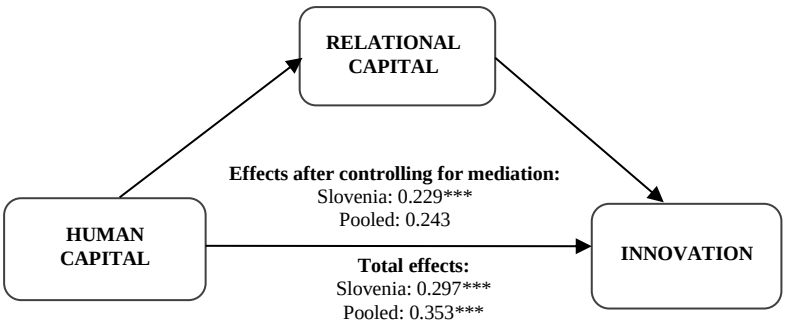
## Testing For Mediation Effects

Figure C1. Full mediating effect of Structural Capital in the relationship between Human Capital and Innovation – Slovenia




***p<0.001
**p<0.05

Figure C2. Partial mediating effect of Relational Capital in the relationship between Human Capital and Innovation - Slovenia




***p<0.001
**p<0.05

## Appendix D: Summary in Slovenian language / Daljši povzetek disertacije v slovenskem jeziku

Zgodovinska vloga otipljivih fizičnih sredstev kot virov gospodarske rasti, je nesporna. Ključni argument za njihov nesporni status kapitala je to, da so ustvarjene z uporabo obstoječih sredstev z namenom povečanje proizvodnje. Corrado in drugi (2009) poudarjajo, da ta argument velja enako za vse izdatke narejene pri razvoju novih produktov in trgov (vključno z, vendar ne omejeno na, R&R izdatke), izobraževanje delavcev ter razvoj organizacije, ki imajo prav tako v namen povečanje proizvodnje in potrošnje.

Gledano z makroekonomskega vidika, na katerem temelji glavni razlog za vlaganje v neotipljivi kapital in ustvarjanje novega znanja ter povečanje inovativnosti, je rast izhoda (outputa) - tako kot pri vlaganju v opremo in stroje. Mogoče ješe večji pomen vloge intelektualnega kapitala za države v razvoju v njihovem prizadevnanju, tako za gospodarsko rast, kot za izboljšanje svoje mednarodne konkurenčnosti. Z makroekonomskega vidika, povečanje zaloge intelektualnega kapitala je tesno povezano z bogastvom držav (Augier in Teece, 2005).

Z mikroekonomskega vidika pa, podjetja, ki temeljijo na materialnih sredstvih ne bi mogla doseči nadaljne rasti svoje ekonomije obsega in posledično ne bo mogla obdržati konkurenčne prednosti samo na podlagi teh sredstev. Taka podjetja imajo na razpolago dva pristopa pri odpravljanju tega problema: lahko outsource-ajo dejavnosti, ki jim ne prinašajo konkurenčne prednosti; ter da inovirajo. Inovativnost je kompleksen proces, katerega cilj je uspešno ponudba novih izdelkov na trgu ali razvoj novih procesov, ki bi povečali konkurenčnost podjetja na trgu. Zato je ključnega pomena znanje v pravem trenutku. Tako znanje je sredstvo, ki z ustreznim upravljanjem vodi do poslovnega uspeha. Z drugimi besedami, inovacije predstavljajo način za ustvarjanje večje dodane vrednosti v podjetju, ki pomaga pri doseganje trajne konkurenčne prednosti in so na ta način ključni dejavnik za rast (Cheng in Tao, 1999).

Od trenutka, ko so se ekonomisti in oblikovalci politik začeli zavedati pomena intelektulnih sredstev za gospodarsko rast, so bili soočeni s številnimi izzivi v zvezi z zajemanjem in merjenjem vhodnih in izhodnih parametrov te "enačbe". Čeprav se zdi jasna, je povezava med vlaganjem v znanje in donosnostjo teh naložb netrivialna in njeno razumevanje je še vedno slabo. Osnovno vprašanje pri tem je kako izmeriti naložbe v ustvarjanju znanja. Naslednjo pomebeno vprašanje pa ima za cilj odgovoriti v kolikšni meri te investicije rezultirajo v povečanem kapitalu znanja. Odgovor teh vprašanj bo

prispeval k boljši podlagi za nadaljno analizo povezave med povečanjem kapitala znanja in gospodarske rasti.

Torej ni presenetljivo, da so inovacije in neotipljivi kapital v središču politične razprave in, da vedno več pridobivajo podarek v akademskih raziskavah. V svoji disertaciji sem poskušala ponuditi odgovor na nekatere od teh izzivov z glavnim poudarkom na državah v razvoju v regiji Zahodnega Balkana.

**Merjenje inovacij v državah v razvoju z modificiranim CIS vprašalnikom**

Inovacije so glavna gonilna sila tako za gospodarsko rast držav, kot za konkurenčnost podjetij in panog (Geroski in drugi, 1993; Freel in Robson, 2004, Roper in drugi, 2008). Vendarle, merjenje in analiza inovativnih dejavnosti in njihovega vpliva na mikro-, mezzo- in makro ravni so pogosto omejene s konceptualnimi in aplikativnih težavami (Aralica, Račić in Radić, 2008), med katerimi so najbolj izpostavljeni dostopnost in kakovost podatkov. Pri interpretaciji empiričnih rezultatov študij, ki preučujejo vpliv R&R na produktivnost je potrebno biti previden, ker uporabljene metodologije ne upoštevajo neotipljivega dela inovacijskih aktivnosti v podjetjih.

Glede na metodološko razpravo, ki je prisotna v preučeavanju in analizi inovacij, v prvem poglavju predlagam razširjen pristop k uporabi anketnega vprašalnika CIS (Community Innovation Survey). Predlagana metodologija sledi priporočilom obstoječe literature na področju merjenja in analiz inovacijskih aktivnosti (OECD/Eurostat, 2005; Mytelka in drugi, 2004; Mairesse in Mohnen, 2010). Predlagani vprašalnik po eni strani neposredno obravnava obstoječe izzive, ki se nanašajo na zbiranje podatkov v državah v razvoju, kjer je dostopnost in kakovost pogosto vprašljiva. Po drugi strani pa obravnava vprašanje standardizacije, ki je prisotna pri obstoječih anketnih preučevanjah inovacij. Standardizacija je po eni strani zaželena pri primerjalnih empiričnih analizah, po drugi pa pogosto ne zajame posebnosti tehnološkega, strukturnega in gospodarsega razvoja v državah, ki v končni fazi vplivajo na njihove inovacije in R&D. Najpomembnejše spremembe in razširitve v primerjavi z obstoječim vprašalnikom CIS (IV) sta pregled kompetenc podjetij in sposobnosti, ki so predpogoj za absorbcijsko sposobnost, kakovosti, izpostavljenosti in virov znanja, strateška usmerjenost v R&R. Le-ti v kombinaciji z uvedbo kaskadnega pristopa pri merjenjuponujajo trdno podlago za analizo inovativnosti.

Analiza je bila narejena na podlagi primarnih podatkov za Slovenijo, pridobljenih z anketnim vprašalnikom, in sekundarnih, ki so bili pridobljeni iz letnih poročil za obdobje od leta 2006 do 2011, ki jih je zbrala Agencija Republike Slovenije za javnopravne evidence in storitve (AJPES). Rezultati govorijo v prid predlaganega pristopa pri merjenju inovacijskih aktivnosti in kažejo, da njihovo vključevanje lahko vodi v bolj podrobne analize inovacijske dejavnosti držav v razvoju oziroma vdržavah,ki predstavljajo tehnološke sledilce (technological followers). Natančneje, rezultati potrjujejo, da je

inovativna dejavnost podjetij tesno povetana z njihovimi kompetancami in sposobnostmi. Na vprašanje v kolikšni meri so le-te povezane z notranjo organizacijo podjetja in ali podjetja znajo izkoristiti priložnost za učenje z izvozom, poskušam odgovoriti v naslednjem poglavju.

**Evolucijski pristop k analizi razvoja podjetij v modelu izvozno usmerjene rasti**

Majhna odprta gospodarstva se pogosto zanašajo na paradigmo izvozno-usmerjene rasti (Palley, 2011; Borgersen in King, 2012). Prisotnost na tujih trgih je del strategije znane kot "učenje z izvozom" katera naj bi pospešila njihovo produktivnost in inovativnost. Podjetja, so prisiljena, da izboljšajo svojo inovativnost pod pritiskom zahtevnejše konkurence in zahtevnejših potrošnikov, vendar pa imajos tem tudi dostop do naprednih tehnologij in znanja (Tabrizy in Trofimenko, 2010; Wagner, 2007; Helpmanet al, 2004), ki bi sicer bili nedostopni. Pri tem je pomembno omeniti, da je proces učenja odvisen od motivacije podjetij ter njihovesposobnosti, da absorbirajo in uporabljajo razpoložljive informacie in znanja.

Medtem ko neoklasična teoretična literatura obravnava neotipljivi kapital kot vhodni parameter z zgolj statičnimi učinki, temelji evolucijske šole ležijo v kognitivnih sposobnostih zaposlenih v podjetjih in njihovih interakcijah. Iz teh idej so se razvili koncepti, kot so »ekonomske kompetence« (Eliasson, 1990), ali »absorpcijske sposobnosti« (Cohen in Levinthal, 1990). Ti koncepti lahko pomagajo pri pojasnevanju razlik v uspešnosti med podjetji (Ballot, Fakhfakh in Taymaz, 2001).

Skladno z Nelsonovo in Winterjevo tezo o »genetskiem materialu«, ki zajema vse procese v organizaciji, odnose med zaposlenimi ter sodelovanje in pretok znanja, sem modelirala mehanizem ki prikazuje način na katerem podjetje izkoriščai priložnosti, ki nastajajo iz izpostavljenosti zunanjim, bolj razvitim virom znanja in inovativnih idej. Poleg tega preučujemoblikovanje genetskega materiala, ki po drugi stranivpliva na inovativnost oz. konkurenčnost podjetij na svetovnem trgu. Pri tem se naslanjam na številne različnih teorije, vključno s teorijo inovacij, teorijo izvozno usmerjene rasti, modelom odprte inovacije, evolucijsko šolo ekonomije in teorijo dinamičnih konkurenčnih kompetenc.

V drugem poglavju s pomočjo anketnih podatkov, pridobljenih preko anketnega vprašalnika v Sloveniji testiram delovno hipotezo teoretičnega strukturnega modela in ga s pomočjo PLS sturkturnega modeliranja analiziram.. Rezultati kažejo, da vsa podjetja ne izkoriščajo »učenja z izvozom«. Sposobnost za učenje je povezana z obstoječim genetskim materialom podjetja in obstoječih kompetencah in sposobnosti. Zunanji viri idej skupaj z genetskim materialom in kompetencami vodijo v pozitivno spiralo, ki vodi v bolj inovativno podjetje. Priložnosti za učenje se ne izkoriščajo, če podjetje ne goji primerne klime – primerno klimo navadno zgradi vodstvo podjetja postopoma skupaj z vsemi udeleženci. Poleg tega rezultati kažejo, da je tržna usmerjenost pomembna, saj prisotnost na globalnih (bolj razvitih) trgih pomeni boljše črpanje znanja in informacij iz interakcij ostalih udeležencev trga, kot so konkurenti, kupci, dobavitelji in drugo (npr. znanstvena, tehnična literatura).

**Intelektualni kapital, inovacije izvozno usmerjena rast: primerjalna raziskava**

Tretje poglavje prispeva k zelo omejenemu empiričnemu znanju o intelektualnem kapitalu v gospodarstvih v razvoju. S primerjalno študijo med dvema nastajajočima trgoma iz Zahodnega Balkana (Albanije in Republike Srbske) ter Slovenijo, ki predstavlja bolj razvito gospodarstvo in je že članica EU.. Vse tri države so mala, odprta gospodarstva z izvozno usmerjeno rastjo.. Študija predlaga merila za posamezne elemente intelektualnega kapitala, kot so človeški kapital, strukturni kapital in relacijski kapital ter pojasnjuje katera merila so pomembna za obravnavana gospodarstva. Prav tako je predlagan model, ki pojasnjuje vpliv človeškega, strukturnega in relacijskega kapitala na inovativnost podjetij in njihovo izvozno usmerjenost. Rezultati kažejo na to, da je pomembna medsebojna povezanost gradnikov intelektualnega kapitala in, da imale-ta neposreden vpliv na inovativno usmerjenost vodstva. Poleg tega rezultati kažejo, da razpolaganje z intelektualnim kapitalom samo po sebi ni zadosten pogoj za uspešno poslovanje na mednarodnih trgih v primeru Albanije in Republike Srpske, za Slovenijo pa to ne drži. To je tudi v skladu z EBRD (2011) poročilom, ki nakazuje, da pomanjkanje izvoza lahko ogrozi razvoj.

**Zaključek**

Disertacija prikazuje pomembnost pravilne indentifikacije in merjenja neotipljivega kapitala in dejavnikov trga, ki spodbujajo inovativnost v majhnih, odprtih gospodarstvih. V njej je predlagana in uspešno testirana metodologija, ki pojasnjuje inovativnost na podlagi vlaganj v neotipljivi kapital v Sloveniji, Albaniji in Republiki Srpski. Na podlagi rezultatov lahko trdimo, da inovativnost podjetij ni odvisna le od njihovih notranjih značilnosti, sposobnosti in kompetenc temveč, da so le-ti oblikovani tudi s strani okolja podjetja. Neglede na smer vzročnosti med izvozno naravnanostjo in gospodarsko rastjo, je model odprte inovacije (open innovation paradigm) posebej pomemben za manj razvita gospodarstva in podjetja. Sposobnosti absorbiranja in uporabe znanja so najpomembnejši pri ohranjanju konkurenčnosti podjetja. Preprost recept za premostitev tehnološke nerazvitosti ne obstaja. Pri reševanju problema zaostalosti gospodarstva imajovelik pomen specifične institucionalne in strukturne značilnosti posameznih držav in države bi jih morale upoštevati pri oblikovanju svojih strategij rasti. Ta disertacija je med prvimi ki poglobljeno preučuje specifičnost inovativnih aktivnosti podjetij v državah iz Zahodnega Balkana in s tem doprinaša k razumevanju neotipljivega kapitala v državah v razvoju.