Achieving growth that matters

Editors:
Polona Domadenik Muren, Matjaž Koman, Tjaša Redek

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PREFACE

"Achieving growth that matters" is the result of an entire year's work of a selected research team *(Marija Drenkovska, Daša Farčnik, Ada Guštin Habuš, Tanja Istenič, Jan Jazbec, Matjaž Koman, Marko Limbek, Denis Marinšek, Dušan Mramor, Matej Pregarc, Rok Požun, Tjaša Redek, Adriana Rejc Buhovac and Polona Domadenik Muren)*, and the students of the XXVIIIth generation of the International Master in Business and Organisation Programme (IMB) at the School of Economics and Business, University of Ljubljana. Their contributions were invaluable. Our special gratitude goes to *Blaž Brodnjak, Blaž Zupan, Martin* Čopič*, Peter Wostner, Saša Jazbec, Tilen Božič* and *Peter Gašperšič* for excellent insights into relevant topics during the *Financial Management course* on the IMB programme in spring 2021, led by *Dušan Mramor*, and discussed further in the first part of the book. *Matej Rigelnik* from Union Hotels Collection enabled an experience of working on real challenges of business transformation, while *Iztok Škerlič* from the Public Agency for Promotion of Entrepreneurship and Development Projects of the Municipality of Izola provided invaluable support in designing a new business hub model, discussed in the third part of the book.

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Ljubljana, October 2021

Editors

I.

INTRODUCTION

Polona Domadenik Muren, Matjaž Koman, Dušan Mramor, Tjaša Redek

ACHIEVING GROWTH THAT MATTERS: A NEW ECONOMIC NARRATIVE

Introduction

The global economy has been facing turbulent times in the past three decades, with several major disruptions affecting global economic and social developments. Some of them have been positive and some negative. Technological progress, innovation and the rise of digital economy spurred hope of increased growth and consequently improvement of well-being. However, the question is to what extent these can neutralize the negative effects of climate change, population ageing, struggles with public finances and macroeconomic tensions, due to both the 2008 crisis as well as the COVID-19 pandemic and other challenges. Furthermore, there have also been dramatic changes in the global political arena, increasing political instabilities and pressures on free global trade flows, which have historically significantly contributed to global wealth growth. And while these trends look like they should be addressed by states and suitable policy mixes, it is also the companies that are struggling to navigate the heavy seas of increased global competition and significant changes in their business environment, brought upon by the emerging trends.

In continuing, we first highlight the main challenges faced by the global economy, national economies, and primarily national (and supranational) policymakers. In the second part, the corporate perspective is highlighted, providing examples of good practices and innovative business models, which have or are expected to have a positive direct impact on both the companies as well as the economic and social spillover effects.

1 Legacy and the emerging trends as challenges to policymakers

Already before COVID-19, most developed economies in the EU faced fragile economic growth, coupled with rising income and wealth inequalities between the richer and the poorer segments of population, gaps in regional and country development, as well as increasing unemployment and insecurity of working arrangements (Jacobs, 2021). The lack of macroeconomic policy coordination has long been the "usual suspect" for the comparative European weakness (towards e.g., the US and rapidly growing China). It was particularly clearly manifested during the recent 2008 "Great Recession", when monetary stimulus was first not sufficiently supported by fiscal policy, and the fiscal policy itself was tightened too early (de Galhau, 2021). Macroprudential policies, which have been applied to increase resilience of the financial sector,[1] targeted emerging risks better than conventional monetary policy by bolstering the balance sheets of borrowers and lenders (Brandao-Marques, 2020). However, as argued by many policymakers, macroprudential policy is subject to "leakage effects" (Bengui & Bianchi, 2018), reducing its effectiveness, while monetary policy has the advantage of "getting into all the cracks" but causes potentially large costs to the economy at large. Erosion in social cohesion and lack of trust in economic and social policy-making prescriptions have contributed to mistrust in governmental policy instruments. The distrust manifested itself particularly strongly during the COVID-19 epidemic (Cairney & Wellstead, 2021).[2]

Given the scale of the decline during the Great Recession and the sluggish recovery, it became evident that the policymakers use an outdated and inappropriate policy mix (economic, social, and industrial policies). The global financial crisis motivated macroeconomic debates, revolving around several issues. The complex role of banks and financial institutions in the economy in general, the associated risks related to liquidity and eventually solvency and the impact on economic stability have become more important in the economic discourse. However, besides fiscal austerity (macroprudential regulation) and the few reforms of the banking regulation to reduce the systemic risk, little wider reform of the financial sector, one of the main culprits for the Great Recession, has been performed.

1 A macroprudential policy is a subset of a broader financial policy, which includes macro- and microprudential policies with the ultimate goal to achieve stable financial systems. By design, capital and liquidity requirements increase buffers available to absorb losses and periods of illiquidity, and studies indicate they have reduced banks' risks, which strengthens the financial system's resilience (Brandao-Marques et al., 2020).

2 During a pandemic, people need to trust experts to help them understand and respond to the problem, governments to coordinate policy instruments and make choices about levels of coercion and citizens, as they cooperate to minimize infection (Cairney & Wellstead, 2019). However, the dynamics of trust process is complex and varies markedly on individual, institutional or societal levels and different contexts of political systems (Cairney & Wellstead, 2021).

As a consequence, economic policy with its standard neoclassical tool pack has failed to deal with continuing weaknesses in productivity, declining earnings and lower business investment (Laybourn-Langton et al., 2019). Amongst the large EU members, Germany and Italy are at the two ends of the 2008-2021 growth spectrum with increasing divergence in GDP per capita (Buti, 2020). The general perception that public borrowing and spending are harmful for recovery in case of high public debt, which was one of the core premises of macroprudential policies, was especially harmful to peripheral EU countries (Prašnikar et al., 2021).[3]

The threat of secular stagnation in economies (Summers, 2013, Teulings & Baldwin, 2014), an old concept in a new world, dragging down the equilibrium real interest growth, as well as long term growth, despite advances in technology and productivity, demands from the policymakers a new, innovative, ambitious and efficient policy mix. In a situation of persistent excess savings (the case of the EU), very low interest rates and little or no inflation, arguments for a macroeconomic policy attempting to reach full-employment output with a more expansionary fiscal policy are very strong. And primarily, they are also a complete opposite to the prudent fiscal policies that have been followed so far (Buti & Papacostantinou, 2021). Central to this new policy discussion are the fiscal-monetary policy mix and the role of central banks. The need to ensure a ‘congruent’ policy mix (Bartsch et al., 2021) underpins the evolution in the relations between monetary and fiscal authorities in Europe.

1.1 Mission-driven policy mix for sustainable growth

Growth as such is no longer associated only with improvements in the material well-being but is usually perceived as a means, a necessary condition to achieving multiple goals of economic and social progress. Growth as such is a necessary condition (but not a sufficient one) to progress or development. In this context, growth implies also changes in the structure of economic activity, which requires a shift from solely material production growth to “inclusive growth”, “green growth” or “sustainable development”. The new growth paradigm, which on one hand must still focus on sustaining the material progress, should be used smartly to achieve the following objectives (OECD, 2019):

- **Environmental sustainability:** A path of rapidly declining greenhouse gas emissions and environmental degradation, consistent with avoiding

3 In the analyzed Great Recession episode, policy orientation in procyclical or countercyclical policy interventions was not systematic. The common effects of all the investigated policies were countercyclical (but still weak) in the analyzed countries only in the boom and bust phases (Prašnikar et al., 2021).

catastrophic damage and achieving a stable and healthy level of ecosystem services;

- **Rising well-being:** An improving level of life satisfaction for individuals, and a rising sense of improvement in the quality of life of all individuals in the light of the growing pressures of the ageing society.
- **Decreasing inequality:** A reduction in the gap between the incomes and wealth of the richest and poorest groups in society, a reduction in rates of poverty, a relative improvement in well-being.
- **Improving the incomes and opportunities** of those experiencing systematic disadvantage, including women, members of ethnic minorities, disabled people, and those in disadvantaged geographic communities. This also includes paying attention to the increasingly fragile intergenerational consensus, resulting from demographic trends.
- **Systemic resilience** in terms of the economy's ability to withstand financial, environmental or other shocks without catastrophic and system-wide effects.

As multiple problems and challenges facing developed economies have emerged over the last decade, such as the environmental crisis, the ageing society, rapid technological advances, and globalized value chains, many new approaches to economic policy have been developed in response.[4] One of the approaches builds on the **"new economic narrative"**, following the underlying principles:

1. Deep challenges in the business environment and society require a profound reform that should be based on the active role of economic policy to improve "the engine of the economy".
2. Policy must be made in an integrative way, not in the "traditional policy silos".
3. Trans-boundary issues that need to be tackled with proper global economic, social and environmental policies (taxation, labor and environmental standards, decarbonisation, digital services, etc.) require international coordination and multilateral cooperation.

Profound economic challenges, relating to the environmental crisis, technological change, globalization and demographic transition, cannot be addressed by a conventional monetary-fiscal policy mix but require a wider set of policies and institutional reforms. Macroprudential policies following the financial crisis seem to promote short-term "brown" investments at the expense of more long-term, climate-friendly investments (Gersbach & Rochet, 2012, Haldane, 2013, Thanassoulis, 2014). In addition, the liquidity requirements particularly negatively

4 For more details see OECD (2019).

affected banks' willingness to lend to green projects[5] (Liebreich & McCrone, 2013; Caldecott & McDaniels, 2014). The new economic narrative supports the idea of **high, but smart and focused** public investment and the use of industrial policy to **steer R&D, innovation and investment** towards those particular areas that can **help solve major** economic, social and environmental **challenges**[6] (Mazzucato, 2020) and as such provide answers to specific challenges.

Mission-oriented fiscal policies aimed at shifting multiple sectors in a new direction, crowding-in private sector investment, should lead to a "supermultiplier" effect of public investment on GDP growth. Moreover, high public investment could serve also as an accelerator for future productivity growth, due to synergies across the economy, connections between sectors, and co-creation of key competences needed for green and digital societies (Deleidi & Mazzucato, 2019). Reorientation of fiscal policy should be supported by monetary policy. Misalignment of timespans of short-term monetary and fiscal policies with long-term climate risks and ageing population, on the other hand, point to "The Tragedy of the Horizon" (Campiglio et al., 2018). The danger is that central banks are going to remain wedded to a "market-fixing" approach to carbon-risk, rather than fully adapt monetary policy and financial regulation to support green transition, being often argued to be the main inhibitor of faster changes[7] (Mazzucato & McPherson, 2018).

Mission-oriented policies, which represent the core of new policy-making paradigm, are aimed at providing new, practice oriented solutions to specific "grand" challenges, identified by policymakers (i.e., global warming and ageing). By definition, these are broad concepts, due to the requirement that the suggested solutions should be examined in all phases of the innovation process when designing and implementing invention oriented policies, and on the other hand, have a narrower focus concentrating on the R&D/invention phase. Those policies are focused on stimulating R&D and invention and not on the potential applicability of inventions, leaving any possible diffusion of the invention to

5 The type of finance that companies and cutting-edge technology leaders receive is not neutral and can affect both the rate and the direction of innovation. Based on the lessons of technological revolutions (IT, biotech and nanotech, for example), different forms of public funds had been essential in providing the high-risk and early funding (Block & Keller, 2011; Mazzucato, 2013).

6 The 21st century state should be about co-creating and co-shaping markets, rather simply fixing them in the case of positive (public goods such as basic research) or negative externalities (pollution and carbon taxes) (Mazzucato, 2013).

7 Innovation, for example, is highly uncertain, has long lead times, is collective and cumulative (Lazonick & Mazzucato, 2013). These four characteristics reveal much about the kind of finance that is needed. The uncertainty means that finance must be willing to bear high risks. Financial institutions are very important actors in the innovation system as they provide access to high-risk capital. Empirical evidence is showing that spending funds on areas such as their own shares exceeded spending on investment in intangibles (Lazonick, 2013) due to prevailing short-terminism of corporate structures that prioritize quarterly performance (Kay, 2012) and macroeconomic conditions. When companies receive long-term finance, they can learn more and dare to invest in areas that will require much trial and error (Janeway, 2012).

the market. Such policies became popular in many countries several decades ago by believing that advances in science and technology might create high benefits for the society (Mazzucato, 2020). Such support today is often classified as innovation policy (in the past often perceived as a part of industrial, science, research, or technology policies) (Boekholt, 2010).

1.2 The challenges addressed and solutions

The first part of the book presents a detailed and profound analysis of already mentioned challenges. Unprecedented economic policy measures, observed in the monetary policy after the financial and economic crisis starting approximately in 2009 and the fiscal policy as a response to the COVID-19 pandemic since the spring of 2020, are analyzed in Drenkovska et al. (2021). The monetary policy took the 'whatever it takes' stance as a response to the crisis, continued to be pursued also when the effects of the crisis were surpassed with a goal to neutralize long-term negative effects of falling rates of productivity growth and shrinking active working population to increase ailing economic growth. However, in spite of positive short-term results, current economic policy measures also pose high risks for the future business environment (i.e., inflation, market bubbles, insolvency, unemployment, etc.) with serious social consequences. This refers to economic policy measures that were improperly used to fight long-term structural changes (i.e., productivity and demographic trends) which they were not designed for.

In our opinion, there are two most pressing issues that will determine the course of business developments at least in the period from 2025 to 2050. Severe demographic changes of the ageing population and enormous environmental changes with severe global warming are threatening many countries. Therefore, economic changes of vast proportions are required to reduce their highly negative impact on people's standard of living, as shown in Istenič et al. (2021) and Mramor et al. (2021a). The required extraordinary increases in economic growth rates have to be addressed first by substantially increased growth rates of productivity. Much is known about factors that increase growth rates of productivity, but according to the historical experiences, like the one a few decades ago when computers suitable for the general use were introduced, technological advances are regarded as by far the most important. However, following the boom in growth of productivity that computers induced, productivity growth has had a downward trend as new technological advances failed to meet the expectations. The major question is, can the much-praised extensive digitalization change the trends again. The same applies for the actively working population that could help mitigate the threat. Unfortunately, its growth rate is on a downward trend as well, approaching zero growth very quickly. Productivity increasingly depends also on intangible capital investments, as reported by Piekkola et al. (2021), where Slovenia is at the moment lagging behind the studied economies. Higher productivity, resulting also from higher value added generated from technological progress, intangible investments, and other factors, will improve the well-being as it will lead to higher wages and increase job quality, as studied in Redek et al. (2021).

As reported in Istenič et al. (2021) and Mramor et al. (2021a), there are numerous ways to reduce the negative trends, but their combined impact is not big enough to neutralize the two problems. Thus, a reduced standard of living with accompanying negative consequences seems quite probable. One way how to mitigate this problem is also in a more efficient use of institutions. As shown by Kovač & Spruk (2021) in this book, better institutional quality, more impartial government administration and lower prevalence of corruption at the local level are associated with significantly higher probabilities of patent grant and can therefore increase productivity.

Therefore, we turn to analysing the environmental challenges and predicting necessary and planed shifts in the structure of production and consumption of energy (predominantly for transport) to achieve the required net zero carbon emissions by 2050 (Domadenik Muren et al., 2021a; Koman et al., 2021a). One example how to achieve the previous mentioned goal is also electric planes. Company Pipistrel currently holds the only certified electrically propelled airplane (Koman et al., 2021b). Huge capital investment costs and higher current costs of this switch (primarily to electricity) will exacerbate the problems mentioned in Mramor et al. (2021a).

It is a general belief that a more extensive use of existing technology (i.e., digitalization) coupled with new technological breakthroughs will help increase productivity to such an extent that it will prevent a reduction of the living standard. Whether this has some merit depends on the assumed potential of existing technology and expected technological advances. Therefore, in Mramor et al. (2021b) we analyse the substance, scope, probability of success, and expected timing of the already known and thus expected technological advances at different stages of development, while Marinšek et al. (2021a) present the existing technologies implemented in a local real estate market by company Equinox. This is the basis to better understand the soundness of high expectations concerning the implementation of these technological advances and the expected scope of their positive economic impact versus the impact needed to solve the problems explained in Istenič et al. (2021) and Mramor et al. (2021a).

Within this framework, each company will have a specific position to which it will need to react. However, due to such a magnitude of changes in their business environment (i.e., opportunities and threats), they will be exposed to extreme pressures to change frequently, much bigger than ever before. Most importantly, besides changes in technology used, sources of energy and their costs, age structure of employees coupled with artificial intelligence, fast development in digitalization for very different purposes, their decisions will have to take into account the constant possibility of severe shocks due to macro imbalances mentioned in the chapters. And as a rule, management and employees will constantly need to upgrade their knowledge to be able to work best to their advantage or at least weather this demanding period. Companies are aware of the need to step off the beaten path and adopt new, innovative and more sustainable approaches, as stressed by Žabkar et al. (2021a). Moreover, the loop of successful transition can only be closed with the support of the consumers who place increasing attention to companies' sustainable practices (Žabkar et al., 2021b).

2 Mission-driven economic policy and business model transformation

A sound policy mix (monetary, fiscal and industrial policies) and financial support do not bring results unless complemented with profound changes at the micro level. Business model transformation, in particular micro and small companies, which is a prerequisite for future productivity growth, especially in particular regions, could be based on a supportive business environment that builds on synergies and the stakeholder approach.

2.1 Business model transformation

Business model transformation represents a major challenge, especially for companies in traditional sectors when facing the challenges related to new technological advances, digitalization and repositioning of global value chains. Moreover, a growing number of incumbent firms are putting sustainability issues at the top of their corporate agenda, demanding a shift from a linear to a (more) circular business model (hereinafter BM).[8] Traditional business models (otherwise known as pipes) have over the years become the dominant ones, adopted by the majority of organizations. A transformation target might serve also as an opportunity to strategically improve overall company efficiency or redefine identity, roles and value (Keen & Qureshi, 2006). This choice of transformation response has profound implications for the structure of organizations as well (Zeng et al., 2008).

The strategic capabilities the firm needs for successful business model transformation therefore include the following:

1. Leadership to provide a clear strategic focus with visible top management commitment.
2. A culture of support for transformation to ensure willingness to share knowledge, invest in resources, and recognize the abilities of all individuals and groups within the organization. In other words, decisions should not always come from the top.
3. Organizational structure aligned with the goals and activities of the organization. The more innovative an organization is, the flatter and more networked the structure should be.
4. The skills necessary to implement a given strategy. These skills include not only those necessary for the given technology, but also time, knowledge, and space management skills.

The transformational approach to business models could be addressed as a mechanism to understand change and innovation across firm-based components and across their interconnection with external stakeholders. This approach integrates the transformational approach, perceiving a BM as a system of interdependent activities that goes beyond the initial firm and spans its boundaries, focusing particularly on the role of sustainability and sustainable value creation in BM (Garcia-Castro & Aguilera, 2015).

One of the industries going through substantial changes, both due to technological advancement and climate changes, and specially the COVID-19 crisis, was the hospitality industry. In order to continue creating value, companies had to change their business models. As a result, hybrid hospitality, which combines different accommodation offers based on customer's needs, and dual brands, which combine two hotel brands under the same roof, have emerged. These

8 For example, Denmark-based renewable energy provider Ørsted, the first electricity firm ever, has been recognized as the world's most sustainable company in 2020. They completely reinvented their core business model from being a pretty coal-intensive utility to being almost a pure-play renewable power provider.

trends are analyzed in detail in the chapter by Farčnik et al. (2021), where it is also shown how Slovene company Union Hotels Collection can transform its business model to generate a new stream of revenue by offering hybrid hospitality in its dual brand hotel.

2.2 Beehive business hub as an ecosystem for higher productivity growth

The concept of business ecosystem is based on the idea that firms can jointly pursuit creation of far superior value propositions than a sole firm can marshal and capitalize on synergies in marketing, distribution channels, technology, R&D&I, human resources or working environment with all supporting employee services (Jacobides et al., 2018). In this context, a number of initiatives have been undertaken, including the introduction of a better infrastructure for business-building (establishing incubators, an accelerator and flexible office spaces), as well as developing the "soft" infrastructure via supermarkets, gyms, conference centers, exhibitions, art, open spaces, "street food", and transportation. As such, it becomes more attractive also for future (talent) employees. A business ecosystem therefore offers the possibility to sensing, seizing and reconfiguring capabilities to build new competencies and implement organisational renewal, which is required for the on-going business model transformation (Mezger, 2014).

The idea of creating supportive microenvironments for startups and small companies is not new. The ecosystem concept stems originally from evolutionary theory in biology, which was adapted in different manners to theory of organization for understanding the complex network of business relationships within and across industries (Adomavicius et al., 2006) and strategic decision-making (Iansiti & Levien, 2004).[9] According to the seminal work by Moore (1996), business ecosystems comprise organizations and individuals interacting in economic communities, creating value for their customers and users[10] and sharing a common fate (Iansiti & Levien, 2004). In today's business ecosystem the organizations do not work individually, they interact within the ecosystem to evolve (Iansiti & Levien, 2004) and they form the local economy on a local

9 Actually, it is still a relatively new field of study, with different uses of the terms and goals by different researchers, such as digital business ecosystem, social ecosystem, economy as an ecosystem, industrial ecosystem, ecosystem model of technology evolution, and value ecology (Anggraeni et al., 2007).

10 Managers should think of companies as part of an ecosystem instead of a particular industry, which consists of a loosely interconnected network of actors that co-evolve their capabilities around an innovation and where they work cooperatively and competitively to support new products and services (Moore, 1993).

scale and the global economy on the global scale. In practice, this means that value creation and capture - the key features of business models – are embedded within the whole ecosystem of players, and innovations are formed together with businesses and public organizations, basically implying that value is co-created and co-captured (Mazzucato, 2013).

An interesting aspect to explore is the role of foreign multinational companies to anchor a business ecosystem in a particular region. Governments regularly offer financial and other incentives to attract multinational enterprises (hereinafter MNEs) to particular regions in order to create employment, often with high(er) wages (Berrill et al., 2018), foster technology and knowledge transfer and increase access and exposure to foreign markets. There is a long-running 'curse or blessing' debate in the literature and amongst policymakers as to whether the entry of MNEs to a region has positive or negative business spillovers (De Backer & Sleuwaegen 2003; Audretsch & Keilbach 2008; Berrill et al., 2018). MNEs have been shown to have a positive impact on regional value added and average wages and as incubators for micro firms operating in their value chains or by generating new spinout ventures of former employees who draw on the learning that they have gained within the MNE (Neck et al., 2004). However, MNEs have also been shown to inhibit business development in the regions in which they are based by attracting local talents that have a preference for high wages and job security of paid employment that MNEs can offer (Bhawe & Zahra, 2019; Berrill et al., 2018). In the case of regions facing emigration of young skilled individuals due to lack of perspective employment, this is not a drawback but rather another positive impact. The empirical analysis on micro financial data on the complete set of Slovene firms in the period of 2012-2019 showed that foreign capital inflow had a positive effect of regional value added the following year (Domadenik Muren et al., 2021c).

Besides traditional "FDI" in manufacturing, supranational cooperation can also foster joint development and creation of transnational business eco-systems. One of the most prominent examples of high-tech innovation business ecosystems is the High Tech Campus of Philips located at its corporate research site in Eindhoven,[11] as well as its smaller Innovation Campus in Shanghai, China.

11 Established in 1999, the High Tech Campus consists of some 30 buildings, with more than 100,000 square meters of office space and 50,000 square meters of lab space alongside Philips corporate R&D facilities. At the heart of the campus is the Strip, where conference rooms, restaurants and other facilities are available to researchers, business development managers and other campus members to meet and share ideas and experiences. In addition, the campus includes 8,000 square meters of clean-room facilities for microelectronics development. The clean rooms, among the largest in the world, are part of the Microsystems Plaza (MiPlaza) section of the campus, which offers a range of advanced equipment. The facilities, used by nearly two thirds of all the companies and research organizations located on the campus, are also crucial to Philips for its internal strategic innovation programs focused on materials and devices for molecular medicine (Blau, 2007).

The aim of these campuses is to create an environment that fosters interaction, networking and knowledge sharing, and ultimately encourages participating research organizations, manufacturers and startups to jointly develop groundbreaking technologies (Blau, 2007). An innovation ecosystem has been designed as the right environment for people with good ideas to find each other and cooperate. An overview of current business ecosystems with four distinctive cases are presented in details in Guštin Habuš et al. (2021).

Despite increasing enthusiasm among academicians the embracement of the notion of business ecosystems among practitioners has been chaotic (Adner, 2017), and there are still multiple uncertainties of how companies should manage the new business logic and interdependence.[12] Ghanbari et al. (2017) find that the fundamental key concerns for companies nowadays revolve around understanding to understand how ecosystems will evolve and how companies should position themselves in a way that guarantees profitability as part of being a member of a business ecosystem, strategic choices related to what role companies should enact and how to act that role successfully (Iansiti & Levien, 2004). Staking out a role in business ecosystems is important to secure future competitive success for the firm as well as the ecosystem, yet this represents a key challenge for managers across industries. The third part of the book[13] presents the conceptual framework, investment analysis and financing options of the Beehive business hub idea that can be implemented in any local community.

Conclusion

The complex global economy is a constantly evolving socio-economic organism and while some specific challenges facing national economies differ significantly, some are broader and some may leave a more marked impact. The new growth paradigm will have to be more sustainable, which, in contrary to common misperception, is significantly more than just green, it is also inclusive, equal, balanced and it is also material growth with the final aim of resolving the challenges today while providing a solid development base for the generations to come.

12 One such uncertainty arises due to the altered way of competition in the ecosystem environment. Adner (2017) argues that competition operates at two different levels. First, competition occurs across ecosystems which concern the collective advantages to create and capture value relative to other ecosystems. Second, competition occurs within the ecosystem regarding the security of activities, positions, and roles, which affect the distribution and capture of value among actors.

13 For more insights please see Domadenik Muren et al. (2021c), Jazbec et al. (2021) and Marinšek et al. (2021b).

In the European and Slovenian context, from the macroeconomic perspective, the challenge of declining productivity growth amidst the ageing population, perils of pressures on public finances and the preeminent need to lead the green transformation requires an active role of the state, contributing an efficient, new, innovative policy mix, channeled also into stimulating technological development in the areas where new solutions are required. Purposeful innovation with the support of the state along with the existing and emerging new technologies and a smart state gives hope of a sustainable tomorrow.

Experiences gained through our academic and professional engagements lead us to a firm conclusion about preconditions of companies' long-term success, those being constant access to high quality information and sufficient knowledge of economics, business and other scientific/professional fields. These are prerequisites for companies to develop sufficient understanding of current and potential future global business trends that they need to identify in time to properly address the challenges and take full advantage of opportunities. This is especially true for exceptional circumstances where disruption is challenging the very nature of business. We are convinced that nowadays the global economy, including Slovenia, is faced with such circumstances.

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II.

BEYOND GROWTH: DESIGNING SOUND ECONOMIC POLICIES FOR BETTER WELL-BEING

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THE PRODUCTIVITY CHALLENGE

Introduction

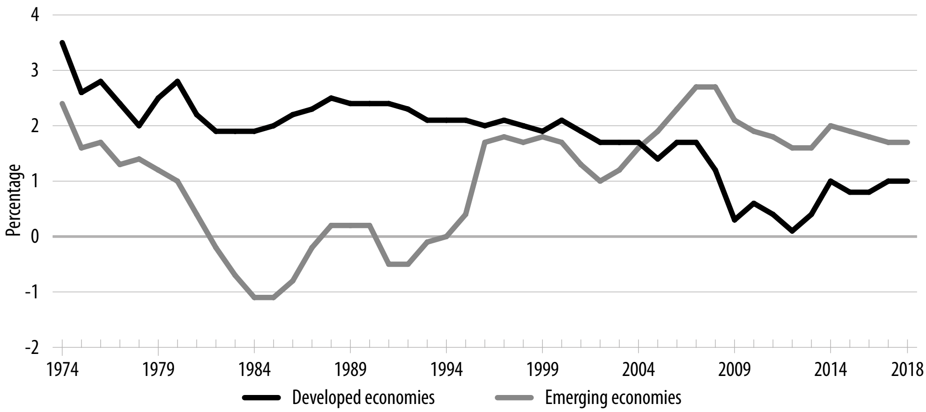
It is becoming evident that economic and societal challenges are enormous (health threats, possible catastrophic environmental disruptions, contested shifting of world powers, aging population, etc). High growth of productivity is regarded as a general saviour, a quick fix for all the problems. There are countless references, from Krugman (1997) to ILO (2015) and others, claiming almost unanimously the benefits of higher level and growth of productivity and presenting numerous factors that have a positive effect on increased productivity.

However, in the past few decades the growth of labour productivity has been declining globally. The situation is even worse in developed economies, as the growth of labour productivity has been declining since as early as the early 1970s. Moreover, the latest estimates extend the global downward trend to 1.7 percent in the period between 2011 and 2019 (The Conference Board, 2021). This is by far too low to meet the challenges. To address this misrepresentation, we present the findings on labour productivity trends and factors that affect them and give some guidance on how to address the recent decline in growth and what impacts are to be expected. The topic of productivity is covered from macro to micro, nonetheless, it is worth noting that these are not separate subjects but rather complementary and intertwined.

1 Trends in productivity

Global productivity growth has been sluggish over the past two decades. It has been affected by the global financial crisis and the COVID-19 pandemic but is expected to recover through 2021 (The Conference Board, 2021). The productivity gap between developed economies and emerging economies, which is defined as the difference in the output per worker produced, is large and even larger compared to low-income economies: between 2010 and 2018, the average labour productivity in emerging economies was only 17 percent of that in developed economies (Dieppe, 2020). The differences in productivity growth were widening the productivity gap already before 2004 (Figure 1). The gap narrowed between 2004 and 2018 due to a comparatively higher productivity growth in emerging economies, however, with the process of closing the gap being very slow, averaging only 0.5 percent annually from 2004 to 2018 (World Bank, 2020), it would take hundreds of years for an average emerging economy to catch up with an average developed country.

Figure 1. Average annual labour productivity growth in developed and emerging economies in period 1974-2018 (5-year moving average)

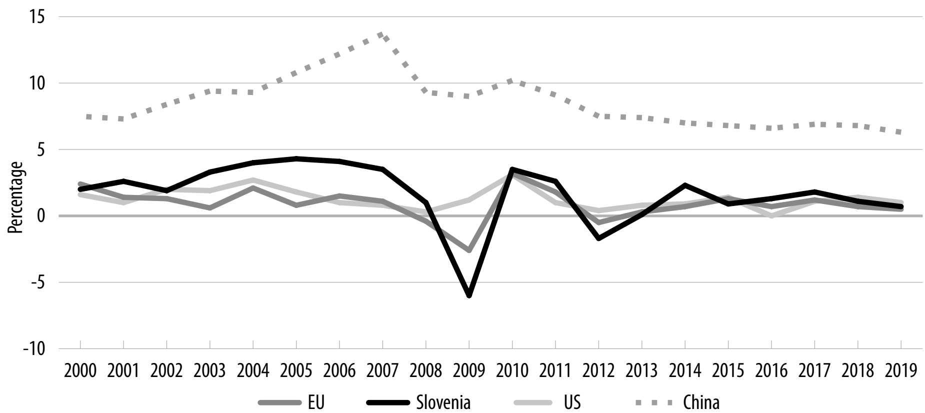


Source: Dieppe (2020).

Between 2000 and 2020, global productivity growth was declining. In addition to the generally declining trend of productivity growth, three additional more pronounced productivity growth downfalls can be observed in 2009, 2012, and 2019, coinciding with economic downturns. Over the 2000 to 2008 period, labour productivity growth averaged 1.4 percent in the US, 1.2 percent in the EU, 3.0 percent in Slovenia, and 6.4 percent in emerging markets. In China, it was much higher at 9.8 percent. Since the 2008 crisis, many have not been able to reach pre-crisis productivity growth levels. In the EU, however, the productivity growth recovered in the decade after the crisis but remained at a modest average yearly growth of around 0.7 percent (OECD, 2021a).

In the subsequent period from 2009 to 2019, annual productivity growth was highest in China, but interestingly lower than in 2008 (Figure 2). At the end of the observed period, all economies were in a very similar phase of annual declining labour productivity growth, with emerging markets growing by 5.1 percent on average, the US 1.0 percent. In the EU productivity growth was 0.5 percent, while Slovenian productivity growth was 0.7 percent. In 2019, labour productivity growth was most pronounced in Poland, Lithuania, and Estonia. However, according to Mackenzie et. al (2021), in 2020, due to the COVID-19 pandemic and the introduction of furlough schemes, labour productivity in the EU fell by 4.7 percent, with the UK being most affected (-9.4 percent), while productivity in France, Greece, Spain and Italy fell by around seven percent. On the other hand, Ireland recorded the highest growth at five percent (OECD, 2021a).

Figure 2. Growth of GDP per person employed between the period 2000-2019 in selected countries (constant prices; annual growth/change)



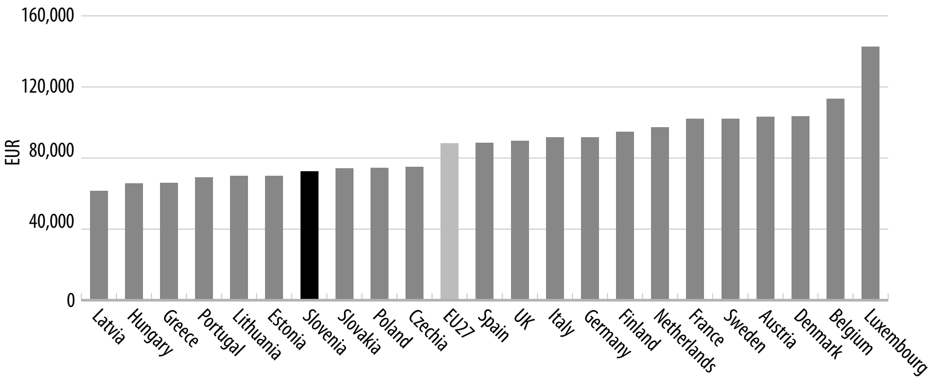
Source: OECD (2021a).

There is also a productivity gap within the EU (Figure 3). Ireland, which had the highest labour productivity in the EU, was at 206 percent of the EU average in 2019.[1] Latvia, Hungary and Greece, at the lower end, were only at around 73 percent of the EU average (OECD, 2021b). In the 2000-2019 period, labour productivity in Slovenia was lower than the EU average. In 2000, productivity in Slovenia was at 77.4 percent of the EU average. By 2008, it was at 84.3 percent, reflecting higher productivity growth in Slovenia during this period. From 2008 to 2019, Slovenian productivity growth fluctuated around the EU average, while the productivity level was around 82.2 percent of the EU average in 2019 (Figure 3). As a result of the weak labour productivity growth, Slovenia continues to lag behind the EU average in GDP per capita (UMAR, 2020). In 2018,

1 The substantial productivity growth was driven by a highly concentrated group of multinational enterprises, attracted by Ireland's favourable corporate tax treatment (OECD, 2019; NCC, 2019).

energy supply, real estate[2] and ICT were sectors with the highest value added per employee. On the other hand, administrative services, hotels, restaurants, and construction had the lowest levels (OECD, 2021c). But these results have been significantly affected also by employment patterns and sectoral characteristics, consequently, the differences should be interpreted with great caution.

Figure 3. Differences in productivity in the EU: GDP per person employed in 2019 (constant prices, EUR)



Source: OECD (2021b).

2 Determinants of productivity growth

To study the productivity puzzle and its determinants more in depth, a dual approach including both external (environmental) and firm-level determinants of productivity (Table 1) was adopted. Following the summary of literature (Redek et al., 2019), external determinants are divided into economic and other business environment determinants (institutions, regulations, education, etc.), while firm-level determinants are divided into tangible and intangible capital and their subcategories.

2.1 Key external determinants of productivity growth

Among the **external determinants**, **business environment determinants** are very important. **Institutions** are an often-overlooked determinant of productivity growth. They create conditions for the development of economic ac-

2 Note that the result may be caused by differences in methodology between countries.

tivity by establishing intellectual property rights, reducing transaction costs, and building trust among different economic actors (Rodríguez-Pose, 2013). Quality of institutions is positively connected to productivity growth, as a one-unit change in the institutional quality index[3] on average causes a 19.2 percent increase in labour productivity growth (Rodríguez-Pose & Ganau, 2019). Consequently, productivity growth often remains low in regions with low institutional quality, even if workers have adequate skills and training.

Table 1. Overview of demand and supply determinants of productivity*

External (environmental) productivity determinants	Firm-level productivity determinants
Economic determinants • Business cycles and macroeconomic conditions • International trade • Sectoral composition **Business environment** • Institutions • Regulations • Financial sector development and access to finance • Education • Labour market and demographics	**Intangible capital** • Human capital • Business model • Management **Inclusion in global value chains** • Internationalisation • Resource allocation • Software and Big Data capabilities • Investment in R&D and innovation
	Tangible capital • ICT capital • Automation and robotization • Other machinery and equipment

*Demographics are discussed in Facing population ageing by increasing labour market activity chapter (Istenič et al, 2021) and are therefore not covered further in this chapter.

Source: Own work.

Regulation of the labour, product, and financial markets are also governed by institutions. Labour market regulations raise labour costs and improve the bargaining power of workers, which has a positive effect on productivity growth (Autor et al., 2007). However, higher labour costs lead to a decrease in expected investment in other productivity factors, such as R&D, and thus also have a negative effect on productivity growth. Product market regulations increase productivity growth when they make the market more competitive and decrease it when they make the market less competitive (Arnold et al., 2011). Increased competition incentivizes firms to innovate, invest in new equipment, and adopt new technologies. In contrast, anticompetitive regulations reduce the

3 The institutional quality index scores institutional quality in EU countries by NUTS-2 regions on an interval from 0 to 1. It is derived from citizen-based survey data in the EQGI dataset and from institutional dimensions in the World Bank's WGI dataset. Further information and derivation in Rodríguez-Pose & Ganau (2019).

reallocation of resources to more productive firms (Corcos et al., 2007). Finally, development of financial markets (i.e., stock market liquidity and banking development) is also positively correlated to productivity growth (Levine & Zervos, 1998). Most authors propose a mechanism whereby better developed financial markets cause lower capital costs, enabling firms to invest more in drivers of productivity (Heil, 2017).

Education is another important determinant of productivity growth. As the level of education increases, so does the impact on labour productivity. Tertiary education has a higher positive impact on labour productivity growth than lower levels of education (Benos & Karagiannis, 2016). On average, a one percent increase in years spent in tertiary education increases labour productivity by 0.4 percent (Kocourek & Nedomlelová, 2016). Besides quantity of education (e.g., share of people with tertiary education), quality also matters (e.g., student-teacher ratio). Several authors have found a positive connection between education quality and labour productivity (Islam et al., 2014; Benos & Karagiannis, 2016). As digitalisation and automation are increasingly prevalent in firms, informal education (i.e., lifelong learning) is also crucial for employees to acquire new skills.

While the determinants of the business environment crucially affect long-term performance of firms, the short-run macroeconomic and cyclical factors in the domestic economy, as well as internationally, have a strong impact both on short-term and medium-run performance, due to firms' involvement in global value chains, although the sectoral differences can be quite significant (Redek et al., 2019).

2.2 Key firm-level determinants of productivity growth

Tangible capital directly and indirectly increases labour productivity growth. Machinery, buildings, and other equipment used in production represent the most important part of investment. In 2019, investment into machinery and equipment represented 49 percent of all investments in EU companies on average, while in Slovenia the same investment represented as much as 59 percent of all investments. Further 22 percent in Slovenia represented tangible investments into buildings and infrastructure, while the respective share in the EU on average was 16 percent (European Investment Bank, 2021). Tangible capital also comprises investments into new technologies. For example, **automation** can help eliminate repetitive work, giving workers more time for higher-value tasks, such as problem solving, finding solutions, and developing new ideas (Ellingrud, 2018). In addition, **robotization** also has a positive impact. They both coincide with the principles of Industry 4.0, and it has been found that production in factories can be increased by an average of ten percent within three years (Wellener et al., 2019). Across all industries, a one percent increase in robot density translates into a 0.8 percent increase in productivity (Mazachek, 2020). Besides, an adequate level of **ICT capital** is a necessary requirement for implementation of Industry 4.0. In most countries, computer equipment accounts for more than half of the ICT capital (Spiezia, 2012). ICT technologies contribute positively to the generation of convergence clubs in the evolution of labour productivity (Ceccobelli et al., 2012). Unfortunately, Slovenian investment in computer equipment fell sharply by 54 percent from 2008 to 2017 (EU KLEMS, 2019). In 2019, investment into software, data, IT, and website activities represented 13 percent of all investments in the EU on average, while Slovenian companies used only seven percent of all investment resources for this purpose (European Investment Bank, 2021).

Intangible capital is essential for effective use of tangible capital and an important determinant of innovation, growth and employment (O'Mahony, 2019). For instance, software and Big Data are used for data collection and analysis enabling faster, more flexible, and more efficient processes to produce higher quality goods at a lower cost. This increases the productivity of production, stimulates industrial growth, and changes the profile of the workforce, which ultimately increases the competitiveness of firms (Rüßmann et al., 2015). However, investment in computer software and databases in Slovenia has fallen by three percent since the global crisis year of 2008 (EU KLEMS, 2019). Besides, firms seek to promote innovation, create value, and improve labour productivity by investing in **R&D**. Kancs and Siliverstovs (2016) estimated that on average a one percent increase in R&D led to a 0.15 percent increase in productivity among OECD firms. In Slovenia, the share of investment devoted to R&D was seven percent, which is comparable to the EU on average (eight percent) but significantly lower than Finland (13 percent) (European Investment Bank, 2021).

In terms of **human capital**, which coincides with the aspect of intangible assets, additional education improves the productivity of individuals. Menon (2010) argues that higher income of skilled workers reflects higher productivity. Moreover, human capital complements physical resources and technology by helping workers to acquire necessary skills (Lau et al., 1991). Furthermore, on-the-job training increases knowledge and skills, consequently resulting in productivity growth as well. Positive implications of the latter are also seen in increased motivation and loyalty to the company (De Grip & Sauermann, 2013). In 2019, investment into training in Slovenia represented only four percent of all investments, which is less than half of the EU average (nine percent) and the lowest among EU economies (six percent in Slovakia, Bulgaria and Romania). Besides, it is also significantly below the economies investing in training most – Luxemburg (12 percent), Belgium and the UK (12 percent) (European Investment Bank, 2021).

Table 2. Summary of selected key productivity factors and their influence

Productivity factor	Influence on productivity	Cited literature
Regulations	• Product market regulations increase productivity growth if they make the market more competitive and decrease it if they make the market less competitive. • Labour market regulations increase productivity by encouraging capital deepening and attracting high-skilled workers, but also decrease it by reducing investment funds. • Development of financial markets increases productivity growth by reducing capital costs, enabling firms to invest more into drivers of productivity.	• Arnold et al., 2011 – OECD. • Corcos et al., 2007 – EU. • Conway et al., 2006 – OECD. • Autor et al., 2007 – US. • Storm & Naastepad, 2009 – OECD. • Levine & Zervos, 1998 – 47 countries. • Heil, 2017 – literature review.
Institutions	• Quality of institutions is positively connected to productivity growth in OECD countries.	• Afonso, 2020 – OECD. • Rodríguez-Pose & Ganau, 2019 – EU.
Education	• Educational attainment is positively connected to productivity growth. The influence of tertiary education is larger than that of lower educational levels.	• Islam et al., 2014 – 60 countries. • Kocourek & Nedomlelová, 2016 – EU.
Investment in R&D	• Investment in R&D has a positive effect on productivity growth.	• O'Mahony (2019) – OECD firms. • Dilling-Hansem et at. 1999 – Denmark.
Human capital	• On-the-job training directly and indirectly increases productivity and other components like motivation and loyalty.	• Liu & Lu (2016) – China. • Hanks & Madland (2018) – US.
Automation and robotization	• The concept of digitalization and automation under Industry 4.0 will significantly increase labour productivity, despite the decline in active population. • Adequate level of ICT capital is a necessary requirement for the implementation of Industry 4.0.	• Grenčiková et al., 2020 – Slovakia. • Rüßmann et al. (2015) – Germany.
Inclusion in global value chains	• Firms involved in GVCs outperform the ones outside or in domestic value chains, and firms that are both suppliers and buyers in the value chain have the highest productivity premium.	• Giovannetti & Marvasi, 2018 – Italy. • Lu et al., 2018 – China. • Doran & O'Leary, 2011 – Ireland.

Source: Own work.

Another important factor is the business model and within it the factors of management, value chain, internationalisation and resource allocation. The most important component are **Global Value Chain,** which are positively related to productivity (with causality possible in both directions). Baldwin and Yan (2014) argued that firms participating in GVCs have up to five percent higher labour productivity compared to firms not participating in GVCs. Frontier firms, large firms and exporting firms benefit more from GVC participation than non-frontier, small and non-exporting firms. Besides, frontier firms and large firms benefit more from GVC participation of upstream industries, while non-frontier firms and small firms benefit more from GVC participation of downstream industries (Banh et al., 2020). If upstreamness increases by one step, productivity on average rises by five percent (Mahy et al., 2019).

2.3 Influence of key productivity factors on productivity growth in selected countries

To analyse the relationship between productivity and the main productivity factors, correlations between these factors have been calculated (Table 3). The calculations are based on country productivity data for all OECD countries (OECD, 2021b), spanning the period from 1996 to 2020. Where fewer data were available for factor indicators than for productivity, the period of the analysis was shortened, causing a variation in the number of observations.

Institutions have proven to be the factor most strongly correlated with productivity, which is a surprising finding. Nevertheless, it supports the view of Acemoglu et al. (2003) that institutions are the main cause of differences in economic growth across countries. Looking at the 2019 data, the relationship remains evident (Figure 4). For example, Norway, Luxembourg, and Ireland are the countries with the highest labour productivity, while also being among the top performers in terms of regulatory quality. On the other hand, Mexico and Greece are among the countries with the lowest labour productivity, while also scoring poorly on the regulatory quality indicator.

Finally, we checked how Slovenia performed on some of the key productivity determinants compared to the EU27 average (Figure 5) over the period from 2010 to 2019. Its productivity level was consistently just below 80 percent of the EU27 average over this period. Slovenian companies are highly export-oriented and if measured by openness, Slovenia on average performed better in internationalization or openness (inclusion in global value chains) and worse in institutional quality. It also performed worse in education, measured by the share of working-age persons with tertiary education. Performance on human capital (measured by the share of active population engaged in training) deteriorated significantly. Spending on R&D fell from well above the average in 2013 to just around it in 2018. ICT, measured by the share of the workforce using computers at work, was around the average throughout the entire period (Figure 5).

Table 3. Relationship between key productivity determinants and productivity*

Productivity determinant	Indicator	Number of observations	Pearson's r	Strength of connection to productivity**
Regulations	Ease of doing business score*	165	0.26	Weak
Institutions	Voice and accountability	710	0.61	Semi-strong
	Political stability	710	0.40	Semi-strong
	Government effectiveness	710	0.66	Semi-strong
	Regulatory quality*	710	0.57	Semi-strong
	Rule of law	710	0.67	Semi-strong
	Control of corruption	710	0.64	Semi-strong
Education	Percent of GDP spent on education	578	0.37	Semi-strong
	Share of working-age population with tertiary education*	681	0.50	Semi-strong
Investment in R&D	Percent of GDP spent on R&D*	699	0.46	Semi-strong
Human capital	Percent of active population participating in education and training*	588	0.45	Semi-strong
Automation and robotization	Percent of enterprises using service or industrial robots	39	0.09	No connection***
	Percent of employees regularly using a computer in their work*	241	0.69	Semi-strong
Inclusion in global value chains	Trade as a percent of GDP*	806	0.41	Semi-strong

*Variables such as ICT investments, training of employees were not included in the analysis since the data for these variables was not available in a similar format, instead only firm-level survey data was available.

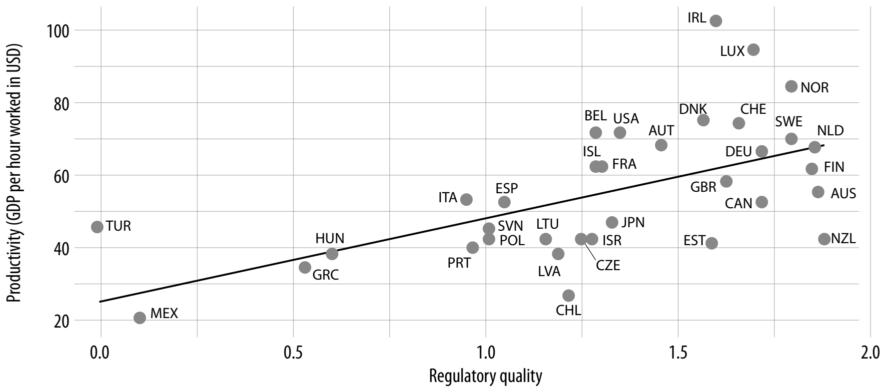
**Determined by Pearson correlation coefficient: 0.0-0.1 Very weak; 0.1-0.3 Weak; 0.3-0.7 Semi-strong; 0.7-0.9 Strong; 0.9-1.0 Very strong.

*** Likely due to the low number of observations as data was only available for 2018 and 2020.

Source: Own calculations based on the data from OECD (2021b), World Bank (2021a, 2021b, 2021c), and Eurostat (2021b, 2021c).

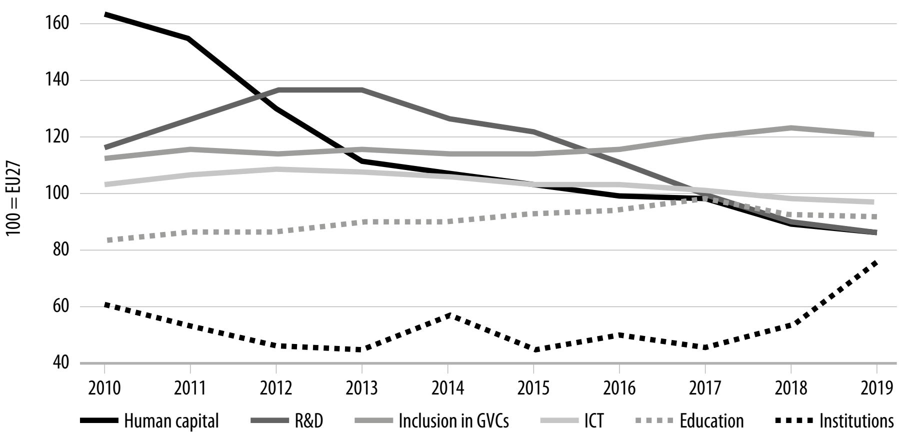
In summary, all but one of the selected determinants showed a statistically significant relationship with productivity. Institutions and ICT were found to be the most correlated determinants with productivity in our sample. In addition, institutions are also the determinant where Slovenia performed the worst compared to the EU27 average over the period from 2010 to 2019. Finally, the adoption of Industry 4.0 has not been measured long enough to empirically find a relationship between the two variables.

Figure 4. Correlation between productivity and regulatory quality in our sample in 2019



Source: Own visualization of the data from OECD (2021b) and World Bank (2021c).

Figure 5. Trends in key productivity factors in Slovenia compared to the EU27 average in the period from 2010 to 2019*



Selected indicators for each determinant are marked with an asterisk (*) in Table 3.

Source: Own visualization of the data from OECD (2021b), World Bank (2021a, 2021b, 2021c) and Eurostat (2021b, 2021c).

3 Recommendations for higher productivity growth

The phenomenon of declining labour productivity growth facing economies worldwide is expected to intensify in the coming years but can be suppressed and ameliorated through targeted productivity measures (Table 4). The recommendations are divided into firm-level and government policy recommendations.[4]

Table 4. Summary of firm-level and government policy recommendations and relevant practices

	Recommendations	Explanation behind	Good practices
Firm-level recommendations	Promote alliances, partnerships, and collaborations.	Develop cooperation and strengthen partnerships between institutions, industry, and government.	ITER – collaboration between seven international partners, including Slovenia (Cosylab)
	Adopt Industry 4.0 transformation.	Exploit IOT, machine learning, Big Data, etc.	Agreta – software module MePIS OPEX (Smart factory)
	Upskill and reskill workforce.	Identify needed skills for the future and retrain workforce accordingly.	Amcham – Partnership for change, Talent cloud (Danfoss etc.)
	Reinvent the traditional business model and move up the value chain.	Build a resilient, durable and agile business model and move away from producing low value-added products.	Hilti – providing complete solutions
Government policy recommendations	Establish effective institutions to reduce transaction costs.	Reduce transaction costs, increase certainty and SMEs growth opportunities within institutions.	Estonia – digitalizing most public sector services
	Focus on teaching digital skills by equipping classrooms, re-educating teachers, and updating curricula.	New technologies that are increasingly present at most jobs require employees with adequate digital skills. Lifelong learning can help upskill people who have already completed formal education.	Finland – Raising compulsory school age to 18
	Provide a predictive and bureaucratically simple taxation environment.	Provide SMEs with appropriate tax legislation and needed financial backing for their scale up.	Italy – Stimulation of crowdfunding activities by the government
	Adopt innovation policies and foster Industry 4.0 transformation.	Remove barriers to innovation, allowing ideas to reach the market quickly, and implement collaborations.	Portugal – Industry 4.0 vouchers, EU–Digital innovation hubs

Source: Adapted from the text under heading 3.

4 Significantly more recommendations just for Slovenia can be found in Mramor et al. (2020).

3.1 Firm-level recommendations

Promote alliances, partnerships, and collaborations. Industrial alliances that are a part of relational capital and fall under the category of intangible assets will play an important role in achieving resilience, global competitiveness, digital transformation, and a successful transition to carbon-neutrality (European Commission, 2021). Alliances should involve multiple value chain partners, such as industries, financial institutions, innovators, academia, research institutes, etc. The aim is to achieve a greater convergence of rules, break down barriers and make it easier for all to develop and scale up. As a part of the most extensive science collaboration, China, EU, India, Japan, Korea, Russia, and the USA joined forces to deliver ITER – the largest fusion machine to date, which would harness the power of fusion, a source of limitless energy (Cosylab, 2019).

Continue investing in tangible resources, in particular adopt Industry 4.0 technologies. Businesses should adopt the principles of Industry 4.0, including IoT and ICT technologies, the creation of device networks, and harnessing Big Data to improve business efficiency and innovation (IBM, 2021). Firms that will not invest into these areas will struggle to keep up with the productivity and performance improvements they bring. In order to optimize production, Argeta invested in software modules (MePIS OPEX) that ensure full traceability of production processes, high level of energy efficiency, and constant productivity growth, as well as support the adoption of a smart factory (Ogorevc, 2020).

Upskill and reskill workforce. Employees working with new technologies will need to be upskilled or reskilled accordingly. The demand for basic cognitive and manual skills will decrease, while the need for technical, social, and emotional skills will increase (Manyika & Sneader, 2018). Companies should identify critical and needed skills, implement capability-building programs, invest in building a learning culture, and focus on adaptability and resilience (Garcia et al., 2021). An example of a good practice is Talent Cloud, which is an AmCham's project within the Partnership for Change, which enables free movement of knowledge and experiences between different companies and industries, and was implemented in companies such as Danfoss and Competo (AmCham Slovenia, n.d.).

Reinvent the traditional business model and move up the value chain. Firms should build business models that put emphasis on resilience, durability and agility, countering the ever-changing environment. Besides, they should move away from producing low value-added products that result in low profit margins, and instead seek to produce high value-added products through product and process innovation. The process of change and innovation should be continuous as competition will cause every profitable product market to become saturated after a while (OECD, 2007). An additional step further was taken by Hilti, who transformed their offering from being a seller of products to becoming a provider of complete solutions, thus addressing the growing demand for customized solutions (Wurzer et al., 2019).

3.2 Government policy recommendations

Establish effective institutions to reduce transaction costs. Efficient institutions lower transaction costs of businesses by reducing administrative barriers and increasing certainty. Moreover, establishing SME-friendly legislation would provide SMEs with new growth opportunities. Administrative costs can be reduced by simplifying and shortening procedures related to public services (e.g., for building permits) (European Commission, 2021; Alessandrini et al., 2019). Furthermore, certainty can be increased by improving efficiency of the regulatory and judicial system. Businesses are more likely to invest in a country where their property and other rights are properly protected. For example, Estonia (Kattel & Mergel, 2019) successfully reduced administrative barriers by digitalizing almost every service offered by the public sector, meaning that citizens and businesses can conduct almost all dealings with public institutions over the internet (Vassil, 2015). A good illustration of that is the Netherlands that has reduced administrative burdens for citizens, professionals in the public sector, and government administrative burdens as well (OECD, 2009).

Invest in digital education, especially the tertiary level. To contribute to productivity growth, education must have solid fundamentals and adequate specialization, be abundant in quality and quantity, and be extensively spread. As countries are confronting the technological frontier, they should put more weight on education, especially tertiary, as it has the most impact on labour productivity growth. Finland's parliament, for example, has approved the proposal to extend the age of compulsory schooling to 18 years old, strengthening the country's long-term growth potential (Cedefop, 2021). An especially important area for future investment is digital education. Countries need to adequately equip classrooms, reeducate teachers, and update curricula to successfully teach digital skills. Moreover, developing online learning platforms would complement current lifelong learning initiatives by making educational content more accessible to everyone. For example, Serbia has implemented a compulsory programming course in primary schools to promote digitalization (Vasiljević, 2017).

Provide a predictive and bureaucratically simple taxation environment. Even the smallest enterprises can achieve productivity levels above the large-company average. As SMEs account for more than 99 percent of businesses in the EU, it is important to encourage their growth through appropriate tax legislation and flexible financing (lending (e.g., P2P), funding, venture capital, crowdfunding, etc.), supporting it also with financial advisory, inclusive of SMEs. As a part of Growth Act 2.0, the Italian parliament for example allowed equity investments through crowdfunding platforms, making it easier for SMEs to raise money (OECD, 2015). In addition, to facilitate a reliable government support to SMEs, R&D or LLL, a tax offset could be introduced, which would encourage investment in these areas and consequently result in productivity growth.

Adopt innovation policies and foster Industry 4.0 transformation. In line with the EU industrial policy, product and service innovation should be accelerated by removing barriers to innovation and allowing ideas to reach the market faster. To encourage SME investment in innovation and support the development of new ideas the emphasis should be on the proof-of-calls grants, included also in the Horizon Europe (Schiermeier, 2021). To accelerate the digital transformation of the European industry and business, Industry 4.0 vouchers could be implemented allowing SMEs to fund the adoption of Industry 4.0-related technologies and processes, thus climbing up the TRL scale (IAPMEI, 2021). Besides, Digital Innovation Hubs could create a networking environment and promote the transfer of expertise (European Commission, 2020).

Slovenia has specific other challenges that need to be resolved to enhance its productivity growth. Mramor et al. (2020) stress that the government and companies carry a significant responsibility in promoting change in the institutional framework, as well as tangible and intangible capital investments. The government in particular should also promote infrastructure development (including green energy, roads and railways, as well as digitalization), research and development, public education and health, while paying attention to public finance stability. Companies in particular should also improve corporate governance, increase relevant tangible and intangible investments, and invest in training and the implementation of new technologies (Mramor et al., 2020). Significant changes in all related fields would stimulate the development of a positive productivity-enhancing behaviour of all relevant systems and contribute to the Slovenian catch-up process.

Conclusion

The answer to the question why productivity growth is falling is not a unanimous one. We investigated several causes behind the decline, which raised the importance of cross-collaborations, intangible capital, and digital transformation on the one hand, and institutions, along with legislation, education, and innovation policies on the other one. Our findings suggest that unlocking the productivity potential requires a holistic approach, combining measures both on firm and external levels, which will depend on the ability of firms as well as policymakers. As boosting productivity growth at the forefront starts with companies, their focus should be on realigning their digital agenda and building strong and genuine relationships with other parties. To incentivize long-term changes, companies need to invest in digitalization, innovation and intangible capital, in addition to propelling business ecosystems, achieving a better position within the value chain. As productivity advancements are crucial to increase nation's living standards, a significant effort should be put towards its support also in the macro environment. There are no quick fixes, no short cuts to boosting productivity. Shaping our future around the above mentioned guidelines should be the main priority of economies and businesses worldwide. The ultimate goal should be closing the gap to the leaders and improving ours as well as future generations' prosperity.

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FACING POPULATION AGEING BY INCREASING LABOUR MARKET ACTIVITY

Introduction

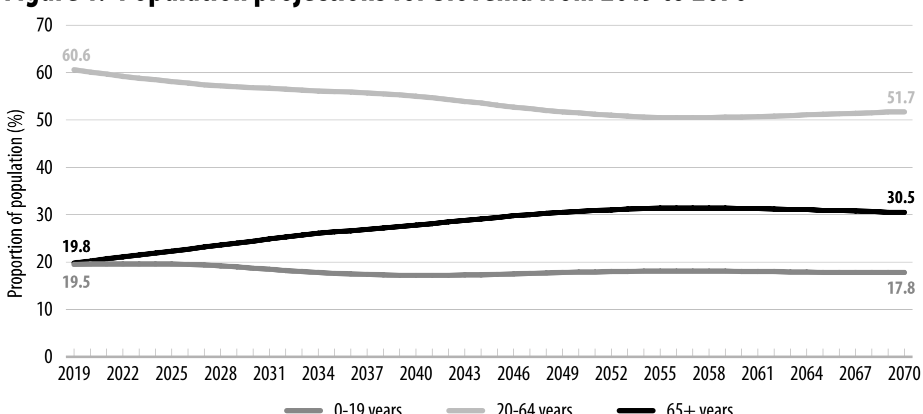
European countries are facing a rapidly ageing population, which combined with the pay-as-you-go pension system threatens the sustainability of the public transfer system. They also report a decline in the subjective well-being of individuals as they age (OECD, 2021). In the EU27, less than 60 percent of the population aged 55-64 are currently working (Eurostat, 2021). European countries have already adopted several pension reforms (European Commission, 2021a), however, even if all of them are implemented, age-related public expenditures are expected to continue to increase (European Commission, 2018). This chapter aims to present some measures to alleviate these problems. Specifically, it proposes measures aimed at reducing the projected ratio between the number of retirees and people of working age, including promoting the integration of migrants, the disabled and the long-term unemployed into the labour force, and reforming the education system.

The chapter begins with outlining current trends in population ageing, followed by projections of the impact of future reforms on GDP and public expenditures. Then, it reviews other policies and best practices around the world to further increase labour force participation. Next, it provides implications for management with holistic solutions suggested and offers an evaluation of the solutions proposed by various senior managers based on the primary data collection. The final section concludes the chapter with a brief overview of the issue at hand and provides a short summary of the proposed solutions.

1 Trends in population ageing

The working age is usually defined as people aged between 15 and 64 (OECD, 2021), while everyone else is considered dependent population. Latest population projections show that the proportion of the European Union's (EU) population aged 15-64 is expected to decrease from around 59 percent in 2019 to around 51 percent in 2070. At the same time, the proportion of the population aged 65+ will increase from around 20 percent to 30 percent, while the proportion of those aged 80+ will increase even more substantially (from around six percent to 13 percent) (Eurostat, 2021). In contrast, the proportion of the population aged 0-19 is projected to decrease from about 20 percent to 18 percent. The ageing of the Slovenian population will be similar to the EU27 average (for more details see Figure 1). Consequently, the old-age dependency ratio (ratio of people aged 65+ to those aged 20-64) in the EU is projected to increase from 34.4 percent in 2019 to 59.2 percent in 2070, whereas in Slovenia from 33.2 percent to 58.8 percent (European Commission, 2021a). Similarly, in the United States, the dependency ratio will substantially rise in the future, with about 2.5 working-age adults for every retired person in 2060 (United States Census Bureau, 2018), up from 3.9 in 2020 (Knoema, 2021). In China, there will be only 1.9 people aged 15-64 for every person aged 65+ in 2060 (European Commission, 2021a).

Figure 1. Population projections for Slovenia from 2019 to 2070



Source: Eurostat (2021).

Population ageing combined with generous public pension schemes threatens the sustainability of public transfer systems, especially in European countries. Moreover, elder people in developed countries generally do not work for as long as they would physically be able to (Istenič, 2018). Besides early retirement age, there are also other significant factors for the labour force inactivity. The main reason for inactivity of people aged 15-64 in Slovenia in 2020 was education and training (38.7 percent), closely followed by retirement (32.6 percent). The third most common reason for inactivity was own illness or disability with 12.4 percent (Eurostat, 2021). Encouraging young and disabled people to enter the workforce implies broader economic consequences: it could potentially lower other expenditures, such as healthcare or education spending. Additionally, adopting immigrant-friendly policies would further mitigate the population ageing issue.

2 Challenges and best practices related to maximizing the labour force

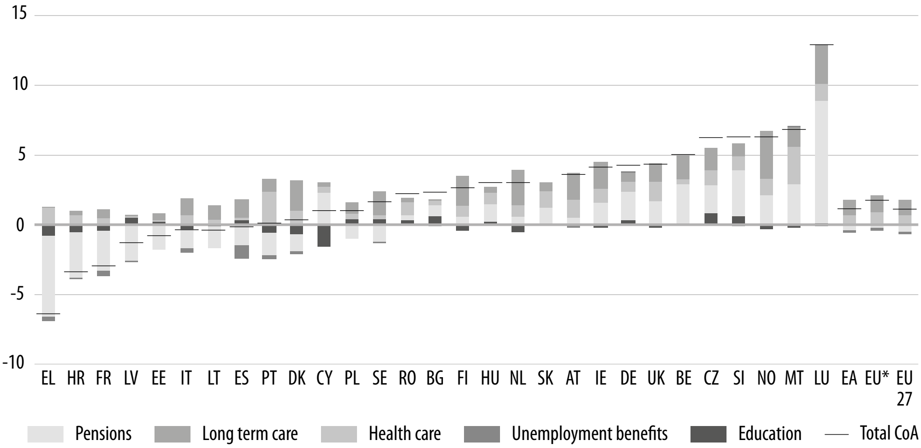
2.1 Extending the statutory working age and keeping the retired active

OECD countries point schemes typically allow withdrawing pension between two to five years earlier than the statutory retirement age (OECD, 2019b). Extending the working age could reduce GDP in the short run (European Central Bank, 2018). This is because earlier retirement could increase the incentive to work and save, thereby increasing productivity, while later retirement could dampen morale and productivity (OECD, 2020). However, later retirement may increase GDP in the longer run, as the working population pays more income taxes and social security contributions than retirees, which also generates more funds to finance pensions. Additionally, there would be less pressure on these funds, as retiring later means people draw their pensions later (Leibfritz, 2002).

In 2013, Slovenia already implemented some reforms targeting the working population. The minimum retirement age for a person that had been employed for 40 years was raised to 60. After retirement, retirees can work at the maximum of 60 hours in a calendar month, exceptionally up to three months in a year for 90 hours in a calendar month, while the sum of all hours of temporary and casual work can be a maximum of 720 hours in a calendar year. Unused hours from the previous month cannot be carried over to the next month (ZUTD, 2019). Despite the already implemented reforms, public pension expenditure in Slovenia is projected to increase from 10.9 percent of the GDP in 2016 to 14.9 percent of the GDP in 2070, which is 3.5 percentage points above the projected EU27 average

(European Commission, 2018) (see Figure 2). This implies that Slovenia needs further reforms to sustain the public pension system. Moreover, Slovenians rely heavily on public pensions and do not have strong incentives to invest in private pension provision in the current environment (Walkenhorst & Sila, 2015).

Figure 2. Projected change in age-related expenditure (2016-2070) by expenditure component in the European countries (percentage points of GDP)*



*Note: Total CoA stands for total age-related expenditure.

Source: European Commission (2018).

Although the Netherlands faces the same problems concerning the ageing population as other countries, the Dutch pension system has been recognized as one of the best. The Dutch pension system is a combination of pay-as-you-go funding for the state pension as the first pillar and capital funding for the occupational pension as the second pillar (Pensioen Federatie, 2021). The Netherlands abolished early retirement in 2006. The contribution period to be eligible for a full pension is 50 years, compared to 40 years in Slovenia (European Commission, 2021a). The statutory retirement age in the Netherlands will reach 67 in 2024 and will thereafter increase in line with life expectancy (European Commission, 2021b), exceeding 70 in the future (OECD, 2019a). Northern Ireland, which allows its citizens to work past retirement age while drawing pensions, is also a good example. The amount of tax paid is based on the amount of pension received (Pension Advisory Service, 2020). Similarly, in Australia, the government encourages older Australians to work if they are able and willing. They can earn up to AUD 300 of the so-called Work Bonus every two weeks without reducing the amount of pension received. As a result, labour force participation increased from 8 percent in 2006 to 13 percent in 2018 (Australian Institute of Health and Welfare, 2018).

Although the pension reform will raise the working age in Slovenia, postponing the retirement even further should be encouraged. The working age could be increased in line with life expectancy, as seen in the case of the Netherlands. Delayed retirement can also be promoted through bonuses for people who remain in the labour market, by encouraging employers to retain and hire older workers and by leveraging technological innovation to grow the overall productivity. Furthermore, positive organizational perceptions of older employees must be also achieved as this leads to their good health, better performance, satisfaction with their work environment, willingness to transfer and share good experiences. Organizations should also pay more attention to employees' competencies rather than age and transfer of knowledge and experience (Streb et al., 2008). Carlson (in Freedman, 2019) found that after six months of tutoring students, older adults had improved brain and cognitive functions. Improved productivity could be a result of a better age-mix in the workplace by older and younger workers benefiting from competitive advantages of each other if work tasks performed are creative and not routine (Backes-Gellner & Veen, 2013). Göbel and Zwick (2013) also concluded that mixed-age working teams are beneficial for younger and older workers' productivity after analysing a German employer-employee dataset between 1997 and 2005. Older workers should get a mentee which would improve their brain function and help younger people develop faster.

2.2 Positive net migration

Ethnic diversity has been shown to positively affect productivity in rich economies and to have positive effects at higher levels of development (Alesina & La Ferrara, 2003). High levels of population fractionalization have stronger effects on a country's productivity in the first 30 years, with positive effects lasting over 100 years and playing a vital role in a country's future level of development. The big migration waves flowing to the USA in the late nineteenth and the early twentieth century positively impacted the economy on the county level. The counties that attracted a large diversity of international immigrants developed more due to the enlarged skill set, the different perspectives and experiences brought with the arriving migrants, and the interaction among those groups. The surge of new ideas and newfound dynamism can still be felt today (Rodríguez-Pose & von Berlepsch, 2019).

In 2019, the European continent hosted about one-third of the world's migrant population (82 million migrants), with an increase of nearly ten percent since 2015; 42 million of these were intra-regional migrations and this number has increased significantly from 28 million in 1990 (OECD, 2019a).

The active labour supply in Slovenia is influenced by daily labour immigrations and emigrations, as well as the increasing trend of emigration (including intra-EU migrations) of Slovenian citizens abroad (UMAR, 2019). In 2018, daily net migrants represented only 0.5 percent of the total active population, while first-generation immigrants played a more important role in providing labour supply in Slovenia. In 2018, immigrants represented 11 percent of the total active population (SURS, 2019), with 86 percent of these 101,200 foreigners coming from Balkan countries. It is expected that Slovenia will rely heavily on immigrations in the future as well (European Commission, 2018).

An example of a good practice of integrating immigrants into the workforce comes from Germany, where the government decided to turn the country into a land of immigration and integration to solve the ageing population problem. In 2009, the National Integration Plan was introduced. It consisted of ten core issues that needed to be implemented to bring the "welcome culture" to life, for example: integration courses, language acquisition, education and vocational training, and opportunities for women and girls. In 2012, Germany introduced the European Blue Card, a work- and residence permit for non-EU/EEA nationals, which helped attract highly skilled non-EU citizens as new workers. The Blue Card initiative provides, among other things, working and salary conditions equal to nationals, comprehensive socio-economic rights, and a path towards permanent residence and EU citizenship (EU Blue Card Network, 2021). When waves of refugees began pouring into Europe in 2014, Germany opened its door to new arrivals (Mushaben, 2017). While this helped Germany address its labour shortage, there have also been negative effects, one of them being a rise in crime. This started already decades ago, first with the end of World War II, then during the cold war, and lastly, after the fall of the Wall in 1991. The poor integration of those immigrants into the host society led to an increase in organised crime, especially by ethnic groups of immigrants who exploited the democratic system with goals of inclusion and equality (Pancevski, 2018).

Another good practice is the EPIMA Programme from Austria, a part of the EU EQUAL Strategy from 2001, which was mainly aimed at integrating young refugees and asylum seekers into the Austrian society. The program included group work and individual coaching, always considering regional circumstances. It consisted of many courses, divided into basic and specialized courses, e.g., German language course, basic education, English, and most importantly, intercultural learning (Matheus & Pinho, 2018).

To further attract foreigners, the introduction of mentoring and internship programs for shortage occupations and the intensification and improvement of school-business cooperation is recommended. An example of such cooperation is BioCamp, organized by Novartis, which attracted 191 students from 24 countries only in 2020. BioCamp brings together top university students, distinguished experts, and top managers to help students gain insight into the professional and business environment within the pharmaceutical industry (Lek, 2020). By building and strengthening relationships with carefully selected foreign schools, companies could also gain a large pool of eager and prospective candidates. In addition, financial initiatives like Erasmus and Erasmus+ scholarships are widely available, which financially relieve companies from paying for students' work (Erasmus, 2021). Stable conditions (transport to work, accommodation, family care and other non-financial benefits) also attract highly skilled and talented foreigners (Krishnakumar & Indumathi, 2014). This can be achieved by effectively managing the entire onboarding process and by leveraging external connections and acquaintances to ensure favourable conditions for living in Slovenia. Companies should support governmental directions by implementing and adhering to inclusive and welcoming policies. A multicultural organizational culture contributes to a better idea flow, more open-mindedness and better effectiveness of employees.

2.3 Making the young more active and future-oriented

Younger generations are a critical component in maximizing the active labour force for several reasons: first, when young people enter the labour market, they are fully motivated and achieve higher productivity; second, they solve the staff shortage problem and provide a steady inflow of new workers; third, they hold enormous potential for further development and can be easily trained and retrained if needed (Barham et al., 2009).

Current policy is not oriented towards a more stable, holistic, and long-term form of student work. Presently, student employment is classified as casual, which limits not only students but also companies that want to develop and retain them (Franca, 2020). Furthermore, students can also be employed and retain their student status, but companies then pay higher contributions and students are not eligible for most student benefits. In addition to the low hourly wage, income tax can also be a major hurdle and can discourage students from working more. Finally, students are not entitled to any subsidies related to setting up legal entities such as sole proprietorships or a limited liability company. As a result, the biggest problem preventing the maximization of the active labour force lies in the fact that students who agree to work for a student wage typically receive some unreported cash payments, especially in service and construction industries, and consequently, due to such favourable terms, then extend their student status to continue working under the student work regulations and have no desire to work full-time (Franca, 2020). This has many negative impacts on the economy and talent development. In addition, the overall duration of education in Slovenia is quite long compared to other countries, which delays the entry of new workers (DZHW, 2018).

One way of adressing this problem, as for example in the UK, is a form of student work called "apprenticeship", which combines practical training in a job as part of their studies, allowing students to develop their talents in an organised and supervised way while continuing their studies. As an apprentice, students are true employees, receiving a salary and even holiday pay; they work alongside their mentors and gain job-specific skills. For tertiary education, the British system offers the so-called "sandwich package" programs where universities provide for a year specifically set aside for work placement (GOVUK, 2021).

It is therefore recommended that student work in its existing form is redesigned to combine tertiary study with practical experience and that for student work only corporate scholarships are used. In that way, employers would have a guaranteed inflow of new talent, while students could focus on their studies and when free, work and gain new experiences. Some new legal hurdles could arise from this change, however, with the unified system and right guidelines from the Ministry for Education, they could be mitigated. Gymansiums and universities should promote and further develop their apprenticeship programs and include courses with practical experience in their curriculum. Managers, in turn, need to create clear development plans for the students they want to employ and hire them after a maximum of one year of student employment. Despite the needed effort, this would allow them to retain students easier as well as better integrate them in their companies. In contrast, at the legislative level, the shortening of the study period is proposed as the most appropriate solution to increase the active working population - e.g., shortening the master's degree by one year, limiting the number of exam retakes, and shortening the period in which students can complete their theses. In addition, it is proposed to abolish the option of the "gap year" on the master's level and to convert it into a work-placement year.

2.4 Disabled, long-term ill and long-term unemployed individuals

The UN Convention on the Rights of Persons with Disabilities defines persons with disabilities as "those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" (United Nations, 2006). Hereinafter, the term disabled also includes long-term ill people with illnesses such as cancer, Alzheimer's disease, or arthritis, as they are not separated in legislation and in data collected, as explained further in this subchapter. In 2012, the average global workforce participation rate of persons with disabilities was 31.9 percent, half the average workforce participation rate of persons without disabilities, which was 62.5 percent (ILO, 2021). There are about 12-13 percent of disabled people in Slovenia, but only around 30 percent of them are part of the active population (Čuk, 2014). Disabled people are primarily unable to work due to their disability, but other factors also influence their participation in the workforce. They are often subject to discrimination and stigma, which leads to unemployment (Shier et al., 2009). Environmental factors, such as lower education or lack of educational opportunities, lack of transportation, and physical accessibility, further contribute to their inactivity (Buckup, 2009). In 2020, 12.4 percent of the inactive population in Slovenia (12.3 in the EU) were not seeking employment due to own illness or disability, which is the third most common reason, right after education and retirement. In Slovenia, for people aged 25 to 49 own illness or disability is the most common reason for inactivity with 26.7 percent, while in the EU, it only amounts to 15.6 percent (Eurostat, 2021).

Slovenia introduced quotas in 2006, requiring all companies with more than 20 employees to employ a certain percentage of people with disabilities, depending on the industry. People with severe disabilities who cannot apply for a job on the open market can be employed in one of the 151 sheltered companies (Čuk, 2014). There is also the possibility of vocational rehabilitation, a process in which a person is vocationally, physically, and psychosocially trained either for another profession or job or to perform the same work in an adapted post (ZPIZ, 2019). Disabled people in Slovenia are entitled to disability compensation, which is often very low: the average was below the at-risk-of-poverty threshold in 2019 (Gantar, 2019), therefore, their goal is to enter and stay in the labour market. Unfortunately, discrimination on the part of employers and a very rigid bureaucratic system do not help their integration into the labour market (Nussdorfer, 2018). The issue is very complex as the disabilities and illnesses are very diverse and cannot be approached in the same way, however, they are all regulated with the same legal acts. In Slovenia, there is also no data being collected on disabilities, illnesses, and severities of those, which would serve as a basis for further development of legislation, policies, and solutions. Therefore, this subchapter provides several different, although rather general recommendations for tackling this issue.

The Netherlands is one of the countries that has made great efforts to mitigate these issues. The Dutch introduced the UN Disability Treaty in 2016, which aims to promote, protect and safeguard the human rights of people with disabilities, and are putting the treaty into practice under the close supervision of the Netherlands Institute of Human Rights. They launched an Action plan in 2019 to include more people with disabilities in Dutch politics, and elected the first Minister for Disability Issues in the Netherlands (Nwanazia, 2019). Although the Netherlands is making progress in the inclusion of people with disabilities and providing them with equal opportunities in several areas of life, they have not yet managed to increase employment and participation rates. The newly introduced quota system has slightly improved the situation, while support measures are often complicated and bureaucratic and thus unsuccessful (Netherlands Institute for Human Rights, 2018).

In Germany, a patient is admitted to vocational rehabilitation soon after the onset of a disability, and the retraining is selected considering the expected consequences of the disability. As a result, 95 percent of long-term ill people successfully return to the labour market (Zupanič, 2019). Similarly, the Netherlands introduced the Gatekeeper protocol in 2002, which requires employers and employees on sick leave to develop a return-to-work plan within eight weeks of absence. The plan includes rehabilitation measures for employees on long-term sick leave and activities for their transition back to work, designed with the help of an occupational health doctor. The employer is responsible for early reintegration efforts (Scharle & Csillag, 2016), and if the UWV (Employee Employment Agency) considers the measures to be insufficient, they need to pay the employee's wage for up to two years, while the employee might get a reduced amount of a disability benefit. Such a system, combined with more funds being invested in education and rehabilitation (Božič, personal communication, March 10, 2021) and occupational physicians who treat each patient individually, would achieve better results in the return of people with disabilities to the workforce and prevent inactivity due to disability. However, additional delays could arise due to waiting periods for some medical procedures, which is why the public health service should also be revised and improved.

The employers should try to meet the required quota, proposed by the state, instead of taking the "easy way out" and paying the contribution to promote the employment of disabled people. The managers should work more closely with organizations that offer free consulting and help in integrating disabled people into the workplace. They can help identify and develop best practice solutions to enable people with disabilities to participate as equal members of the organization. Furthermore, investment must be made in public transport, especially bus transport that must be physically accessible to all, without the need for additional assistance, and simplified for people with intellectual disabilities, such as Down's syndrome. Regulations and laws need to be updated as they are rigid, outdated, and costly, due to lengthy bureaucratic procedures (Zupanič, 2019). The legislation should be updated so it would capture all of the disabilities and illnesses, and apply to their specificities. More effort should also be put into collecting and analysing the data on disabilities, long-term illnesses, and their severities to serve as the foundation for policymakers. Funds should be invested in education and rehabilitation of the disabled and long-term ill to enable faster transition back into the workforce. Managers must do everything in their power to prevent their employees from developing disabilities – the ones that are caused by physical exertion as well as burnouts or even mental illnesses.

Next, long-term unemployment (LTU) referring to the share of the active population that has been unemployed for 12 months or more (OECD, 2016), should be considered. The causes of LTU are multiple, and although the weight of these elements varies in each country, it is associated with economic, behavioural, and institutional factors. The causes of LTU are the lack of demand due to high labour costs, technological changes, and potentially strict labour protection laws. Workers, on the other hand, face personal barriers and are discouraged from taking up work by an inadequate minimum wage, especially when compared to relatively high unemployment benefits. Finally, while labour supply and demand may match in absolute terms, there are still mismatches in the skill groups and levels required between the two (Duell et al., 2016; Sharone & Vasquez, 2017).

In 2019, the LTU rate in the EU was 40.4 percent, compared to the OECD average of 25.8 percent. In Slovenia, the LTU rate was 43.1 percent (Eurostat, 2021). The incidence of long-term unemployment is higher among those with lower levels of education (lower secondary or below) than among those with middle and higher levels of education (short tertiary or above). Furthermore, 44.3 percent of the long-term unemployed in Slovenia in June 2021 were more than 50 years old (ZRSZ, 2021).

An example of good practice is a project from two Belgian cities, Antwerp and Alost, where a targeted approach to solve LTU among persons living in poverty was used. They focused on "experimental trajectories towards work", such as a non-fragmented, cyclical guidance model and a mediator/buddy for every job seeker, plus, every trajectory was tailor made. The projects included 300 jobseekers, and although they faced many difficulties, the overall results were promising.

The lessons learned were later integrated in a single methodology and are helping 500 new jobseekers a year (OECD, 2013).

Biased and outdated hiring practices that focus on factors such as networking or age unfairly disadvantage the long-term unemployed and play a key role in discouraging them from seeking employment (Sharone, 2021). Managers need to recognise and pay attention to these biases to dismantle them. LTU also has deep psychological and sociological roots, therefore, sociologically informed discourse and practice are critical to reduce stigma and 'reevaluate' oneself to address the personal causes of LTU. Internalizing the stigma often leads to self-deprecation, self-blame, and an emotionally difficult job search (Sharone & Vasquez, 2017).

2.5 Summary and overview

Table 1. Summary of challenges, possible solutions, and best practices

Demographic group	Challenges	Possible solutions	Best practices
Elderly	Decline in labour input and productivity; Decline in GDP per capita, altered savings and investments, pressured fiscal balance	Leverage technology to boost productivity; Raising the retirement age, providing partial retirement opportunities; Promoting diversity and inclusion initiatives	Northern Ireland: citizens can work past retirement age while drawing pensions; Australia: the government encourages the elderly to work if they are able and willing, »Work Bonus«
Migrants	Higher unemployment rates; Lack of adequate talents in certain professions; Brain-drain; Assimilation	Targeted migration policies to make supply and demand meet; Subsidies; Encouraging student and work exchanges; Efficient housing policy; Talent management, work conditions	Germany: National Integration Plan; European Green Card; welcoming immigrants and thus addressing talent shortages
Young people	Lack of safe and vital opportunities; Exploitation	Model of corporate scholarships; Preparing development plans, shortening study duration; Elimination of student services; New regulations	United Kingdom: apprenticeship model; Study programs with a work-placement gap year
Disabled, long-term ill and long-term unemployed	Stigma and fear; weak education and rehabilitation possibilities; Shortcomings of policies on the behavioural aspect of unemployment	Education; Embracing the quota system; Investments – adjusting educational establishments, sooner rehabilitation, etc.; Sociologically informed support	Netherlands: UN Disability Treaty, Action plan, Minister for Disability Issues; Germany: Vocational rehabilitation; Netherlands: »Gatekeeper control«

Source: Own work.

Addressing the challenges of the inactive population requires thoughtful policies and extensive resources. To provide a general and sharper overview of the challenges and recommendations for the inactive population, Table 1 was complied, listing all the essential information we believe is critical for maximizing the active working population.

3 Managerial implications

To paint a more holistic picture of this issue, interviews were conducted with six senior managers from various Slovenian and multinational companies in different industries - pharmaceutical, service (gastronomy), hospitality, retail, and high-tech R&D; from SMEs to large corporations. Their views and strategic goals regarding their recruitment strategies and their views on including the elderly, disabled, immigrants and students to maximise working population were collected[1]. "The issue of diversity and inclusion has never been more relevant than it is today. Attracting new diverse talent and supporting them on their journey has been the main priority of this year" (Respondent 3).

In general, all respondents indicated that they see the importance of the issues discussed before in this chapter, however, some indicated that implementing such initiatives takes a lot of resources that many of them do not have or cannot prioritise. Based on the interviews, this is true for smaller companies as they struggle with both the current talent shortage and post-pandemic recovery, while larger companies can and in fact already do invest in such initiatives. Regardless, most believe that including everyone, from immigrants to elder people, as well as students, in the workplace is vital to the future growth of their business, however, many also pointed out the fact that sometimes the legislation is so strict that managers cannot choose to do it - in the end, it is just not feasible for them (Respondents 1, 3, & 4). Four respondents also said that current related legislation is very outdated and is not 'forward looking'. Almost all respondents indicated that they miss some government initiatives and action plans to support and promote inclusion of all marginalized groups. In relation to the ageing population, respondents shared a common view that employees should start their careers earlier rather than extending the length of their working lives. Two of the interviewees also proposed a solution, namely a nationwide and state-supported education program to reskill and (or) upskill the older part of the workforce - all over the age of 50. Although there is a similar initiative already in place by the Public Scholarship, Development, Disability

1 Interviews were conducted from 30th June 2021 to 8th July 2021.

and Maintenance Fund of the Republic of Slovenia, it is not focused enough on the current market trends and is lacking proactivity.

When dealing with inclusion of students, some pointed out that students should take their first jobs more seriously. They should enter the job market in the industry and the role they want to pursue long-term, not as cashiers or waiters, unless of course that is what they want to pursue. They have also stressed the importance that this measure is a two-way street, as managers need to first create an environment for it, open up the jobs, and prepare a better program for student employment (Respondents 2, 5 & 6).

In reviewing our suggestions made in this chapter, all respondents agreed that they were feasible in general and going in the right direction, but had grave doubts as to whether they were actually feasible due to legislation and the current situation the business world is in. To summarise the specific responses: firstly, to offer corporate scholarships to students, the system should be completely overhauled. This would also require more collaboration with universities, which could be reached with special collaboration agreements; however, the proposed solution seems the best and most bulletproof in the long-term. Secondly, including more immigrants in the workforce is a necessity as there is a significant shortage of workers in nearly all industries. However, the government's actions are not helping - they have recently accepted a newer, even stricter immigration policy. Thirdly, while most businesses want to be as inclusive as possible, employing disabled talent can be a huge challenge as it requires not only process adjustments but also facility adjustments, which are simply not possible in some cases.

Conclusion

The ageing population and the consequent increase in the old-age dependency ratio and in public expenditure to finance the elderly call for urgent changes in the labour force activity. Government measures aimed at all potential groups of workers, not just the elderly, must be implemented as soon as possible and accompanied by appropriate corporate policies. Policymakers should strongly encourage the inclusion of all groups in the labour market and take care that work is not discouraged by an insufficient difference between labour and social benefits. Our research provides a summary of the national and global challenges posed by an ageing population. It also provides best practices for maximizing labour force participation and offers some solutions for all marginalised groups from a government and managerial perspective.

Based on the interviews with managers, our research shows that the proposed policies are broadly acceptable but difficult to implement under the current regulatory regime and in the face of the COVID-19 crisis. However, it is shown that the economic consequences of population ageing can only be managed through intensive involvement of all potential working groups and therefore proposed measures implemented. It should also be based on the principle that work pays off. It seems that a change in the mindset of the whole society is necessary to ensure a long-term success. The changes will be gradual and will require a lot of time and effort, but will have the greatest payoff in the end. In the meantime, many short-term solutions proposed in this chapter can be implemented.

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ECONOMIC POLICY MIX FOR SUSTAINABLE GROWTH

Introduction

The pandemic crisis, which broke out in early 2020, is still affecting human lives and economies worldwide. The virus containment measures – such as lockdowns and closure of certain business activities – have caused one of the deepest and most protracted slumps in the last century. Governments had to finance extensive programs to support the economy, boost healthcare services, replace lost incomes, and protect firms, which resulted in higher debt-to-GDP ratios across the developing countries. The extreme uncertainty of the pandemics was reflected also in the financial markets which have seen increased volatility. Furthermore, because of cross-border spillovers, commodity markets were disrupted, thus affecting trade, supply chains, travel, and tourism. Central banks continued maintaining their pre-covid interest rates at low levels – a policy decision undertaken since the global financial crisis to boost investor confidence and provide liquidity in the market (World Bank Group, 2020). For the time being, favourable financing conditions and support schemes alleviate short-term debt sustainability concerns, but in the medium term higher indebtedness could increase financial stability concerns.

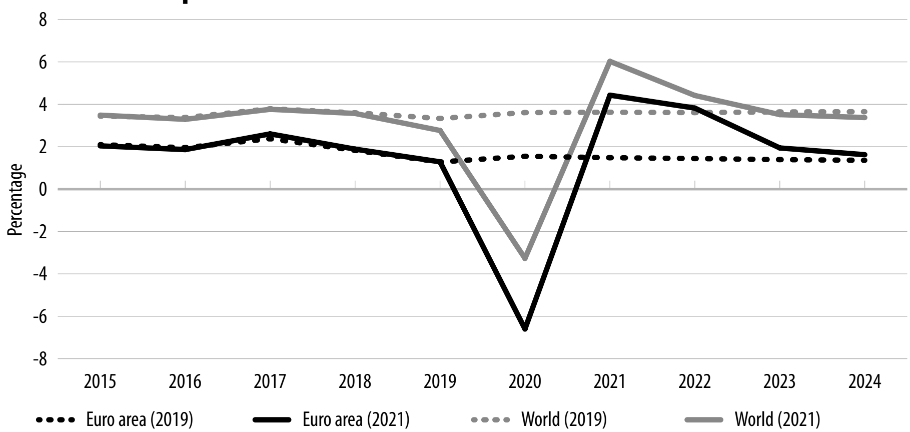
Against this background, emerging megatrends in new technologies, climate change, inequality and demographics are challenging the economic and financial environment, presenting opportunities and challenges for policymakers and organizations. This is why countries and societies cannot afford to remain complacent, as the opportunities and risks from digitalisation and climate change will need to be addressed while still navigating out of the COVID-19 pandemic. A new normality has already surfaced, and inaction is itself a risk.

This chapter provides an overview of the current state of the economic and financial landscape and pinpoints some of the key secular trends (technological and demographic developments) that are urging decision making and policy implementation. Building on the provided analysis, it aims to identify the key opportunities for rethinking recovery and development toward sustainable growth and offers a discussion on the optimal policy mix for achieving that goal. The chapter first presents the current macrofinancial conjecture, followed by a discussion of key megatrends and policy proposals to successfully address the challenges.

1 Current macrofinancial conjecture

International economic and financial linkages have become increasingly complex in recent decades. At the same time, the global decline in natural interest rates,[1] which began before the global financial crisis (hereafter GFC), has accelerated. The secular stagnation, a global savings glut, and central bank monetary easing have all contributed to this decline. To better deal with the spillover effects of a highly interconnected global economy, a policy mix of unconventional monetary policy, foreign exchange intervention, macroprudential measures, and capital flow regulation became increasingly popular. The COVID-19 pandemic and its impact on the global economy, public budgets, monetary policy and financial market fragility added to the complexity (ECB, 2021a) and took the global economy off its growth path (Figure 1).

Figure 1. GDP growth projections prepared in 2019 and 2021 for the euro area and the world in percent*



* Gross domestic product at constant prices, y-o-y change in percent.

Source: IMF (2019a, 2021a)

1 The natural interest rate (also known as neutral interest rate, neutral rate, r* (r-star), and the long-run equilibrium interest rate) is the interest rate that keeps inflation constant while supporting the economy at full employment/maximum production. It cannot be observed directly.

1.1 Monetary-fiscal policy mix

An effective monetary policy fulfils its mandate by achieving macroeconomic goals that promote sustainable economic growth. Regardless of whether monetary authorities in advanced economies have officially adopted a sole or a dual mandate,[2] they have been chiefly relying on conventional policy instruments[3] and typically using the policy interest rate as their tool for conducting monetary policy. In response to the GFC of 2007-2009 and the deep recession it caused in parts of the world, many monetary authorities in the advanced world lowered their policy interest rates to near-zero levels. Those actions have been insufficiently effective as in nearly 60 percent of the economies worldwide, the output in the past decade has not succeeded to surpass its pre-crisis trend (IMF, 2019c).

Such developments have once again brought forward the hypothesis of the "secular stagnation"[4] trap economies may be falling into. Namely, the literature has been largely consent about the downward trend in the estimated[5] equilibrium interest rate in the past decades (Kiley, 2019). In such conditions, and having to keep the interest rates very low, zero or even negative, monetary authorities are left with hardly any policy space to fulfil their mandates leading them to turn to unconventional instruments to address the pertaining weak economic growth (Figure 2 depicts the downward trend in interest rates and GDP growth in the USA and the euro area). These typically included asset purchase programs and forward guidance. On the other hand, the structural factors that weigh down on the equilibrium interest rate are most commonly identified as accelerated globalization trends, ageing population, technology, climate change, and rising inequality. If they persist, the rates are likely to remain low as excessive savings act as a drag on growth and inflation, exerting a downward pressure on real interest rates (ECB, 2017).

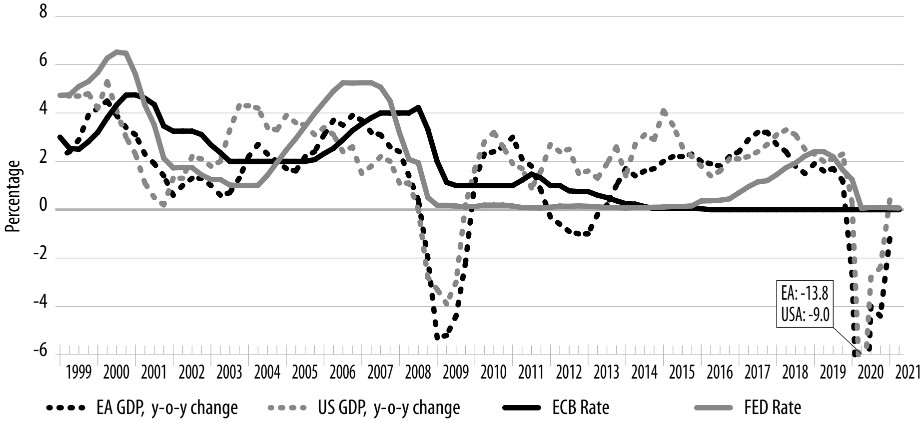
2 While the ECB primary objective is price stability, as established in the Statute of the ESCB, the Federal Reserve System has a dual mandate, i.e. not only price stability but both price stability and growth. Some argue (for eg. ECB, 2007) that the FED has in fact a triple mandate, as it has to ensure low long-term interest rates.

3 The typical advanced country central bank's conventional toolbox includes instruments such as the discount rate, the reserve requirement, open market operations, and the interest on reserves (Amadeo, 2021).

4 The term secular stagnation originates with the Keynesian economist Alvin Hansen and has been recently revived by the former American Treasury Secretary, Larry Summers. For countries suffering from secular stagnation it is characteristic that they are burdened with too much saving and too little investment. One of the hypotheses on the ways demographic shifts affect the increase in savings is that as life expectancy rises, people think about securing funds for a longer retirement. Demographics also partially explain why investment is so low, as slower growth in the labour force means slower growth overall and with fewer workers to hire, firms will also need less capital (The Economist, 2015).

5 The natural interest rate is a widely used concept that monetary authorities use as a benchmark in their assessment of the performance of the economy, which informs the adjustment of their policies. In that sense, rising or lowering the short-term nominal interest rate by policymakers may be advised by the deviation of the real interest rate (current nominal rate minus expected future inflation) from its equilibrium value (the rate that would be consistent with output at its potential level). As the natural interest rate is unobserved, it is usually estimated as the real risk-less interest rate at which economies can operate at full employment on average and is usually denoted as R*.

Figure 2. Base interest rates and real GDP growth in the euro area (EA) and the USA (1995-2021)*



EA GDP and US GDP: Gross domestic product at market prices, chain linked volumes in million euros, seasonally and calendar adjusted data, y-o-y growth rate in percent; ECB rate: ECB main refinancing rate; FED rate: effective Federal Funds rate.

Source: ECB Statistical Data Warehouse (2021c), Eurostat (2021), Federal Reserve Economic Data (2021)

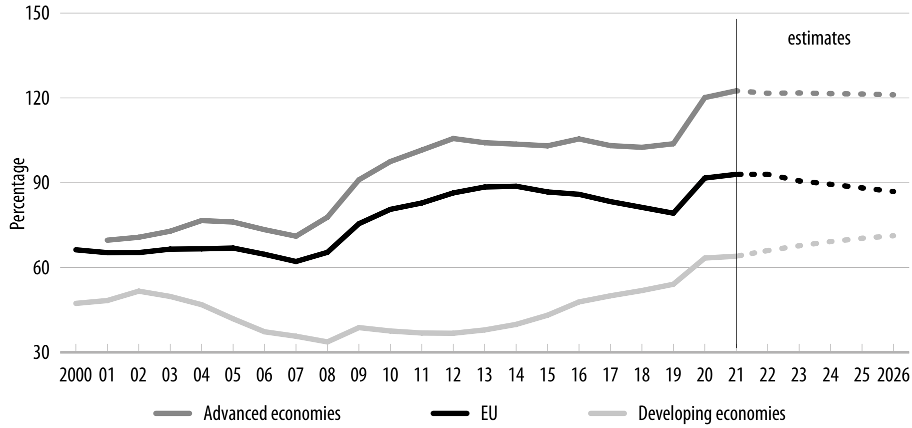
Looking at the reasons that led central banks to keep their interest rates low for much longer than initially intended, a prominent one is the premature withdrawal of fiscal policy support in the developing countries within the first two years after the GFC,[6] which has negatively impacted growth and inflation. And while the fiscal policy has been mostly qualified as either weak[7] or erroneously used in procyclical or acyclical way,[8] an important paradigm shift has taken place in the wake of the negative consequences of the pandemic. Governments around the world have turned to expansionary fiscal policy to provide relief and stimulus to the economy. A crucial relief has been provided to households and firms via direct grants, public guarantees, and payment moratoria. In 2020, it was estimated at over six trillion euro in direct budgetary support (around 7.5 percent of the global GDP), with the G20 countries providing the majority of this support. This is more than double the amount given in response to the GFC in 2008 (European Commission, 2021).

The unprecedented swiftness and extent of the fiscal response to the pandemic has risen the public debt levels to record hights (Figure 3), reflecting in a significant drop in income and huge increases in public spending. Given the favorable global financial conditions, the sizable expansion in government

6 In the developing countries, the governments focused on their budget deficits because they had allowed their public debts grow fast in the wake of the Global Financial Crisis.
7 Some researchers concluded that the famed fiscal multiplier was low and sometimes even negative (eg. Alesina, Favero, & Giavazzi, 2019).
8 See Alesina et al. (2008), Jaimovich, & Panizza (2007), Fatas (2019), Gootjes, & de Haan (2020).

spending has been made possible for countries with a sufficient financial space and a low credit risk. However, in those countries where access to external financing is more limited, primary spending is currently projected to be even lower than forecast before the pandemic (IMF, 2021c). To narrow the divides, collective actions will have to remain and the international community (predominately the IMF) will have to continue to play a major role in securing financing for the most vulnerable countries. Focusing on the European Union, the Next Generation EU (NGEU) package, which is being funded collectively, has created a critical fiscal policy space, akin to the federal budget support in other economies. However, with a prolonged extension of the support measures the question of the right timing of their withdrawal is emerging as essential. Extending the measures for too long risks distorting resource allocation and asset prices, increasing moral hazard, postponing necessary structural adjustment in the economy, and draining fiscal resources. And the longer support measures last, the greater the concerns about debt overhang, which depresses investment and growth (Financial Stability Board, 2021).

Figure 3. Debt in advanced and developing economies as a share of GDP in percent*



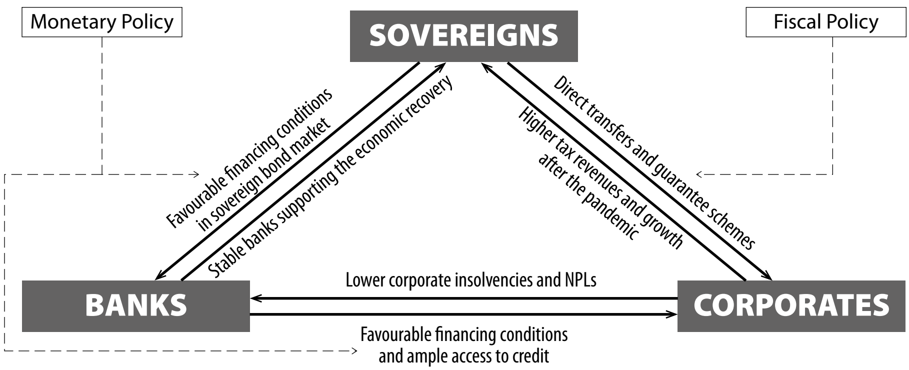
* The graph shows estimates for years 2022 to 2026.

Source: IMF (2021a).

1.2 Financial conditions

While the massive policy support has contained the immediate adverse effects of the pandemic on the financial system, it has contributed to the rise in medium-term vulnerabilities caused by growing debt burdens and the emergence of the sovereign-corporate-bank feedback loop (Figure 4). The governments' measures that supported firms whose revenues collapsed and were facing acute liquidity shortages that threatened to turn into solvency problems during the lockdown measures, coupled with the central banks' support of bank lending to firms by providing ample liquidity at favourable conditions, have created a virtuous circle between sovereigns, banks and corporates. In this context, banks and corporates have become more dependent on government support. The resilient banks in the euro area and around the world are beginning to face a combination of growing asset quality concerns, persistent structural problems and ongoing pressures on profitability (ECB, 2021b).

Figure 4. A virtuous circle between sovereigns, banks and corporates



Source: ECB (2021b).

The disconnect between financial markets and the economy persists, with markets recovering faster[9] than real output, boosting the likelihood of a correction. Additionally, policymakers and regulators are in somewhat uncharted seas due to the loosening of financial regulation in the wake of the pandemic. During the recovery, the banks' risk appetite is expected to be weighed down by concerns about the credit quality of hard-hit borrowers and the profitability outlook. When the ongoing impact of the economic shock on bank profitability and borrowers' ability to repay is factored in, there is an increased ambiguity about the nature of medium-term systemic financial stability risks. To avoid a legacy of vulnerabilities, prompt intervention is necessary (IMF, 2021b). The prolonged low-interest rate environment has also revealed the boundaries to the ability of macroprudential policy to address the related risks, as the available macroprudential instruments are limited to the banking sector and to borrower-based measures for households, based on national legislation (European Systemic Risk Board, 2021).

9 The combination of ultra-low interest rates and abundant liquidity has resulted in high stock prices.

The three open key questions that stem from the current macroeconomic conjecture – (1) what are the steps that monetary authorities will take in the future, (2) how to address the substantial debts that governments accrued in battling the pandemic negative shock on the economy, and (3) how to deal with the consequent financial vulnerabilities – are discussed in section three.

2 Global trends and uncertainties that have implications for growth and stability

If policymakers are concerned about achieving inclusive and sustainable growth and stability, it is their primary task to look at the elevated uncertainties emerging from the COVID19 pandemic from the perspective of the evolving trends having power to affect economic sustainability. These trends that represent both opportunities and challenges include, but are not limited to, innovations in digital technology, climate change, inequality, and demographics.

2.1 Technological innovations

The emergence of new technologies is already reshaping our societies and economies. Their integration has already proven to be an accelerator of long-term growth, facilitator of higher quality goods and services, and a bridge for inclusiveness (IMF, 2021b). In ageing economies, the integration of automation tools can help alleviate labour shortages, while the new advanced technologies can help companies grow more quickly with less employees and have proven to have a significant potential for enhancing firms' productivity and overall living standards (IMF, 2021c).

Technological innovations have vastly advanced also in the financial system reaching even the area of design of money.[10] There are two main areas of digitalisation that have the largest disruptive power for the future of finance: payment services and digital currencies. The first point of entry into finance is the market for **payment services,** which are foundational to all economic activity.[11] Substantive digital innovations have introduced new digital payment offerings by fintech startups, big techs and incumbents.[12] In this sense, as BIS

10 One such example can be found on primary foreign exchange (FX) venues, where market-makers can now access real-time prices at five-millisecond time intervals (BIS, 2021).

11 See BIS, "Central banks and payments in the digital era", Annual Economic Report 2020, June 2020, Chapter III.

12 See M. Bech and J. Hancock, "Innovations in payments", BIS Quarterly Review, March 2020.

(2020) confirms, there is a growing trend of emergence of fast retail payment systems, which allow 24/7 instant settlement of payments between households and businesses. The innovations, such as the Unified Payment Interface (UPI) in India, CoDi in Mexico, PIX in Brazil, and the FedNow proposal in the US, have shown that the existing system can adapt, providing good examples of how innovations in public-private partnerships are working. Another innovative example is **digital currencies**. Key aspects, when discussing digitalisation of all money, are digital currency[13] and access.[14] Policymakers (i.e., BIS (2020), Carstens (2021), Boonstra (2021), and many others) emphasise the risks of unsustainable security of the decentralised systems for concepts like Bitcoin and the governance concerns in asset-backed cryptocurrencies issued by private entities like Libra (renamed Diem in December 2020).

In light of the abundance of issues surrounding the decentralised digital currencies, one highly probable path of future development, if digital money is to exist, is the path of central bank digital currencies (CBDCs). The considerations about taking that direction should be discussed through the lens of the core principles for CBDC issuance, as laid out in the report of the Group of Central Banks.[15] Carstens (2021) discusses the following implications for the monetary system: i) the design of the CBDC issuance should not disintermediate commercial banks or lead to heightened volatility of their funding sources; ii) the impact on monetary policy and its transmission should be limited, and iii) there is an international aspect that relates to the perceived threat of international currency competition. In this regards, central banks around the world have made progress in their CBDC design efforts. Although, as Carstens (2021) points out, this should not be seen primarily as a reaction to the emergence of cryptocurrencies and be taken rather as a proactive assessment of possible new form of money that is in line with central bank mandates.

And while new technologies have the ability to yield positive effects on productivity at the firm and industry levels, thus enhancing competition, efficiency and inclusiveness, if not addressed properly by policymakers, they may also have adverse effects in transforming the financial industry and fundamentally altering the macro financial landscape. The rise of fintech and digital assets can disrupt capital flows, create global misbalances, boost cross-border spillovers, reduce customer welfare, and increase financial risks (IMF, 2021c).

13 This refers to the dichotomy of an authority maintaining trust and stability and the purely decentralised governance decision.

14 This refers to whether the access should be built around verification of identity as in bank accounts (sometimes called "account-based access") or around validity of the object being traded as with physical cash, for instance with cryptography ("token-based access").

15 See Group of Central Banks, "Central bank digital currencies: foundational principles and core features", joint report No 1, October 2020.

2.2 Climate change

Climate change has and will continue to have manifold socio-economic consequences. This will be reflected in its effects on important economic sectors and its contributions to changes in the supply and demand for goods and services. Not only economic activity, all aspects of life (such as human security, health and well-being, and even culture) will be affected by increasing temperatures, rising sea levels, frequent extreme weather events, and other climatic changes (OECD, 2021). Consequently, climate change will certainly have an impact on the fiscal sustainability[16] of government budgets both in medium and long run.

The impact of climate change on the economy has two components: i) "physical risks" i.e. the consequences of the environmental impact, and ii) "transition risks" i.e. the consequences of policies aimed at mitigating climate change (Batten, 2018). While it is expected that the mitigation policies would hamper the climate change related impact on the environment and the economy, they will generate their own costs, which must be added to the cost arising from the environmental impact. Although there is scarce quantitative evidence on what the economic impact of climate change is, governments need to assume the three roles, as proposed by Musgrave (1959) in addressing the impacts: resource allocation, redistribution and stabilisation. The allocation roles refer to mitigation and adaptation policies that both affect the revenue (expenditure) side of the public budget. These include taxes, subsidies, and/or public guarantees as fiscal instruments. As climate change can influence the average tax revenues per capita by modifying the average tax rate, the productivity of labour or the unemployment rate, OECD (2021) proposes the following formula to clarify the impact of climate change on tax revenues:

$$\frac{\textit{Tax revenues}}{\textit{Population}} = \frac{\textit{Tax revenues}}{\textit{GDP}} \cdot \frac{\textit{GDP}}{\textit{Workers}} \cdot \frac{\textit{Workers}}{\textit{Population}}$$

where Tax revenues/GDP is the average tax rate; GDP/Workers is the productivity of labour, and the Workers/Population is the unemployment rate.

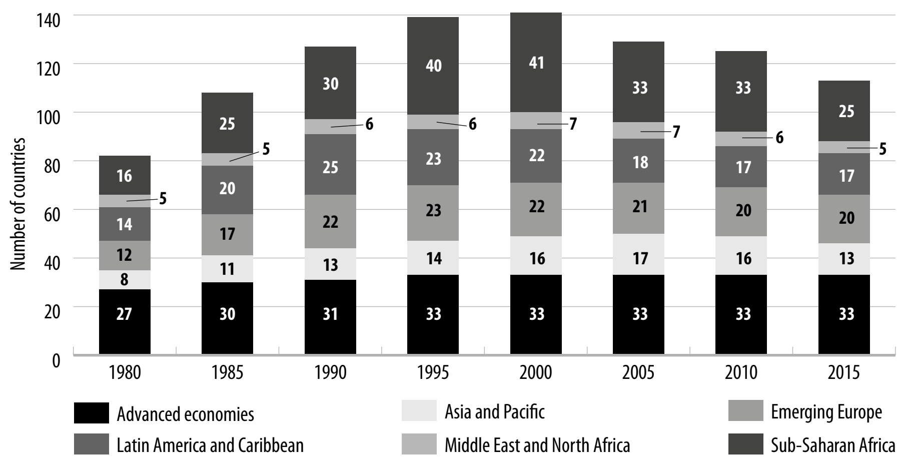
Koman et al. (2021) references the short-term and long-term challenges of energy transition, however, the projections estimate that if no measures are taken, it could wipe off up to 18 percent of GDP of worldwide economy by 2050, if global temperatures rise by 3.2°C (Marchant, 2021).

16 Fiscal sustainability is an important policy objective for many countries, requiring a balance between tax revenues and public expenditures at national and subnational levels (OECD, 2021).

2.3 Inequality and the 'digital divide'

Despite remarkable advances in poverty reduction and improvement in life expectancy, progress in reducing income inequality has been slow over the past two decades.[17] The Gini coefficient (a measure of statistical dispersion intended to represent income inequality) declined only gradually (Figure 5). Entering the crisis, income inequality had risen significantly compared with the early 1990s in many advanced economies and among some fast-growing emerging markets and developing economies (IMF, 2021c). The pandemic is having particularly adverse effects on economically more vulnerable people, including younger workers and women. The burden of the crisis has fallen unevenly across sectors. Differentiating jobs based on attributes that make them amenable to telework, workers most affected by the pandemic are employed in accommodation and food services, transportation, retail, and wholesale (Brussevich et al., 2020).

Figure 5. Gini income inequality 1980-2015*



* The data is represented as a five-year window, unbalanced sample, 1980-2015.

Sources: IMF staff calculations, using data from the Luxembourg Income Study (2017); the Organisation for Economic Co-operation and Development's Income Distribution Database (2021); Eurostat Income Inequality Statistics (2021); the Socio-Economic Database for latin America and the Caribbean (2021); and PovcalNet (2021).

While the future challenge remains to close the income inequality gap between and within countries, there is also a pressing challenge to cope with the rising inequality in terms of technological change. Even though technology has positive effects on overall economic growth, its progress causes inequal-

17 For further discussion, see IMF (2021c).

ity in the spread of wages, by benefiting the ones with high skills (European Commission, 2017), especially in highly valuable and prioritized sectors like ICT. However, technological progress, namely automation has also widened the inequality gap between high and low skilled workers in labour-intensive sectors. In the agricultural sector, the unequal exchange of agricultural products from the periphery and industrial products from the core, has been one of the reasons for the stagnation of the peripheric countries (Gräbner & Hafele, 2020). Countries from the periphery export fewer complex products to the core, paving the way for a 'vicious specialization', where only the core specializes in the production of innovative and advanced products, an activity that has been one of the drivers of economic growth. However, the full potential of technology for sustainable development can be achieved when everyone has access to it. As long as there are persisting 'digital-divides' and ,lack of technological diffusion, governments and firms will fail to materialize the benefits stemming from technology. Therefore, proactive policies and institutions can help ensure technological gaps to be tightened.

2.4 Population ageing

The increasing pace and rapid ageing of the population have raised concerns worldwide about its impact on public budgets and economic growth, thus presenting multiple opportunities and challenges for governments. The countries that are experiencing this demographic transition, explained more thoroughly in Istenič et al. (2021), will see a decline in the working-age population, which as a result decreases the output, given that less labour or input is available for production.

The changing patterns of reduction of working-age population and the increase in the ageing population are also causing shifts in the financial structures of savings and investments. The increased pool of senior citizens on one side and the lowered number of spenders – the working population on the other one, may lead to a reduction in aggregate consumption. On the other hand, the lower level of aggregate income in the economy may lead to lower domestic savings, which also hampers the investments (Yoshino et al., 2019). Similarly, fiscal sustainability will be altered given the lower number of taxpayers and higher government expenditures for age-related programs. Following these misbalances, policymakers are situated in tougher positions and need to make tougher decisions that resolve the age-related expenses and introduce new reforms that will lead to efficient and functional social support systems.

3 Recommendations for policymakers and the private sector in reaching sustainable growth

In an environment of low inflation and low interest rates, monetary and fiscal policies are particularly mutually dependent. This new reality of central banking increasingly challenges conventional 'monetarist paradigms', according to which monetary policy constitutes a strictly technical task that requires little discretion and should be conducted by an independent central bank under a narrowly interpreted legal mandate (Gortsos & Ringe, 2020). The swift monetary authorities' reaction in the pandemic has made them active contributors in counteracting the crisis along with fiscal and regulatory authorities. This 'new' role of the ECB (especially with respect to the unprecedented flexibility of its measure, the PEPP)[18] has triggered the discussion around its decisions and actions under a narrowly interpreted price stability (primary)[19] objective. However, in its recent strategy review, the ECB has strongly commited to incorporate climate change considerations[20] and has by doing so indicated that it will not neglect its supportive objectives[21] that require the ECB's "attention to systemic distributional and intergenerational challenges as far as its policies can make a significant impact and continue to give precedence to the primary objective in case of real trade-offs" (Gortsos & Ringe, 2020).

Learning from the last two crisis, policymakers now know that stimulating demand cannot be sufficient to escape the low growth trap. Economies must adapt to the new economic environment created by the pandemic, with resources being reallocated across sectors and firms. Rebuilding tax bases and service debt in the long run would require boosting productivity and growth potential, which would be only achievable by protecting public investment over the entire business cycle while successfully implementing structural reforms. In the EU, the NGEU will play a crucial role in managing the structural transformation created by the accelerated shift toward digitalization and automation. Meanwhile, liquidity support provided by programs such as the temporary Support to mitigate Unemployment Risks in an Emergency (SURE) and the European Stability Mechanism remains targeted at yesterday's challenge, i.e. substituting lost income and supporting health expenditure. Furthermore, redistribution

18 ECB announced €750 billion Pandemic Emergency Purchase Programme (PEPP) (see press release from March 18, 2020).
19 TFEU Article 127(1), first sentence.
20 Please see ECB's press release from July 8t, 2021 ECB presents action plan to include climate change considerations in its monetary policy strategy.
21 TFEU Article 3(3), second sentence. The often-used term 'secondary objective' may be misleading in that the ECB is legally bound by both objectives.

policies will play an important role in poverty reduction, narrowing the existing gaps in terms of income inequality, access to education, and gender equality.

Referring to the potential and the opportunities that emerge from the pandemic, 'twin trends' seem to be of crucial importance – the digital transformation and the increased emphasis on sustainability. The exit strategies from the last crisis have been aiming to take advantage of the positive opportunities of the transformation of the banking sector. One driver would be the accelerated digitalisation urged by the adaptation in the pandemic times (increased digital interactions), which includes establishing in-house departments responsible for development and enhancement of digital technologies, new digital business models (eg. joint ventures between banks and FinTechs), and cooperation between banks, FinTechs and technological companies towards their transition to the digital environment (Gortsos & Ringe, 2020). Focusing on the EU banking system, such developments may further influence market consolidation, in addition to the regulatory supported one,[22] and result in "differentiation and segmentation of the banking system into several major types of business models and categories of players" (Gortsos & Ringe, 2020).

As from the monetary authorities' perspective, digital innovation can also support broader policy goals. On one hand, if CBDs are properly designed and widely adopted, CBDCs could become a complementary means of payment that addresses specific use cases and market failures. They could act as a catalyst for continued innovation and competition in payments, finance and commerce at large. On the other hand, the increased use of digital payments goes hand in hand with a smaller informal economy (BIS, 2020), as creating a digital record of payments can allow businesses and individuals to build up a transaction data history, access credit and other financial services. In addition, it can make tax collection, law enforcement and social protection more effective, and expand the coverage of supervision and regulation of financial services as well.

The measures taken during the pandemic stand on a different level and meet a policy approach inspired by the need to protect the collective interest. Their future development will undoubtedly follow the same approach, their formalisation and framing however should be carefully considered. Table 1 aspires to summarize the optimal policy mix that would potentially emerge from the last crisis with a stronger economy and greater social and political cohesion.

22 See 2020 ECB Guide on the supervisory approach to consolidation in the banking sector.

Table 1. Summary of policy mix actions addressing the outstanding open issues

Open question	Policy mix
The future role of **monetary policy**	Commitment not only to price stability but also to systemic distributional and intergenerational challenges, as far as its policies can make a significant impact and continue to give precedence to the primary objective in case of real trade-offs.
Increased **government debt** in the aftermath of the pandemic (a monetary and fiscal policy mix for addressing the debt issue)	Common fiscal instruments, reallocation of resources and transforming economies and institutions. • As stimulating demand cannot be sufficient to escape the low growth trap, the economy must adapt to the new economic environment created by the pandemic, with resources being reallocated across sectors and firms. • The most productive companies need to expand, and the unprofitable ones need to exit. • NGEU recognizes this by providing grants to accelerate the green and digital transitions, in exchange for growth-enhancing recovery plans that modernize legal and institutional frameworks, enabling this reallocation of resources.
Emergent **financial vulnerabilities** from the SBC (sovereigns-banks-corporates) nexus and withdrawal of the support measures	Banks need to proceed with the early and transparent recognition of losses and provide adequate provisioning. Transparency and information disclosure in financial markets will be key to uphold trust and discipline, especially as Europe enters the phasing out of public support measures. On the monetary side, in an environment characterised by prolonged low rates, banks need to and can redefine their business models, footprints and income sources mix.
Opportunities and risks from **technological innovations and digitalisation** in the financial system	• Establishing in-house departments responsible for development and enhancement of digital technologies, new digital business models (eg. joint ventures between banks and FinTechs), and cooperation between banks, FinTechs and technological companies towards their transition to the digital environment. • Consequent differentiation and segmentation of the banking system into several major types of business models and categories of players.
Climate change risks and impact on fiscal sustainability of government budgets	Increasing use of environmental taxation. Shifting the tax burden away from direct income to consumption, immovable property and environmental externalities can have significant benefits in terms of GDP growth.
Risks of widening the **inequality gap and digital divide** after the pandemic	• Technology policies must be reformed to promote innovation and wide diffusion rather than serve primarily to lock in incumbents' advantages, as seen under the current patent systems. • Access to quality education and training must be greatly improved, including putting in place stronger and smarter programs for worker upskilling and reskilling and lifelong learning to respond to the shifting demand for skills. • Governments must reorient expenditure priorities and find a fiscal space to restore public investment programs in infrastructure and research and development that have been allowed to run down. They must also review tax and transfer systems that have seen erosion of their redistributive role.
Demographic trends and the impact of the **ageing population**	• Leverage technology to boost productivity; raising the retirement age, providing partial retirement opportunities. • Targeted migration policies to make supply and demand meet; subsidies; encouraging student and work exchanges; efficient housing policy; talent management, work conditions. • Model of corporate scholarships; preparing development plans, shortening study duration; elimination of student services, new regulations. • Education; embracing the quota system; investments – adjusting educational establishments, sooner rehabilitation, etc.

Source: Own work.

Conclusion

The increased economic and policy uncertainty have put policymakers in a tough spot of having to design the right policy mix that addresses the economic, environmental and social vulnerabilities. The pressing challenge remains to identify how coordination between the fiscal and monetary authorities can be incorporated into the institutional architecture and modalities that might make such coordination most successful. To address the concurrent fiscal, socioeconomic and sustainability transition, new integrated models are needed to examine the multiple transition impacts as well as potential reinforcing or balancing mechanisms, such as the technological change, environmental policies, and fiscal sustainability.

Policymakers have already made significant policy innovations that include the establishment of the pandemic recovery package fund (NGEU), the launch of asset purchases by emerging market central banks, and the novel use of digital technologies to deliver social assistance in places like sub-Saharan Africa. Such actions have undounbtedly prevented even more extreme collapses and can serve as powerful reminders that effective, well-designed policies protect people and collective economic well-being. Building on these actions, policies for the next stage of the crisis must seek lasting improvements in the global economy that create secure, prosperous futures for all.

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LOW-CARBON ENERGY TRANSITION

Introduction

Energy transition has become a global process all over the world because of the urgent need to stop the high greenhouse gas (GHG) pollution by fossil fuels, the main culprit for rising average global temperature and sea level, and overexploitation of Earth's limited resources. The energy sector is responsible for about two thirds (62 percent) of global GHG and 80 percent of CO_2 emissions (IEA, 2020b). Technological and economic progress is closely correlated with per capita energy consumption, and the inadequacy of energy supplies in the future calls for a giant step — the development of nuclear fusion energy (Lee and Saw, 2011).

The transition from traditional fossil fuels to new, limitless, clean source of fusion energy that is not estimated to happen before the end of the century (Kembleton, 2019), is based on renewables (such as hydro, wind, solar, biomass and geothermal energy) and nuclear energy. It is pushing the frontiers in modelling energy supply and demand by applying new technologies and holistic frameworks representing the interdependencies between policy making, energy infrastructure expansion, market behaviour, environmental impact and supply security (del Granado et al., 2018; Chen et al., 2019). Moreover, the sustainable energy transition in distant future implies well-managed concerns on environmental and social costs, risks and benefits (Sareen & Haarstad, 2018).

The aim of this chapter is therefore to highlight the short- and long-term challenges that the energy transition brings, and present the potential scenarios for decarbonisation of the energy sector, considering technological, environmental and economic perspectives. The chapter begins with an overview of the current and past structures of energy supply and consumption, the sufficiency of renewable resources, and the role of nuclear energy, followed by discussion on energy prices in major powerhouses (USA, China, EU) and Slovenia. The last part presents the road map for the energy transition in Slovenia.

1 Energy mix in Slovenia, the EU, the US and China

1.1 Overview of the current state of energy transition

Global energy consumption increased from about five Giga-tonnes of oil equivalent (in continuing Gtoe) in 1970 to almost 12 Gtoe in 2010, but slightly decreased due to Covid-19 lockdowns to 11.2 Gtoe in 2020, with large contributions from countries such as China and the US (Aydin et al., 2016; IEA, 2020a). Fossil fuels are still the dominant source of primary energy supply (81 percent), especially in the US and China (Table 1). While in the EU the importance of solid fossil fuels, oil, natural gas and nuclear energy has decreased in the last decade, a significant increase in renewable energy production could be observed during the same period (Eurostat, 2020). Slovenia still relies heavily on fossil fuels and nuclear energy, while the share of renewable resources is lagging behind, if compared with the EU (Table 1, Government of RS, 2020). The biggest energy consumer is transport, followed by the manufacturing sector and households.

All analysed countries have acceded to the Paris Agreement with different environmental targets to be met by 2050. However, energy policies in developed economies also include the need for secure energy supplies, sustainable energy consumption, and improvements in energy efficiency (European Union, 2020). There is a whole range of renewable energy sources,[1] but only wind energy, hydropower, biomass and solar systems are the ones that currently contribute significantly to global energy production.

The binding target of renewable sources in the EU's energy mix by 2050 is expected to increase to 40 percent by using renewable fuels, such as hydrogen in industry and transport (Eurofound, 2021). Increased use of renewables should be supported by reducing final and primary energy consumption by 36-39 percent in the EU27 until 2030 to meet emission targets, and increasing energy costs for consumers and industry (Eurofound, 2021).

1 The major types of renewable energy sources are biomass (wood and wood waste, municipal solid waste, landfill gas and biogas, ethanol and biodiesel), hydropower, geothermal, wind, solar, ocean and ambient heat (Eurostat, 2021).

Table 1. Overview of the current energy indicators in the US, China, the EU and Slovenia in 2019

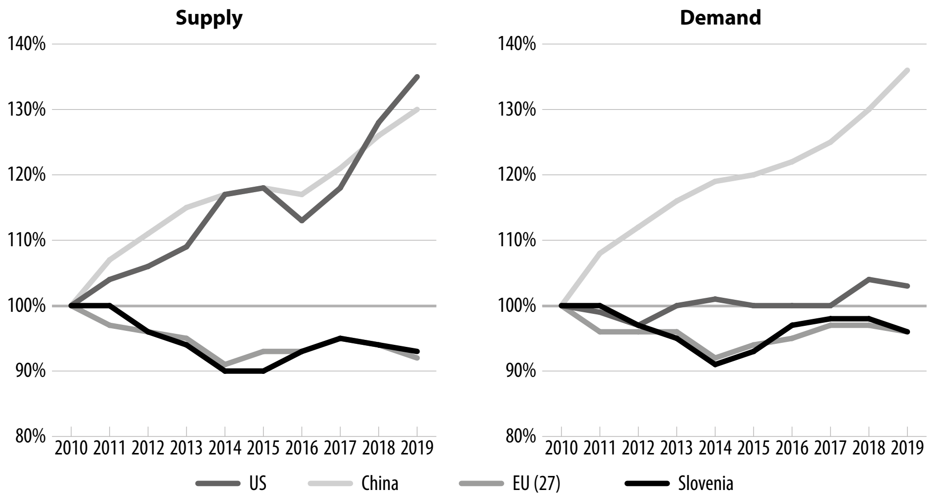
	US	China	EU	Slovenia
Primary energy production structure (in percent)				
Petroleum	25	7	33	35
Natural gas	35	6	24	11
Solid fossil fuels	14	69	12	16
Nuclear electric power	8	3	14	21
Renewables	11	15	16	17
Other	7	-	1	-
Structure of renewables in energy production (in percent)				
Hydropower	22	65	14	31
Wind	24	22	12	-
Biofuels	20	-	50	3
Wood	20	-	-	56
Solar	9	12	6	3
Other	5	1	18	7
Major consumers (in percent)				
Transportation	44	16	26	40
Manufacturing	37	49	22	27
Households	11	17	23	21
Other industries	8	9	29	12
Other	-	9	-	-
Main environmental goals (Paris agreement, European Green Deal)				
Target	• Reach net-zero GHG emissions by 2050.	• Reach a peak in CO_2 emissions by 2030. • CO_2 neutral by 2060.	• Reduce GHG emissions by 55 percent by 2030 compared to 1990. • Reach net-zero GHG emissions by 2050.	• Low-carbon circular economy by 2030. • Sustainable management of natural resources by 2030. • No use of fossil fuels in primary energy production by 2050.

Sources: Horowitz (2021); Eurostat (2021); OECD (2019); EIA (2021); McGrath (2020); Our World in Data (2020); Statista (2021a, 2021b).

1.2 Energy consumption and primary energy supply in the last ten years

In the past 100 years, energy consumption has increased significantly in absolute and relative terms. The doubling time of world population was about 50 years whilst the doubling time of energy consumption was 30 years (Lee and Saw, 2011). This above-average increase in energy consumption is unsustainable as the world is already near the critical point when supply of energy barely meets the demand, and consumption trends are still far away to significantly reduce GHG emissions. Primary energy consumption in the EU27 in 2019 reached 1.35 Gtoe, which is 3.0 percent above the 2020 target and 19.9 percent higher than the 2030 target. Final energy consumption[2] reached 0.98 Gtoe: 2.6 percent above the 2020 target and 16.3 percent above 2030 target[3] (Eurostat, 2021).

Figure 1. Total energy supply and primary consumption in the US, China, the EU27 and Slovenia, 2010-2019 (in percentage relative to year 2010)



Sources: Eurostat (2021); IEA (2020a).

Primary energy supply[4] and consumption decreased by almost ten and three percent in the EU and Slovenia, respectively, in the 2010-2019 period, while the primary energy supply in the US and in China was mostly increasing, reaching

2 The difference between primary and final energy consumption relates mainly to transformation and distribution losses and amounted to almost 30 percent in 2010 and stagnated to 27 percent in 2019 (Eurostat, 2021).

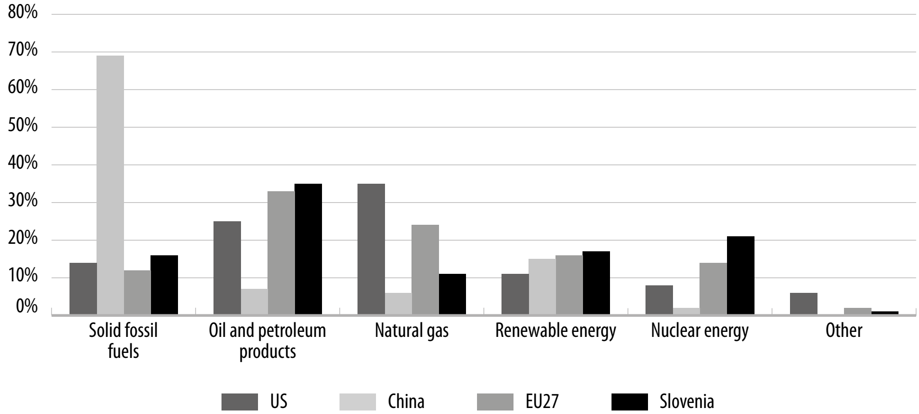
3 Compared with 2018, primary energy consumption decreased by two percent at the EU27 level and final energy consumption by one percent (Eurostat, 2021).

4 Primary energy supply is defined as energy production plus energy imports, minus energy exports, minus international bunkers, then plus or minus stock changes (OECD, 2021).

significant increases by more than 30 percent in China and 35 percent in the US in 2019, if compared to 2010 (Figure 1) (IEA, 2020a; Eurostat, 2021). The decrease in primary energy consumption and energy supply in the EU27 and Slovenia is attributed to a lower level of economic activity from 2010 to 2015 and increasing energy productivity (Eurofound, 2021).

The biggest sources of primary energy supply in the EU and Slovenia in 2019 were oil and petroleum products (33 and 35 percent, in the EU and Slovenia respectively) (Figure 2). The second largest source of energy supply in the EU was natural gas (24 percent) that amounted to 11 percent of total energy supply in Slovenia. The use of nuclear energy has increased by two percentage points in the last decade in Slovenia and represented 21 percent of total energy supply in 2019, but decreased to 14 percent of total energy supply in the EU27. As the energy transition in Europe is based on replacing solid fossil fuels with renewables,[5] the use of the former has decreased significantly in the EU27 and Slovenia from 16 to 12 percent and 20 to 16 percent, respectively, while the share of renewables in total energy supply increased from 11 to 16 percent in the EU27 and from 16 to 17 percent in Slovenia in the period of 2010-2019.

Figure 2. Main sources of primary energy supply in the US, China, the EU and Slovenia in 2019 (in percentage share of total energy supply)



Sources: Eurostat (2021); EIA (2021); Our World in Data (2020); Statista (2021a, 2021b).

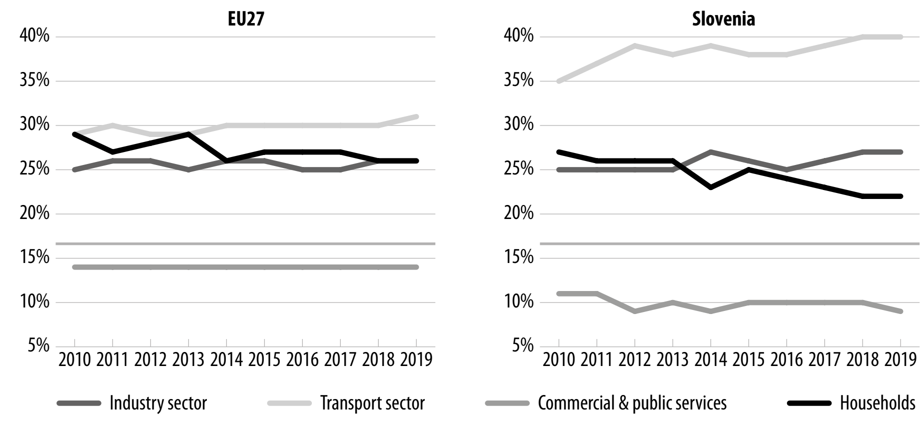
In 2019, China's biggest source of energy supply by far was solid fossil fuels (57 percent), while in the US, the largest source of energy supply was natural gas (35 percent), followed by oil and petroleum products (28 percent) (Figure 2,

5 Renewable energy sources in energy statistics include two broad groups: non-combustible (hydropower, tide, wave, ocean energy, geothermal wind, solar energy, ambient heat) and combustible renewables (biofuels including fuels from biomass and renewable municipal waste) (Eurostat, 2021).

EIA, 2021). During the last decade in the US, the use of solid fossil fuels as a source of energy supply decreased by 35 percent, while the use of natural gas and petroleum products increased significantly (Our World in Data, 2020).[6] In China, solid fossil fuels and petroleum products as a source of energy supply decreased by ten and 30 percent, respectively, while natural gas increased by 36 percent (Statista, 2021b). In China, the share of renewable energy in total energy supply has increased from eight to 15 percent in the last decade (Our World in Data, 2020). There was no change in the US, as the share of renewable energy in total energy supply remains 11 percent (EIA, 2021).

Regarding final energy consumption in the EU27 in the last decade, approximately one quarter is used in manufacturing and households, 30 percent in transport and the remaining 20 percent in commercial and public services. The share of the transport sector is slightly increasing while the shares of household and manufacturing are slightly decreasing (Figure 3). Interestingly, the share of the transport sector in Slovenia amounts to almost 40 percent in final energy consumption and has increased by almost five percentage points in the last decade. On the other hand, the shares of households and commercial services have been decreasing. The issues relating to the transport industry are analysed in detail in Koman et al. (2021).

Figure 3. Final energy consumption in the EU27 and Slovenia, 2010-2019 (in percentage share of total energy consumption)



Source: Eurostat (2021).

Non-metallic minerals, Paper, pulp and printing, Machinery, Iron & steel, and Chemical & petrochemical are the energy-intensive sectors with the highest

6 The use of natural gas increased by 62 percent while the use of oil and petroleum products by more than twice.

energy consumption in the EU27 countries and Slovenia, with approximately ten percent share of energy costs in total operational costs. Among non-manufacturing (air and land transport, mining of metal ores), energy costs amount to 20-25 percent of operational costs (European Commission, 2020). These sectors are going to pay the highest price for energy transition if not mitigated by a significant increase in energy efficiency (Parker and Liddle, 2017).

1.3 The role of renewables and nuclear power in electricity production

Electricity generated only from renewable sources (RES), possibly in conjunction with hydrogen (for big users like trucks or airplanes) and biogas, represents the final goal of energy transition.[7] An important role in the process is played by electricity triangle that refers to electricity generation from renewables, exploitation of electricity and electrification of the final energy uses in all sectors and must be carefully assessed from technological, economic, societal and environmental perspectives (Bompard et al., 2020). In 2020, the EU27 and Slovenia generated 38 and 33 percent of electricity from renewables, respectively, while the US and China lagged behind with 29 percent and 20 percent, respectively. The production of solar electricity has had the highest growth rate in the last decade in all of the aforementioned geographical units (Figure 4), but still represents the resource with the smallest share in electricity production.

General wisdom in the past assumed no constraints on the future energy use, especially regarding solar energy,[8] bio and geothermal energy. These high estimates are being increasingly challenged as unrealistic (Searle and Malins, 2014). The renewable energy potential is distributed heterogeneously within countries, and energy profiles of specific regions depend on geomorphological characterization (the location, quality and variation of the Earth energy flows) and the socio-economic structure of the territories (Scaramuzzino et al., 2019).[9] Land constraints (complex geography, alternative land use and environmental

7 It is usually perceived that electricity can be directly generated by the most abundant and economic RES, such as wind and solar energy, easily transferred over long distances and controlled with high efficiency.

8 This estimation is based on the fact that the sunlight that strikes Earth in one hour carries more energy than is required to power human civilization for an entire year. This frequently encountered statement accounts for the primary energy consumption but excludes the sunlight required to grow food and other ecosystem services like evaporation and other energy use in the ecosystem (Rand et al., 2017).

9 European countries, for example, could be divided in several clusters with the Alpine area having a medium/high potential from forest biomass and a medium potential from wind, while North Atlantic areas have very high potential from wind energy and agricultural biomass. South Atlantic areas of Portugal and France and the mountain area of Spain and France are recognized as regions with a very high potential from forest biomass and solar energy. The high potential from forest biomass was noticed also in Central European areas (Germany, Belgium, Switzerland and Slovenia). West Mediterranean areas of southern Italy and Spain, part of Portugal and Malta are very high potential locations for solar energy but less (medium potential) for wind energy. East Mediterranean areas (Greece, Cyprus) are a high potential for solar energy (Scaramuzzino et al., 2019).

sensitivity) therefore limit access to renewables and raise an important question of adequacy of the energy supply of renewables (Moriarty & Honnery, 2016).[10] It has been estimated, for example, that the required land area to power a totally electrified US economy might be approximately 16,000 square miles, which is roughly the size of Maryland, without counting additional dedicated land required for energy storage facilities and transmission corridors (Rand & Hoen, 2017). Moreover, the energy returns on energy invested falls as cumulative output rises due to technical inefficiencies (de Castro et al., 2013), [11] need to adjust grid flexibility due to variability in energy sources and additional costs for maintaining ecosystem services in the case of the extensive use of renewables, particularly bio and hydro energy resources (Moriarty & Honnery, 2016).

An important aspect to be considered in the case of renewables is the energy return on the energy invested (EROI). The EROI of any energy conversion device is the ratio of gross output energy to the energy inputs needed for manufacture, erection, maintenance, operation, and decommissioning, with both inputs and outputs measured in comparable energy terms (de Castro et al., 2013). The difference between output and input energy, the net energy, can power the non-energy economic sectors. Project "Desertec", an ambitious proposal on installing the solar and wind power plants in North Africa and Middle East (estimated to cover up to 20 percent of energy needs in Europe by 2050), got stuck on the reins of high investment in energy storage and transmission network. If hydrogen was used as the energy carrier, large amounts of water would be needed. All these factors greatly reduced the EROI (de Castro et al., 2013) and the ambitious plan initially supported by German multinationals E.ON, Munich Re, Siemens, and Deutsche Bank was abolished in 2015.

The Desertec project has been continued in much smaller scale in the case of Ouarzazate solar plant in Morocco and TuNur solar project in Tunisia.[12] However, these engineering projects are mainly designed to satisfy Europe's energy needs and contribute to its carbon reduction targets. North Africa and West Asia are well endowed with natural resources, from fossil fuels to sun and wind but spreading solar energy initiatives that further deplete scarce water

10 Hydro power plants have inundated forests, and in some cases entire cities have been relocated. Public opposition against wind energy is already significant in many OECD countries because of perceived effects on surroundings and property prices, and concerns for bird and bat deaths.

11 A wind turbine, for example, cannot extract all the energy from the wind. Further, the important sources, wind and solar, being intermittent flows, will eventually need energy storage, and perhaps partial conversion to non-electric energy, lowering the final energy and raising costs (Moriarty & Honnery, 2016).

12 TuNur solar project in Tunisia is a joint venture between Nur Energy, a British-based solar developer, and a group of Maltese and Tunisian investors in the oil and gas sector. Their explicitly export-oriented solar project has a capacity of 4.5 GW. At present the project is at the fund-raising stage.

resources is perceived as a great injustice for region suffering most from global warming, initiating a debate about forced trade liberalization.

The future use of renewable energy is intertwined with the development and deployment of energy storage technologies. Volatility in electricity produced by renewable energy sources demands efficient energy storage solutions and grid flexibility. Although the costs of storage based on Li-ion battery technology are estimated to fall due to economies of scale and technology improvement by one third and one half by 2030 and 2050, respectively, in stationary applications, large scale storage solutions are not yet available (Schmidt et al., 2019).

Nevertheless, despite serious concerns on sufficiency and volatility of renewable sources for future energy needs, nuclear power is facing an uncertain future (especially in Europe). Low social acceptance relating to a risk of serious nuclear accidents and radiation (Krikorian, 2018), high investment and decommissioning costs (Kan et al., 2020), [13] as well as the dangers of nuclear weapons proliferation in countries with poor governance, hinder future nuclear projects. On the other hand, the most important argument in favour of expanding nuclear power is climate change mitigation and serious concerns on the rapid and massive expansion of renewables. In China, the share of nuclear energy has almost doubled, whereas in the EU there has been a decline of 14.7 percent (Figure A1).

The future of nuclear energy, which partly avoids the problems of the long lead times, high costs and the risk of accidents in conventional reactors, may lie in the development of small modular reactors for commercial use (Moriarty & Wang, 2020). The proposed new reactors typically sized 10-100 MW,[14] a number of which are now under development in several countries, would be factory made and delivered to site, unlike present large reactors which can have an output of 1,000 megawatt (MW) or more and are perceived as much safer with respect to the conventional ones.[15] Small modular reactors could be used as single reactors or groups in countries or regions with poor prospects for RES energy production (Glaser et al., 2015). Regarding costs, a 1,000-MW plant will generally cost less to build and operate than five small 200-MW power plants of a similar design. On the other hand, if the number of small plants constructed becomes large enough, if “learning” is strong

13 Austria, Germany, Belgium, and Switzerland have decided to phase out nuclear power, while Finland, France, UK and Slovakia are building new nuclear power plants (Kan et al., 2020).

14 Generally, a small reactor has a capacity less than 300 megawatts, that is less than one third the capacity of the reactors that are common today (Glaser et al., 2015).

15 When a pressurized-water reactor is small enough, safety can be enhanced by placing all the pipes carrying high-pressure water within a very strong vessel that is capable of withstanding high pressures (Glaser et al., 2015). Moreover, less radioactive material is released during an accident and less energy available in the reactor to disperse this material.

enough, and if the diseconomies of scale are weak enough, five 200-MW reactors could become cheaper than one 1,000-MW plant (Glaser et al., 2015).

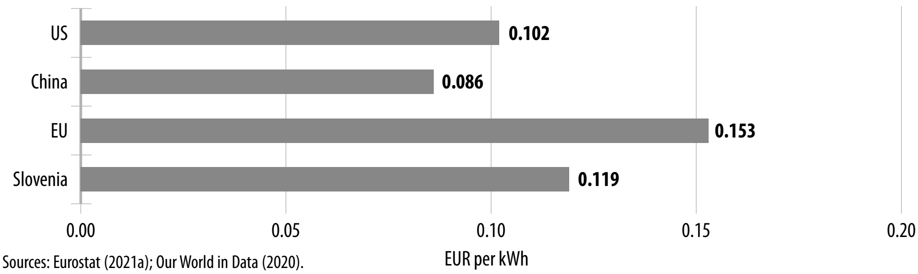
1.4 Energy prices for industry and household consumers

The energy transition will be very expensive and the costs of energy are expected to increase mainly due to higher energy prices based on high investments in renewables and low energy returns. The analysis of energy prices usually focuses on analysing the prices of electricity which represents the most important energy source for the future, and with faster electrification the costs of electricity will represent a significant part of energy costs in manufacturing. **Electricity prices** depend on energy supply resources and vary due to various factors such as price of power generation, transmission, distribution infrastructure, and taxes, as well as other minor factors. Due to different national energy strategies (i.e., using renewables, fossil fuels or nuclear power to generate electricity), the prices of electricity for households and businesses vary widely among EU members, and so do the costs of applying new sustainability measures, such as for instance CO_2 emission certificates or subsidies (Eurostat, 2021b).

In general, average retail electricity prices in the EU have been increasing over time and are higher than in most developed countries, due to relatively high consumer taxes and levies, as well as high network costs (European Commission, 2020). The EU27 average **household electricity prices** increased by around 32 percent (from around 156 EUR/MWh to 208 EUR/MWh) between 2008 and 2019. Slovenian households, on average, paid 154.5 EUR/MWh for electricity in 2017, which ranked them 15th among EU member states. Household electricity prices in China are highly subsidized and amount to around one third of the EU27 average, and US prices are just above half of the EU27 average and remained at around the same level between 2008 and 2019.

Average **industrial electricity prices** in the EU27 increased by around five percent between 2008 and 2019. In 2020, businesses in the EU were paying higher electricity prices (averaging at 153 EUR/MWh with taxes and all other costs) than businesses in the US (102 EUR/MWh) and China (86 EUR/MWh) (Figure 4). The price difference could be attributed to differences in production costs, taxes and subsidies for households. By comparing wholesale and retail prices, for example, we find that the difference between the two is by far the largest in the EU (for households), although there is a significant difference also in industry (Eurostat, 2021a).

Figure 4. Non-household electricity prices in the US, China, the EU and Slovenia with all taxes and levies included, 2020 (in EUR per kWh)



Sources: Eurostat (2021a); Our World in Data (2020).

Comparing non-household purchasing power adjusted (PPS) electricity prices, Slovenia has been experiencing lower electricity prices since 2017, however, it is approaching the EU average trend line (Figure A2). Slovenia's retail prices (with taxes) were 22 percent lower than the EU average in 2017, but in 2020, the difference decreased to ten percent. Non-household prices are typically lower than household prices, as businesses consume more energy and are able to negotiate prices (Eurostat, 2021a).

An important determinant of retail electricity price is the production costs. To determine the production price of electricity, a common metric such as the levelized cost of electricity (LCOE) can be used**.** It allows a comparison of different sources of electricity generation on a consistent basis, taking into account all costs incurred during the project. They are calculated as the minimum constant price in € per kWh to break even over the lifetime of a project (Rand & Hoen, 2017). Interestingly, the most expensive electricity is offshore wind, despite a 35 percent decrease in electricity generation costs over the last five years and future prospect indicating a further significant decrease. The reason can be found in the high cost of initial investment and relatively high operating costs (Figure A3) (IRENA, 2021). There has also been a declining trend in the LCOE of solar power over the last decade, which can be attributed to improved technology, increasing competition of solar panel producers and economies of scale. On the other hand, the cheapest electricity, all costs included, comes from hydropower, due to its minimal operating costs and a relatively low initial investment compared to others (IRENA, 2021).

Average prices for **compressed natural gas (CNG)** were significantly higher in the EU by around 50 to 70 percent if compared with the US or China, but being relatively comparable in the case of **liquefied petroleum gas (LPG). Biofuel** prices have shown a decreasing and converging trend across the markets

(European Commission, 2020). Wholesale prices of **natural gas** in the EU in the past decade have been similar to most other developed countries, with the exceptions of the US, which has benefitted from the onset of shale gas around 2010. Household prices of natural gas in the EU27 were considerably higher than in most other developed countries, although at the same level in 2008 and 2018. Relatively high consumer taxes in the EU and price regulation/subsidies in China play an important role in the differences. On the other hand, industrial prices of natural gas in the EU27 were lower than in China but higher than in the US (European Commission, 2020).

EU **petroleum prices** tend to follow the crude oil price trend and were higher than in other developed countries, the US and China, mainly due to tax differences.[16] For **heating oil** EU average prices are amongst the lowest among the OECD both including and excluding taxes, EU taxes on this product are relatively low compared to EU taxation of other fuels (European Commission, 2020).

1.5 Future prospects

The implementation of the planned emission reducing policies and measures will contribute to a gradual increase in energy prices for end customers (no significant price increases are expected by 2030 according to current forecasts) (Energy Outlook Report, 2021). Reducing the necessary volume of energy consumption, a profound change in energy mix due to eliminating environmentally harmful incentives to more environmentally friendly ones in the EU energy taxation reform, could substantially mitigate the increase in final energy costs, increase competitiveness and reduce the vulnerability of businesses to price risks on unpredictable energy markets (European Commission, 2020).

The increased volume of renewable electricity production will have a significant impact on the functioning and interconnection of energy markets. Efficient market-based instruments will have to compensate for increased fluctuations in production and new energy services will be provided (connecting gas, heat and electricity markets for excess electricity storage purposes) (Table 2).

On the household level, increasing electrification and the use of renewables in electricity production will increase the demand for batteries. Nevertheless, the suppliers can expect an enormous price drop of batteries, as the prices of energy

16 Excluding taxes, EU average prices for petrol and diesel are comparable or lower than in most OECD countries.

Table 2. Forecasts in the energy sector

Market aspect	Expected changes
Major changes on the supply side	**Renewables:** • Increase from 29 to 90 percent of global energy mix (2020 to 2050) • Decentralized electricity generation **Fossil fuels:** • Decrease from 80 to 20 percent of global energy mix (2020 to 2050)
Major changes on the demand side	**Final consumption of electricity:** • Increase by 25 percent (2020 to 2030) • Increase by 50 percent (2020 to 2050) **Share of electricity in global energy consumption:** • Increase from 20 to 26 percent (2020 to 2030) • Increase to 50 percent (2050)
Innovation opportunities and challenges	• Technological improvement of lithium-ion batteries • Smart grid technologies • Innovation opportunities for hydrogen electrolysers and direct carbon capture and storage • Accelerated use of small nuclear reactors • Advances in fusion science could potentially redefine current energy structure • New market-based instruments connecting electricity, gas and heat markets

Sources: International Energy Agency (2021); Mramor et al., (2021).

storage have already dropped by 80 percent in the last few years (Bahar, 2020). The cost of lithium-ion batteries is expected to be lower by at least 50 percent in 2030 and up to 75 percent in 2040 (EU Science Hub - European Commission, 2018). New innovations towards high-density energy storage will improve the capacity of battery energy storage installations exponentially from 9 GWh/17 GWh deployed as of 2018 to 1,095 GWh/2,850 GWh by 2040 (Bahar, 2020). Moreover, new technologies in smart grid will efficiently deal with energy system's demand and supply issues, advanced batteries, hydrogen electrolysers, and direct air capture and storage (International Energy Agency, 2021).

2 Roadmap for energy transition in Slovenia

Although the general solution for energy transition is similar worldwide (i.e., moving towards renewable resources and reducing the use of fossil fuels), its techno-economic details are very location-dependent and vary substantially from country to country (Bompard et al., 2020). In 2020, domestic energy production in Slovenia was 3,692 Mtoe, with nuclear energy accounting for the largest share of 42 percent, followed by renewable energy sources (including hydro energy) with 32 percent, solid fossil fuels (coal) with 25 percent, and with less than 0.5

percent of energy being produced from other sources. Slovenia has limited energy reserves (IAEA, 2021) and imports all of its oil and natural gas, referring to energy dependency at 44.5 percent as in 2020 (Statistical Office of RS, 2021). Slovenia set ambitious targets, incorporated in the Integrated National Energy and Climate Plan of the Republic of Slovenia (Government of RS, 2020) that is based on the Effort Sharing Regulation within the EU,[17] and is lagging behind in GHG reduction, share of renewables and energy efficiency (Table 3).[18] Moreover, an ambitious target is also set for decreasing energy dependency to 25 percent by 2030.

Table 3. Overview of the current state and national targets for Slovenia

Targets	Current state (2019)	2020 goal	2030 goal
GHG compared to 2005 under the Effort Sharing Regulation (ESR) (in percent)	-7.2 (2018)	+4	-20
GHG emissions set in NECP (kt CO_2 eq)	17,453 (2017)	16,660	13,089
Renewable energy (in percent)	22	25	27
Energy efficiency (compared to 2007) (in percent)	10.4	20	35
Primary energy consumption (Mtoe)	6.52	7.12	6.36
Final energy consumption (Mtoe)	4.85	5.12	4.72
Primary energy production (Mtoe)	3.69	-	4.77

Sources: Government of RS, 2020; Statistical Office of RS (2020).

The main legislative framework for the energy sector in Slovenia is postulated in the Energy Act (Energy Act (EZ-1), 2019),[19] while the long-term development strategy - the Energy Concept of Slovenia - defines the objectives of the reliable, sustainable and competitive energy supply for the next 20 years (and tentatively for the next 40 years) on the basis of the projections of the country's economic, environmental and social development and the adopted international commitments.

The Slovenian energy policy goals also aim to ensure a reliable, safe and competitive energy supply in a sustainable manner by ensuring the transition to a low-carbon society. As an EU member state, Slovenia is expected to com-

17 For the EU to meet their 20-20-20 goal (20 percent increase in energy efficiency, 20 percent reduction of CO_2 emissions, and 20 percent renewables by 2020), the Member States must deliver on their national targets within the Effort Sharing Regulation by designing a proper energy transition roadmap.

18 Energy productivity is rising both in the EU and Slovenia and the gap has slightly narrowed. In 2010, Slovenia's productivity was 12.21 percent lower than the EU average, and in 2019, the gap was 10.36 percent (Figure A4). Energy productivity of a particular economy, proxy for efficient energy consumption, is represented as a ratio between total economic output and the amount of energy consumed, or in other words, as a ratio between GDP and gross available energy for a given period of time (Eurostat, 2020).

19 The Energy Act transposed a number of EU directives concerning electricity and gas markets, energy efficiency and renewable energy sources in national legislation. It also contains the principles of energy policy, measures ensuring energy security, and measures regulating energy infrastructure and heat distribution.

pletely phase out the use of fossil fuels in primary energy production by 2050. Thus, replacing more than one third of the current source for electricity production[20] could prove to be a daunting task for Slovenia, especially in the context of the negative public opinion about future use of nuclear energy. Moreover, in the ambitious NECP scenario, the electricity and heat production sector must become carbon-free by 2050, requiring major changes before 2030, with particular emphasis on speeding up the development of the electricity distribution network (Government of RS, 2020). Sustainable transition requires a few alternative solutions with the analysis of the current state and predictions. Each alternative carries its own advantages and disadvantages (Table 4).

The NECP scenario, which is development-oriented, envisages increased production of electricity from hydroelectric power, as well as wind and solar power – classed as dispersed sources, in combination with energy storage units and operation of the existing nuclear power plant until 2043, subject to obtaining the appropriate environmental permit. A proper analysis should take into account the environmental, social and economic impacts of the potential transition to 100 percent renewable or renewable/nuclear energy.[21] Although we can expect that the total annual costs of the energy system will be higher, as, for example, 100 percent renewable energy systems in Europe would lead to 12 percent higher costs if compared to the fossil fuel alternative (Connolly et al., 2016), the total social effect of the energy transition might be positive. Moreover, by applying the Smart Energy Europe scenario the total number of additional direct jobs is estimated to reach approximately ten million (Connolly et al., 2016).

After qualitatively evaluating proposed alternatives, the most viable option would be to extend the operation of the existing nuclear plant due to the comparably lower investment, low LCOE and consequently lower than average electricity prices for final consumers, combined with small nuclear plants. In addition, it would also be prudent to optimize and expand our electricity from renewable sources to the extent planned in the NECP and improve energy productivity in Slovene firms.

20 The biggest facility, the thermal (coal) power plant Šoštanj (TES) that contributes 35 percent in electricity production in Slovenia, is expected to implement environmentally-friendly carbon capture and storage (CCS) technology (post-combustion capture) by 2030. The use of CCS technology would significantly reduce the level of emissions only in the years just before the end of the power plant's life. Several estimates show that this is pointless due to a long installation period of CCS technology and soaring price of emission coupons forcing to close the plant by 2029 when the accumulating loss would reach 870 million euros.

21 The Smart Energy Europe transition is presented in a series of 9 steps, based on hourly modelling of the complete energy system. The corresponding impact is quantified for each step in terms of energy, the environment (carbon emissions), and economy (total annual socio-economic cost) (Connolly et al., 2016).

Table 4. Different scenarios of energy production in the low-carbon energy transition in Slovenia

Alternative	Current state – electricity produced in 2019 [GWh]	What could be done	Main advantages	Main disadvantages	NEPN – prediction [GWh]
Solar	302 (1.98 percent of total energy)	• Integration of photovoltaics into buildings, parking spaces and degraded areas - in total 282.9 million m2 available for photovoltaics in SLO. • Balance of system is crucial.	Improving technology: • lower LCOE • better yield	• No stable supply (weather dependency) • High investment in storage facilities and smart grids • Degradation of PV on a yearly basis (ageing of the cells) • Not enough for self-sufficiency (lack of land available for PV)	2030: 1,866 2040: 5,361
Hydro	4,622 (30.36 percent of total energy)	• Hydroelectric power plants on the Sava river (gornja - spodnja kota) • Small hydropower plants (SHP) • Pumped hydroelectric energy storage (PHES) systems	• SHP has a min. impact on the environment. • Pumped-storage hydroelectricity (PHES) as a way of energy storage (such as Avče power plant) – grid management.	Nature intervention: • disruption of the ecosystems • changing the river landscape • season variation in the stream flow (PHES) • production of electricity • not enough for self-sufficiency (lack of water)	2030: 4,966 2040: 7,014
Wind	6 (0.04 percent of total energy)	• Installation of the wind power plants in the size above 5MW on the 12 identified potential areas. • Balance of system is crucial.	Onshore wind – low LCOE.	Installation difficulties: • a lot of protected and endangered areas • lack of socially accepted areas (noise and safety issues) • Not enough land available for self sufficiency • birds' and bats' protection issues • Weather dependency	2030: 248 2040: 577
Nuclear energy	5,533 (36.34 percent of total energy)	Build a new nuclear power plant with third generation of nuclear reactor technology. • Upgrade existing nuclear power plant (would last approximately 40 years more) • Investing into new generation of nuclear reactors (micro and small swelter reactors)	• high energy self-sufficiency • stable and safe operation of electricity system • cheaper than renewable sources of energy (lower LCOE) • reliable and predictable operational costs	• High initial investment • Costly and lengthy construction project (eight bn euros, ten years) • Unpredictably high decommission costs • Political and public disagreements	2030: 8,000 - 12,000

Sources: Government of RS (2020); Ministry of Infrastructure of RS (2021); Aquarius (2015); Kovač et al. (2018).

Conclusion

The current debate on unsustainability of population growth, energy consumption trends and degradation of the environment, whilst important in raising public awareness, does not address the fundamental problem. A long-term structural change in energy systems, transition away from fossil fuels like oil, natural gas, lignite, and coal, and a shift to renewable energy sources, are motivated by the fight against climate change, the increase of energy security, energy efficient and green technology innovation, and social justice. However, studies show that transition to a cleaner energy supply is often not constrained by technological feasibility or economic viability, but by political issues slowing down the sustainable energy transition (Hofer & Madlener, 2020).

In the next three decades, the energy sector will change substantially. The use of renewables has taken off, with solar and wind leading the way. But a slowdown in improving access to electricity and a risk of under-investment in grids are warning signs for the future (IEA, 2020c). EU citizens expressed strong support for the EU energy strategy to secure clean, affordable energy in the future, based on reducing fossil fuels, reducing energy consumption, and developing clean energy technologies (European Comission, 2019). Almost 90 percent of respondents argue that the EU must be responsible for taking action to ensure competitive market prices to avoid energy poverty and assure a fair energy transition with no citizen or region left behind. As the renewable energy potential is distributed heterogeneously within countries, it calls for supranational energy policies and strategies (Scaramuzzino et al., 2019). The energy transition should be built on the stakeholder concept that enables the participation of citizens in infrastructure projects, is well coordinated with international partners, and is environmentally friendly (Hofer & Madlener, 2020). Last but not least, it offers interesting business opportunities for energy companies developing a new infrastructure for renewable energy use, storage and transmission.

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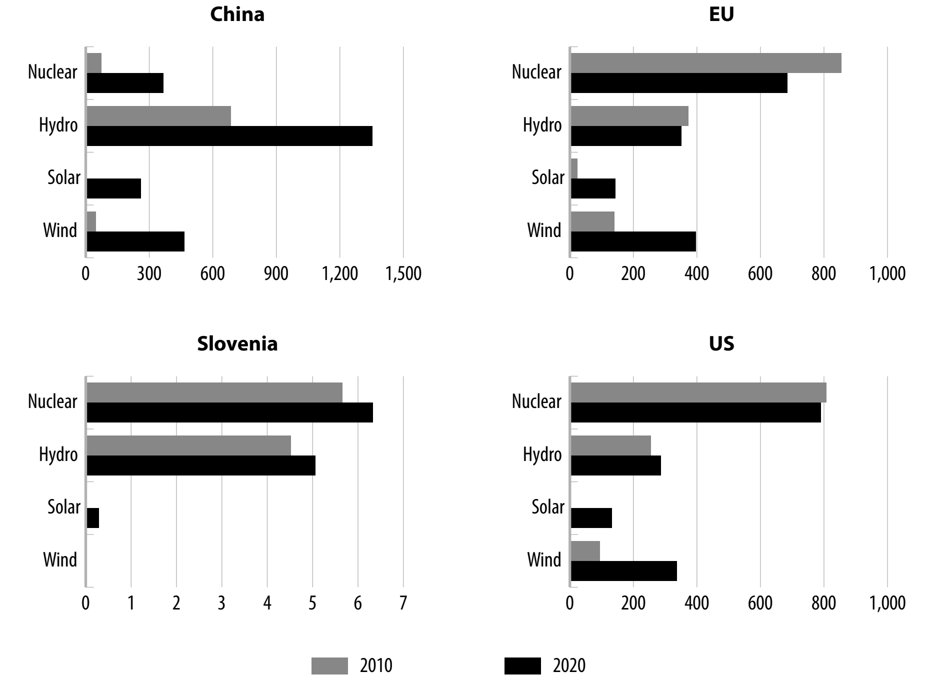
Appendix

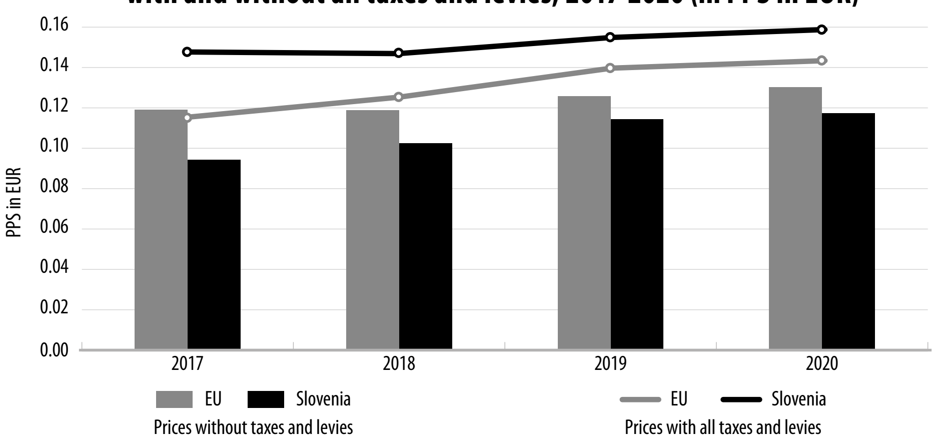
Figure A1. Renewable and nuclear energy in electricity production by the EU, China, the US and Slovenia, 2010 and 2020 (in TWk)*



* X axis is in absolute value; bars labels represent the share of total electricity produced.

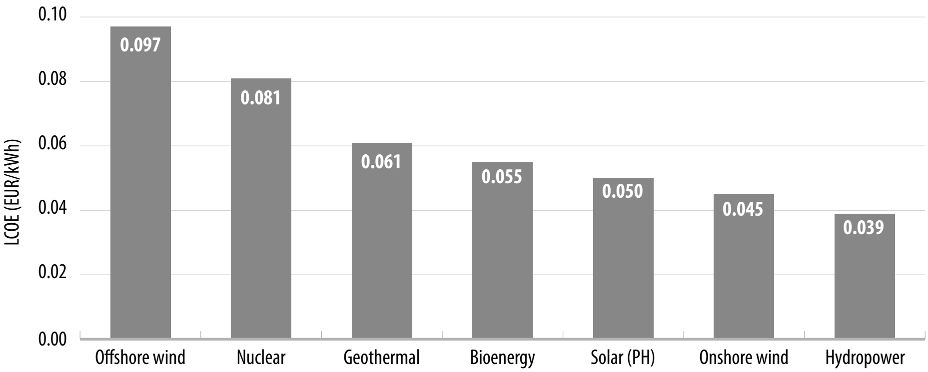
Source: World of data (2021).

Figure A2. Electricity prices for non-household consumers in EU and Slovenia, with and without all taxes and levies, 2017-2020 (in PPS in EUR)



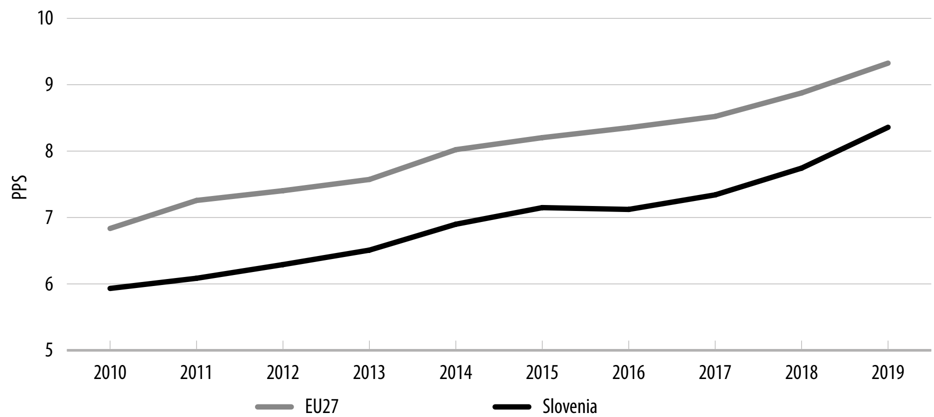
Source: Electricity prices for non-household consumers (2021).

Figure A3. Global weighted average of LCOE by different renewable sources of energy, 2019 (in EUR per kW/h)



Source: Electricity prices for non-household consumers (2021).

Figure A4. Energy productivity in the EU and Slovenia, 2010-2019 (in PPS)



Source: Eurostat (2021).

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DECARBONIZATION OF FREIGHT TRANSPORT

Introduction

Transport accelerates the economic and social developments, increases the competitiveness of economies and provides opportunities for the poor. Transport infrastructure links people with jobs, education, as well as with health services, while enabling a faster supply of goods and services around the globe. As the needs for transport of goods and passengers have been increasing throughout the years, the world is facing one of the biggest challenges that will urgently need to be addressed by all involved stakeholders – how to increase the efficiency of the transport sector (passenger and freight) and at the same time reduce its harmful emissions to the environment.

The aim of this chapter is to analyse the transport industry and the changes made due to the gradual process of achieving carbon neutrality by 2050. By analysing the existing practices and modern technologies in this area, we assess the main pain points regarding emissions and productivity that Slovenia will need to address in the future years. Moreover, we further analyse different scenarios of freight transport development on the local and global levels, with the aim of creating an action plan which would efficiently solve the challenges Slovenia has been facing in achieving the set goals.

1 The transport sector and emissions in the USA, China, and the EU

Transportation of people and goods accounts for around one fourth of global CO_2 emissions, making it one of the greatest challenges that countries are faced with today. To reduce pollutions, policy makers have set carbon reduction targets and established green legislation. The EU, including Slovenia, has set a goal to reduce carbon emissions by 55 percent till 2030 (from 1990 levels) and to become carbon neutral by 2050. This commitment has become the core of the European Green Deal and is in line with the Paris Agreement (European Commission, 2020). Moreover, the USA and China have set somehow less ambitious goals, as China wants to achieve carbon neutrality by 2060, while the goal for the USA is to reduce 80 percent of its emissions by 2050 (Deloitte, 2020).

1.1 General comparison of passenger and freight transport

US citizens mainly use passenger vehicles for their trips, while the usage of railways is low (Bureau of Transportation Statistics, 2021a). US freight transport, on the other hand, has been gradually growing throughout the years. Currently, the most used form of freight transport is truck transportation, representing around 40 percent, followed closely by railroads at 32 percent of total metric tonnes (which can be attributed to their historic focus on this form of transportation). In comparison, China has the largest road network for movements of high volumes of cargo and passenger transport (Statista, 2020a, 2020b). Road transport was also the most important mode of freight transportation, representing 73 percent of total million metric tonnes in 2018, however, the volume of cargo transported through roads decreased in comparison to previous years (Table 1). The latter can be attributed to a higher efficiency of rail transport and large infrastructural investments, which enabled rail transport to increase (Statista, 2020b).

Lastly, within the EU, the share of passenger mileage has greatly increased in the last years. European citizens largely depend on the use of passenger cars for their trips, as they represented 71 percent of all passenger mileage in 2018. In comparison, railway transport represented only seven percent of all passenger mileage (Eurostat, 2021a). Referring to freight transport in the EU, road transport represented the biggest share of inland freight mileage in 2018, followed by sea and rail. Slovenia has been following a similar pattern as the EU, where road is the dominant form of transportation for both passenger as well as freight transport. This observation holds true for all cases, except for passenger transport in China, where rail transport largely dominates (Table 1).

Table 1. Size comparison of freight and passenger transport in the USA, China, and the EU in 2018

		Passenger		Freight	
		Rail	Road	Rail	Road
USA	million miles (passenger)/(million metric tonnes (freight)	62,043	8,466,291	1,729,638	2,033,921
	average 10-year growth	0.67%	1.38%	0.17%	-2.27%
China	million miles (passenger)/(million metric tonnes (freight)	1,414,660	928,970	4,026	39,569
	average 10-year growth	6%	-5%	2.35%	4.19%
EU27	million miles (passenger)/(million metric tonnes (freight)	407,186	4,826,586	423,325	1,708,909
	average 10-year growth	1.07%	0.58%	0.31%	0.28%
Slovenia	million miles (passenger)/(million metric tonnes (freight)	568	31,266	5,151	9,460
	average 10-year growth	-2.86%	1.11%	4.54%	1.36%

Sources: Bureau of Transportation Statistics (2021a), Bureau of Transportation Statistics (2021b), Statista (2021), National Bureau of Statistics of China (2020).

1.2 Contribution to emissions and decarbonization goals

Due to the global economic development and fast and strong economic growth in the past, China is today the world's biggest emitter – their share of global emissions in 2018 was around 27 percent, among these 11 percent were caused by the transport sector (Table 2). The total contribution to transport emissions for road vehicles is around 84.1 percent (Gesellschaft für internationale Zusammenarbeit, 2020). In these circumstances the Chinese government is pushing for electrification of passenger transport, with major cities supporting electric cars and buses. Following China, the second biggest emitter of CO_2 is the USA. Just in 2019, the US greenhouse gas (GHG) emissions totalled 6,577 mil metric tonnes of CO_2 equivalents, with transportation representing 15 percent of total CO_2 emissions caused by the USA (EPA, 2021).

Table 2. Contribution to emissions as a percentage of worldwide/within country transport emissions

	USA	China	EU	Slovenia
Country contribution to global emissions (%)	15%	27%	9.8%	0.04%
CO_2 emissions caused by transport sector (%)	28%	11%	18%	50%

Sources: Deloitte (2020), Statista (2021), Eurostat (2021b), US Department of Transportation (2021), EPA (2021).

Within the European countries, Germany and the United Kingdom are leading in terms of absolute CO_2 emissions produced in 2019, as both emitted around 81 mil tonnes, which is well above the EU28 average of 18 mil tonnes. Denmark, Spain, France, and the Netherlands all emitted between 40 and 45 mil tonnes of CO_2. However, in relative terms Denmark contributes the most to emissions, emitting around 7,800 kg of CO_2 emissions per capita. Slovenia produces around 731 kg of CO_2 emissions per capita, which is below the EU28 average of 988 kg (Eurostat, 2021b).

2 The transport sector in Slovenia

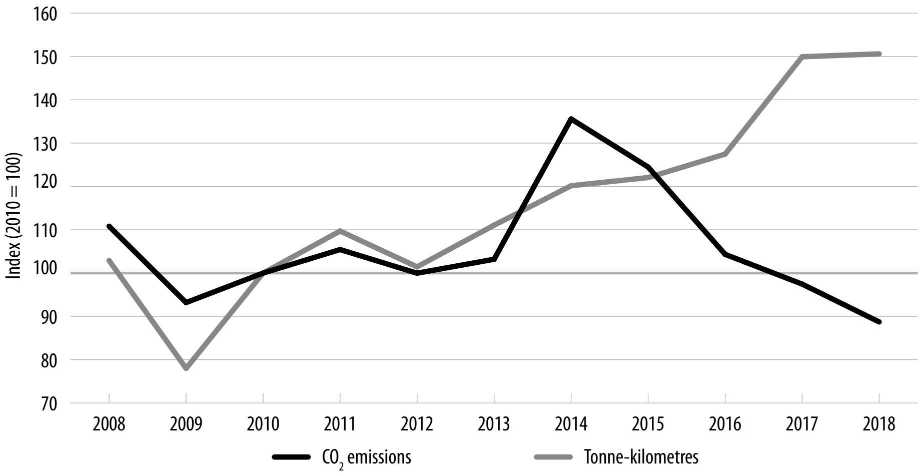
Logistics is one of the most important industries in Slovenia. Namely, in 2020, the industry was employing almost 52,000 people, representing around 5.5 percent of Slovenian GDP (Statistical Office of RS, 2021d) and having high potential for further developments. Moreover, the transport sector in Slovenia contributes to around 50 percent of overall carbon emissions (Life Climate Path 2050, 2020). Slovenia is, as a strategic transitional path connecting different parts of Europe through maritime, rail, and road, of high importance for international freight transport. Road transport in Slovenia on average accounts for around 4.25 times larger amounts of cargo carried (thousand tonnes/year) in comparison to maritime and rail (Eurostat, 2021a). Namely, the average amount of freight transported by road is approximately 77,000 thousand tonnes/year, while rail and maritime transport each account for around 18,000 thousand tonnes/year (Eurostat, 2021a).

2.1 Rail transport in Slovenia

The total length of Slovenian railways is around 1,208 km (Slovenian Railways, 2020), out of which 50 percent are electrified (Eurostat, 2021b). From 2000 onwards, the length, density and electrification of Slovenian railway network have remained nearly unchanged. The care for technical efficiency of the railway network has been stagnating in the recent years – the unused parts of the network have not been shrunk, while at the same time the most used parts have not been modernized. Slovenia is also a part of Pan-European Transport Corridor V (Venice – Kyiv) and Corridor X (Salzburg – Thessaloniki), an important part of which are Slovenian railways. Investing into the modernisation of the current outdated railway infrastructure would, according to the Strategy of Transport Development, increase the amount of cargo transport and decrease emissions (Government of RS, 2016).

It is not disputed that rail transport has significantly lower GHG emissions per unit of tonne-kilometre (tkm) then road transport. Namely trucks' emissions on average amount to 59 g CO_2/tkm while trains only to 3 g CO_2/tkm (Life Climate Path 2050, 2020). Our research has shown that there was an 11.3 percent decrease of CO_2 emissions between 2010-2018 from rail freight transport in Slovenia (mainly from a 10 percent increase of electrified parts of railways – from 40 percent to 50 percent) (Statistical Office of RS, 2021a), while at the same time there was a 50.6 percent increase of tonne-kilometres of cargo from inland and international rail freight transport (Figure 1).

Figure 1. Rail freight transport in Slovenia from year 2008-2018: tonne-kilometres and CO_2 emissions*



* The data was calculated based on the proportion of km done in passenger and freight transport per year (2008-2018). The initial data from Statistical Office of RS only gathers the total emissions from railways in Slovenia.

Sources: Statistical Office of RS (2021a), Statistical Office of RS (2021b).

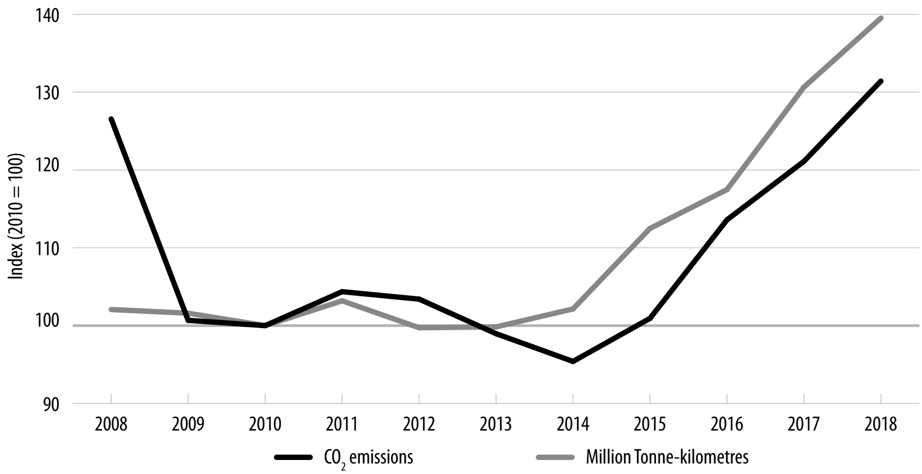
In the past few years, Slovenia has recognised the importance of improving the railway system, as the budget for the modernisation of railways in 2020 amounted to €509 million (Volfand, 2020). Still, higher resources will be needed to meet TEN-T standards[1] and environmental objectives and complete the European high-speed rail network by 2050. A study showed that to achieve TEN-T standards in the field of railways by 2030, Slovenia would need to invest more than €4 billion (Government of RS, 2019), which is not surprising as the quality of the railway infrastructure is highly below the global and European average, as shown in the research done by the Global Economy (2019).

1 Speed for freight trains 100 km/h, possibility to run trains 740 m long, axle pressure 22.5 t, ERTMS.

2.2 Road transport in Slovenia

In the period from 2008 to 2018 there was a 31.4 percent increase of CO_2 emissions from road freight transport (Figure 2*)*, while at the same time the number of tonne-kilometres (tkm) of cargo increased by 39.5 percent from both inland and international freight transport (heavy and light goods vehicles).

Figure 2. Road freight transport in Slovenia from year 2008-2018: tonne-kilometres and CO_2 emissions



Sources: Statistical Office of RS (2021a), Statistical Office of RS (2021c).

The analysis of road network usage in Slovenia has shown that the country's road efficiency is only at 70 percent (Mramor et al., 2020). The main reason for that is the poor quality of the roads due to the lack of investments in the last decade. As the road quality research shows (The Global Economy, 2019), Slovenia is positioned at rank 15 among 40 European countries.

Nevertheless, moving additional freight transport to roads worsens the heavy pollution of the environment even further. Therefore, Slovenia will need to find new ways to deal with the heavy traffic problems, while simultaneously lowering the emissions to reach carbon neutrality goals. From 2010 to 2018, there was nearly a perfect correlation between the amount of CO_2 emissions produced from road freight transport and tkm of cargo transported, meaning that for each percent increase of transported goods the CO_2 emissions also increased by almost one percent.

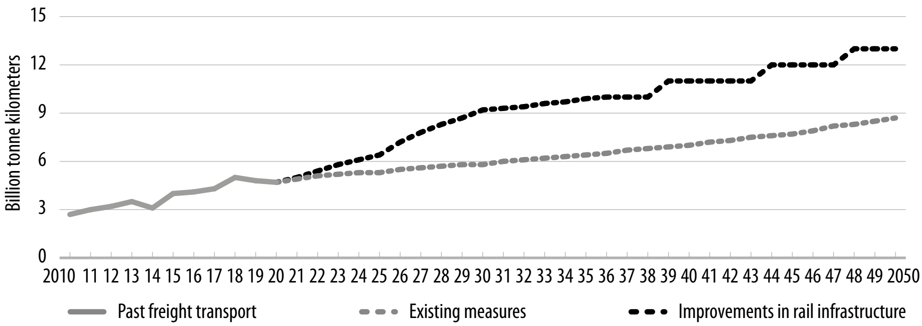
3 The future of freight transport

It seems that in the future the Slovenian logistics industry will continue to grow and expand. Namely, forecasts of the current National Energy and Climate Plan (NECP) (Government of RS, 2020) anticipate that by 2050, freight transport will increase by 84 percent compared to 2017. Moreover, the Port of Koper (the largest generator of freight flows through the Slovenian territory) is expected to increase its transhipment capacities by 38 percent (Zanne, 2013). However, this anticipated rise of freight transport through Slovenia, if not handled accordingly, will also cause an increase in GHG emissions and energy consumption. Thus, to tackle the future of freight transport in line with carbon reduction goals, Slovenia needs to adopt strict measures moving road freight to rails, making alternative fuels mandatory, electrifying roads and rail, etc.

3.1 Different scenarios concerning the increase in road and rail freight transport

The "Analysis of scenarios for deciding on Slovenian long-term climate strategy for 2050" (Life Climate Path 2050, 2020) anticipates that road freight transport will increase up to 120 bn tkm by 2050 if current trends continue, and only to approximately 100 bn tkm when promoting circular economy causing a decrease in demand for foreign products. Referring to rail transport, the same study anticipates that if we continue with the same pace and transport, by 2050, the rail transport will increase to approximately 8.5 bn tkm from 4.7 bn tkm in 2020 (Statistical Office of RS, 2021d) (Figure 3).

Figure 3. Projections for rail freight transport by 2050 in two scenarios*



* The full gray line represents the rise in freight transport from 2010 to 2020 while dotted lines represent different future scenarios depending on the adoption of stricter measures.

Source: Life Climate Path 2050 (2020).

However, if extensive policies and measures are adopted to promote the shift of cargo transport to rails, the amount of rail freight transport could increase to approximately 13 bn by 2050 (Life Climate Path 2050, 2020) (Figure 3). To do so, Slovenia firstly needs to upgrade the TENT network to meet the European Commission's requirement for completion of the European rail network by 2050, construct new traffic intermodal connections for enabling combinations of different modes of transportation, and promote the shift to rail freight transport.

Furthermore, to lower GHG emissions, policies for increasing efficiency of road freight transport need to be addressed. Studies suggest that longer and heavier vehicles (LHVs) are economically and environmentally beneficial (Vierth, 2014), thus, the load capacity of lorries and trucks is expected to increase in the future. In an optimal scenario (where Slovenia would adopt measures obliging for LHVs and investing in the road infrastructure that would allow LHVs), load capacity could increase by 25 percent until 2050 (Life Climate Path 2050, 2020).

As far as alternative fuels are concerned, forecasts anticipate improvements in technologies, e.g., petrol or diesel internal combustion engine, and on the long run increasing the number of electric vehicles and the number of vehicles using synthetic gas and liquids. There are different scenarios with regards to improvements in fuel efficiency and adoption of alternative energy sources in transport that depend on technological breakthroughs, quality and pace of measures and policies adopted, investments in road infrastructure, etc. Furthermore, it is important to note that in case of trucks and lorries adoption of electric vehicles is much slower than in case of passenger cars. Thus, the scenarios predict an increase mostly in synthetic gas and hydrogen fuelled trucks (Table 3).

Table 3. Index (2017 = 100) of anticipated movements in alternative fuel sources in two scenarios

		Existing measures		Measures encouraging alternative fuels	
		2030	2050	2030	2050
Diesel	**ICT***	90	82	84	73
	Hybrid	94	84	88	73
	PHEV**	95	84	88	74
Gas	**ICT**	90	79	84	69
LPG***	**ICT**	90	80	80	75
Gasoline	**ICT**	90	80	80	75
Electric	**BEV******	99	97	96	93

* ICT – Internal combustion engine; ** PHEV - Plug-in hybrid; *** LPG - Liquefied petroleum gas; **** BEV - Battery electric vehicle.

Source: Life Climate Path 2050 (2020).

With respect to the fuel structure, in the optimal scenario the use of gaseous fuels will increase the most. By 2050, the share of natural gas is expected to be 19 percent and the share of synthetic gas 57 percent. The latter has the potential to even completely replace natural gas. Furthermore, in the optimal scenario biofuels would represent 6 percent of fuels, hydrogen 15 and electricity 19 percent (Life Climate Path 2050, 2020).

3.2 Projections of energy usage and GHG emissions connected to freight transport

With an increase in freight transported through Slovenia, there will also be a higher demand for energy. According to all scenarios prepared by "Life Climate Path 2050", energy consumption in freight transport will increase by 2030. After 2030 energy consumption in freight transport will either increase, stabilize, or decrease, depending on the measures and policies adopted (Table 4).

Table 4. Increase in energy consumption by different scenarios (in PJ)

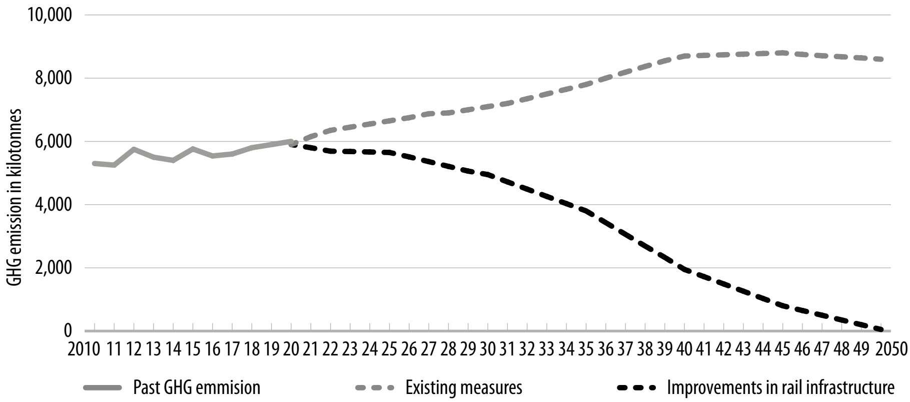
	2017	2030	2050
Existing measures	22	33.2	40.8
Ambitious scenario	22	28.6	23.2

Source: Life Climate Path 2050 (2020).

In 2017, energy consumption per unit kilometre was 0.43 MJ/tkm and is in the most ambitious scenario predicted to decrease to 0.37 MJ/tkm by 2030 and to 0.25 MJ/tkm by 2050 (Life Climate Path 2050, 2020). In freight transport there are significantly smaller reductions in energy consumption than in passenger transport, but there is incremental improvement of internal combustion engines, propulsion components, and aerodynamics.

GHG emissions in transport amounted to approximately 6,000 kilo tonnes in 2018(Statistical Office of RS, 2021d), out of which freight transport contributed approximately 1,550 kilo tonnes. If the existing measures and policies stay in force, emissions will continue to increase until 2040, when they are predicted to reach 8,600 kilo tonnes of CO_2. However, in the optimal scenario, if appropriate measures are taken, emissions will decrease to 4,957 kilo tonnes of CO_2 by 2030 and even further to 43 tonnes in 2050 (Life Climate Path 2050, 2020) (Figure 4). The measures that are anticipated to have the biggest impact in reducing the GHG emissions, in addition to improving the railway system, are the introduction of alternative vehicles in traffic and the improvement of vehicle efficiency. It is important to note however that a lot can also be done with incorporating new information and communication technologies. For example, 236 bn litters of fuel could be saved globally in 2030 through traffic control and optimization (Mordor Intelligence, 2020).

Figure 4. Projections for GHG emissions from freight transport by 2050 in two scenarios



The full gray line represents GHG emissions from freight transport from 2010 to 2020 while dotted lines represent different future scenarios depending on the improvements in the rail infrastructure.

Source: Life Climate Path 2050 (2020).

4 Action plan for Slovenian freight transport

4.1 Road transport

Firstly, Slovenia should invest into the reconstruction and restoration of the current regional road infrastructure, thus increasing the carrying capacity for around 1/3, which would enable a more productive usage of freight traffic network (Mramor et al., 2020). Here, the possibility of trial versions of Electric Road Systems (ERS) like in the examples of Sweden and Germany discussed above should be considered. Moreover, Slovenia should determine which parts of highways would be the most suitable for potential trials (considering the strategic position and adaptability of the system) and simplify administrative procedures related to electrification. With a successful implementation of road electrification, companies will be stimulated to buy zero or low emission vehicles. Since Slovenia is a transit country, this would have a huge positive impact on the environment.

Secondly, Slovenia should invest into new traffic connections of secondary roads to TEN-T network, which would improve the accessibility of regions to home and international markets. This would enable shorter transport time, lower costs of transport, and improved competitiveness. Consequentially, it would result in higher productivity and creation of better conditions for establishing distribution networks on regional and national levels (Mramor et al., 2020).

Thirdly, Slovenia should build the missing regional road infrastructure on the 3rd development axis in order to implement it into the 4th development axis (Posočje, Cerkljansko), the connection of the Zasavje region to the highway network, and solve bottlenecks with beltways (Mramor et al., 2020). Moreover, Slovenia should establish fees for driving in traffic congestions and establish low emission zones in city centres, as they lower emissions by 10-20 percent (Malovrh, 2021).

Fourthly, Slovenia should enable an adequate supporting environment for the introduction of alternative fuels, like liquefied natural gas for freight transport, as discussed in scenario analysis (Government of RS, 2020). In the case of optimal scenario, where appropriate measures are taken and sufficient support enabled, emissions could decrease to 4,957 kilo tonnes of CO_2 by 2030 and to only 43 tonnes by 2050 (Life Climate Path 2050, 2020).

4.2 Rail transport

Firstly, Slovenia should reconstruct the railway infrastructure in a way that would enable it to fulfil the TEN-T criteria. As in 2016, mere 20 percent of Slovenian core network was meeting the TEN-T criteria (Government of RS, 2016), such reconstruction of the relevant rail network would demand an investment of more than €4 bn (Government of RS, 2019). Moreover, Slovenia needs to develop the railway infrastructure in the Mediterranean and Baltic-Adriatic corridors – for example an additional rail between the cities of Ljubljana and Jesenice (Mramor et al., 2020; Government of RS, 2020). Slovenia should also ensure that rails are included in all new transport strategies and positioned in a way that they have access to the important parts of the production supply chain (Government of RS, 2020). As rail transport is the most energy efficient and has lowest contributions to the country emissions, updating the railways is a step in the right direction to achieve the decarbonization goals.

Table 5. Action plan summary

Type of transport	Key challenges	Action plan
Road	Unproductive usage of freight network traffic	Invest into the reconstruction of the current regional road infrastructure, thus increasing the carrying capacity for around 1/3.
	Traffic congestion in bigger cities at rush hours	Invest into new traffic connections of secondary roads to the TEN-T network, which would improve competitiveness and accessibility to home and international markets, shorten transport times, and lower transport costs.
	Missing regional road infrastructure on the 3rd development axis	Build the missing regional road infrastructure in order to fit it into the 4th development axis (Posočje, Cerkljansko).
	Gradual switch towards the usage of alternative fuels	Enable an adequate supporting environment for the introduction of alternative fuels, like liquefied natural gas for freight transport, as discussed in the scenario analysis.
Rail	Fulfilling criteria of TEN-T for core network	Reconstruct the railway infrastructure to enable the speed of at least 100 km/h, 740 m long trains and a weight of 22.5 tonnes per axis.
	Ensuring a well-developed suburban railway infrastructure	Finance the projects mentioned in the 1st point of this proposition, to increase the loading and unloading of cargo and passengers. Add more cargo on trains, currently the multimodal split is 30 percent rail and 70 percent roads.

Sources: Mramor et al. (2020), Government of RS (2020).

Secondly, Slovenia needs to finance projects mentioned in the previous paragraph to increase the loading and unloading of cargo and passengers – for example with railway and logistic centres. At the same time, for this to be fully utilized – it is of utmost importance to ensure a well-developed suburban railway infrastructure (Mramor et al., 2020). More cargo should be added on trains, as the current multimodal split is 30 percent rail and 70 percent roads. Moreover, Slovenia should ensure regular, more frequent rail connectivity from the Port of Koper to the hinterland to increase efficiency (Bole, 2006). The summary of the action plan for road and rail is provided in Table 5.

Conclusion

The transport sector, both on global and local levels, will need to be highly addressed in the future years to meet the goals set by international organizations on reaching carbon neutrality by 2050. Based on the research done in this chapter, Slovenia will need to put a lot of emphasis on this issue, especially on passenger and freight transport as 50 percent of all emissions in Slovenia come from the transport sector (Life Climate Path 2050, 2020).

As the data from Statistical Office of RS (2021d) reports, one of the biggest issues in the past years were the increased emissions from road freight transport, which have been nearly proportionally increasing with the increase of goods transported (inland and international). Moreover, in Slovenia goods are being transported by roads four times more often than by rail and sea (Eurostat, 2021a). On the other hand, the data from rail freight transport suggests there is a possibility of reducing the emissions and utilizing the Slovene railway system on an even higher scale with additional investments into the infrastructure (TEN-T network standards), which will additionally decrease the emissions and make the transport of goods faster and more efficient.

The question of achieving carbon neutral freight transport by 2050 is subject to interdependence of numerous factors, i.e., manufacturing of fossil-free vehicles, transition to such vehicles, clean energy sources becoming a default option,[2] establishment of a sufficiently dense network of charging and refuelling stations suitable for trucks, etc. The crucial part is the measures and policies promoting investments and shifts to environmentally friendly options. To conclude, Slovenia will need to adopt ambitious measures, such as higher carbon prices, inclusion of road transport in the EU emissions trading system, road charges based on CO_2 emissions, an energy taxation system based on carbon and energy content, etc., in order to successfully reach the carbon neutrality goals.

2 This issue is covered by Domadenik et al. (2021).

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CUTTING EDGE TECHNOLOGIES – GAME CHANGERS OF THE FUTURE

Introduction

The development of new technologies, which includes Industry 4.0 as well as other emerging potentially breakthrough technologies, is proceeding at a record pace and it is expected that innovative technological solutions will increase productivity growth, support efficient transition to a greener development, as well as increase the well-being and efficiency in an ageing society (Ark et al., 2018; Mazzucato, 2019; Vandenberghe, 2017). However, two key aspects must be examined in more detail. First, the existing novel Industry 4.0 technologies are only being implemented. EU companies are integrating internal processes, using cloud computing, industrial or service robots, 3D printing, implementing the Internet of Things (IoT), using automated e-invoices, and using big data for internal analysis (Mehl et al., 2020), but there are significant differences between countries and firms by size and industry. Second, several new breakthrough technologies are emerging, from quantum computing to space technology, which could help resolve several sustainability problems, especially those related to energy. However, a wider use of these experimental technologies is still distant. Countries and the EU have set up policy programs to fully exploit the advantages that are offered by new technologies, where this potential is very hard to assess due to specific uses of some technologies and often at the moment also very high cost.

In view of the increasingly competitive business environment countries should maintain their proactive attitude and consider stepping up their efforts in some areas to handle the remaining difficulties (EC, 2019). Companies that do not adopt relevant new technologies will be threatened and will find it difficult to survive in a rapidly changing business environment. Furthermore, 69 percent of surveyed CEOs acknowledged to be concerned about the pace of the development of new technologies, however, only 20 percent have made considerable progress in understanding technology and its possible business implications (PwC, 2021).

This chapter identifies key technologies of today and the future, their current use in companies, as well as the key factors for the implementation of new technologies and the main obstacles. Furthermore, based on the findings and the gap between the possible technologies and their actual use, a recommendation model is going to be developed.

1 Key technological changes

Industries and their productivity have been profoundly impacted by technological advancements: from the First Industrial Revolution and the steam machine to the production automation and the conveyor belt of the Second Industrial Revolution, use of electronics and IT systems in the Third Industrial Revolution, and the cyber-physical systems of the Fourth Industrial Revolution, which is now being implemented (Prašnikar et al., 2017). The Fifth Industrial Revolution is already on the brim, with the experts forecasting the focus to be on personalization, innovation purpose and inclusivity and deep, multi-level cooperation between people and machines (RegInsights, 2020).

1.1 Classification of new technologies

The emerging technologies can be classified both by their characteristics as well as the stage of adoption. Many of the technologies that are classified as the (early) adoption stage technologies are the technologies of the Fourth Industrial Revolution. Among the best known or most studied are robotics, blockchain technology, artificial intelligence, nanotechnology, batteries, medical innovations, and 3D bioprinting (Table 1). These technologies are today predominantly implemented in manufacturing, finance, retail, telecommunications and healthcare, however, the increasing use, declining costs and simultaneous innovations are expanding the use to other sectors as well. Some of the Industry 4.0 technologies are still in the testing phase and not widely used (e.g. autonomous vehicles, drones, innovative batteries, 3D bioprinting), but it is expected that within a decade these technologies will significantly impact both the economy and society.

Table 1. Overview of key technologies by adoption stage

	Technologies	Selected highlights
(Early) adoption	• Networks • Machine learning • Automation & robotics • Distributed ledger technology (blockchain) • Financial technology • Digital currencies • Artificial intelligence • Autonomous vehicles • Drones • Batteries • Nanotechnology • Medical innovations (genomics, DNA sequencing and vaccines) • 3D bioprinting • 3D construction printing	• Wide range of use and use expanding • Manufacturing, retail, logistics & transport, banking and finance, healthcare, entertainment • Some technologies still in (wide) testing stages, possible uses still explored and expanded but addressing important challenges of the ageing society (personalized medicine, organ printing, etc.) and environmental protection
Potential breakthrough technology	• Quantum computing • Space technology • Nuclear fusion	• Increasing efficiency and productivity even further with quantum computing • Resolving the challenges of resource exploitation and clean energy shortages

Source: Own work.

Importantly, the parallel increase/adoption in the use of new Industry 4.0 technologies as well, the improvement of existing technologies and expanding array of its use along with innovation of new technologies, which are seen as the future breakthrough technologies (Table 1) are expected to lead to a significant increase in productivity growth, but also personalization, and purposeful innovation that will help address also some of the productivity and sustainable challenges ahead, such as ageing and environmental challenges. In continuing we first address some of the technologies of Industry 4.0, and at the end, we highlight the benefits of emerging, possibly breakthrough technologies.

1.2 The role and characteristics of Industry 4.0

Today, Industry 4.0 (hereafter I4.0) technologies are at the forefront of discussions and implementation; therefore, the role of selected I4.0 technologies is addressed first. Mainly, in manufacturing, Industry 4.0 has led the transformation and increased productivity (Table 2). Ordinary machines have been transformed into self-aware, self-learning machines that can enhance overall performance and maintenance management by interacting with their surroundings (Lee et al., 2014). Some of the most prospective technologies of I4.0 are artificial intelligence (AI), Internet of Things (IoT), automation and robotics, including autonomous vehicles and drones, and additive manufacturing or the so-called 3D printing (Mehl et al., 2020). The Fourth Industrial Revolution entails a higher degree of organization and control over the whole value chain of a product‘s life cycle, as well as a focus on more customized client needs (BCG, 2015).

AI refers to the simulation of human intelligence in machines programmed to mimic their actions as it trains computers to learn human behaviours such as learning, judgement and decision making (Feldman, 2001; Zhang & Lu, 2021). It is projected that by 2030, the global GDP could be up to 14 percent higher due to AI, whereas productivity is forecasted to increase by up to 40 percent until 2035. Its impact is strongest in retail, financial services and healthcare due to increased productivity and the quality of products (Buchholz, 2020; PwC, 2017). For example, at Deloitte a program scans complicated legal documents and extracts relevant information (Adzooma, 2020). AI also reduces hiring time by 75 percent and increases employee retention by 50 percent. Moreover, it increases also speed, efficiency and accuracy (Adzooma, 2020).

IoT is a global network of interconnected and uniformly addressed objects that communicate via industry-standard protocols, which is essential for transforming systems into intelligent ones (Hozdić, 2015). IoT has the potential to completely change the way we live and do business and it is projected to have an economic impact of USD 11 trillion by 2025. IoT investments are increasing every year and in 2020 alone there were between 20 and 100 billion connected devices (Espinoza et al., 2020; McKinsey & Company, 2021). Industries that are benefiting the most from IoT are health, hospitality, retail and industrial manufacturing. For instance, in hospitality, executives use IoT to operate more efficiently as well as modernize the companies and include new capabilities such as security and customer experience (Mesirow et al., 2019).

The use of **robotics and automation** in companies has grown in recent decades as (sometimes) more expensive human workers are often being replaced with machines in repetitive and/or physically demanding tasks (McKinsey&Company, 2017). Estimated 50 percent of current jobs worldwide could theoretically be automated and in the EU 45 to 60 percent of workers could be replaced by automation before 2030 (European Commission, 2020a), which will most likely have a huge impact on the labour market. Already now, the relative wage of worker groups specialized in routine tasks in rapidly automating industries has decreased by 50 to 70 percent over the last four decades.

Table 2. Opportunities of selected technologies

Technologies	Opportunities
AI	• Increased productivity • Improvement of customer service • Development of new-generation products and services • Combining with newer forms of technology (machine learning, deep learning, and IoT)
IoT	• Better understanding of real-time customer needs • Increased operational efficiency through lower operating costs • Improved productivity through the collection of data and monitoring • Improvement of business models due to continuous customer connections and disintermediation
Automation and robotics	• Replacement of more expensive labour and faster work • Increase in efficiency while lowering production costs • Improved quality assurance of executed tasks and reduced waste • Increased productivity by quality improvement • Ability to work in hazardous environments • Potential use in manufacturing, space exploration, military, medicine, entertainment to increase profitability
3D printing	• Cost reduction and more flexible product development • Better customization and prototyping • Development of new business models • Less dependency on human resources, while reducing costs and errors • Sustainability and environmental friendliness with decreased material usage
Smart factories	• Combination of different I4.0 technologies further increases efficiency • Easier optimization, customization • Significant increase in productivity

Source: Our own.

However, due to ageing, technology is expected to help overcome the shortage of labour (Acemoglu & Restrepo, 2021; Kim, 2021).

3D printing, also known as additive manufacturing, is a manufacturing process that involves adding material rather than subtracting it. It is changing the traditional industrial manufacturing processes and stimulating the development of completely new production lines and business models (Zocca et al., 2021). It has affected a wide variety of fields and applications in ways that were previously considered to be too expensive or difficult to accomplish using traditional manufacturing methods. 3D printing is used mostly for large volume manufacturing as well as for making tools, casts and moulds (Stewart, 2018).

Smart factories combine a number of novel technologies, such as the Internet of Things, cloud monitoring, big data, robots, digital twins, virtual and augmented reality, to allow a more flexible, efficient, modular, optimized production process in comparison to the more traditional industry. Companies are reporting gains of 10 to 12 percent in manufacturing output, factory utilization and labour productivity after investing in smart factory initiatives and U.S. manufacturers are expected to triple the labour productivity growth rate in this decade (2019-2030) in comparison to the previous decade (2007-2018) (Sprovieri, 2020).

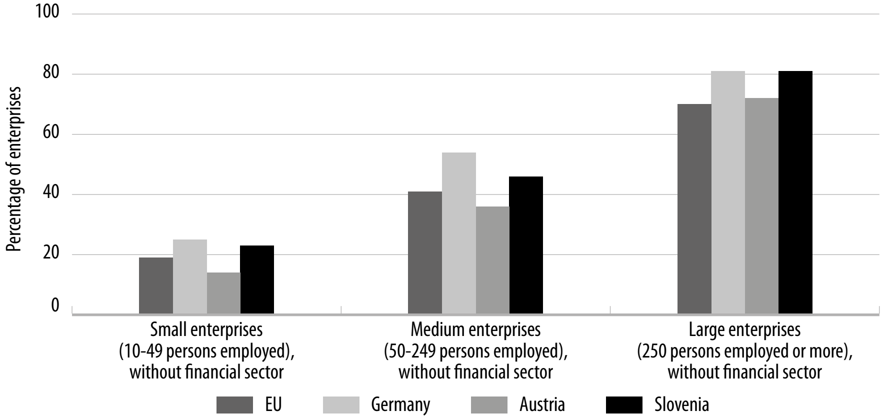
2 The use of new technologies in companies today

2.1 ICT in enterprises

One of the first and crucial steps of ICT implementation in enterprises is access to the internet. In 2019, almost all enterprises (99 percent) in Slovenia had internet access, which is two percentage points higher than the EU28 average (Eurostat, 2021). The percentage of total employees using computers with access to the World Wide Web in Slovenia increased from 45 in 2011 to 54 in 2020, a bit less than in the EU. In Scandinavian countries, this percentage is between 77 and 83 percent, in Germany and Austria it is 59 and 63 percent, respectively (Eurostat, 2021). The percentage of enterprises that employ ICT specialists was relatively stable in the period from 2012 to 2020. In 2019, on average, 18 percent of Slovenian companies and 19 percent of companies in the EU27 employed ICT specialists. Comparing the percentage of enterprises that provided digital skills training, Slovenia was above the EU27 average and Austria, however, just slightly behind Germany. The data also reveals significant differences by company size (Figure 1, Eurostat, 2021).

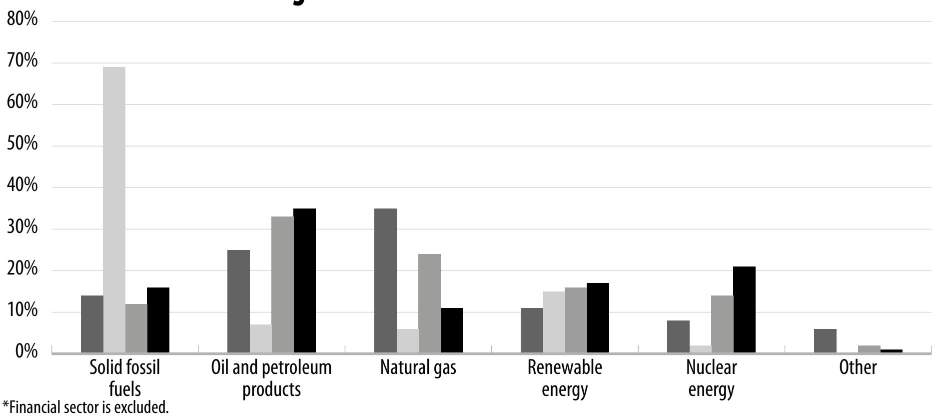
More complex technologies of I4.0 are still rarely used. AI was used by seven percent of EU27 businesses with at least ten employees in 2020. Only a few (one or two percent) businesses utilized machine learning in using big data for internal analysis, natural language processing and creation, or speech recognition. The same percentage of businesses also utilized chat service to respond to clients using natural language responses created by a chatbot or service robots, which have some autonomy in doing things like cleaning, risky or monotonous activities, sorting items in warehouses, assisting customers in stores or at payment points, etc. Slovenia has one of the lowest shares with just three percent of enterprises using AI (Figure 2).

Figure 1. Enterprises providing training to develop/upgrade ICT skills of personnel in 2019 in selected countries



Source: Eurostat (2021).

Figure 2. Percentage of enterprises with at least 10 people employees using artificial intelligence in the EU in 2020*

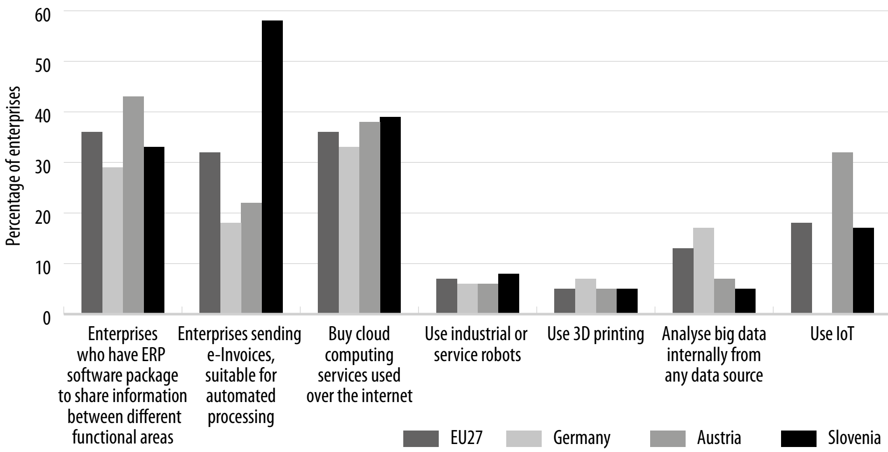


*Financial sector is excluded.

Source: Eurostat (2021).

Roughly 36 percent of EU27 enterprises are integrating internal processes, particularly by using ERP (enterprise resource planning) software packages to share information between different functional areas. To increase the integration with customers/suppliers, 32 percent of EU enterprises are sending e-invoices suitable for automated processing. The percentage of total EU enterprises that use IoT is 18 percent. With the help of IoT and other data sources, 13 percent of enterprises analyse big data internally. The use of certain specific technologies is not appropriate for all industries, which could explain partially why industrial or service robots are utilized only in seven percent and 3D printing only in five percent of EU enterprises (Figure 3).

Figure 3. Percent of enterprises with at least 10 people employees using different ICT technologies in 2020*



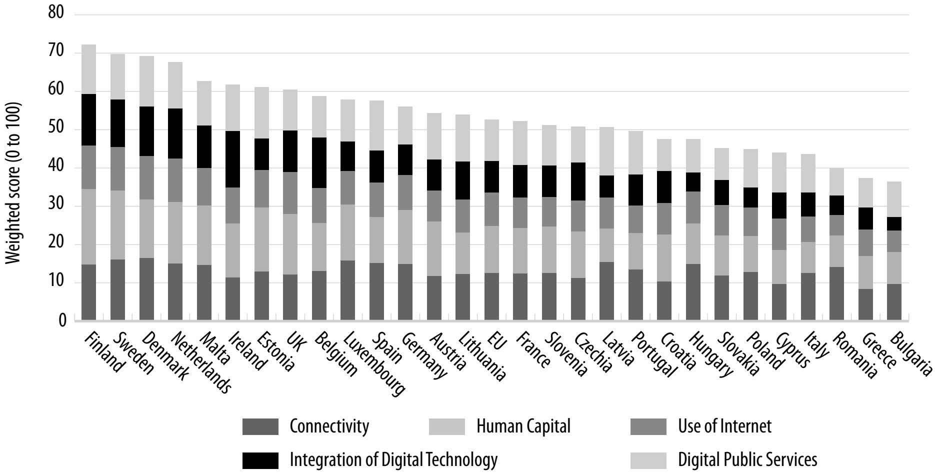
*Data for the "Use of IoT" for Germany not available. Financial sector excluded.

Source: Eurostat (2021).

The intensity of integrating internal processes, the use of cloud computing, industrial or service robots, 3D printing, and IoT in Slovenia is comparable to the EU average. And while Slovenia is significantly better in the use of e-invoices (58 percent of enterprises using it in comparison to the EU average of 32 percent), it is significantly lagging in the use of some other technologies. For example, only five percent of companies are using big data in internal analysis, compared to the EU average of 13 percent (Figure 3).

The Digital Economy and Society Index (DESI) places Slovenia among the countries with room to expand its e-government capacity. Slovenia is slightly above the EU average in the connectivity dimension; however, it is below average in all other dimensions (Figure 4). As it is, despite vast improvements, slightly below the EU average in the digital public services, human capital, and integration of digital technology dimensions, it is lagging significantly in the use of the internet dimension (European Commission, 2021). Slovenia has indeed improved its score in all five dimensions (connectivity, human capital, use of internet, integration of digital technology, and digital public services) based on data collected before the pandemic, but has advanced comparatively more than other EU countries only in the factor of digital technology integration (European Commission, 2021).

Figure 4. Digital Economy and Society Index (DESI) 2020 rankings



Source: European Commission (2021a).

In conclusion, the data reveals that there are significant differences in the use of new technologies between countries as well as companies by size (Čater et al., 2019; Dassisti et al., 2017; Tortorella et al., 2020). Moreover, the intensity of the use of specific technologies to a large degree differs by technology type. Simpler and cheaper technologies as well as the older ones are more widely used, while for example only a few percent of companies use AI, robots and other modern technologies. Understanding these differences, motives and obstacles in technology implementation also helps evaluate the true extent of the potential impact of the Fourth Industrial Revolution.

3 Motives and challenges to the implementation of new technologies

Opportunities of new technologies can be divided into short-term oriented, focusing on efficiency, and long-term strategically oriented (Table 3). In the short-run new technologies increase efficiency. For example, virtual simulations in **operations** are a vital part of process optimization before the realization of value creation providing increased efficiency and decreasing costs. Manufacturing companies, for example, are therefore more flexible and respond faster to changes in orders and volatile market demands (Rudtsch et al., 2014; Stock & Seliger, 2016). Furthermore, smart components and connected goods enable the collection and analysis of data about the usage and the entire life cycle, providing better stock information and more accurate forecasting. Products "being aware of their state" result in reduced faults, higher reliability and an overall increase in quality level (Erol et al., 2016, Kiel et al., 2017, Lee et al., 2014). Companies, implementing I4.0, experience also operational benefits, such as decreased costs, increased quality, lower inventory and increased flexibility. The positive effect has been noticed in chemical, plastics and automotive manufacturing (Muller et al., 2018b).

Table 3. Motives for implementation of new technologies

Short-Term Orientation (Efficiency- based)	Long-Term Strategic Orientation
• Decreased costs • Increased quality • Lower inventories (load balancing and stock reduction) • Increased speed and flexibility • Traceability and transparency	• Creation and implementation of new business models • Leading solutions for the customers • Creating knowledge that is hard to imitate and enhanced competitiveness • Reduction of monotonous work, elimination of unfavourable work conditions and age-appropriate workplaces • Reduction of environmental impact. • Increased competitiveness and digital connectivity

Source: Maravić et al. (2021), Müller et al. (2018b).

Strategic opportunities support the achievement of long-term goals. I4.0 and other new technologies cause also changes in established business models and lead to new emerging business models. Differences occur in customization enhancement, improved customer relationships, data-based value creation, etc. (Arnold et al., 2016, Arnold et al., 2017, Laudien et al., 2017). Within highly competitive markets, business model innovation is a primary source of unique selling propositions (Voigt et al., 2017). Moreover, the competitiveness of firms increases with the use of I4.0 technologies. Companies, which implement new technologies, have observed strategic benefits in manufacturing, in particular in larger enterprises with a focus on mechanical and electrical engineering companies (Müller et al., 2018b).

The last opportunity refers to the **environment and people.** New technologies can reduce greenhouse gas emissions, waste, resources and energy consumption (Herman et al., 2016; Peukert et al., 2015). Management processes are improved due to the availability of real-time data throughout the supply chain and information transparency and traceability. New circular business models can be significantly supported by digitalization (Kiel et al., 2017). In the long-term, employees' health and productivity are improved because of the use of connected devices and robotization in unfavourable workplaces (Hirsch-

Kreinsen, 2014). Automation also results in higher motivation and employee satisfaction as it reduces repetitive tasks and monotonous work. These changes are especially important amidst ongoing demographic challenges as they facilitate the design of age-appropriate work environments (Kagermann et al., 2013).

Table 4. Financial and non-financial challenges

Challenges	Explanation
Financial challenges	
• High investments with uncertain ROI • Lack of internal funding • Lack of external funding (related to risk as well)	• High initial investments needed and sometimes hard to justify • Difficult to measure the full economic impact
(Additional) Non-financial challenges	
• Lack of education and skills training programmes	• Successful implementation of new technologies requires the alignment of employees' skills with the latest technology
• Lack of skilled workforce	• Installation and maintenance of equipment, such as IoT, Big Data, 3D printing, require specific skill sets
• Cybersecurity	• The risk of cyber-attacks and industrial spying imposes the challenge of securing data rights and access
• Organizational and production fit	• Synchronization and coordination with current manufacturing setups lead to high levels of complexity and expenses
• Resistance to change	• Changes are a difficult process in any company and the resistance of the employees will almost always be present

Source: Own work

Key challenges in the implementation of new technologies can be divided into financial and non-financial, although in several cases clear delineation between the financial and non-financial challenges is hard (Table 4). The first set of key obstacles is related to **employee qualifications and acceptance.** The emphasis is on the importance of adequate personal (e.g., willingness to learn), social/interpersonal (e.g., creative problem-solving in social settings), action-related (e.g., ability to find practical solutions), and domain-related competencies (e.g., understanding network technologies as well as data analysis and processing) (Erol et al., 2016, Müller et al., 2018b). Companies should also educate employees to reduce and neutralize the resistance to change. This was also the most important challenge in Volvo, Orkla Confectionery & Snacks,[1] and Sandvik Coromant.[2] It is also important that employees gain these essential

1 Leading snacks and biscuit manufacturer in Sweden with one of the most modern factories in the industy.
2 Part of the Swedish multinational engineering company Sandvkik Group with highly automated plants.

skills because production lines and machinery will get even more sophisticated. Also, whole organizations will need to accept and adapt to the changes in order to benefit in the long run and automate complicated processes to make employees' jobs easier. Sandvik reported the generational gap challenge as older employees had a hard time accepting machine learning and AI of which they have never heard of (Larsson & Nilsson, 2019).

The next set of obstacles is connected to **new rivals and cybersecurity.** New rivals offering smart and connected product solutions, as well as completely new business models such as platforms, might emerge rapidly, posing a challenge to the existing current market position of the firms (Kiel et al., 2017; Müller et al., 2018b). For example, platform-based business models (i.e., Airbnb, Uber, Amazon, eBay) have increased rivalry in certain conventional industries, such as accommodation, transportation, and retail services, where online and offline company models compete (OECD, 2018). Platform-based businesses have a lot more data about their users, which gives them an additional edge. However, digitalization increases the risk of cyber-attacks and industrial spying and imposes the challenge of securing data rights and access (Zhou et al., 2017). The implementation of new technologies is negatively affected by new rivals and cybersecurity because, in the case of new technologies (especially IoT and online platforms), the combination of highly competitive markets, data security and transparency issues prevent manufacturers from integrating them. Volvo expressed its concerns about data security because it can be difficult and time consuming to work with due to additional privacy steps (Larsson & Nilsson, 2019). In addition, companies that do not have sufficient IT and software know-how due to focusing on machinery, products and hardware, have to look for external knowledge, which may hinder the implementation (Sila, 2013, Arnold et al., 2016, Müller et al., 2018b).

The last set of obstacles is linked to **organizational and production fit.** The adoption of new technologies must be tailored to unique organizational and production settings, such as various production structures or firm sizes (Müller & Voigt, 2017; Herman et al., 2016). Synchronization and coordination with the current manufacturing equipment and processes may lead to high levels of complexity and expenses (Müller et al., 2018a). There is also a significant negative effect of organizational and production fit, especially on large companies. SMEs have larger flexibility and the ability to respond to quickly changing environments and are therefore less influenced by the challenge (Sciascia et al., 2014). Adding new systems on top of the older ones was in the case of Volvo also time-consuming and costly (Larsson & Nilsson, 2019).

5 Development challenges and technologies of the future

The sluggish productivity growth, the upcoming burdens of population ageing and the consequent further decline in productivity growth and changes in the structure of public finances, as well as the increased public finance burden and the looming dangers of the environmental damage, endangering the sustainable development, are expected to be at least partially addressed in the near future by both the aforementioned Industry 4.0 (European Commission, 2018, 2020b; Müller et al., 2018) as well as the latest emerging and disruptive technologies (i.e. Industry 5.0). The purposeful innovation, excelled by the combination of highly innovative new technologies is in particular expected to support dealing with the challenges of future development (European Commission, 2021c).

Several technologies are already used or are at an advanced experimental stage. Molecular biology, genomics and nanotechnologies are the most prosperous technologies of the future (Zupan, 2021). Innovations in the medical field, including personalized medical treatments, would prolong life expectancy and the quality of life. Nanotechnologies would enable us to improve storage of solar energy, produce stronger materials that are more durable, resistant and lighter, improve food packaging, shelf life, create biosensors and more (Hulla et al., 2015; Fourie, 2020; Ghasemzadeh & Shayan, 2020). In addition, quantum computing has a lot of potentials and will be used to solve complex problems and augment the capabilities of classical computing in almost every industry. It can speed up the computation and it will be able to answer complex AI questions, accelerate drug development, improve financial modelling, develop advanced techniques of cryptography such as cracking encryption, forecast the weather and more (Ghose, 2020; Statista, 2019). Nuclear fusion power plants are expected to generate sustainable, cheap, and safe source of energy and thereby offer an efficient solution to global energy problems in view of reducing fossil fuel use, although at the moment there are only a few experimental plants (Cardozo, 2019). Space technologies are expected to be developed with the purpose of space exploration and colonization and will help mitigate the problem of resources as well as clean energy.

Nevertheless, these technologies of the future cannot operate or be implemented without proper digitalization, especially data economy. The COVID-19 pandemic clearly showed that there is a lack of appropriate data, data collection and data processing in different parts of the public sector (Zupan, 2021). In addition, while there are cutting edge technologies available and future technologies developed, the majority of companies are still lagging behind, using Industry 3.0 or 2.0 technologies.

6 Recommendations

6.1 The European Commission's future goals

The European Commission plans for the EU to become a global role model for the digital economy, support developing economies in going digital, developing and promoting digital standards also internationally within the **Shaping Europe's digital future** project (European Commission, 2021a). The project has three main goals. The first goal, **"Technology That Works for People"**, is technology development, deployment, and adoption that makes a significant difference in people's lives, accompanied by creating a strong and competitive economy that masters and shapes technology while upholding European values. The EU will also invest in digital competencies for all Europeans and has presented a new European cybersecurity strategy to protect them from cyber threats. To boost digital literacy and competencies at all education levels, a Digital Education Action Plan is set in place. Furthermore, Artificial Intelligence must be developed in a manner that respects people's rights and earns their trust. In this respect, the European Commission is presenting a White Paper on creating ecosystems of excellence and trust in the field of AI, based on European values. A significant step forward is expected with the accelerated deployment of ultra-high-speed internet in households, schools, and hospitals across the EU. For this purpose, accelerated investments are being made in Europe's Gigabit connectivity. To provide breakthrough medical, transportation, and environmental solutions, the EU plans to expand supercomputing capability. To deploy cutting-edge joint digital capacities in the areas of AI, cyber, super- and quantum computing, quantum communication, and blockchain, European Strategies on Quantum and blockchain as well as a revised EuroHPC Regulation on supercomputing have been developed (European Commission, 2020b).

The second objective, **"A Fair and Competitive Digital Economy"**, is to create a frictionless single market in which businesses of all sizes and sectors can compete on an equal footing, while developing, marketing, and using digital technologies, products, and services at a scale that boosts productivity and global competitiveness. The Digital Services Act is expected to increase online platform responsibility and clarify standards for online services, enhance access to high-quality data while preserving the security of personal and sensitive data. A European Data Strategy has been unveiled to position Europe as a global leader in the data-driven economy by creating a single market for data, where data will be able to circulate within the EU and across different sectors (European Commission, 2020b).

The third objective, **"An Open, Democratic and Sustainable Society"**, is to create a secure environment in which citizens have control over how they act and interact, as well as the data they contribute online and offline. To promote focused research, diagnosis, and treatment, a European health data space will be established. Another goal is to combat online deception and promote diverse and trustworthy media content through the Media and Audio-visual Action Plan. The EU will improve the resilience of our democratic processes and protect media pluralism with the European Democracy Action Plan (European Commission, 2020b).

6.2 The Slovenian digital strategy

Slovenia aims to become a society powered by digital technologies, which will help maintain its global economic competitiveness. Furthermore, companies and public-sector organizations were encouraged to completely integrate digital technologies into their business processes, products, and services under the Smart Specialization Strategy and the Digital Slovenia 2020 development strategies (International Telecommunication Union, 2021). Digital Slovenia, which was enacted in 2016, serves as a development strategy that establishes principles for the creation of an information society. The Smart Specialisation Strategy, in which Slovenia defined its priority areas for future investment, sets out and concretizes the principles (European Commission, 2019). Slovenia is in line with EU policies and has signed the Joint Declaration on 5G Security with the United States; however, further advancements in the security of 5G networks must be made. Slovenia will work on the Artificial Intelligence Act during its presidency in 2021 (International Telecommunication Union, 2020).

Slovenia has a high-quality human capital, and the amount of invention is extremely high, particularly in specialised areas. However, broadband connectivity and digital service adoption by the Slovenian economy, particularly SMEs, remains a difficulty. Low government investment and a lack of channels to access finance for businesses are the most significant issues. Low digital literacy, a lack of e-skills, and a lack of utilization of advanced e-services and ICT solutions by specific demographic groups are also considered as a weakness (European Commission, 2019).

The European Commission made substantial investments across initiatives of the different pillars of the Digitising European Industry (DEI). Slovenia has taken a proactive approach to address the difficulties, launching various projects in recent years, primarily skill development. Slovenia also has a Guidelines document in place for educational institution digitalization and the use of new pedagogical approaches. The national Digital Coalition was formed in 2016 with the goal of boosting digital literacy and competency nationwide. Other prominent efforts include the Digital Innovation Hub Slovenia, established in 2018 as the sole national one-stop-shop, and the FabLab Network. As an example of good practice adopted by Slovenia, the European Commission emphasizes the implementation of SRIPs (Strategic Development and Innovation Partnerships), which started in 2016 and are public-private partnerships that bring together all nationally relevant investment parties working on Industry 4.0 priority areas. In terms of the regulatory structure, the slowest development has been made. Slovenia is transposing the required EU Directives but there is a lack of a more specific digital regulation (European Commission, 2019).

Future prospects and conclusion

New technologies are expected to support the resolution of the key development challenges today – from declining productivity to ageing-related challenges, as well as sustainable development issues. Technologies are both already available (Industry 4.0) as well as being developed. However, the data shows that there is a significant variation in the use of new technologies between countries, sectors and firms. A critical evaluation is needed of the actual potential of new technologies, also in view of suitability (general suitability) of technologies and opportunities and obstacles affecting the use and implementation of new technologies. Throughout researching current ICT usage in Europe and Slovenia, comparing Slovenia to the top countries in terms of technology utilization and looking towards future goals, it was established that Slovenia has many opportunities for improvement.

The transformation is inevitable, although the actual effect or pace by country or sector might differ from the estimates. The number of new technologies is growing at a record pace and may disrupt economies for the better if they are taken advantage of rightly. If not, the lag behind the most advanced countries will increase, making it hard for idlers to catch the wave of transformation. In order to keep up and efficiently exploit the advantages of new technologies, coordinated action is needed by the states and companies, where the states must support the implementation of new technologies with different financial and non-financial programs, while companies should actively explore the suitability, potential and implement also the new technological solutions.

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III.

BUSINESS MODEL TRANSFORMATION OF SLOVENE COMPANIES

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UNION HOTELS COLLECTION

Introduction

The hotel industry has been experiencing challenges long before the COVID-19 pandemic. Continuous changes in consumer demands, with an expectation of unique, memorable and luxurious service, put extra pressure on hotels (Khichar, 2020). The emergence of sharing platforms, such as Airbnb, has posed a serious threat to the economic sustainability of the hotel industry (Farronato & Fradkin, 2018). The COVID-19 pandemic further exacerbated the existing challenges within the hospitality industry, forcing many hotels to alter their value propositions and create new revenue sources, thus transforming previous business models. These new business models are based on new hotel concepts, market penetrations, and process innovations.

Two of the most recent innovations in the business model are **hybrid hospitality**, combining different accommodation offers based on customer needs, often including workspaces (Folgado, 2020), and **dual brands,** combining two hotel brands under the same roof (Donovan, 2020). Both have already been introduced by largest hotel chains like Accor (Accor, 2018). In this chapter, we focus on risks and opportunities in business model transformation for hotels towards two concepts: the dual brand strategy and hybrid hospitality. Both concepts are proposed for Slovenian accommodation company Union Hotels Collection Inc. (UHC) that operates five hotels in Ljubljana, Slovenia, and has faced a severe decline in revenues due to COVID-19. In particular, in order to address the challenges and generate additional revenue, this chapter proposes combining hybrid hospitality and extended stay at dual-branded Central Hotel and the Fuzzy Log Hotel.

1 Hybrid hospitality

Hybrid hospitality is a combination of different accommodation offers based on consumer needs, usually combining a hotel with workspace (offering co-working spaces, offices and amenities in the room). With hybrid hospitality, existing space in a hotel can be used for more than just overnight stays; guests are offered a place to work and interact without the long-term commitment (Folgado, 2020). For hotels, the hybrid hospitality model is an opportunity to have an additional revenue stream, especially during the off-season (Vasquez, 2020).

Hybrid hospitality was pioneered by Zoku with a hotel in Amsterdam in 2016. The focus in the hotel shifted from sleeping to living, working and socializing, as hotels started to offer home-office amenities in rooms that were also suitable for long stays, combining the services of a hotel and the social buzz of a thriving neighborhood (Zokumin, n.d.). It was first introduced by hotel chains like Accor, Ace Hotels, and Hilton (Folgado, 2020). Trends like these have already been visible in Asia and North America for some time now and are expected to become more appealing in Europe, especially since the COVID-19 pandemic has put an additional burden on hotels to look for additional revenue streams (Bakker & Coenders, 2020).

Applying a hybrid hospitality concept requires adjustments in hotels: shared workplaces, meeting rooms and co-working spaces are required. Some of the hotel rooms should be made suitable for working, with the bed concealed, so that guests can receive visitors (Coenders, 2020). However, improper application might deoptimize revenue flows, as repurposing too much of the hotel room will lead to an inability to satisfy all accommodation demand for rooms. Also, the repurposing needs to be done carefully, in order not to lose focus from the traditional hotel business and pivot too much towards office spaces or other hybrid hospitality (Coenders, 2020).

2 Dual-brand hotels

A recent trend in the hotel industry are also dual-brand hotels that combine two hotel brands of the same hotel chain, or in rarer cases, from different hotel groups, under the same roof,, offering owners access to multiple reservation systems and customer bases (Donovan, 2020). A dual-brand hotel targets different segments of customers with respect to their reservation price (budget versus midscale travellers), travelling characteristics (group versus transient travellers), or length of stay (short versus extended stay), and by that it diversifies and expands the market reach. Staying in such a hotel can increase brand awareness and possibly encourage brand loyalty (Venetis, 2018). Dual-brand hotels offer owners and developers potential cost-cutting benefits by having one operations team and shared staff, as well as consolidated back-of-house services (Donovan, 2020).

However, the price gap and product offering of the two brands should not be too far apart and should not represent the two extremes of the brand spectrum for them to successfully co-exist (Perreten & Perret, 2016). Hotels having two brands in a single building shall have separate entrances, public spaces and clear brand identities to distinct both brands in the eyes of the guests (Donovan, 2020). Although dual-brand hotels can achieve cost savings in administration and general management, as well as maintenance, they have higher IT and marketing costs (Dev & Steiner, 2020). If not communicating the dual brands clear and having the same service and brand integrity as a single entity, pursuing such a strategy can lead to potential guest confusion (Perreten & Perret, 2016). As a downside from the owner's perspective, exit strategies are limited as it is more difficult to sell the hotel as two separate entities due to the shared back-of-the-house area. Thus, the most important prerequisite for the success of a dual strategy hotel is that the hotel's location and its market allow for a layered market mix and that there is a clear customer demand at different price and offer levels (Perreten & Perret, 2016).

Some of the biggest hotel chains, such as Marriott, Hyatt and IHG, have already invested in this concept. For example, in 2018, Marriot International opened a dual-branded property in Europe under the Moxy and Residence Inn brands in Amsterdam. The lifestyle driven Moxy offers 152 guest rooms and is a tribute to local heritage. With 92 suites, Residence Inn is designed to give longer-staying guests a more home-away-from-home experience, complete with extra living space and fully-equipped kitchen (Töre, 2021). Hyatt Hotels Corporation has two dual-brand properties open and another five under development (About Hyatt, n.d.), whereas Hilton has 20 open and 22 under development or awaiting approval (Hilton, n.d.). Moreover, in Chicago, Hilton has a multi-brand property in one hotel, where Garden Inn, Hampton Inn and Home2 Suites brands are joined in one hotel.

Extended stay hotels are often the "other brand" in the dual brand strategy. Extended stay hotels are offering a prolonged stay of even multiple months, with a monthly rent system. Under the dual brand strategy, with Moxy Hotels offering a traditional hotel stay, Residence Inn by Marriott offers the extended stay type of accommodation, where people can stay for prolonged time periods at a monthly rate, while still incorporating some of the traditional hotel services, such as breakfast, cleaning, room service, and other amenities. Extended stay hotels are getting increasingly more attractive since they have been relatively less affected during the pandemic (Clough & Cross, 2021). Hotel chains such as IHG, Marriott and Hilton have experienced a drop of over 40 percent in the revenue per available room in their extended stay brands, compared to an almost 60 percent drop across other brands offering a traditional hotel stay. Similar, the decline in occupancy rates at luxury hotels was over 67 percent on average during the COVID-19 pandemic, whereas occupancy in the extended stay model declined by only 13 percent (Farazad, 2021).

3 Tourism accommodation market in Ljubljana

Tourism accommodation market in Ljubljana has been disrupted by an increasing supply of private accommodation offered through Airbnb. The number of beds available on the Airbnb platform increased from 336 in 2013 to 7,161 in 2018 (Knežević Cvelbar et al., 2021). Airbnb also contributed to stiff competition in the accommodation market by offering a more unique experience from the traditional hotels, especially for younger segment of tourists (Amaro et al., 2018). From 2013, when hotels dominated the tourism accommodation market in Ljubljana by providing 59 percent of all available beds (Statistical Office of the Republic of Slovenia, 2014), this share had decreased to 54 percent by 2017, as the number of private accommodation providers increased significantly - from 35 percent in 2013 to 41 percent in 2017 (Statistical Office of the Republic of Slovenia, 2018). In 2020, the number of beds available in hotels and other establishments in Ljubljana decreased by 23 percent, from 25,905 in 2019 to 19,855 in 2020 (Statistical Office of the Republic of Slovenia, 2021).

Tourism demand in Ljubljana had grown significantly between 2014 and 2019, with an average annual increase of 17 percent in overnight stays and 13 percent in arrivals, with 1.13 million arrivals resulted in 2.23 million overnight stays (Statistical Office of the Republic of Slovenia, 2020). This significant increase in demand is mainly the result of improved destination management, targeted promotion in international markets and the general increase in international tourism demand (Knežević Cvelbar et al., 2021). Decreased demand due to COVID-19 significantly affected tourism in Ljubljana. In 2020, Ljubljana recorded only 0.54 million overnight stays, which is 76 percent less than in

2019, and around 0.25 million arrivals, which represents a 77 percent decrease compared to the previous year. Tourist arrivals are seasonal, and almost 39 percent of all arrivals occur in the summer, followed by 24 percent in autumn, and 22 percent in the spring (Statistical Office of the Republic of Slovenia, 2020).

4 Union Hotels Collection

Union Hotels Collection Inc. (UHC) is a Slovenian accommodation firm that operates five hotels with different concepts in Ljubljana, Slovenia. They manage three 4-star hotels: Grand Hotel Union, a hotel with a classical elegant architecture, a more urban uHotel, and a recently renovated Hotel Lev, which offers semi-luxurious accommodation and is popular also among families. A three-star Central Hotel Superior is more popular among the new generation of tourists – digital nomads and millennials. At the Fuzzy Log Hotel, UHC offers an innovative and affordable alternative to classic hotel rooms: cabin logs, outdoor rooftop tents, and capsules. The Fuzzy Log Hotel is located in Central Hotel and is one of the first examples of dual-brand hotels in Slovenia. In total, they account for 767 rooms (Union Hotels Collection, n.d.).

UHC is facing several challenges. COVID-19 has to a great extent affected tourism demand in cities, and Ljubljana was not an exception. As in 2020, tourism demand in Ljubljana severely decreased, it resulted in a decrease in total revenue of UHC by 67.5 percent (AJPES, 2021). In addition, hotels have also been facing increased competition from private providers (Knežević Cvelbar et al., 2021), continuously changing consumer demands, limited travel opportunities, and uncertainty in international travel (Shin & Kang, 2020). In order to address the challenges and generate profit, this chapter proposes to apply the hybrid hospitality concept in Central Hotel and the Fuzzy Log Hotel by offering also extended stay.

4.1 Application of hybrid hospitality with extended stay in UHC

In order to increase the revenue stream, the recommendation is to keep the dual brand strategy in Central Hotel and the Fuzzy Log Hotel, apply more elements of hybrid hospitality, and offer an extended stay in Central Hotel.[1] In particular, when applying hybrid hospitality by adjusting the hotel rooms and

1 Extended stay was offered in Central Hotel in September 2020 for a monthly rent of 350 EUR. In the summer of 2021, this offer was no longer available.

common areas being appropriate to work and study, the extended stay would be attractive especially to foreign students and workers. There are no such offers currently in Ljubljana and hybrid hospitality complemented with the possibility of extended stay would give UHC a competitive edge. By focusing on foreign students alone, there are more than 2,000 exchange students only at the University of Ljubljana every year (Univerza v Ljubljani, 2021). If each student stays in Ljubljana for one semester (five months) and on average spends 550 EUR per month on accommodation (Numbeo, 2021), the potential demand for extended stay is a little less than four million euros annually.[2] Additionally, students come in the fall and winter and are gone for the summer, which would offer an additional revenue in the off-season.

In order to check the interest of students to stay in a hotel during their studying, in August 2021, 34 former, current and future foreign students in Ljubljana participated in an on-line survey. There are clear benefits of staying in a hotel: from the possible use of amenities to cleaning and food services, which translates to a more convenient and safer accommodation option. The respondents showed great interest in the possibility of staying in a hotel for an extended period. 43 percent of the respondents said that if there was a possibility of renting a hotel room that would offer some place to study or work, they would definitely be interested in; additional 50 percent said maybe. In general, potential guests would on average be willing to pay from 200 to 300 EUR per month, about a quarter of the respondents would even be willing to pay 350 EUR per month. Moreover, upon having a good customer experience, students staying at Central Hotel and the Fuzzy Log Hotel could become guests in other hotels managed by UHC in the future.

4.2 Profitability of hybrid hospitality with the extended stay concept

The proposal for Union Hotel Collection includes devoting a specific amount of capacity as an extended stay offer during the school year (from October to June). The optimal capacity allocated to the extended stay, determined with the trial and error method, is 45 percent of the capacity allocated to extended

2 There are no statistical data that can help classify foreign students by type of accommodation (dormitory, room, or apartment). Moreover, it is assumed that all foreign students choose a one-bedroom apartment and are willing to pay a rent equal to the average rent in Ljubljana. It is very likely that foreign students will also opt for another type of accommodation. However, the estimation of demand for longer stays did not take into account students from Slovenia who come to Ljubljana to study and would consider staying in a hotel.

stay from fall to spring. In order to check the profitability of the proposal it was compared to the existing offer in Central Hotel and the Fuzzy Log Hotel.

The simulation was done by calculating and comparing the net present value (NPV) of Central Hotel & Fuzzy Log with a terminal value (TV)[3] in 2025. The starting points of the projection were the years 2018 and 2019. Data was collected from GVIN and UHC. The simulation assumes only changes in demand. The change in demand is estimated using three different scenarios: (i) a sunny case, which assumes a 19 percent decrease; (ii) a base case with a 36 percent decrease; and (iii) a rainy scenario with a 50 percent decrease in demand in all five observed years compared to 2019 (McCartney, 2020). High demand for extended stays is assumed with the 95 percent occupancy rate (as in the United Kingdom, the Netherlands, Germany, and CEE (Vetrak, 2021)) and a 68 percent occupancy rate for traditional offerings (M. Rigelnik, personal interview, June 26, 2021). The price for extended stay is assumed to be 450 EUR per month (an average cost of accommodation in Ljubljana is 550 EUR) (Numbeo, 2021). A weighted average cost of capital (WACC) equal to 6.11 percent was used as a discount factor calculated using company's data, ten-year Slovenian government bond, and SBITOP five-year trailing return. The proposed alternative of the hybrid hospitality model with extended stay is compared to the standard (existing) model under the three different scenarios (Table 1). The comparison shows that the existing concept performs better only in the sunny case. The proposed concept, however, outperforms it in the baseline and rainy scenarios with a five percent higher NPV under the base scenario and an 18 percent higher NPV under the rainy scenario.

Table 1. Comparison of NPV between the existing and the proposed hybrid hospitality models with extended stays (in thousands of EUR)

SCENARIO (decrease in demand in brackets)	Existing	Hybrid hospitality model with extended stays
SUNNY (19 percent decrease)	12,196.69	11,305.28
BASE (36 percent decrease)	8,144.78	8,536.47
RAINY (50 percent decrease)	5,954.98	7,040.11

*The NPV assumes terminal value in 2025. The weighted average cost of capital (WACC) is 6.11 percent.

Sources: Gvin (n.d.), Union Hotels Collection Inc. (n.d.).

3 Terminal value (TV) is the value of an asset, business, or project beyond the forecasted period when future cash flows can be estimated. Terminal value assumes a business will grow at a set growth rate forever after the forecast period. Terminal value often comprises a large percentage of the total assessed value (Ganti, 2021).

4.3 Expanding the proposed concept to other cities

The concept that offers hybrid hospitality with extended stays also allows sustainable scaling in the country and in the region. In order to check if the expansion could generate an additional profit, four cities with high number of international students and workers are suggested: Maribor (in 2022) and Koper (in 2023) in Slovenia, and Zagreb (in 2024) and Trieste (in 2025) in the region. In order to test profitability of the expansion of the model to other cities, NPV is again calculated and presented in Table 2.

Table 2. NPV of expansion of proposed hybrid hospitality with extended stay to Maribor, Koper, Zagreb and Trieste (in thousands of EUR)

	2021	2022	2023	2024	2025
Transaction costs*		(20.64)	(35.13)	(139.97)	(292.45)
Lease costs per year**		(70.18)	(119.43)	(475.91)	(994.32)
Consult. (O/s): Market Research & Acquisition Targets	(75.00)				
IT (O/s)	(80.00)				
UCF (Maribor)***		137.60	163.53	139.94	214.39
UCF (Koper)***			70.64	60.02	92.70
UCF (Zagreb)***				733.20	1.269.60
UCF (Trieste)***					372.96
Total	**(155.00)**	**46.78**	**79.62**	**317.27**	**662.88**
Net Present Value (NPV)****	748.25				

Values in parenthesis mean negative value or cash outflow. * Estimation is based on the expert opinion (Field expert estimation, 2021). ** The model assumes that new hotels are leased. Estimation is based on the expert opinion (Field expert estimation, 2021). *** Cash flow structure of the new leased property is equal to unlevered cash flow (UCF) of Central Hotel & Fuzzy Log adjusted by student and leisure factors in each city. UCF for Maribor is adjusted by a student factor of 0.36 and a leisure factor of 0.34. The student and leisure factors used for Koper are equal to 0.16. The student factor for Zagreb is 1.87, whereas the leisure factor is 2.67. The student factor for Trieste is 0.62, and the leisure factor is 0.62. **** The weighted average cost of capital (WACC) equal to 6.11percent is assumed for the calculation of NPV.

Sources: Gvin (n.d.), Union Hotels Collection Inc. (n.d.).

The calculation assumes expansion by leasing instead of buying or building hotels. The size of the hotel and predicted cash flow in each city depends on the number of students (approximated by a student factor) and leisure tourists (approximated by a leisure factor) in the city where expansion is proposed. Student and leisure factors are used to adjust the unlevered cash flow of Central Hotel and Fuzzy Log. Student factor, which is a comparison of students between Ljubljana and the proposed city for expansion in 2019, equals to 0.36 for Maribor, 0.16 for Koper, 1.87 for Zagreb, and 0.62 for Trieste. Leisure factor, which compares leisure tourists in Ljubljana and the city of expansion in

2019, is equal to 0.34 for Maribor, 0.16 for Koper, 2.67 for Zagreb, and 0.62 for Trieste. Based on the adjustment of unlevered cash flow of Central Hotel and Fuzzy Log in 2019, the proposed leased hotel in Zagreb would be the largest and would generate the highest cash flow. The cost of a lease also reflects the size of the hotel and is assumed to be equal to 60 percent of the adjusted unlevered cash flow (UCF) of Central Hotel and Fuzzy Log (Field expert estimation, 2021). Upfront investments would include market research of 75,000 EUR (for the identification of suitable hotels to lease), IT software and website of 80,000 EUR, and transaction costs for each property being leased as with the cost of leasing equal to 15 percent of unlevered cash flow (UCF) (Horvat, 2021 & Field expert estimation, 2021).

Taking into account the additional costs of expanding to Maribor, Koper, Zagreb and Trieste (transaction costs, leasing costs, initial costs), the positive incremental cash flow would soon cover the cost resulting in a positive NPV of about 750,000 EUR (Table 2).

The calculation has potential biases resulting from assumptions made for the calculation of NPV. The cash flow of the new properties is assumed to be the same as in Central Hotel & Fuzzy Log and only adjusted for the student and leisure factors. In reality, the results may be significantly different and the local conditions in the mentioned cities should be analyzed in detail before expanding.

Conclusion

In addition to offering accommodation, hotels are increasingly repurposing existing space for other use, such as office space. This so-called hybrid hospitality allows hotels to tailor services even further to the needs of guests. Combining two hotel brands in one building looked like a complete novelty not long ago, but the dual brand concept is gaining traction and is becoming more prevalent in today's hotel market (Perreten & Perret, 2016). Marriott, Hyatt and IHG offer dual brands under the same roof, where one brand is usually an extended stay hotel.

Business model transformations, such as hybrid hospitality, gained momentum also during the COVID-19 pandemic, as especially city hotels were hit hard. City hotels in Ljubljana, Slovenia, were not an exemption. The revenue in 2020 severely decreased also in Union Hotels Collection Inc. that operates five city hotels. In order to transform the business model to generate new revenue, this chapter proposes to offer hybrid hospitality in its dual brand hotel: Central Hotel and Fuzzy Log. One brand – Central Hotel would offer an extended stay by offering in-room amenities for working/studying and repurposing the existing common spaces in the hotel for meetings/gatherings/study groups and socializing. The proposal suggests devoting 45 percent of its capacity to extended stay. The target segment for an extended stay offer is international students and workers.

Comparing the existing offer to the combination of hybrid hospitality and extended stay concept shows that in case of low demand in the next five years (decreased demand by 36 percent or 50 percent compared to 2019), would result in higher net present value. Contrary is true in case of high demand in the following years (or a decrease of 19 percent compared to 2019), since the calculations show that the existing offer would be more profitable comparing to the hybrid hospitality with extended stay concept. In order to generate additional profit, the hybrid hospitality and extended stay offer could be further expanded to other cities, especially those that have a high number of incoming international students and workers in the region: Maribor, Koper, Zagreb, and Trieste. Again, offering two brands in the same hotel, a mixture of accommodation and a possibility to work from a room or a hotel for a prolonged period of time, could generate additional profit, where the estimations show that scaling the hybrid hospitality concept with the extended stay offer could generate additional 750 thousand EUR of net present value.

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DEMOCRATIZING REAL ESTATE MARKET: THE EQUINOX CASE

Introduction

Real estate has long been considered one of the safest investments, promising a virtually guaranteed above-average return. However, the high barriers to entry in the form of high upfront costs and the implication of a long-term commitment to the asset have deterred many investors (Lodha & Joshi, 2021). One of the possible solutions to overcome this barrier is real estate investment trusts (REITs), which make real estate accessible to all types of investors.

Equinox is expected to be the first REIT in Slovenia to be listed on the Ljubljana Stock Exchange and they will have the most centrally located real estate portfolio in the EU, with buildings less than 300 meters from Prešeren Square, which is thought to be the central point of Ljubljana, the capital of Slovenia. Currently, Equinox owns four hotels and four commercial facilities (Equinox, 2021).

This chapter discusses trends in real estate in Slovenia and provides an overview of best practices in democratizing real estate markets in other countries, with a focus on how Equinox can use this to its advantage. Third part presents a discussion on the advantages and disadvantages of different types of investments. The chapter concludes with an analysis of investment habits of individuals in Slovenia to estimate the market potential of REIT.

1 Real estate investment trusts and alternative solutions for democratizing ownership

1.1 Traditional real estate investment funds

The United States of America (USA), as the country with the most democratized financial sector and market, sets the trends for the rest of the world with its financial practices. In order to give all investors equal access to income-producing real estate, previously reserved for wealthy individuals, the US Congress created real estate investment trusts in the 1960s. Real estate investment trusts (REITs) are companies that invest accumulated investment money in various types of real estate with the goal of maximizing shareholders' value. Shareholders earn high dividend yield since REITs are required to distribute at least 90 percent of current net income back to shareholders each quarter (DiLallo, 2020).

REITs are typically traded on major stock exchanges and can be divided into several subgroups, such as equity REITs, mortgage REITs, PNLRs (unlisted public REITs), and private REITs, which are exempt from SEC registration and can only be sold to institutional investors (DiLallo, 2020). The REIT sector has outperformed the market over the long term, while some subgroups have really excelled. The most successful REIT subgroups have been those investing in self-storage, industrial, and residential properties, with an average annual return of 14.8 percent since 1994, while the resort subgroup has been the worst performer at 10.2 percent annually (DiLallo, 2020).

Since 1978, real estate funds have generated an average return of 12.9 percent, which exceeds the return of the S&P 500 with an average return of 11.6 percent (Nareit, 2021). It is worth noting that this asset class has not produced negative returns for investors in any ten year period. Even in the decade 2000-2009, which includes the 2008-2009 housing crisis, REITs earned an average annual return of 3.4 percent, while S&P 500 experienced an average annual return of 2.7 percent. Investment volatility (or risk) is also an important factor in investing. Volatility is measured by standard deviation, which indicates how much returns deviate from the average. For real estate funds, the average standard deviation over ten year periods has been 7.9 percentage points, while the average standard deviation of the S&P 500 has been 16.9 percentage points. The American stock index has thus fluctuated almost twice as much as those of the REITs (Nareit, 2021).

1.2 REITs investors' profile

Research from Nareit (2020) estimates that 145 million Americans own REIT stocks directly or indirectly through mutual funds, which is roughly 44 percent of American households. Nareit reports that 52.6 percent of households have equity exposures. The most popular type of equity is deferred retirement account, such as 401k (50.5 percent of households), followed by direct stock (15.2 percent of households). According to Nareit, equity ownership is divided into four categories. These categories are equity funds, target date funds, balanced funds, and company stock. Table 1 depicts estimations of the share of assets that have REIT exposure in different categories.

Table 1. REIT ownership by funds in the US, in percent

Estimate	Equity funds	TDF	Balanced funds	Company stock	Total
Share of equity holdings	54	31	6	10	100
Share with REITs	88	100	88	3	
No. of households with equities	67,707,846	67,707,846	67,707,846	67,707,846	
No. of households with REITs	32,056,116	20,997,929	3,395,106	214,521	56,663,672
No. of Americans with REITs	81,833,614	53,694,012	8,667,107	547,635	144,652,368

Source: Employment benefit Research Institute (2020).

From the table above, it can be concluded that most Americans have REIT exposure indirectly through equity funds. In 2020, commercial real estate was the third largest asset class in the US investment market, with a 14 percent market share and 92 percent of advisors they will increase or maintain their use of publicly traded REITs over the next one to three years. This is all due the strong dividend income REITs provide and competitive long-term performance. Another reason is correlation. Over the past few decades, assets have become increasingly correlated, and advisors have been challenged to identify investments to better diversify their clients' portfolios. The correlation of REITs in the USA with the Total Stock Market from 2000-2020 was less than 0.7 (1.0 meaning total correlation) (Nareit, 2020).

1.3 Real estate democratization via tokenization

Tokenization represents one of the applications of blockchain technology in the financial sector. Tokenization generally refers to the issuance of a blockchain security token, which is a digital representation of a tradable asset, such as a share in a company, real estate ownership, or an investment in art (OECD, 2020). One advantage that tokenization offers is the elimination of process steps, which significantly reduces effort, both in terms of cost and time (Kovacs, 2014).

Tokenization is becoming increasingly popular as it has several benefits for investors, issuers, and the market as a whole. The most important aspect is the introduction of higher liquidity versus traditional illiquidity constraints in the real estate market. According to an estimate by Complexity Labs, improved liquidity of real estate assets can increase the value of real estate by up to 20 percent (FCA, 2017). Tokenization also allows for fractionalization of assets, lowering barriers to entry for investors. Tokens can be traded on the secondary market, making assets accessible to a larger pool of investors (Wandmacher & Wegmann, 2020). The first tokenization real estate project took place in Colorado (USA) in 2018. St. Regis Aspen Resort based its tokens on the Ethereum blockchain, which are now available on the Securitize platform, which allows tokens to be traded on multiple exchanges (Wandmacher & Wegmann, 2020).

1.4 Advantages and disadvantages of alternative types of financing

After the financial crisis of 2008, banks increased the risk premium for real estate financing, leading investors to seek alternatives to bank loans (Olsson, 2015). As a result, most investors are pursuing a mix of financing options. These range from conventional mortgages to crowdfunding and tokenization. Larger companies with an established market share and a good reputation with investors are pursuing tokenization methods as part of going public and in search of increased liquidity and additional funding (Lyons, 2019).

Table 2. Summary of alternative types of financing

Type of financing	Advantages	Disadvantages
Initial Coin Offering	• Way to raise capital without jeopardizing ownership (Wiesflecker, 2020b). • Lower cost and preparation time as no regulation (Sherry, 2019).	• Coins are not backed by assets (Sherry, 2019). • High volatility, as no backing (Konotop, 2021). • Investors are not protected.
Security Token Offering	• Combines practices of ICO and IPO (Deloitte, 2019). • Regulated by governments and financial systems, providing investor protection and security (Murphy, 2019).	• New technology (Deloitte, 2019). • Higher upfront costs due to regulation (Murphy, 2019).
Revenue-based financing	• It allows entrepreneurs to retain control of the business (Hayes, 2019)	• No interest payments and no fixed payments (Hayes, 2019). • Certain requirements must be met to finance in this way (Rush, 2021).

Source: Own work.

The initial public offering (IPO) is not the only way for companies to apply for and receive funding. In fact, there are many alternatives available today that also offer a number of advantages over traditional mechanisms. These mechanisms are available to companies of all sizes, from small start-ups to big businesses, but the focus here will be on those that may be the best options for Equinox. In Table 2, various alternative financing types are presented and discussed in terms of their advantages and disadvantages for businesses.

2 Real estate market in Slovenia

Although the Slovenian real estate market was affected by the COVID-19 crisis in 2020 and the volume of transactions was lower than the year before, real estate prices did not fall due to the strong supply shortage; on the contrary, they actually increased (GURS, 2021). In 2020, the number of issued building permits for multi-family houses increased, which indicates a further revival of the residential real estate market in the medium term. Compared to the EU, Slovenia is still below the Eurozone in terms of housing price growth (Toplak, 2021).

For 2020, around 31,800 purchase contracts for real estate with a total value of around EUR 2.2 billion were concluded (GURS, 2021). The number of completed purchase and sale transactions decreased by 13 percent in the year 2020, compared to 2019, while their total value decreased by 21 percent. Of the total value of completed real estate transactions, residential real estate (apartments and houses) accounted for 66 percent (EUR 1.4 billion), building land for 13 percent, commercial real estate (offices, shops, services and restaurants) for ten percent, and agricultural and forestry land for four percent (GURS, 2021).

Demand for residential real estate continued to far outstrip supply in the year 2020, especially for new residential units in the largest cities. However, due to low supply and high prices, the number of residential transactions completed in the primary market continued to decline at a much greater rate than in the secondary market. Over the period 2015-2020, prices for apartments in multi-family buildings have increased the most (Table 3). At the state level, their prices have increased by nearly 40 percent since 2015, while the prices of apartment buildings and land for their construction have increased by about a quarter. In Ljubljana, where apartments are by far the most expensive, the average price of a used flat exceeded EUR 2,900/m^2 and started to approach the EUR 3,000/m^2 mark. After the sharp increase in flat prices in 2017 and 2018, followed by stagnation in 2019, prices have increased by six percent since then (GURS, 2021).

Table 3. Price growth of different types of real estate in Slovenia and Ljubljana between 2015 and 2020, in percent

Percentage growth during 2015-2020	Slovenia	Ljubljana
Apartments	+39	+48
Houses	+23	+37
Building land	+25	+29

Source: GURS (2021).

Due to the uncertainty of economic entities regarding the economic consequences of the epidemic of SARS-CoV-2, the demand for different segments of real estate is changing. Working and learning from home has created a need for additional workspace and larger homes. Real estate prices in Ljubljana are not expected to decrease in the near future, but there is a possibility of a shift in demand for certain types of real estate. There is already a sign of lower demand for commercial real estate, as the number of transactions of commercial real estate (offices and bars) has decreased by up to 30 percent. People's needs change depending on the economic situation they are in. The accelerated construction of block developments and smaller villa blocks and neighbourhoods of terraced and low energy chain homes offer choice and variety at both the price and supply levels. Due to cheap bank credit, people are more likely to opt for a newly built property of a higher price bracket that offers modern home comforts (lift, garage, underfloor heating, etc.) (Toplak, 2021).

3 Equinox Real Estate Investment Trust

Equinox Real Estate Investment Trust is expected to be the first REIT based in Slovenia to enable smaller investors to enter the real estate market. Equinox Nepremičnine Inc. has been established in May 2021 by separating hotel management and ownership of real estate into different legal entities. The goal of Equinox Real Estate Investment Trust is to become a leading player in the Slovenian real estate market, attractive to domestic and foreign investors, both institutional and retail. The management promises liquidity of shares on the stock exchange and transparency of operations with clear supervision, as they also expect above average returns for investors (STA, 2021).

3.1 Separation of managing hotels and real estate ownership

Company Union Hotels Collection Inc. confirmed a split of its properties in March 2021. Ownership of hotels and restaurants was transferred to the new company Equinox Nepremičnine Inc. (Šimac, 2021a). Nowadays, more and more hotel chains are separating managing hotel and property management activities, including Hilton and Marriott. Larry Spelts, the CEO of Charlestowne Hotels said that the risk associated with owning an asset like a hotel is high, but the risk of a franchise agreement is pretty low. The cost to get a new franchise is vanishingly small and the brand will still get between eight and 12 percent of revenue, and that's gross, not net, so there's really no risk. (Šimac, 2021b).

Due to the risks, large hotel brands no longer own real estate and instead relay on franchise agreements to spread their brand around the world. This allows the brands to expand more quickly, especially internationally. The strategy also helps these hotel brands grow in the flourishing boutique hotel area. Another big benefit of the franchise model, for both the franchisee and the hotel chain, is allowing the big brands to focus more on their digital strategy and loyalty program, giving the hotel owner access to systems and rewards while attracting more members to the programs and maintaining better control over the customer experience and data (Campbell, 2021).

3.2 Equinox's portfolio

Equinox's real estate portfolio comprises properties with a total area of approximately 65,000 m2. It includes four hotel properties, premises in the building of the Delo newspaper, commercial premises in Vošnjakova, Miklošičeva and Nazorjeva Streets (Šimac, 2021a). The net asset value of the portfolio is estimated at EUR 109.4 million, while the largest European REIT is worth EUR 20 billion. The management plan is to further expand and diversify the real estate portfolio to residential properties (Equinox, 2021).

After the split, the shareholders of Union Hotels will become shareholders of two companies as a result of the spin-off. Of the approximately 300 shareholders, by far the largest is Axor Holding, which emerged from the restructuring of ACH Group and owns 76.6 percent of the voting shares. The shareholders' capital of Union Hotels will be reduced from the current EUR 7.5 million to EUR 1.79 million, while the shareholders' capital of Equinox Real Estate Trust will be EUR 5.7 million. All 139 employees at Union Hotels will remain in this company (STA, 2021).

3.3 Equinox's investment policy

Equinox's strategic objective is to provide shareholders with a reasonable rate of return with appropriate risk and portfolio diversification. The expected long-term annual return is between nine and 12 percent (Equinox, 2021). It will be comprised of the dividend yield (the main part of the return), with at least 50-70 percent of funds from operations (FFO) to be paid out in dividends (expected return between five and seven percent return per year) and share price appreciation (expected return between four and five percent return per year). Equinox will consist of five main asset classes (Table 4). Each class differs in expected return and associated risk (e.g., market risk, credit risk, operational risk). The main reason for diversification is to reduce risk (Equniox, 2021).

Table 4. Allocation of assets

Main assets class	Allocation target in percent
Hotels	40
Residential	15
Office	15
Healthcare	15
Other	15

Source: Equinox (2021).

Considering that Equinox's current portfolio consists of approximately 75 percent hotel properties, the share of this property class will gradually decrease over the coming years with the goal that in five years hotel properties will represent no more than 50 percent of the entire portfolio value.

3.4 Advantages and disadvantages of Equinox

In a growing real estate sector, Equinox is primarily welcome as it allows smaller investors to participate in the real estate market. Equinox, as a completely new financial instrument, also leads to a liberalization and democratization of the financial market in Slovenia, allowing smaller investors to easily participate in the real estate market. Equinox will also help the Ljubljana Stock Exchange to attract new investors and improve liquidity. Table 5 summarizes the expected advantages and disadvantages of Equinox Real Estate Trust.

Table 5. Advantages and disadvantages for investors of Equinox

Advantages	Disadvantages
• Diversification of investment in the real estate market • Increased liquidity of real estate investment • Equinox has a distribution policy of between 50 and 70 percent of funds from operations (FFO) • Protection against inflation • Real estate investment made more easily accessible	• A decline in economic growth and a decline in demand for commercial real estate could lead to a decline in rents and property values • Poor diversification of Equinox's portfolio • Incentive for speculation • Risk of monopolization of the real estate market • Possible lack of activity on the secondary market

Sources: Equinox (2021) and own work.

3.5 Democratizing the market

Equinox and other REITs assist in democratization of real estate in many ways. The prices of real estate in Slovenia and Ljubljana are growing up fast and people that are not in the upper class may find it impossible to afford a new apartment for the purpose of renting. With the first Slovenian REIT, Slovenians will get a new financial instrument that will broaden the opportunities for the investors at the Ljubljana Stock Exchange and investors will be able to participate in the real estate market with a small investment and earn from dividends and capital gain. REITs also tend to remove the gap and provide for easy entry and exit options for the stockholders.

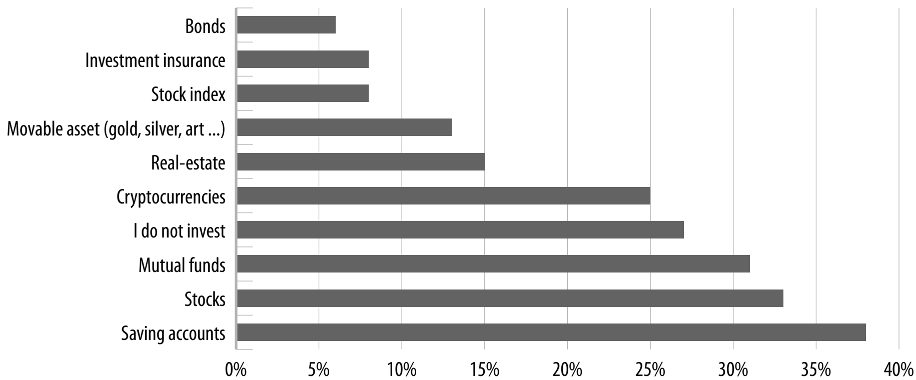
Most REITs focus on a particular property type. For example, in Slovenia there are not enough senior living facilities or they are too expensive. Health Care REIT could invest in building new health care related real estate and collect rent from tenants. If that happened, more people would be able to get into senior living facilities and costs would lower, due to higher supply of senior homes. On the other hand, investors would get capital gains out of it. All this can be done with REITs, without imposing any financial burden on banks, since REITs have a long-term funding source.

Around the world, there are many unoccupied apartments in high-end developments. It does not benefit the owners, who get no rent, or the families looking for homes in the city. A professionally manager REIT would ensure any real estate it owns is rented out at the highest possible level of occupancy.

4 Investment habits in Slovenia

In order to better understand the investors or potential investors, we conducted an online survey on investment habits in Slovenia in April 2021, with 147 participants (54.5 percent were employed, three percent retired and 42.6 percent of them were students). The results indicate a rough picture of the potential demand for Equinox shares. The majority of the interviewees have their money in savings accounts, while the most popular investments are stocks, mutual funds and cryptocurrencies (Figure 1). Interestingly, only 13 percent of the participants do not invest their money.

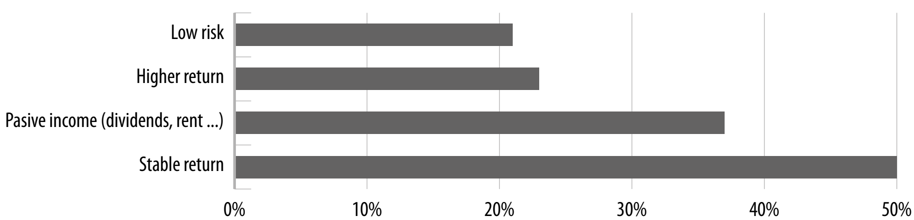
Figure 1. Preferred investments of respondents in percentage of valid answers



Source: Own work.

The main reasons why participants do not invest their money are lack of knowledge, poor experience and scarcity of resources. The most important thing Slovenian investors look for when they decide to make a new investment is a stable return (Figure 2).

Figure 2. Most important investment motive, as percent of all answers



Source: Own work.

The survey results also show that only 30 percent of the respondents have heard of REITs, but promising information is that 33 percent of all participants would invest in REIT and 41 percent would consider investing in REITs, however, they would need additional information. The most important information requested by the respondents is related to risk, returns, dividends, transparency, and the trust's strategic investment decisions. We believe that management should invest a large portion of their resources in presenting Equinox to the public.

Conclusion

The aim of the paper was to present Real Estate Investment Trust in general and Equinox in particular as a new financial instrument in the Slovenian financial market. The survey among potential investors shows that there is a market potential for a real estate investment fund, as 40 percent of respondents keep their financial resources in savings accounts and mostly appreciate stable returns. However, the first real estate investment trust in Slovenia, Equinox, will not only help individual investors enter the thriving real estate market, but also expand opportunities for the Ljubljana Stock Exchange investors and contribute to deepening the financial market.

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PIPISTREL: CAN A FAMILY-OWNED COMPANY FLY WITH THE BIG GUYS?

Introduction

Ultralight and light aircraft have advanced significantly since their emergence in the 1960s and 1970s, however, since the introduction of composite materials in the production and the design of ultralight aircraft in the 1990s, there have not been any major breakthroughs in the industry. For example, one of the most popular light aircraft models, the Cessna 172, was initially developed in 1955 and the same model is still being produced and sold around the globe today (Bertoncelj, 2014a). Nonetheless, if there is one company that has been pushing innovation in the space of ultralight and light aircraft, it has been the Slovenian aircraft producer Pipistrel. As one of the pioneers of the electric aircraft propulsion, Pipistrel has been producing and selling the electric self-launch gliding airplane Taurus since 2008, developed various electric aircraft for the purposes of pilot training (Bertoncelj, 2014b) and has just recently obtained the first ever type certificate for an all-electric aircraft, Velis Electro, establishing a giant leap towards the commercialization of electric aircraft (Gole, 2020). This is largely impressive, as the aviation industry is facing challenges in finding solutions to lower its carbon footprint (Nugent, 2021), primarily battery weight and power, which are at the moment disabling the possibility of longer routes. Still, smaller electric aircraft are increasingly in high demand by logistics companies, for example, DHL just invested seven billion USD to reduce emissions by 2023 and purchased 12 electric aircraft with a range of 815 kilometres (Reichmann, 2021).

The goal of this chapter is to present Pipistrel and evaluate how well the company is positioned to successfully follow the general aviation industry trends, such as urban air mobility, electric aircraft propulsion, and lowering carbon emissions, as well as achieve success on a mass scale. Firstly, the chapter focuses on overviewing the global industry of ultralight and light general aviation aircraft, with an emphasis on electric aircraft propulsion. In the second part, the chapter concentrates on presenting Pipistrel, beginning with a short overview of the company's history and its current operations, continuing with the evaluation of Pipistrel's financial performance as well as their extensive R&D activities. The last part of the chapter focuses on evaluating Pipistrel's future growth prospects, as well as providing some suggestions on how the company can scale-up and become one of the household names in the aviation industry.

1 Industry overview

1.1 General characteristics

The definition and classification of ultralight aircraft differ globally due to various country regulations, but most often include aircraft that have a maximum take-off weight of less than 600 kilograms, the capacity for one or two people and are designed for short distance travel (The Courier, 2021). Their lightweight materials and construction allow for longer flights while using less fuel (Aviation Association of Slovenia, 2021).

The beginnings of ultralight aviation date back to 1922 when the British and French started to test new forms of creating low-cost aeroplanes. Still, the attention of a wider audience was not acquired until the late 1960s and mid 1970s when the 'ultralight revolution' began (National Air and Space Museum, 2020). At the time, there was a huge boost in demand for less expensive airplanes, as fewer people could not afford available conventional planes made by Beech, Piper or Cessna (Wright, 2014). Pilots and engineers started to experiment by adding small gasoline engines to flex and fixed wing gliders, culminating in the game-changing moment when smaller two cycle engines were able to swing larger propellers (Sport Pilot Aviation, 2021.). Nowadays, with growing indulgence in aero activities the demand for suitable ultralight and light aircraft continues to grow, which is resulting in assuring more safety and regulations.

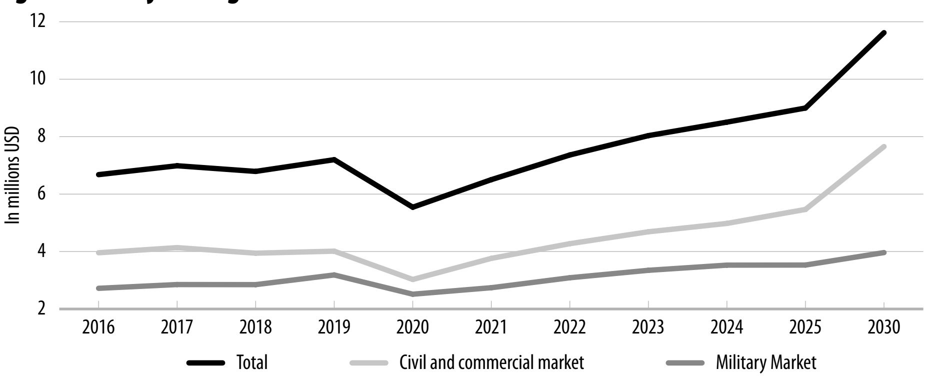
Table 1. Global market breakdown by region

Market	Market share in % (2020)	Market size in USD million (2020)	Projected growth in % (2020-2030)
North America	45	2,498	7.1
Asia Pacific	21	1,143	8.5
Europe	17	962	8
Latin America	10	562	6.6
Middle East & Africa	7	378	9.3
Total	100	5,543	7.7

Source: Markets and Markets (2020).

In 2020, North America had the largest share of the global market, as they lead in the number of wealthy individuals combined with major ultralight and light aircraft manufacturers such as Textron, Piper Aircraft, Cirrus Aircraft, and others. The region is expected to continue growing (Table 1) mainly due to anticipated reforms in the sector of aviation. However, in the next years fast growing economies, including China and India, will present many new opportunities for fruitful market growth, as they advance with highly productive labour and new aircraft programs. Interestingly, the highest projected growth of 9.3 percent will be in the Middle East and Africa, due to the increasing demand for private jets for tourism and other commercial applications in the Middle East. Despite a fall in sales and revenue due to COVID-19, the overall market is expected to grow from \$5.5 billion in 2020 to \$11.6 billion until 2030 (Figure 1). This represents a compound annual growth rate (hereafter CAGR) of 7.7 percent and includes certain obstructions, such as fluctuation in aircraft deliveries. The civil and commercial use market (mostly agriculture, training and medical use) is expected to have a CAGR of 9.7 percent by 2030, which is five percentage points higher than the market for military purposes (Markets and Markets, 2020).

Figure 1. Projected global market size 2016-2030 in USD



Source: Markets and Markets (2020).

Moreover, current general advancements in technology have facilitated the development of semi and fully autonomous unmanned aerial vehicles (UAVs), which are equipped with motion-detecting sensors, used mainly for military purposes. Therefore, several types of UAVs with a high autonomy level, ranging from fixed wing to multirotors or distributed propulsion fix wing, are currently being developed globally (Markets and Markets, 2020). Nevertheless, aviation in general is estimated to be responsible for almost two percent of global carbon dioxide emissions. Experts believe that the industry is one of the hardest to decarbonize, as the needed fuels and technology are currently underdeveloped, meaning that the aviation industry's global share of emissions will increase with other sectors being more successful in finding cleaner solutions (Nugent, 2021). As aircrafts cruise at high altitudes, emitted particulates and nitrogen oxides create an even greater danger. To mitigate these negative effects emission free, sustainable electrically powered aircrafts are being developed. In 2016, Pipistrel developed the first serially produced electric motor ultralight aircraft in the world, weighing just 350 kilograms. Even though this segment of the market is still in its early stages, experts and industry players expect it to be a significant aspect in the future (Intelligent Aerospace, 2020).

Alongside healthy growth predictions, the market will also be faced by a few challenges in the next decade. Firstly, flying of UAVs for defence, as well as civil or commercial use, will be highly dependent on approvals of regulatory authorities and respective governments, as they must ensure suitable air traffic management, controller training and data gathering. Hence, the benefits of using UAVs will have to outweigh the cost of building an according infrastructure.

With the market expansion there is also an increasing uncertainty regarding passenger safety, as the small space and light materials make it hard to ensure safety equipment used in larger aircraft. Similarly, when it comes to UAVs, there is a huge issue with possible system hackers, which can be especially problematic for military UAVs (Markets and Markets, 2020).

1.2 Trends in the ultralight aviation industry

The ultralight aviation sector is still regarded as a relatively new and unsaturated industry. Therefore, it is important that we analyse both the historic development of this field as well as the future trends that are becoming increasingly important for companies working in this industry. It will be key for the future growth of Pipistrel to follow and improve on all current light aviation trends (See Table 2).

Table 2. Overview of key trends in the light aviation industry

	Unmanned aerial vehicles (UAV)	Electrical vertical take-off and landing aircraft (eVTOL)	Aircraft electric propulsion	Urban air mobility (UAM)
Key information	• More commonly termed as drones • *Remotely piloted* or *autonomous* aerial vehicles that play a significant role in the defence and commercial sectors • Used for border surveillance, mapping, surveying, cargo delivery, urban air mobility, etc. • Expected to commercialize by 2023	• Aircraft designed to take-off and land vertically • Considerable improvements in safety, noise reduction, as well as increased comfort, flexibility, and convenience • Viable alternative for intracity travel • Increasing levels of R&D spending in this field by established aviation and transportation companies such as NASA, Airbus and UBER	• Expected to reduce carbon emissions in the aviation sector, as well as reduce flight costs and open new market segments • More than 200 electrically propelled aircraft currently under development • Low ownership and maintenance costs, as well as global environmental trends are the main drivers of the market	• Global urban population is expected to reach 60 percent by 2030 • Urban air taxis are expected to be highly time-efficient and drive down transportation costs • Through various flagship pilot projects, 3,000 passenger drones are predicted to commercially operate in Europe in three to five years • The main drivers of the market are predicted to be e-commerce companies offering last mile delivery, ride sharing companies catering to the intracity market and scheduled operators offering intercity rides
Market size	• $27.4 billion in 2021 • Projected to reach $58.4 billion by 2026, growing at a CAGR of 16.4 percent	• The market is forecasted to reach $4 billion by 2030, growing at a CAGR of 30.3 percent	• Valued at $110.23 million in 2019, • Expected to grow to $1.27 billion by 2027 (CAGR of 35.8 percent)	• Expected to grow from $2.6 billion in 2020 to $9.1 billion by 2030, CAGR of 13.5 percent

Source: Markets and Markets (2020).

Electric aircraft propulsion represents one of the most important trends in the aviation industry currently, due to the environmental shift that is currently well under way all over the world. The fact that Pipistrel currently holds the only certified electrically propelled airplane, makes them the current market leader in this segment. Moreover, Pipistrel must not forget to pay attention to the trend of unmanned aerial vehicles, which are being increasingly used by governments and militaries for border surveillance. Presently, the unmanned program at Pipistrel presents more than 20 percent of the company's turnover. Furthermore, the high concentration of urban population nowadays calls for a much-needed solution to the problem of traffic congestion in cities all over the globe. The likely solution in this case lies in the form of urban air mobility and further improvements in the eVTOL (Electrical vertical take-off and landing aircraft) segment.

2 Company overview

Pipistrel d.o.o. is a world-renowned family-owned ultralight and light aircraft manufacturer headquartered in Ajdovščina, Slovenia. It was established in 1989 by Ivo Boscarol, who up to this date remains the company's CEO. Over the 30 years of its existence, Pipistrel has sold more than 2,200 aircraft all over the world, while the company is mostly known in the aviation industry for their extremely aero-efficient planes and their pioneering efforts in the space of electric aircraft propulsion. Initially established as a garage producer of powered hang gliders in the former Yugoslavia, the company nowadays boasts a selection of 12 ultralight and light aircraft models, for which it also holds more than 120 international type certificates from administrations like CAAC[1] and EASA.[2] With innovation and sustainable development at the forefront of Pipistrel's ambitions, it is to no surprise that the company has won several prestigious aviation awards (Pipistrel, 2020), such as NASA Personal Air Vehicle (2007), NASA General Aviation Technology (2008), and NASA Green Flight Challenge (2011). Recently, Pipistrel has also achieved a significant milestone in the aviation industry by creating the first certified electric aircraft in the aviation history (Velis Electro) and becoming the first certified producer of electric motors for aviation with its newest E-811 electric engine model (T. Boscarol, personal communication, June 27, 2021).

As of 2020, Pipistrel employs around 250 employees (Zart, 2020), while its operations are currently based in three countries – Slovenia, Italy and China. Moreover, the company also has an integrated network of dealers present in more than 60 countries worldwide. Until a few years ago, all Pipistrel's planes were produced in their headquarters in Ajdovščina, Slovenia. However, due to no bilateral agreement on the topic of aviation safety and certification approvals between Slovenia and the U.S., necessary for the export of aircraft to the U.S., Pipistrel expanded a part of their production abroad in 2017 - just 20 minutes across the border to Gorizia, Italy. Besides better weather conditions in Gorizia for doing the necessary aircraft test flights, this was mainly done to gain access to the large and lucrative U.S. market, which contributed 12 percent to Pipistrel's total sales in 2019, whereas the EU and India accounted for 51 and 20 percent, respectfully (Pipistrel, 2020).

Establishing the part of final production abroad, the main headquarter in Ajdovščina is now mainly responsible for logistics, procurement, sales, and

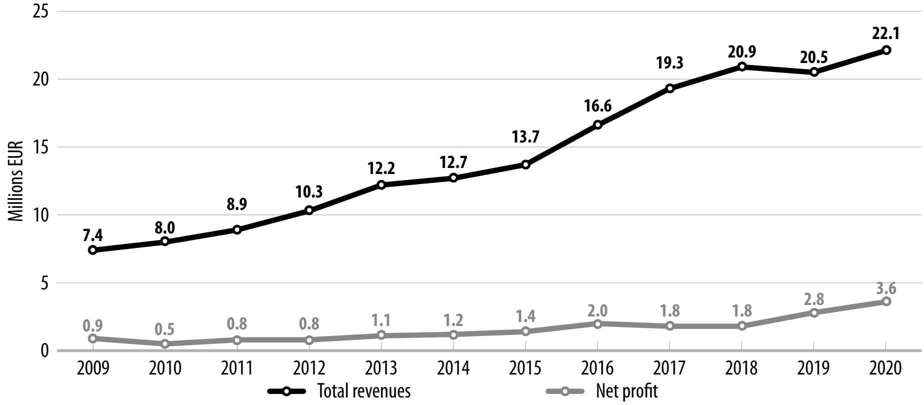
1 Civil Aviation Administration of China
2 European Union Aviation Safety Agency

after-sales activities, while another branch of Pipistrel – Pipistrel Vertical Solutions, was formed in Ajdovščina in 2017 to take over the innovation and certification activities, as well as common services, such as HR, finances, accounting, and IT support. In addition, Pipistrel established a joint venture Pipistrel Asia-Pacific with a Chinese investor in 2016 to build a factory in China as a part of the Jurong Aviation Park Project, which will also include a new airport, residential quarter and modern villas. Pipistrel is entering the deal as a technology and know-how provider, while the Chinese counterpart is gaining the exclusive production rights of Pipistrel Alpha Electro and Panthera Hybrid models in China, with the expected production of 500 airplanes annually once the production facility is up and running. Pipistrel is also selling the exclusive rights to sell the mentioned aircraft models in China and non-exclusive rights to sell in 11 other Southeastern Asian countries, which will greatly increase Pipistrel's access to the Asian markets (Pipistrel Aircraft, 2018).

Pipistrel's main competitive advantage lies in the fact that they can produce their planes almost completely in-house, which helps them to be fast and efficient. This can mostly be attributed to holding an EASA Design Organisation Approval as well as approvals from other countries and, thus having the capability of bringing a new aircraft design concept from a basic idea into a certified design, ready for production. While most of the smaller components are sourced from external partners, Pipistrel does everything else in-house, from idea generation and development, prototyping, on-ground and in the air testing, to certification processes, serial production and even sales and after-sales activities (Pipistrel, 2020). To achieve affordability of its planes, Pipistrel has based their entire manufacturing process on a highly efficient lean manufacturing procedure called the 20 keys, developed by Toyota. Pipistrel also does not have a marketing department, as they rather invest their excess cash into innovation activities to ensure the company is able to sustain its market position, believing good and innovative products will bring their own publicity (Mekina, 2018). While this approach has been successful for Pipistrel in their relatively niche industry over the past couple of decades, it is very hard to imagine Pipistrel scaling-up and becoming one of the companies shaping the future of air travel, as stated in their mission statement, by following the current business model. Even though the immense quality of Pipistrel's products is enough to raise considerable awareness in the aviation industry, the flight manufacturer from Ajdovščina will need to create a strong brand if the company is to survive in the long run; not only to achieve recognition from the public, but to create and manage relationships with investors, partners, potential employees, etc.

who would all share the vision of emission-less air travel as strongly as the team at Pipistrel does.

Figure 2. Total revenues and net profits of Pipistrel d.o.o.* between 2009 and 2020 in million EUR

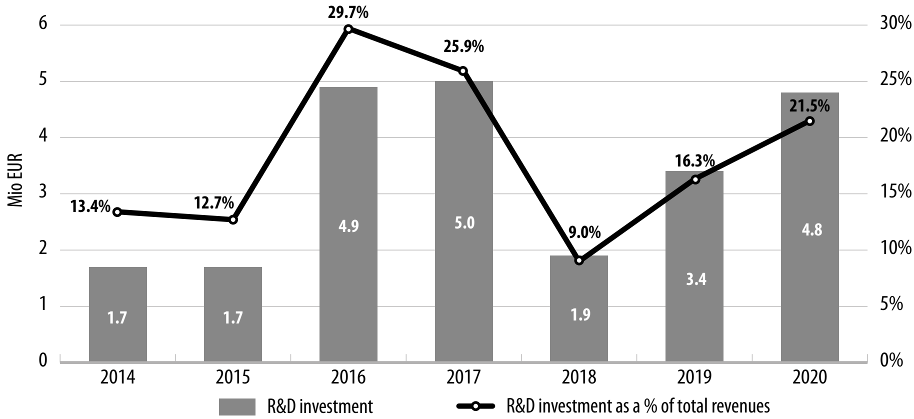


* Not considering Pipistrel Vertical Solutions d.o.o., Pipistrel Italy Srl and Pipistrel China.

Source: Gvin Poslovne Informacije (2021).

Today, Pipistrel d.o.o. is producing around 200 airplanes annually, with 40 percent being all-electric (Pavšič, 2021). In 2020, Pipistrel d.o.o. realized total revenues of €22.1 million, which have grown substantially between 2009 and 2020 at a CAGR of 9.5 percent (Figure 2). The company's net profits amounted to €3.6 million, the largest in the company history, and grew at a CAGR of almost 12 percent since 2009. Pipistrel d.o.o. has also been investing significant amounts into R&D activities (Figure 3), allocating between 10 and 30 percent of its annual revenues towards research and development between 2014 and 2020. There was a sharp increase in the R&D activity in years 2016 and 2017 (Figure 3), which was due to a fulfilment of a large order for the Indian Military. In the recent years, Pipistrel has mainly been investing in the certification of its fully electric airplane Velis Electro, as well as towards development of electric and hybrid engines. The company is said to be exiting the ultralight aviation industry and stopping the production of fuel-cell powered airplanes by the end of the decade. In addition, the R&D department at Pipistrel Vertical Solutions is also developing an electric eVTOL air taxi for UBER, a revolutionary long-range large-capacity heavy-weight autonomous eVTOL UAV for logistics and aerial cargo delivery, as well as a hydrogen fuel-cell powered 19-passenger regional aircraft, planned to be released by 2028 (Pipistrel, 2020).

Figure 3. R&D investment activity at Pipistrel d.o.o. between 2014 and 2020



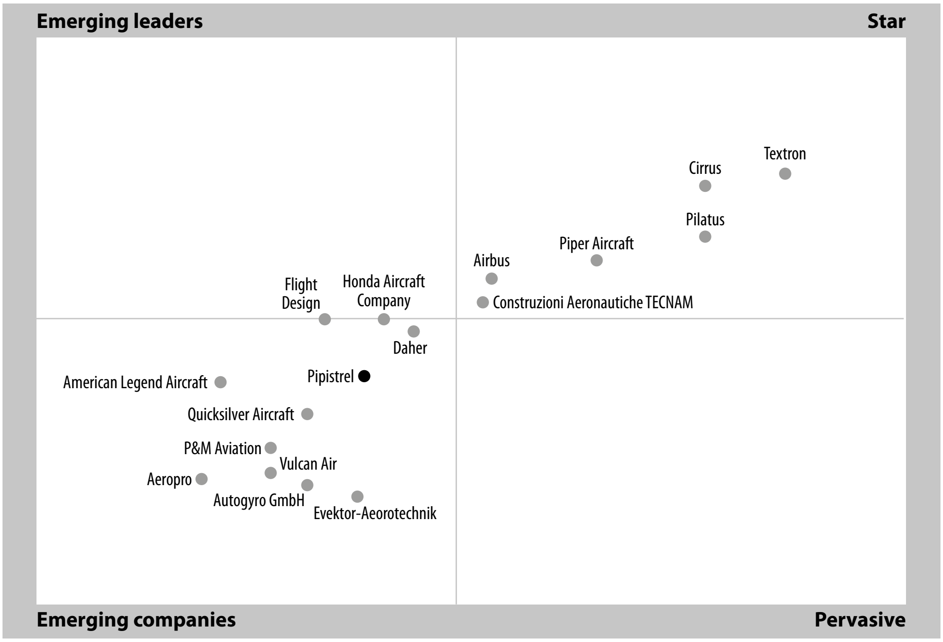
Source: T. Boscarol, personal communication (June 27, 2021).

3 Business model evaluation and managerial implications

Pipistrel is definitely one of the most innovative and globally recognized Slovenian companies. According to the data provided by Pipistrel, they define themselves as immensely financially stable, having one of the most well-known as well as trustworthy CEOs in Slovenia. This can be partially proved by the fact that their CEO has been receiving the Reader's Digest Trusted Brand award for "The most trusted businessman" in Slovenia for nine years in a row now (Marketing Magazin, 2021). Furthermore, they have been able to operate without a single loss for the past 32 years since their establishment. Their core business model revolves around "pioneering" in the aviation industry. According to the company, they currently have no direct competitors in 3 segments: Type certified electric aircraft covering 100% of the global market as the only one to obtain the Type certificate until today, as well as in Ultralight and LSA class electric trainer and 2 seat side by-side electric self launch glider (Pipistrel, personal conversation, 2021).

However, based on our own research Pipistrel does in fact have many competitors on other aircraft segments and are globally perceived more as an emerging company rather than a star in the market (Figure 4). Even though company claims to have full market share in certain segments, they must realize, that other companies are likely to enter those segments as well, especially the electric aircraft market. Accepting that a company has (potential) competition and is trying to learn from it is in our opinion key for business success, thus we would suggest that Pipistrel focuses more on learning from their (potential) competition rather than acting as if it does not exist. This could help them both in their own business development as well as it would ensure that competitors do not overtake the market (Markets and Markets, 2020).

Figure 4. Ultralight and light aircraft market competitive leadership mapping in 2019



Source: Markets and Markets (2020).

Going more into detail on their business model, as we have mentioned beforehand, they have clearly divided operational units that each fulfil their respective roles. Based on the financial and operational results of Pipistrel in the past years we believe that their sister companies approach to their business model is truly efficient and ensures a clear division of responsibilities as well as a more effective production line. According to Pipistrel, the main aim of their business model is long-term growth and development. They want to build success on traditional business values and respect towards their employees, customers and partners, profit is by far not their core motivator.

Generally speaking, Pipistrel has a successful business model. However, we would suggest that they start investing even more into new product development and into designing the next new innovative solution, which would admittedly open new positive and negative externalities, but that is the case in any type of business innovation processes. Furthermore, diversification should be key for them since they do have (potential) competitors, which pose a serious threat, thus Pipistrel should have more streams of revenue. Even though their airplanes are unique and are definitely successful, the long-term fruitfulness of their products lies in the hands of government officials; unless the legislations is adapted and changed, Pipistrel could encounter some future issues. That is why we believe that they should expand their business model into segments that would allow them more stable and quicker results, while still working on their flagship project. Pipistrel already started discovering new opportunities with their projects including cargo HVTOL, passenger VTOL, microfeeder and miniliner types of aircraft, as well as with hydrogen cells and their extreme range surveillance platforms. Which segment would be most successful in the end primarily depends on the future direction that the company wants to take, from diversifying into other transportation segments to developing a new more standardized product. There is a wide variety of different paths they could take.

To further investigate the true success of Pipistrel's business strategy, we conducted an interview with an industry expert (working in a Slovene company that owns multiple small aircraft) who truly highlighted their innovativeness. He particularly stressed the amazing Pipistrel's R&D capabilities (Industry expert, personal interview, July 1, 2021). They have created an environment with skilful employees and a great infrastructure that enables them to develop truly innovative solutions to the complex problems they face daily. Another indicator of their success is the fact that Pipistrel creates 3D models of all parts used in their airplanes. Pipistrel is the first aircraft producer in the aviation history who Type certified the aircraft with 3D additive technology produced parts. In general aviation (smaller and sporting aircraft) that is usually not the case.

Historically, engineering skills paved the way to the development of the firm. However, as the firm expands, a too strong of a focus on engineering is not necessarily good, since it can prove to be a big hurdle for the growth of the company. One area in which the engineering mind-set is really contributing to the success of Pipistrel is their R&D and production (Industry expert). When someone is operating a small workshop, it is crucial that their products are of high quality to be able to compete with bigger players. They need to be able to cater to a variety of different needs of their customers and be substantially flexible with customization options. Over the years, Pipistrel has accumulated unique industry know-how and highly qualified employees that allow them to fulfil the aforementioned aspects. They still mostly focus on designing outstanding aircraft with great performance using new technologies. The second area they excel in is the production of their aircraft (Industry expert, personal interview, July 1, 2021). Since they are constantly updating their infrastructure, they are able to use the best technologies and new methods in the production of their products.

However, there is also a negative consequence that Pipistrel faces from their engineering mind-set history. When owning a workshop, people create truly amazing unique products. Nevertheless, they may not be able to always provide the highest level of support to their customers. When talking to our interviewee, he mentioned how they sometimes still struggled with customer support (Industry expert, personal interview, July 1, 2021). That was due to their incredible commitment to the development and production, which resulted in a slight loss of focus with regards to the maintenance of their aircraft, as well as other customer support aspects. Pipistrel operates with its own network of dealers and service centres in more than 60 different countries on different continents (Pipistrel, 2020). Based on the experience of the above mentioned expert, Pipistrel's upkeep services do not match the quality of their production (Industry expert, personal interview, August 26, 2021). For example, one specific detail mentioned in the discussion with the expert was Pipistrel's manuals, as they can sometimes appear very vague and not treated with enough care, as well as attention to detail. There is also room for improvement in every other area of aftersales services. Therefore, we would suggest Pipistrel to improve their aircraft support and maintenance services, as this is where the true difference between small workshops and well-established enterprises lies.

Furthermore, we would suggest Pipistrel to focus on developing a marketing department. As Mr Boscarol mentioned (Mekina, 2018), they believe that good products speak for themselves, and they don't require additional marketing. The thinking behind this decision can be again attributed to the "craftsman-workshop" mentality. When workshops are extremely limited with their capabilities, then their organic reach might be enough. But when companies are trying to transform themselves and scale up their models, they most definitely do require a dedicated marketing department. Engineering companies often view marketing as a waste of money. The reality is the very opposite. Marketing departments through their activities help increase the value of their products. Companies can sell at a higher price to more customers than they would without marketing. Furthermore, when companies are trying to compete globally with other players, marketing is at the end of the day the most important competitive advantage that all companies need in order to succeed.

We would also like to stress the importance of introducing electric aircraft to the market. This is definitely a step into the right direction. It gives them a first-mover advantage, which enables them to shape the market and set the expectations for the entire segment. Pipistrel should try to continue developing new types of electric engines as well as engines that are powered by fuel cells. They are undeniably making a big change and could represent the future of ultralight airplanes. At the same time, zero emission electric aircraft have the potential to hugely contribute to decarbonisation. With harsher requirements and ambitious environmental laws this can represent a crucial differentiation factor compared to other companies. However, the first-mover advantage is not enough in itself, and they need to focus on continuous development and resilience, as well as other areas, to find opportunities for improvement.

Pipistrel will have to face the problem of their leadership in the future. Ivo Boscarol embodies Pipistrel, its values and goals. However, like all people he will have to retire one day. They must prepare for the eventual change in leadership and start looking for a new CEO of the company. In case they aren't prepared early enough, they can face new leadership without the expert knowledge, charisma and especially vision of Mr Boscarol. Such an event can have potentially catastrophically consequences for Pipistrel. Luckily, there is enough time to prepare adequately and find the appropriate candidate to take over when the time comes.

Pipistrel is focused on sustainable growth and currently they are considered to be successful at it. However, if Pipistrel wants to scale up quickly and efficiently, then they might want to also consider other potential ownership/business model opportunities. One of the options is that Pipistrel will be acquired by a bigger company from the aviation industry. This chance will enable Pipistrel to easily expand their operations and increase their production. They would also be able to support Pipistrel in maintenance and customer support fields. This could really help improve Pipistrel and its brand. The main goal of the company acquiring Pipistrel would be to own and use their innovative engineering solutions. Another option would be to focus just on creating innovative solutions and direct the majority of resources towards Pipistrel Vertical Solutions. That would enable them to create new solutions they could sell to other companies as intellectual property. Other companies would then produce the actual products and aircraft. It should be mentioned that Pipistrel Vertical Solutions already offer R&D services to other companies. The third possibility is to focus more on joint ventures. As mentioned before Pipistrel already has a joint venture in China. They could expand their current operations and with the help of their partners focus on conquering new markets. Lastly, Pipistrel can keep the current model and continue in private ownership of the Boscarol family. There are of course benefits and dangers to all the above listed options. New partnerships could help them get more funds and share the risk of new projects with them. However, there is always a danger of being exploited.

Conclusion

After thoroughly researching, analysing, and interpreting both Pipistrel and the broader industry of light aviation, we can safely say that Pipistrel is one of the most important global players of the industry. The company is most definitely successful in their niche market and is a textbook example of good production practices in the light aviation industry. However, as much as Pipistrel excels in some factors of its business model, it is ignoring and not dedicating enough attention to other segments of the company that are immensely important for their future success. No company should underestimate the threat of competition, even if they are just entering the segment. These are dangerous practices that should not be present in any company with a long-term vision of continuous growth. There are numerous cases of small disruptive companies overtaking big incumbents controlling the industry. Thus, we believe that with more investment into R&D that would develop alternative products or other diversification activities of Pipistrel's business together with a new dedicated marketing department that would thoroughly analyse the activities of the competition as well as convey the success and unmatched quality of Pipistrel's aircraft to the world, is a great recipe for future success of the company. Lastly, a clear line of succession must be created when a company wants to scale itself, it cannot fully lie on the shoulders of one individual, which is another dangerous practice that is likely to become a big issue in the future. In conclusion, Pipistrel is definitely a company that produces one of the highest quality ultralight aircraft in the world, which in itself is a great foundation for future scaling. With just a few relatively simple tweaks to their business model, they truly could become the best in the world.

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IV.

BUSINESS ECOSYSTEM FOR HIGHER PRODUCTIVITY GROWTH

Ada Guštin Habuš, Dominik Božić, Federica Zanasi

SUPPORTING NEW BUSINESS ECOSYSTEMS DEVELOPMENT

Introduction

Rapid digital transformation of business processes, blurred industry boundaries, complex relationships with customers and suppliers, and lower entry barriers to the market for new competitors represent today's business reality, especially for small and medium-sized enterprises (SMEs). The answer to rapid changes in the industry might not lie in traditional business models, products, and strategies. The concept of business ecosystem (BE), an alternative to conventional business models, was defined as "an economic community supported by a foundation of interacting organizations and individuals" (Moore, 1993). Today, a BE presents a networked yet relatively free collaboration between several organizations that ranges from small firms to large corporations (suppliers and distributors), universities, research centers, public sector organizations, and other parties, which positively affects adaptability, flexibility, and ability to respond to customer needs (Moore, 1996; Sarafin, 2021).

What is unique in BE is that companies compete with each other and cooperate at the same time to deliver a particular product or service to a common set of customers. They may also sell to each other in other contexts, though that activity is not part of the BE. At least one member of the BE acts as the participants' leader or orchestrator, responsible for the structure and performance of the BE, including governance, commercial arrangements, go-to-market coordination, value creation mechanisms, value sharing mechanisms, and risk management. However, all members in a BE, whether orchestrators or participants have their brands present in the value propositions (Sarafin, 2021). These uniquenesses differ BE from other concepts, such as science or technology parks (STPs). Mainly, STPs usually involve high specification office space and are managed by specialized professionals whose primary purpose is to support the creation and development of knowledge-based enterprises, which do not necessarily cooperate with each other (The United Nations ESCAP, 2019).

Therefore, being part of a BE can improve a firm's innovative capacity and accelerate its further growth. BEs are a great opportunity for SMEs, since by entering one firms might benefit from interdependency, cooperation and co-evolution, better communication, improved logistics, and easier access to financial services compared to traditional business models (Bossen, 2020).

This chapter first presents characteristics of the most prominent types of BE and how they differ based on their purpose and the players involved. Secondly, it describes how to design an efficient BE and states the key challenges one faces when designing them. Thirdly, the chapter introduces five BEs in practice through which it offers a thorough insight into their organizational structure, essential participants, and leading activities. Following an overview of five BEs, we draw a set of essential characteristics and vital elements of success for each one of them. Afterwards we conclude.

1 Characteristics of business ecosystems

1.1 The definition of a business ecosystem

The goal of a BE is to optimize the collective benefit through independence or semi-independence from external suppliers, thus lowering production costs, leveraging the collaborative effort in research and innovation, and efficiently streamlining knowledge, ideas, and capital sharing within the ecosystem (Sarafin, 2021). When tight interrelationships are formed among players participating in a BE, the entry barriers to that same level of knowledge and productivity become higher for other single competitors. Ultimately, joining an existing BE or establishing a new one enables SMEs to carefully approach the digital economy requirements and, in collaboration with other partners, adopt the most proper strategies, develop innovative business models, test them on the market, and gradually modify their value chain (Bossen, 2020). Various BE types exist on the market (Table 1).

There are two most common approaches to organizing BEs: top-down and bottom-up. The **top-down or centralized approach** follows individual actors' interests, and the ecosystem is developed around a central platform. The system is coordinated and controlled by the company. While this approach allows for rapid development and easier coordination, the drawback is that it is highly dependent on the central actor and their needs. Therefore, its co-evolution together with other partners is heavily limited. On the other hand, in a **bottom-up approach**, the ecosystem comprises several specialised partners that are chosen and operate solely based on customers' needs. In other words, it is a result of the needs for a specific solution. This approach favors equal integration of partners and mutual dependency, higher opportunities for co-development, and higher resilience, resulting in lower chances for one partner to dominate the others. Nevertheless, coordination problems are still present as no superior rule or entity regulates the processes from above (Lenkenhoff et al., 2018).

1.2 Designing an efficient business ecosystem

Designing a BE requires considering not only value creation and delivery but also value distribution among ecosystem members. However, one of the most relevant questions is whether a BE is the most sensible business organization to solve a given problem in the first place. BEs face competition from traditional organizational models (vertically integrated organizations, hierarchical supply chains, and open-market models), and are therefore very efficient in uncertain but highly malleable environments, with both a possibility for modularity and coordination among actors (Pidun et al., 2020).

The main organizational and operational questions must be answered before designing a BE to determine the most efficient structure. Boston Consulting Group analysed 100 successful and unsuccessful ecosystems and created a six-step process for creating a business ecosystem, which should be followed by every BE (Pidun et al., 2020):

1. **What is the problem that you want to solve?** The starting point must always be individuating the problem and understanding whether a BE is the most suitable solution: Is the problem big enough to justify the significant upfront investment needed? Does its value proposition tackle existing friction or an unmet customer need?
2. **Who needs to be part of your ecosystem?** Determine the core actors needed by mapping the value blueprint, define the minimum number of players needed to deliver the core value, assign them well-defined roles, and expand the ecosystem once established.
3. **What should be the initial governance model of your ecosystem?** The chosen orchestrator has to be accepted by all players, and, to do so: 1) it

needs to be an essential member; 2) should have a central position with strong interdependencies; 3) must be perceived as fair and/or neutral; 4) is likely to be the candidate with the highest net benefit and matching ability to sustain the upfront investment.

4. **How can you capture the value of your ecosystem?** To solve the monetization question, it must be defined whom to charge and how much. Strategic monetization helps in avoiding bottlenecks and stimulating innovation.
5. **How can you achieve sufficient participation of both partners and customers in the launch phase?** The focus should be on creating a comprehensive solution rather than being the first mover and attracting the right participants to form a minimum viable ecosystem rather than a large, non-complementary number of them.
6. **How can you ensure long-term scalability?** Many BEs fail due to the lack of scalability opportunities. This challenge can be addressed by orientating the BE to both demand and supply-side economies of scale (Pidun et al., 2020).

To ensure the success of the BE and not to incur fatal misjudgement errors, it is crucial to define the critical challenges to the development of BEs to learn how to avoid or overcome them.

The **challenges** that relate to **interoperability** are mainly:

- *Technological challenges:* incompatibility of platforms and infrastructure due to the lack of standard rules and protocols for communicating, storing, exchanging, information among entities, etc. (Chen et al., 2008).
- *Organisational challenges:* each entity has not only its internal operational mechanisms, but also communication styles and culture. Coherence in decision-making is at the foundation of functional exchange relationships and trust among autonomous partners. They should have a well-defined and hierarchically organised structure, where key partners should coordinate activities and information flow between partners (Adner & Kapoor, 2009). The key partners should also define operational standards and protocols to ensure interoperability within the ecosystem.

Actor related challenges refer to competencies of different stakeholders taking part in BEs:

- *Creativity, connectivity, collaboration, and community* are necessary competencies that the actors must possess (Karakas, 2009).
- *Complementarity* among partners is especially valued in more decentralized bottom-up ecosystems, allowing cooperation and co-evolution among partners (Chen et al., 2008).

Table 1. A systematic overview of various business ecosystem types

Type	Description	Example
Platform business ecosystem	Service-oriented BEs, *platform* is the central element for the development of the ecosystem. The platform is necessary to: • connect and coordinate all players involved, • make interactions easier, • allow customers to access the product or service, • compensate for customer's lack of necessary technological infrastructure and avoid significant capital investment.	Apple's App Store
Digital business ecosystem (DBE) **IoT Business Ecosystem**	• Similar structure to a platform BE. They include an exclusively digital platform on which the BE relies to exist and function. • Essential characteristics to function appropriately: independence from specific providers, code accessibility, usability, and maintenance non-dependent on suppliers. • Characterised by a shared set of assets connecting the physical with the virtual world.	Android; Shopify Bosch IoT Suite
Innovation ecosystem	• Based on innovation, not on existing products, services, or technologies. • Related to value creation instead of value capture like DBEs. • Having a lifecycle that follows a co-evolution process and value co-creation.	Tesla; Cisco; High Tech Campus Eindhoven; Medical Hub Crikvenica
Knowledge ecosystem	• Found in the proximity of universities, their goal is knowledge generation. Also defined as a BE of knowledge-sensitive companies. • Characteristics: knowledge sharing, mobility of personnel, and geographic colocation advantage, important for advancing technological innovation.	National University of Singapore; Yale Art Gallery; Centre for British Art and Peabody Museum of Natural History
Entrepreneurial ecosystem	• Usually start-up related organizations (entrepreneurs, investors, end-users) built around an entrepreneur or an entrepreneurial team. • Main goal: generation of prosperity and economic wealth as their primary goal. • To function properly they should be nurtured by governments (through established business accelerators, incubator programs, low-interest loans, etc.).	Silicon Valley start-up ecosystems; Apple, Yahoo, Google, Facebook in their start-up phases; Medical Hub Crikvenica

Sources: Bart Clarysse (2014); Faber et al. (2019); Fragidis et al. (2007); IARU (2021); Scaringella & Radziwon (2018); Stanley & Briscoe (2010); de Vasconcelos Gomes et al. (2018).

Estimating the impact of a possible failure is crucial before initialising any collaboration with a new player and integrating them into the ecosystem (Hussain et al., 2007). Indeed, cross-geographic market research shows that less than 15 percent of all ecosystems are sustainable in the long run. Specifically, a good half of the analysed BEs did not reach 50 percent of the market share and never took off. Some succeeded immediately with an 80 percent market share but halved it while declining within seven years; others peaked at 80 percent and then kept stable at around 60 percent. The remaining BEs represent fewer than 15 percent of all ecosystems, they have maintained their position to date, evolving into big players (e.g., Windows, Amazon), while generating an average profit margin of 29 percent compared to the 1 percent of those BEs struggling to break even (Pidun et al., 2020).

The political will of local governments is fundamental to providing resources and legislative support. Additionally, they play a crucial role in every development phase of the BEs as they can maximise socio-economic benefits by reducing corruption and bureaucracy (Senyo et al., 2019).

1.3 How SMEs can benefit from entering a BE

In the context of the Fourth Industrial Revolution, BEs are an essential tool for SMEs to capture the benefits of digitalization, thus strongly contributing to their competitiveness.

- The digital platforms that BEs usually rely upon allow for better communication and information sharing, resulting in decreased information asymmetry and improved decision-making, and provide more advanced quality assessment tools (International Trade Centre, 2018).
- Joining a BE increases access to financial services: SMEs show the highest credit constraint, with an estimated rejection rate for trade finance requests up to 50 percent compared to seven percent for multinational companies (World Trade Organization, 2016).
- A BE can also rely on better logistics by investing in its own logistics system, whereas SMEs often lack the resources to run in-house operations.

For these reasons, BEs increase the entry barriers for competitors who must replicate the product or service while competing with a tight network of complementary businesses. Ultimately, an SME that joins a BE can benefit from increased control over critical areas of its business environment, improved knowledge and information sharing, leverage technology, reduced operational costs, and higher financial and investment opportunities (International Trade Centre, 2018).

2 Business ecosystems in practice

The following section presents case studies of five different BEs with the scope of showcasing successful examples from more extensive and global BEs to smaller regional ones, focusing on how BEs can benefit from the support of local and national governmental entities, how SMEs with different backgrounds can be aggregated and prosper under the same BE, and how the right platforms, technologies, and know-how can shape the expansion beyond national borders, which are some of the questions that influenced the selection of the following cases.

2.1 High Tech Campus Eindhoven, Netherlands

The High Tech Campus Eindhoven (HTCE) is an innovation-based BE for high-tech R&D and is often described as "the smartest square kilometer in Europe". Philips, the original force behind the HTCE, established the campus to create a space to reinforce the interaction between researchers and product developers with different technical backgrounds (Romme, 2017). The HTCE currently combines more than 235 high-tech companies and institutes and over 12,500 innovators, researchers, engineers, and entrepreneurs. Companies range from multinationals firms, such as Philips, NXP, and Intel, to small and mid-sized high-tech firms, research institutes, service companies, scale-ups, and startups. They all collaborate and share a common goal of developing new products and services that tackle social problems and challenges and successfully bring these to the market (High Tech Campus Eidenhoven, 2021).

Overall, the HTCE provides an innovation ecosystem for companies operating in high-tech systems, nanotechnology, smart pharma, embedded systems, life sciences, and security and encryption. It enables its residents access to shared resources and facilities to facilitate R&D and product development activities. Besides, it is an innovation community that enhances knowledge sharing between people on the campus (Romme, 2017).

To reach all that, the HTCE BE builds its unique value proposition on the five drivers that reinforce each other so that the firms achieve exceptional focus on both performance and innovation. Namely, the HTCE (1) ensures minimal physical distances between buildings and offices, which provide easy access to technological facilities and other people on campus; (2) hosts a large number of events to facilitate informal networking and knowledge sharing; (3) grows and sustains the diversity of the population of residents and selecting new residents that fit and reinforce its profile and motivating residents that do not contribute to the BE to leave; (4) attracts various programs that provide capabilities for initiating and managing collaboration between the residents; (5) has a management team that ensures a high level of responsiveness to residents' requests (Romme, 2017).

2.2 Cisco Systems, USA

Cisco Systems, Inc. is a technology leader in the Internet infrastructure market. Since 1993, it has followed a merger and acquisition (M&A) strategy to acquire and integrate competitors to enlarge its product offering. Cisco's BE can be defined as a hybrid of two different BE types: (a) the platform ecosystem as it relies on a common platform for product innovation; and (b) the innovation ecosystem because its primary goal is research and development (R&D) and new products and technology development (Li, 2009).

Since June 2021, Cisco has acquired 180 companies (Cisco, 2021). To facilitate the coordination and collaboration between so many entities, Cisco follows a 'people strategy' that focuses on keeping top talents through pre-merger agreements, which assures Cisco that the employees staying onboard are truly motivated. Moreover, Cisco addresses possible concerns through a seven-step strategy (awareness, information, personal, management, consequences, collaboration, and refocusing), where collaboration represents the most critical step. The acquired employees should be eager to learn how to collaborate best. Such a strategy helps members of the BE stay independent and co-evolve with Cisco's roadmap (Mitchell, 2014). M&A allows to manage innovation externally, diversificate, promote growth (resulting in new patents for new products) and manage planned cannibalization while training engineers in Cisco technologies and making hardware companies build products based on the Cisco standard (Li, 2009).

The main takeaway from Cisco's case is that relying on external partners to incorporate new technologies, ideas, and capabilities from different areas can be reinvigorating for the company's tech and product innovation. The main challenges in following this example are: (a) from the future perspective, assessing which technologies, patents, and companies it is worth investing in; (b) from the social perspective, finding the proper way to connect players with different cultures and backgrounds by putting people first and considering the specific challenges of each acquisition (Mitchell, 2014).

2.3 Business City Wollongong, Australia

Wollongong is a new modern business environment city located in Australia. The uniqueness of this city lies in its supportive community, which spawned some of the business leaders who have become the Wollongong city ambassadors. Key elements that help create a supportive business culture in Wollongong are business networks and professional groups filled with diversity. The local business community, with its experience, is closely connected with national and global companies. This community enjoys the support and advocacy from the local council and government agencies that enable access to infrastructure and support services (Wollongong, 2021).

The supportive business community has enhanced growth in the field of business and management. This kind of business works on the continuous development of their employees' skills and working abilities. The cultural mindset of the city community is that everyone should work together and try to push each other to their limits. Constantly working with different businesses and with various partners is what makes this community vital. Co-Founder of Me3D said, "There is a huge push in Wollongong to support businesses like ours. We had support from a local manufacturer, business owners, schools, the council, and the University" (Wollongong, 2021).

Wollongong hosts more than a hundred successful business organisations on a national and global level. It has a diverse local economy, a large talent pool, and covers vital sectors such as technology, professional services, financial services, medical science and technology, advanced manufacturing, etc. For example, tech companies often collaborate with companies orientated towards medical research and development. They help each other in inventing and developing different medical supplies and devices. All companies that work within this ecosystem receive location privileges and different kinds of monetary incentives, tax reductions, better Wi-Fi connection, and more. More importantly, their competitive value is way higher when collectively coordinated than when independent. Also, they exchange not only knowledge and experience, but also clients, projects, and other privileges (Wollongong, 2021).

A network has been created where companies constantly benefit by sharing ideas, working together on projects, sharing facilities, etc. Wollongong cares for the future by collaborating with the local university with modern facilities and research labs where young students and teachers can develop products that will contribute to the community. This is the key to their efficiency. Multiple

SMEs are investing in their business and helping other similar SMEs develop more for the collective benefit. They have been showing desirable results and more immense success every year (Wollongong, 2021).

The government plays a significant role in supporting the Wollongong community. They desire to increase the number of employees and help small businesses and companies in various ways, with subsidies, benefits, facilitation, etc. The government has created a 10-year economic development strategic plan to support sustainable and innovative business models for Wollongong's local businesses and residents (Wollongong, 2021).

2.4 Medical Hub Thalassotherapy Crikvenica, Croatia

The holistic spin in the approach to medicine has been affecting medical tourism and cross-border healthcare. The interest of many countries has been drawn to this branch of tourism over the past decade, resulting in conspicuous investments in innovative medical centers. Consequently, these kinds of health centers need good support from marketing, management, and education. The best-recognized places for medical tourism hubs in Europe are Slovenia, Croatia, and Russia. They have developed highly organized BEs that cooperate with faculties, tourists, governments, and medical agencies. Most patients from Italy, Austria, Germany, and the UK choose these locations for medical treatments. Thalassotherapy Crikvenica is a BE that offers its clients medical procedures and cooperates with spa centers intended as relaxation zones for their patients. A rehabilitation center that provides post treatment services for their patients is also a part of this BE (Thalassotherapia Crikvenica, 2021).

Thalassotherapy Crikvenica offers different packages for its patients. For instance, the medical center also collaborates with local restaurants and accommodation units (e.g., Hotel Omorika, Villa Smiljka, Hotel Meditera) as part of the rehabilitation program. Some companies have provided this BE with wellness and spa services, others have concentrated on providing patients with various medical services. When considering medical procedures offered in this complex, Crikvenica has been collaborating with specialists and diagnostic experts from different areas of medicine, including pulmonology, otorhinolaryngology, and dermatology (Thalassotherapia Crikvenica, 2021).

Crikvenica is a popular destination during the summer tourist season. However, most of its accommodation capacities are empty after September. The benefit that the partners gain from joining this BE is not being dependent on seasonal tourism since they can rely on a steady influx throughout the year. The center is also cooperating with companies that offer management support and marketing support, both crucial for the center's promotion, for example, one of the partners, the Crikvenica Riviera (the Crikvenica Tourist Board), has ensured that the thalassotherapy rehabilitation center is among the city's tourist offers (Thalassotherapia Crikvenica, 2021).

The rehabilitation center works in synergy with the Faculty of Medicine of the University of Rijeka as their primary source of education for new potential workforces and those already involved. Collaboration exists with the government as well. The Ministry of Health collaborates with Thalassotherapy Crikvenica by providing them with certificates for performing all medical procedures (Thalassotherapia Crikvenica, 2021).

2.5 Bosch Group, Germany

The Bosch Group has developed one of the most modern Internet of Things (IoT) BE. A critical segment in creating a sustainable IoT system is a successful and well-connected BE. Bosch's BE contains several essential elements. It starts with connected things, physically "smart" things connected to middleware, such as the Bosch IoT Suite. Moreover, to achieve healthy progress and sustainability, the system depends on its partners (ECKELMANN, Enerbrain, and Senseagent, SAP, General Electric) who participate and contribute their added value to this platform, and on third-party developers who use application programming interfaces and deliver innovative applications. However, one of the most critical elements of the system is the users. The users consume and use the platform's services and contribute to improvements via crowd-generated data (Bosch, 2021).

A strong partnership with all three essential participants of the BE is a crucial element in the IoT journey. One of the collaborations that Bosch has established is with the SAP company. Bosch uses SAP's database technology in the IoT solutions, and SAP uses processed software from Bosch in their IoT platform. Also, a partnership with General Electric brings benefits for both parties. General Electric provides analytic software for Bosch, and GE can use the Bosch Production Performance Manager (Bosch, 2021).

2.6 Case studies takeaways

Table 2 summarizes key characteristics that determine each of the above presented examples of different BEs and key elements of their success. It once again shows that each BE system is unique in its own way.

Table 2. Key characteristics and success elements of the analysed BEs

	Type of BE	Key characteristics	Key elements of success
High Tech Campus Eindhoven, Netherlands	Innovation BE	• Based on communication and interaction with consumers and employees. • Focuses on full customization.	• Collaboration between companies and departments. • Employees share ideas, infrastructure is organised for employees to work better.
Cisco Systems, USA	Platform and innovation BE	• Manages innovation externally to promote growth. • Focuses on acquiring companies to expand the number of patents and promote products and tech innovations.	• Acts as a connector between acquired companies and keeps their original culture and HR. • Provides unified standards, training, and a culture that promotes co-evolution. • Seven-step 'people strategy'. • Assessing in which technologies, patents, and companies it is worth investing from the future perspective.
Business City Wollongong, Australia	Innovation, knowledge, and entrepreneurial BE	• Communication between companies, connection with local government, universities, entrepreneurs, and the city's excellent infrastructure. • Striving for good business management.	• Excellent organisation between companies - companies work together on the problems. • The influx of new talents. • Developed traffic infrastructure. • Subsidies from local government. • Good partnerships and collaboration between SMEs.
Medical Hub Thalassotherapy Crikvenica, Croatia	Innovation and entrepreneurial BE	• Good connection between all partners: medical center, hotel, restaurant, tourist agency. • High expertise in the medical field, well equipped with modern medical technology.	• It does not depend on the tourist season since they can fulfill their capacities throughout the year. • Good support and subsidies from local and national governments, collaborations with universities, attractiveness for foreign medical staff. • Good marketing and management.
Bosch Group, Germany	IoT, digital and innovation, BE	• Well-connected ecosystem to achieve the sustainability of the IoT system. • The IoT BE depends on partners, developers, and users.	• Analysis of crowd-generated data to improve the services. • High dependency on partners, especially on the participation of third-party developers in innovation and value creation.

Source: Bosc, (2021); Cisco (2021); High Tech Campus Eidenhoven (2021); Li (2009); Mitchell (2014); Romme (2017); Thalassotherapia Crikvenica (2021); Wollongong (2021).

Conclusion

The example analysis has shown that collaboration with partners, consumers, governments, and the whole community is crucial in establishing a successful and profitable business. The potential that this kind of collaboration has is enormous and enables different spheres of the community to grow.

Business systems, campus hub organizations, smart city systems, they all have one crucial thing in common, they all strive to create a healthy and prosperous community, a community that can make constant progress, where residents, staff, and partners will work together to achieve a greater good. A system and organization that will attract new investors and talented people to join, interact and co-create the BE thanks to its facilities, benefits, business model, and cultural mindset. Well-organized BEs and hub campuses are the inevitable future in the world of business. As hard as it may seem, BEs represent specific synergies that help maximise the profit of all 'individual entities' connected to them. When the community is healthy, good results are guaranteed, and sustainability is possible. This is why many corporations and SMEs are bound to gravitate towards this way of doing business.

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FOREIGN DIRECT INVESTMENT IN SLOVENIA – REGIONAL PERSPECTIVE

Introduction

Foreign direct investment (FDI) continues to be an important driver of international business activities around the world due to the potential impact on the well-being of host regions and beneficial spillovers which follow it. Agglomeration economies in determining the industrial location of foreign direct investment have been considered as a key issue in theoretical and empirical literature for many decades and a sizeable number of studies have revealed the tendency of foreign investment to agglomerate (Du et al., 2007; Konrad & Kovenock, 2009).

Over the past decade, a growing body of research has focused on the evolution of industrial regions and how such regions have reacted to globalization. This chapter aims to evaluate the effect of inflow of foreign capital on the regional gross domestic product (RGDP) in Slovenia while controlling for the unemployment rate, activity rate, industrialization measured by share of manufacturing in RGDP, international exposure and tangible investment per employee in the period 2012-2019. Methodologically, vector error correction (VEC) estimations are used to identify a potential relationship between regional GDP and FDI. Besides FDI, this chapter also tests for the agglomeration effect.

The first part of the chapter reviews relevant studies in our field of research followed by presenting the FDI trends at national and regional levels. The third part explains the methodology of our research and descriptive statistics, while the fourth part highlights the results. The final part concludes the chapter.

1 Literature review

There is a long-running 'curse or blessing' debate in the literature and amongst policymakers as to whether the effect of FDI on economic development in specific regions has positive or negative business spillovers (De Backer & Sleuwaegen, 2003; Audretsch & Keilbach, 2008; Berrill et al., 2018). Multinational companies (MNEs) have been shown to have a positive impact on regional value added and average wages and as incubators for micro firms operating in their value chains or by generating new spinout ventures of former employees who draw on the learning that they have gained within the MNE (Neck et al., 2004). However, MNEs have also been shown to inhibit business development in the regions in which they are based by attracting local talents that have a preference for high wages and job security of paid employment that MNEs can offer (Bhawe & Zahra, 2019; Berrill et al., 2018). For regions facing outflow of skilled youth due to the lack of perspective employment, this represents a pull factor to stay in the region.

The recent study on Ukrainian regions confirmed the long-term relationships between FDI and regional GDP. The most significant impact has been identified in the case of a two-year deviation, indicating that FDI two years ago has an effect on current regional gross domestic product. However, the relationships are unstable due to political factors affecting attractiveness of the country for foreign investors. The research also indicated no interdependence between FDI and employment level, mainly due to imbalances in regional labour markets (Getzner & Moroz, 2020).

It is important to note that in today's business ecosystem the organizations do not work individually, they interact within the ecosystem to evolve (Iansiti & Levien, 2004). Examining the role of multinational companies to anchor a business ecosystem in a particular region is interesting from various perspectives. Besides traditional FDI in manufacturing, supranational cooperation can also foster joint development and creation of transnational business eco-systems. Therefore, we first provide an overview of pull factors, followed by the role of government specific factors to attract foreign owned capital in the region.

1.1 Strategic determinants of foreign direct investments

Dunning (1993) extended the research by Behrman (1972) within the field of foreign investments and identified the main motives for internationalization with FDIs, which include market seeking, resource seeking, efficiency seeking, and network seeking. Market and resource seeking motives were previously the two most recognized sorts of motives (Dunning, 2000). Efficiency and network asset seeking objectives are becoming increasingly important and prevalent among organizations already involved in a multinational activity.

Demand is the main aspect of market-seeking companies. A company's decisionmakers will focus on market-seeking motives if they assume a direct presence is required for access and see value in reaching specific target markets abroad. There are a variety of reasons why firms engage in such behaviour. To exploit new markets and promote growth, investments are made. Moreover, a direct presence may be necessary to adapt goods and services to local tastes and needs, as well as to establish a physical presence near competitors. Other incentives, such as labour subsidies and trade barriers, may also be tempting (Dunning, 1993; Harris & Wheeler, 2005).

Obtaining resources is the main motive for resource-seeking companies. The resources either do not exist in the home country or the costs are much lower, justifying the move abroad. Firms do not only seek physical resources, such as agricultural products and minerals, but are in search of cheap labour, or on the other hand, seek skills (Dunning, 1993).

Searching for economies of scale and scope, as well as risk diversification, can be part of efficiency-seeking motives of internationalization. Companies gain based on differences in governance, including culture, economic systems, institutional arrangements, factor endowments, etc., and are usually large and diversified multinational enterprises. Factor endowments can differ based on availability and cost. Resource intensive activities are most often placed in developing countries while capital and technology-intensive activities are placed in developed countries. Efficiency seekers are often also internationalizing to lower their tax burden (Dunning, 1993).

Companies gain a competitive advantage by investing in relational capital and local connection. Relational capital, which reflects goodwill and trust, refers to a company's relationships with its customers, suppliers, partners, government agencies, and research institutes. The network-seeking motives inside organizations show the extent to which companies participate in alliances and cooperative ventures (Chen et al., 2004). Firms might develop and expand their network to include new foreign partners if strategic goals cannot be reached utilizing the existing network (Chen & Huang, 2004). Chen et al. (2004) describe two fundamental rules for network players to consider while investing in new relationships – efficiency and effectiveness. Moreover, Harris and Wheeler (2005) promote that building an international strategy requires strong interpersonal relationships.

Along with the strategic determinants of foreign direct investments, a lot of research has also been done on the location chosen for the internationalization of firms and MNEs to try and identify noticeable patterns in the preferences regarding FDI destinations on both national as well as regional levels. Nielsen, Asmussen and Weatherall (2016) conducted a comprehensive review of 153 studies published between years 1976 and 2015, which focused on investment location choices, determinants of the location of FDIs, agglomeration, industrial clustering, etc.

In the area of pure economic factors, the factor with the largest amount of support among research papers was demand. The studies mostly supported the hypothesis that the greater the demand at a given location is, the more likely that location is chosen as a destination for FDI by firms. Additionally, the more advanced the infrastructure and human capital at a given location are , the more likely that area is chosen as an FDI destination by MNEs looking for international expansion (Nielsen et al., 2016).

1.2 The role of specific government-influenced measures

Governments regularly offer financial and other incentives to attract foreign capital to particular regions in order to create employment, often with high(er) wages (Berrill et al., 2018), foster technology and knowledge transfer, and increase access and exposure to foreign markets. Several empirical studies also analysed the role of institutions as a decisive factor in choosing an FDI location. Firstly, they hypothesise that the more developed the formal institutions are in a given location, the more likely it is to be chosen as a destination. Secondly, if a location is classified as a special economic zone, its appeal as a destination for FDI increases. The vast majority (more than 75 percent) of studies find support for the aforementioned hypotheses, indicating that institutions and the government have a large impact on location decision making in the case of

FDIs. Regarding the first hypothesis, 28 percent of the studies which supported it were conducted at a sub-national level, meaning that micro-institutional and regional differences also play a part (Nielsen et al., 2016).

Governmental incentive factors, which were assumed to have a major impact on FDI choice – tax rates and wages, have received the largest level of mixed empirical support. For example, only one tenth of all studies analysing the corporate tax rate find no support in the hypothesis that higher tax rates make the location less favourable for an FDI destination, while half of the remaining studies support the hypothesis that higher tax rates have the opposite effect than expected – the higher they are, the more FDI they attract (Nielsen et al., 2016).

A specific government-influenced measure that has now begun to gain attention as a positive factor regarding FDI location choices is also the e-government capabilities of a country or region. The COVID-19 pandemic has forced many firms to dive deep into digitalization, however, governments had to adapt as well and modernize the offering of public services. Already early literature (Al-Azzam & Abu-Shanab, 2014, for example) stressed that e-government services make it easier for firms to eliminate certain FDI barriers, most notably those associated with information accessibility, bureaucratic protocols and business procedures in general.

Certain e-government services are designed to provide public services mainly to citizens, however, investors and MNEs can also greatly benefit from them. An empirical study using the data from 178 host countries from 2003 to 2018 found that a digital government stimulates the inflow of FDIs by improving the locational attractiveness of a country e-government plays a vital role in improving transparency, efficiency of internal functions, and the flow of information between separate government departments and agencies, while also increasing the potential return on investment. Furthermore, it also reduces corruption opportunities and red tape, both of which are deterrents in the locational decision-making process of firms. Their findings show that countries that implement information and communications technologies (ICTs) are in general better able to attract FDI inflows compared to governments with a weak ICT foundation (Al-Sadiq, 2021).

2 Foreign direct investment from national and regional perspectives

2.1 Economic characteristics of regions in Slovenia

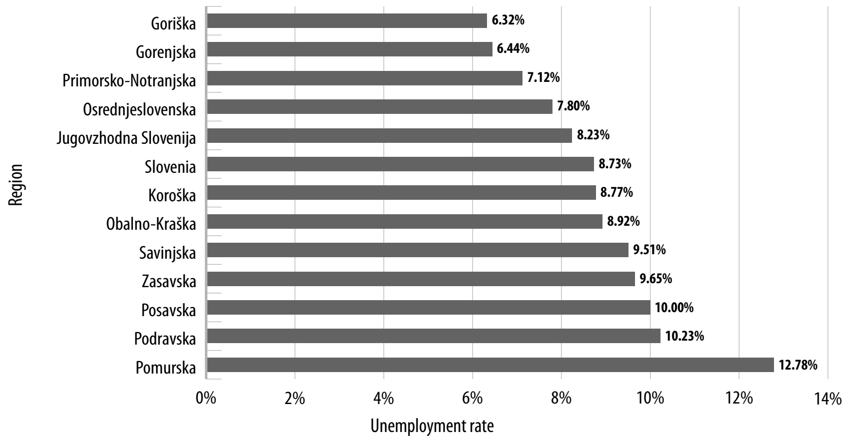
The inflow of foreign capital in Slovenia varies at a regional level and presumably depends not only on size but also on other economic characteristics of a specific region. There are 12 statistical regions in Slovenia. The largest region based on the number of inhabitants is the Osrednjeslovenska region, where the capital city is located. The smallest region based on the number of inhabitants is Zasavska. In 2019, the population in Osrednjeslovenska region accounted for approximately 25 percent of the total population. Five Slovenian regions with the smallest population combined had fewer residents than the Osrednjeslovenska region alone. The majority of residents live in cities, while rural areas are less populated (Statistical Office of RS, 2021).

In 2019, the Osrednjeslovenska region contributed on average 37.2 percent of all gross value added in Slovenia, followed by Podravska (12.7 percent) and Savinjska (11.2 percent), while the contribution of the other nine statistical regions varied from 1.4 percent to 8.8 percent. Such differences are due to the capital city of Ljubljana, positioned in the Osrednjeslovenska region, being the most attractive and interesting for the majority of economic activities. Its share in gross value added in the service sector accounted for almost 45 percent of national value added. In agriculture and forestry, the Jugovzhodna Slovenija (13.4 percent), Savinjska (12.8 percent) and Podravska (12.7 percent) regions stood out and contributed the most, while in the manufacturing industry, Osrednjeslovenska (24.7 percent) and Savinjska (14.8 percent) were the top contributors (Statistical Office of RS, 2021).

In July 2021, Slovenia employed 0.9 million employees (Čuk, 2021), with employment and unemployment rates varying greatly across Slovenian statistical regions. The average registered unemployment rate in 2020 was 8.7 percent (Figure 1). The highest unemployment rate was seen in the Pomurska region (12.8 percent) and the lowest one in the Obalno-kraška region (6.3 percent). The largest Slovenian region, the Osrednjeslovenska region, was positioned right below the Slovenian average with 8.2 percent (Employment Service of Slovenia, 2021).

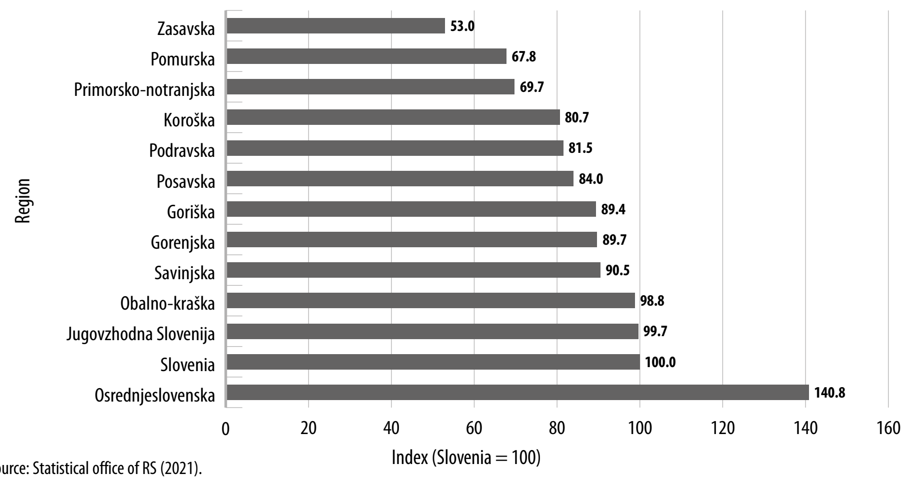
Regional GDP per capita signifantly differed among regions. The Osrednjeslovenska region had by far the highest contribution to Slovenian GDP, 40.8 percent above Slovenian average (Figure 2). Zasavska is the region with the smallest RGDP per capita at 53 percent of the Slovenian average, accounting for only 37.7 percent of Osrednjeslovenska's RGDP per capita (Statistical office of RS, 2021).

Figure 1. Average registered unemployment rates across Slovenian statistical regions in 2020



Source: Employment Service of Slovenia (2021).

Figure 2. Index of gross value added (RGDP) per capita in 2019 (Slovenia = 100)



Source: Statistical office of RS (2021).

The average monthly net wage in 2019 was the highest in the Osrednjeslovenska region. It accounted for EUR 1,231.33, which is 8.6 percent higher than the Slovenian average at EUR 1,133.50. The Podravska and Savinjska regions had monthly net wages below the average, despite being the second and third most populated regions, respectively, with some of the largest and most populated cities in Slovenia. Only Osrednjeslovenska and Jugovzhodna Slovenija exceeded the Slovenian average. The lowest average net wage in 2019 was in the Primorsko-notranjska region, where the average net wage was EUR 1,016.98, which is 89.7 percent of the Slovenian average (Statistical office of RS, 2021).

Interestingly, the Obalno-kraška region has the largest share of companies with foreign capital compared to the whole region (26.2 percent), with the Osrednjeslovenska region positioning second (16.6 percent) (Figure A1 in Appendix). The Obalno-kraška region presents a window to middle Europe for all transport companies, it is positioned near Italy on one side and Croatia on the other, and has therefore a good strategic position for foreign capital inflows. However, it should be noted that foreing-owned companies in the Obalno-kraška region are on average significantly smaller when compared to other regions (AJPES, 2021).

2.2 Inward FDI concentration at a regional level

The total amount of inward foreign capital in Slovenia amounted to EUR 16.0 billion at the end of 2019, equivalent to 33.1 percent of GDP. The number is relatively low in comparison to other countries, comparable with Slovenia in terms of region or GDP per capita, such as the Czech Republic, Hungary, Slovak Republic, Austria and Poland. In 2019, there was an inflow of FDI of EUR 1.2 billion and reinvested earnings of EUR 0.5 billion, while the net debt to foreign owners declined by EUR 0.6 billion. The large inflow of equity was largely contributed by four major acquisitions of Slovenian firms with a total value of more than EUR 0.5 billion. Firms with foreign capital accounted for 1.8 percent of the entire population of Slovenian firms (excluding financial intermediaries), however, they accounted for 24.3 percent of equity capital, 25.8 percent of assets and 23.8 percent of the employees in the entire corporate sector (Bank of Slovenia, 2020).

The COVID-19 health crisis brought a reluctance to invest, which resulted in a slowdown in investment in 2019. UNCTAD (2020) forecasted an even more dramatic decline in FDI in 2020 and 2021. The length and strength of the COVID-19 impact on investments are however very dependent on the duration of the crisis and the effectiveness of the measures taken (Bank of Slovenia, 2020).

The top five investor countries in 2019 were Austria (24.7 percent of all inward FDI), Luxembourg (13.0 percent), Switzerland (11.4 percent), Germany (8.5 percent), and Italy (7.9 percent) (Table A1 in Appendix). Together, they accounted for 65.5 percent of all inward FDI in Slovenia. However, the ultimate source of inward FDI can be concealed by the complex structures of multinational firms. The most important investors that invest in Slovenia via other countries are the US, Germany and the UK (Bank of Slovenia, 2020).

At a regional level, the highest value of FDI in 2019 was in the Osrednjeslovenska region (56.6 percent), followed by Podravje (10.6 percent), Obalno-kraška region (5.8 percent), Gorenjska (5.5 percent) and Posavje (5.5 percent). The Osrednjeslovenska region has always received the highest inflow of FDI, however, the trend has been slowly decreasing from 72.1 percent in 2012. Obalno-kraška, Podravje and Gorenjska have always been the next three largest ones, though not necessarily in this order. The rest of the regions combined have received between 15 and 20 percent of all FDI over the period 2012-2019 (Bank of Slovenia, 2020). The inflow differences are visible also in the regional distribution of foreign capital (Table 2). Manufacturing and wholesale are the most represented industries that attract foreign capital. Most of the regions have the largest share of foreign capital in manufacturing, while the Obalno-kraška and Osrednjeslovenska regions stock most of the foreign capital in wholesale (AJPES, 2021).

Table 2. Regional distribution of foreign capital in Slovenia, 2012-2019, in million Euro

Region	2012	2013	2014	2015	2016	2017	2018	2019
Osrednjeslovenska	788.0	807.7	781.5	793.2	903.9	910.4	929.7	946.6
Obalno-Kraška	185.9	220.6	278.3	210.0	188.2	171.1	181.7	194.0
Podravska	243.1	179.2	179.8	150.2	148.8	148.1	148.9	152.2
Savinjska	73.1	166.9	83.0	199.2	96.6	207.8	208.0	212.5
Gorenjska	163.7	164.9	136.7	133.9	134.1	155.6	163.5	167.3
Goriška	36.2	91.3	109.1	100.2	103.6	110.9	126.4	128.4
Posavska	52.5	55.4	57.0	57.2	57.2	36.1	43.2	43.0
Pomurska	46.4	48.9	50.7	48.3	47.7	47.6	47.6	47.6
Jugovzhodna Slovenija	42.7	41.5	41.9	44.3	43.1	44.3	42.6	43.1
Primorsko-Notranjska	27.1	27.1	27.2	27.3	27.3	26.7	27.2	27.3
Zasavska	4.3	8.7	12.2	11.7	11.5	11.0	10.7	11.3
Koroška	7.3	9.9	9.9	9.9	9.9	9.9	9.9	9.9

Source: Own calculations based on the data from AJPES (2021).

The employees in foreign owned firms received above-average wages in 2019. The average annual gross wage per employee at firms with FDI was 9.5 percent higher than the overall average and the value-added per employee was 7.6 percent above the average. Furthermore, firms with foreign capital perform better than firms without it; in 2019, ROE at firms with FDI was 1.1 percentage points higher, standing at 9.6 percent. The most important sector is manufacturing, which in 2019 accounted for 24.3 percent of all firms with FDI (Bank of Slovenia, 2020).

3 Methodology and descriptive statistics

3.1 Methodology

The empirical analysis of FDI in Slovenian regions is based on the Getzner and Moroz (2020) model, which studied the effects of foreign capital inflow on regions in Ukraine. We employ an exploratory panel time-series approach incorporated in the panel vector error correction (VEC) estimations in order to discuss the potential connections between FDI and economic development in Slovene regions. In general, an error correction model consists of two parts, one that describes short-term influences and fluctuations, and another that mirrors the long-term development towards the mean value of the variables, and can be estimated by applying ordinary least squares.[1]

In terms of empirical specification we assume that the dependent variable is regional gross domestic product (RGDP) per employee and foreign capital (FC) per employee is the explanatory variable. Our empirical model as a pooled panel equation can be represented as follows (Equation 1):

$$RGDP\ per\ employee_{it} = a_o + a_1 * FC\ per\ employee_{it} + a_2 * REGION\ SPECIFICS_{it} + a_3 * YEAR_t \tag{1}$$

REGION SPECIFICS covariates refer to unemployment rate, activity rate, the share of manufacturing gross value added in regional gross domestic product, international exposure, and tangible investment per employee, while YEAR refers to year dummies. Index i denotes the region, t is the year considered, and a and b are the parameters to be estimated. Alternatively, we can test the hypothesis that foreign capital affects gross regional product with a lag of one year.

$$GRP\ per\ employee\ _{it} = a_o + a_1 * FC\ per\ employee_{it-1} + a_2 * REGION\ SPECIFICS_{it} + a_3 * YEAR_t \tag{1a}$$

1 In the case of similar degrees of integration and cointegration between variables, VEC models can be estimated with ordinary least squares estimator (Getzner & Moroz, 2020).

Our empirical model as a panel error correction equation can be represented as follows:

$$\Delta GRP\ per\ employee_{it} = b_o + b_1 * GRP\ per\ employee_{it-1} + b_2 * FC\ per\ employee_{it-1} + b_3 * \Delta FC\ per\ employee_{it-1} + b_4 * \Delta GRP\ per\ employee_{it-1} + b_5 * REGION\ SPECIFICS_{it} + b_6 * YEAR \quad (2)$$

3.2 Descriptive statistics

For the purpose of our analysis, we used data sets provided by AJPES and SPIRIT for years 2012 to 2019. The data sets consisted of all active companies operating in Slovenia with their corresponding information about the companies' financial statements, sources of their capital, and locations of operation. The description of variables, the mean value, the standard errors used in our estimations model, as well as dependent variables, are presented in Table 3.

Table 3. Descriptive statistics for variables used in the regression analysis*

	Number of observations	Mean	Standard deviation
Regional gross domestic product per employee (RGDP per employee)	96	16,665.5	4,410.7
Gross value added (GVA) in manufacturing in total regional value added (in percent)	96	38.1	9.7
Foreign capital per employee (in EUR)	96	18,089.4	10,122.5
Foreign capital per employee in manufacturing (in EUR)	96	19,216.0	11,293.5
Unemployment (in percent)	96	8.0	2.9
Activity rate (in percent)	96	70.2	4.5
International exposure per employee (in percent)	96	34.0	22.4
Tangible investment per employee (in EUR)	96	6,429.4	1,703.6

* Time period is 2012-2019.

Source: AJPES (2021).

FDI per employee is used as a relative measure of foreign investments in a certain region and therefore shows which region attracts foreign greenfield and brownfield investment in a given year. Foreign capital, on the other hand, measures the stock of foreign capital in the region as the result of foreign investment in the past. Gross value added (GVA) per employee shows the value created and is measured as regional gross domestic product (RGDP). It indicates which regions are more efficient in terms of resource use. Unemployment and activity rates were used to mimic economic and social conditions in the regions, while international exposure per employee, measured as the percentage of GDP created in the region and traded with the outside world, is used as a proxy for international connections. Tangible investment per employee measures the investment activity in the regions. On average, the regional value added in the period 2012-2019 amounted to 16,665 euros per employee, the unemployment rate was eight percent and the companies reported around 18,000 euros of foreign capital per employee (Table 3).

3.3 Agglomeration effect

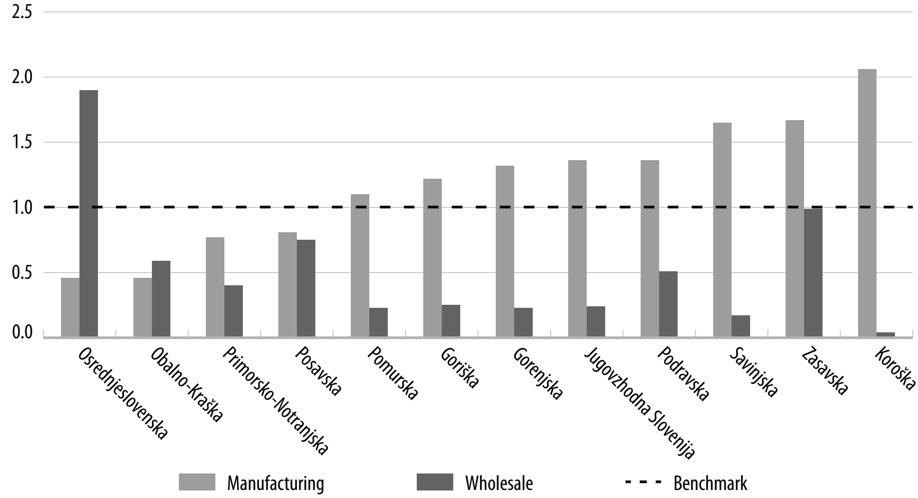
Frequently cited discussions on agglomeration effect are based on the advantages arising from the greater specialization, localized transmission of ideas and lower production costs due to synergies and sharing intermediate suppliers and labour resources (Puga, 2010). Moreover, such agglomerates may attract more customers, suppliers, as well as investors. The agglomeration effect could be measured by the relative share of employment in a particular industry, in a given region, as a share of total employment in the same industry as indicated in (3) (Sfetcu, 2014),

$$AGGLOMERATION_i = \left[\frac{(EMP_{si}/EMP_i)}{(EMP_{st}/EMP_t)}\right] \times 100 \qquad (3)$$

where EMP stands for average annual employment, *s* denotes industry, *i* region, and *t* the whole Slovenia. An index significantly greater than one indicates the presence of industrial agglomeration. The variable that measures the agglomeration effect is included in augmented models 1, 1a, and 2, at the level of manufacturing.

In the majority of Slovenia's regions in 2019, the agglomeration effect seemed to be present in the manufacturing sector (Figure 3). However, Slovenia's biggest region, as well as three others, show no agglomeration effect. A possible explanation could be that those regions do not offer enough plottable, suitable, or affordable land for the development of such sector, since it is usually quite space-consuming. The retail sector, on the other hand, has agglomeration effects present only in the Osrednjeslovenska region, which is a region with the most businesses located there, whereas the Zasavska region seemed only to reach the threshold, with other regions falling behind.

Figure 3. The agglomeration effect in manufacturing and retail in Slovenian regions in 2019



Source: Statisitical Office of RS (2021a).

4 Results and discussion

Our pooled regression results, reported in Tables A3 and A4 in Appendix, point out that presence of foreign capital (as the consequence of past FDI) in the region has positively influenced RGDP per employee since the coefficient was positive and statistically significant in all specification of model (1). The same conclusion applies if only the manufacturing sector is taken into consideration. Interestingly, more industrialized regions have lower RGDP per employee, ceteris paribus. The reason behind that might be that the manufacturing sector in Slovenia seems to underperform in terms of productivity compared to the Slovenian average (AJPES, 2020). The unemployment and activity rates are not significant or are rarely significant in all but one regression model, which therefore offers no explanatory power. International exposure negatively correlates with RGDP per employee in a pooled regression model. As expected, regions with more investment in tangible assets per employee had higher gross regional product, ceteris paribus.

In order to disentangle short- and long-term effects of foreing capital on regional gross product, we applied vector autoregresssion model 2. The results are presented in Table 4. Similarly, as in the case of model 1, we confirm the positive short-term effect of foreign capital per employee in the particular region on gross regional product per employee, ceteris paribus. The long-term effect is weakly present in the first difference indicating that regions that attracted more foreign investment one year ago, are reporting higher gross regional product on average, ceteris paribus. In full specification, activity rate and industrialization have a significantly positive effect on gross regional product per employee, ceteris paribus.

Table 4. Estimation of regression coefficients of model 2

	Dependent variable: RGDP per employee		
	Coefficient (std. error) (a)	Coefficient (std. error) (b)	Coefficient (std. error) (c)
FC per employee (lagged)	0.013*** (0.005)	0.009* (0.005)	0.007* (0.004)
FC per employee (d1)	0.024* (0.014)	0.016 (0.014)	0.008 (0.010)
FC per employee (d2)	-0.004 (0.010)	-0.001 (0.001)	0.005 (0.007)
RGDP per employee (d2)	0.522*** (0.083)	0.536*** (0.079)	0.551*** (0.082)
Gross value added in manufacturing	-1.228 (4.411)	2.758 (4.766)	7.771** (3.525)
Unemployment rate	-6.886 (36.349)	23.910 (38.544)	50.668* (28.432)
Activity rate	88.916*** (23.211)	85.855*** (24.934)	43.890** (19.401)
International exposure per employee		2.948 (2.060)	1.588 (1.532)
Investments in fixed assets per employee		13.384 (29.644)	0.344 (22.889)
Years (2012 – 2019)	No	No	Yes
Number of observations	69	69	60
Adjusted R2	0.701	0.735	0.861

p-value significance: 0.1 * 0.05 ** 0.01 ***
Source: Own work.

The results seem to confirm our expectations of FDI having a positive effect on RGDP. Slovenian regions are relatively small, and any significant investment in the region can influence its RGDP per employee. Secondly, in full specifications of the lagged model, industrialization showed a significantly positive effect, indicating that the manufacturing sector contributes to value creation. For that purpose, an in-depth analysis of multiple lags should be conducted in a longer time span.

International exposure seems to be negatively correlated with RGDP per employee in model 1 but not if the effect of foreign capital is modelled in an error correction model. Since international exposure consists of exports and imports relative to total trade, a further analysis should be conducted to recognize the effects of imports and exports separately. Our results could point out either to firms importing large quantities from abroad, firms with balanced exports and imports, or (less likely) firms highly export oriented at producing low value-added products. Finally, investments in fixed assets per employee indicated firms investing more in fixed assets to produce, on average, greater value per employee. The agglomeration economies that are present in certain regions do not have any significant effects on value added per employee in the case of manufacturing.

Conclusion

The reasons behind corporations conducting FDIs are manyfold, with firms having many different motives to expand and invest into other markets, from fulfilling existing demand in other markets to searching for other resources and spreading their operational networks. Extensive research has also shown that certain regions and countries are more favourable than others, and many economic as well as institutional factors have been confirmed as having a significant role in attracting FDIs. Furthermore, the emergence of digitalization and modernization, which has been accelerated by the COVID-19 crisis, has also shown that e-government is a great contributor to improving how business is conducted in a region and how it can ease the transition of an incoming company.

The results of our empirical study indicate that foreign capital as a stock and as foreign direct investment (with a lag of one year) has a positive impact on GRP per employee. It indicates that it is important to attract foreign and domestic capital in catching-up regions. Creating an innovative ecosystem for small and medium-sized companies, as suggested in Domadenik Muren et al. (2021) and Jazbec et al. (2021), is the initiative that can be deployed at the regional level with a clear focus on attracting potential investors.

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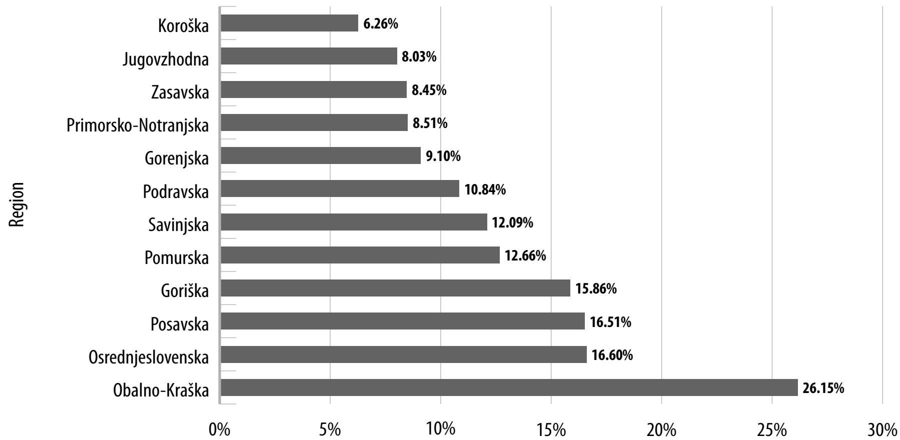
Appendix

Figure A1: Share of companies with foreign capital as a percentage of all companies in the region



Source: Statistical Office of RS (2021).

Table A1: FDI in different industries by country of origin in 2019, in million EUR

Country	Manufac-turing	Financial services	Retail	Real estate	ICT	Other	Total
Austria	1,134.4	670.6	925.0	410.9	212.8	607.6	3,961.4
Luxembourg	451.4	1,001.1	34.5	135.5	398.1	64.3	2,084.9
Switzerland	1,243.0	85.0	303.5	86.9	30.5	76.8	1,825.6
Germany	608.9	18.7	388.2	34.6	12.4	292.0	1,354.8
Italy	393.4	487.0	157.3	14.6	15.4	195.4	1,263.0
Other	1,720.3	1,189.3	913.0	313.2	218.2	1,163.9	5,517.9
Total	5,551.6	3,451.6	2,721.4	995.8	887.4	2,400.0	16,007.8

Source: Bank of Slovenia (2020).

Table A2: Estimation of regression coefficients of model 1

	Coefficient (std. error) (a)	Coefficient (std. error) (b)	Coefficient (std. error) (c)
Dependent variable: RGDP per employee			
Foreign capital per employee	0.075** (0.036)	0.047* (0.026)	-0.048* (0.027)
Gross value added in the industry sector	-135.392*** (38.469)	-148.109*** (30.030)	-149.947*** (30.531)
Unemployment rate	-35.661 (281.540)	-321.263 (215.546)	-346.949 (224.139)
Activity rate	584.619*** (177.704)	218.560 (138.146)	157.715 (149.004)
International exposure per employee		-58.572*** (11.849)	-60.437*** (12.171)
Investments in fixed assets per employee		1027.046 (148.824)	1052.831*** (158.1496)
Years (2012 – 2019)	No	No	Yes
Number of observations	69	69	69
Adjusted R2	0.532	0.754	0.747
Dependent variable: Regional gross value added per employee in the manufacturing sector			
Foreign capital per employee in manufacturing	0.412** (0.181)	0.376* (0.191)	0.328* (0.185)
Gross value added in the industry sector	294.607 (220.058)	186.065 (276.411)	188.829 (270.637)
Unemployment rate	166.448 (1526.649)	278.197 (1706.657)	-516.236 (1674.992)
Activity rate	295.867 (961.441)	270.561 (1093.943)	471.848 (1124.651)
International exposure per employee		-33.776 (88.977)	-30.946 (86.707)
Investments in fixed assets per employee		992.894 (1325.612)	297.466 (1358.620)
Agglomeration effect		3110.761 (4329.935)	1912.955 (4334.019)
Years (2012 – 2019)	No	No	Yes
Number of observations	69	69	69
Adjusted R2	0.016	0.001	0.001

* p-value significance: 0.1 * 0.05 ** 0.01 ***

Source: Own work.

Table A3: Estimation of regression coefficients of model 1a

	Coefficient (std. error) (a)	Coefficient (std. error) (b)	Coefficient (std. error) (c)
Dependent variable: RGDP per employee			
Foreign capital per employee (lagged)	0.076* (0.039)*	0.050* (0.029)	0.052* (0.030)
Gross value added in the industry sector	-140.872*** (42.161)	-140.361 (32.255)***	-140.468 (33.394)***
Unemployment rate	-123.125 (336.422)	-374.553 (270.943)	-347.836 (286.254)
Activity rate	517.927** (210.465)	167.588 (170.283)	144.519 (182.642)
International exposure per employee		63.079*** (13.301)	-63.673 13.933)***
Investments in fixed assets per employee		1006.672*** (164.111)	1052.836*** (178.353)
Years (2012 – 2019)	No	No	Yes
Number of observations	69	69	69
Adjusted R2	0.523	0.744	0.727
Dependent variable: Regional gross value added per employee in the manufacturing sector			
Foreign capital per employee in manufacturing (lagged)	**0.436 (0.212)	0.404* (0.225)	0.368* (0.217)
Gross value added in the industry sector	267.456 (253.655)	129.346 (308.175)	114.286 (308.175)
Unemployment rate	-143.549 (1900.504)	-1018.676 (2090.479)	-1018.676 (2090.479)
Activity rate	74.208 (1192.513)	347.632 (1352.024)	347.632 (1352.024)
International exposure per employee		-17.328 (100.749)	-17.328 (100.749)
Investments in fixed assets per employee		99.876 (1492.544)	99.876 (1492.544)
Agglomeration effect		3674.315 (5106.509)	3674.315 (5106.509)
Years (2012 – 2019)	No	No	Yes
Number of obervations	69	69	69
Adjusted R2	0.005	0.001	0.001

* p-value significance: 0.1 * 0.05 ** 0.01 ***

Source: Own work.

Polona Domadenik Muren, Matej Pregarc, Žiga Jarc, Domen Arne Jelovčan, Petja Oplotnik

BEEHIVE BUSINESS MODEL

Introduction

In Slovenia, the backbone of the economy is a large spectrum of small and medium-sized companies (SMEs), which employ over 436,000 people (72 percent of workforce in the business sector) and generate 64 percent of value added (OECD, 2020). Although there is a positive trend regarding value added and employment growth of SMEs,[1] the urban SMEs perform better than the rural ones, with the reasons stemming from limited financial sources, labor shortages, high costs (operational, transportation, etc.), as well as owner preferences towards growth (Freshwater et. al., 2019).

This chapter aims to challenge the existing model of business zones in Slovenia. We present the conceptual design of a business hub that builds on synergies among business partners and regional specifics to help SMEs grow and develop within their own industry, increase productivity within a specific company, as well as provide benefits (employment opportunities, new business investment, sustainable planning, and business development) for the local community. It is aimed at overcoming the challenges identified in our preliminary research and making it a desired environment for SMEs to work in. The conceptual model is a general one but could be applied to any region in Slovenia.[2]

First, the conceptual model is presented based on the identified shortcomings of the existing standard model of the business hub. Then, the basic findings of the background research on pain points and need analysis for key stakeholders are highlighted, followed by solutions provided by the beehive business hub concept. The final part concludes.

1 Between the years of 2018-2020 the projected value-added growth of SMEs was 10.5 percent, the employment growth was 3.6 percent (European Commission, 2019).

2 The application to the case of Izola is presented in Jazbec et al. (2021).

1 Designing a business ecosystem hub

The development of the concept for the new business model/ecosystem is based on six key terms on how to design a business ecosystem described in detail in Guštin Habuš et al. (2021). The main characteristics we focus on when developing the business model are delivering value to all stakeholders, providing long term scalability, developing synergies, and ensuring high value added for participating SMEs.

The future success and development of a business zone depends on its business model. Considering the current issues SMEs are facing in Slovenia (low productivity, poor growth potential, limited access to financing and skilled workforce), the model provides an alternative to the existing system of business zones, an innovative approach which will benefit all stakeholders and help SMEs to grow through cooperation and synergies.

1.1 Standard model

The standard (prevailing) model is based on the idea of a real estate project within which municipality identifies a certain area as a business zone potential and sells off the land to the best buyer with price being the most important factor. In this model the municipality receives a large initial revenue (proceeds from the sale of land and compensation for infrastructure investment) but does not have the opportunity to influence the scope or type of future activities in the business zone. On the other hand, companies, especially those innovative ones operating in knowledge intensive industries, lack incentives to participate in the business zone due to undefined synergies (Table 1). Due to high fragmentation and disorganization of business zones in Slovenia[3] (the total number of business zones in Slovenia is 653)[4] and the lack of an appropriate, time-adjusted management strategy at the national level (Bizjak et al., 2019), there is no room for improvement in the classical concept.

3 Each municipality strives to establish a business zone in its area even if it does not have adequate spatial, infrastructural, business, organizational or human capacities. All that affects the irrational and unsustainable use of space and the increase of negative impacts on economy and the environment caused by the irreversible loss of available (often agricultural) land, increased passenger and freight transport, energy use and irrational (sometimes even unjustified) investments in land development (Bizjak et al., 1999).

4 Bizjak, 2019.

Table 1. SWOT analysis for a standard business zone model

Strengths	Weaknesses
• "Traditional" way of capital attraction • Bringing in investors with already developed ideas • Diversification of industrial branches	• Initial revenues for municipality, but then no additional revenue streams • Maintenance and administration, longevity of the business model • Initial high financial burden for potential investors (companies)
Opportunities	**Threats**
• High interest by big players from different industries • Quick initial cash inflow could be used for other municipality investments and future development plans	• Non-aligned motives of companies and business zone management that lead to lower value added per employee • Unattractive (many industrial zones in Slovenia already are) • Irrational and unsustainable use of land • Visually an unattractive and incompatible business infrastructure with the surrounding landscape • Lack of specific activities / no benefits and/or synergies for participating companies

Source: Own work.

1.2 Beehive business model

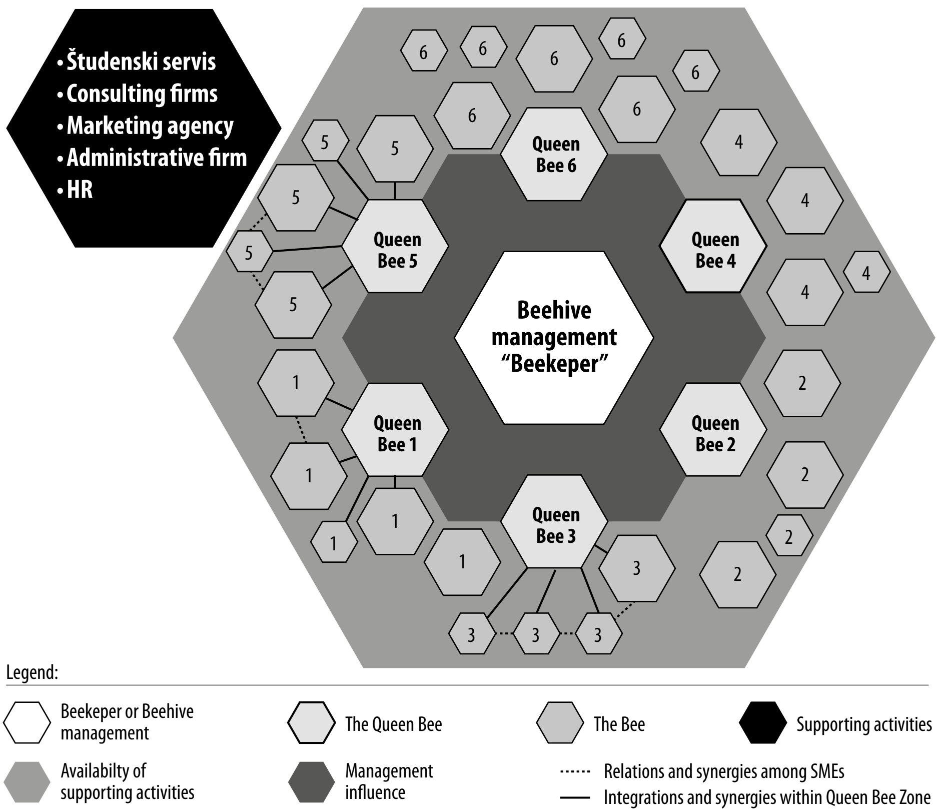
The proposed innovative business hub model addresses the weaknesses and threats of the standard model and builds on the synergies and cooperation among companies and other stakeholders (research institutes and universities), human and natural resources that are present in the specific region.

The Beehive story is based on Slovenian beekeeping tradition used for the purpose of designing a business campus as it resembles key values, synergy and cooperation. Bees are known for not only working hard in large, well-organized family groups, but also for greatly benefiting the ecosystem they live in and the environment in general. The queen bee is pivotal to everything that happens in the beehive, which is like an internal ecosystem where cooperation is fostered to pursue general benefits. To the bees, the beehive is their home, and the beekeeper takes care of their needs. From the business perspective, the Beehive Business Hub provides a similar organization as in nature (Figure 1). The Bees would be the SMEs that would join in and cooperate with each other to reach a common goal, such as growth of SMEs, by establishing synergies and benefiting from them, and by overcoming challenges in their respective industries. The Queen Bee would be an established business in a specific industry that would support growth and development of other Bees (SMEs) by focusing on their own business and being *primus inter pares (i.e., first among* *equals).* The **Beehive** would be the ecosystem that would help SMEs grow, the **Bee House** would be the campus (business zone) where all Beehives would be located and provided with support and guidance, and the **Beekeeper** would be the zone management that would help solve the corporate issues and pain points for the companies (Table 2).

Figure 1. Visual representation of the Beehive model concept

The Beehive Business Hub Story

The Bee	The SME in the Beehive
The Queen Bee	The established business in the industry (there can be many)
The Beehive	The specific ecosystem built around the "Queen Bee" being part of the hub
The Bee House	The overall ecosystem where all Beehives are located
The Beekeeper	The Hub management



Source: Own work.

"Supporting sustainable productivity growth in SMEs through leveraging synergies of big business systems (whenever applicable) and enabling a better focus on core business operations" is the vision statement that would guide everything the Beehive stands for. We aim to follow this by adhering to three principles:

1. Maintaining a 360° stakeholder view.
2. Focusing on sustainable construction and architectural development.
3. Following environmental, social and governance (ESG) objectives.

Table 2. SWOT analysis for the Beehive model

Strengths	**Weaknesses**
• Developing synergies based on selected industries and firms' strategic goals • Prior selection of industries with high value added per employee • Clear focus and purpose driven strategy • Attractiveness to FDI • Higher potential for cooperation with other innovative subjects (universities, institutes) • Development of sub-branches within the most profitable industry • Presence of at least one established player in the industry	• High investment (financial investors) compared to regular business zones • Low cash inflow in the starting phase (for financial investors and municipality) • Possible lack of synergy between companies in the beehive • Inability to effectively cooperate • Selection of the wrong governance model
Opportunities	**Threats**
• Cash inflow over time for municipality (taxes, supporting activities - consumption, rent) • Attracting talents to region (and municipality) • Attracting foreign and domestic companies to region (and municipality) • Sustainable benefits to stakeholders providing strong pillars for the zone to stay active for number of years • Helping SMEs to grow	• (Un)willingness of queen bees to participate • Wrong industry selection for the region • Low or no support by policymakers (national and/or EU level)

Source: Own work.

Based on the desired outcome of the Beehive business model, we present four potential **governance models**: Cooperative, Growing Together, Equity-based, and Spatial models (Table 3). The cooperative model is based, as the name itself puts it, on cooperation, with the votes being equally divided among participants. The Growing Together model is based on increased synergies and a special voting system, that resembles the scope of synergies contributed to the hub by participating companies and other stakeholders. On the other hand, the equity-based model heavily relies on the preferences of the investors; therefore, the votes are distributed according to the size of investment. Lastly, the spatial model is based on the division of votes according to the size of the office space the company in the Beehive possesses. According to the vision, the **Growing Together model** was identified as the most preferred one. In this model, we have taken into consideration the 360 view, which will benefit all the involved stakeholders. Our model takes into consideration the voice of the local community, it provides gradual change of ownership and is focused on industries with a high value added per employee. It is based on a specific governance system, where the queen bees have more voting rights in the beginning (serving also as an attractiveness factor to enter the zone), if compared with SMEs (the bees). With the growth of SMEs and their contribution to the Beehive, the voting system changes and allocates more voting rights also to the bees, mostly based on withdrawing the financial investors from the zone and their transfer of ownership rights.

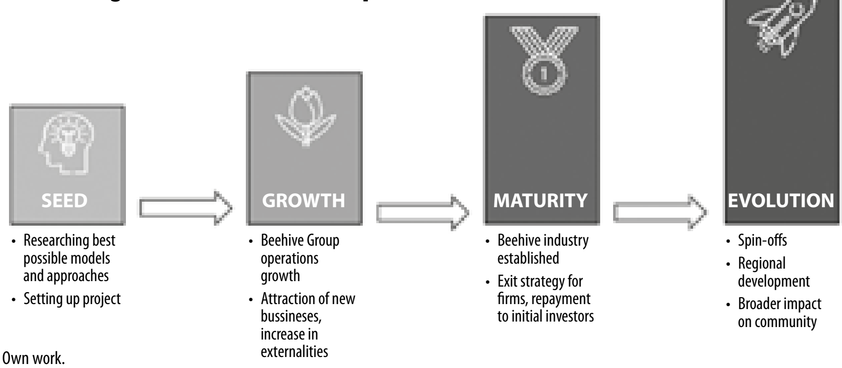
Table 3. Comparing dimensions of different governance systems

	Cooperative model	Growing Together model	Equity-based model	Spatial model
Decision makers	Companies in the Beehive (cooperative members)	Companies in the Beehive, other stakeholders (financial investors, municipality, university, etc.)	Outside financial investors	Companies in the Beehive
Purpose of the business model	Increased synergies & cooperation, profit of cooperative is not the only goal of operation	Increased synergies & cooperation + financial benefits for all the stakeholders	Providing adequate financial resources for initial investment	Increased synergies & cooperation
Profit distribution	Members in cooperative (based on the Establishment Act)	All stakeholders	Financial investors	Companies in the Beehive (depending on the size)
Voting rights	All equal (1 company, 1 vote)	Based on a specific voting system	Pertain to voting stocks	Depend on the square footage

Source: Own work.

The lifespan of the Beehive is also envisioned through four separate phases (Figure 2). These phases will also ensure a clear end goal and the scalability of the model. The evolution of the Beehive model is supported by the Growing Together governance structure, especially entry and exit decisions of SMEs operating in business hub and their willingness to participate in real-estate financing. The concept of the Beehive business hub deviates from the existing (standard) business hub approach in all key elements (Table 4) that represent the critical factors of success for participating companies.

Figure 2. Stages of Beehive development



Source: Own work.

Table 4. Comparison between the standard and the Beehive models

	Standard model	Beehive model
Problem identification	Need for business infrastructure (space for office and production facilities, land)	Growth challenges of SMEs, high value added per employee, lack of synergies
Stakeholders' identification	Companies, municipality	State, municipality, companies, local community, employees
Governance model	One key decision maker	Participation of all stakeholders in decision making, Growing together model
Value creation	Common business area, availability of infrastructure	Synergies, high value added, growth of SMEs
Active participation of stakeholders in the hub's governance	Little participation	Active participation from all the stakeholders
Long-term scalability	Depends on the companies within a zone, usually individual company growth	Managed by the ecosystem of companies in the zone – clearly described development strategy. The growth of the SMEs will have a positive impact on the growth of other stakeholders

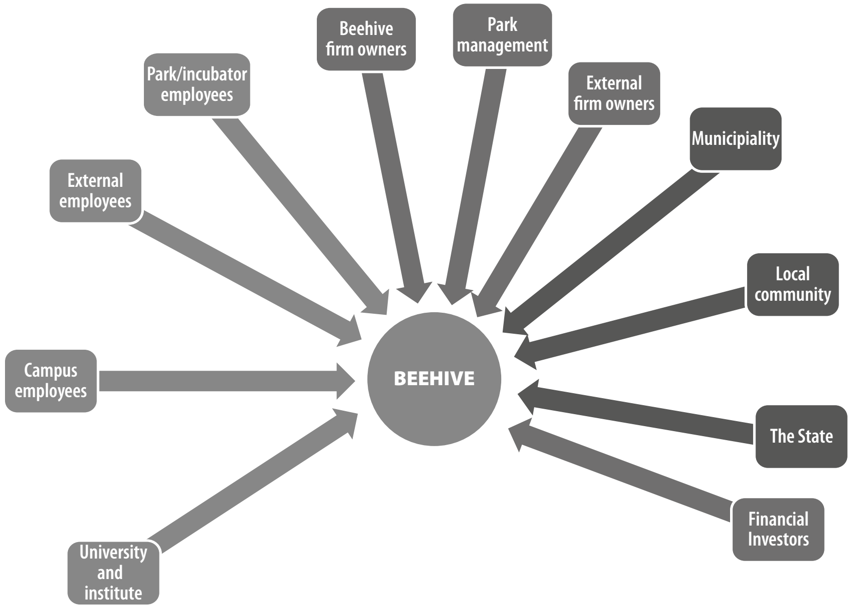
Source: Adapted from Pidun, et al. (2020).

2 The needs analysis and pain points identification

In order to conceptualize the Beehive Business Model in detail to be successful as well as attractive for all the stakeholders, we conducted field research to identify the main pain points of each individual stakeholder, address their needs, while ensuring high quality and functionality of the model. The research was done through in-depth interviews and focus groups with key stakeholders (Figure 3), 14 employees from 13 firms[5] and ten different countries, conducted in June 2021, and three CEOs from three separate technological parks/incubators.

5 Among others employees from multinational companies like Hilti, Adidas, Red Bull, Lidl Digital, Nike, Google, Elaphe, Nervtech, Kolektor and AV Living Lab participated in the interviews.

Figure 3. Identified key stakeholders



Source: Own work.

Based on our focus groups and interviews, we identified pain points of the main stakeholders, challenges they face, as well as the solutions proposed by the Beehive model. The stakeholders were grouped into seven smaller clusters based on their similarities (Table 5).

Following the clustering of similar stakeholder groups, we have identified the main challenges the stakeholder clusters are faced with based on our preliminary research and conducted interviews. We also provide the estimated impact which we believe the Beehive Business Hub would have on mitigating these challenges and would serve as additional incentive for external firms to join.

Based on the identified challenges and the needs analysis, we provide a list of the main proposed amenities (Table 6). They would serve as the main factors of attraction of the Beehive Business Hub and would help the Bees develop and grow as best as possible. These amenities would bring a wholesome set of activities for the well-functioning of the companies and employees, influence the employer branding and increase the well-being of all employees in the Beehive and local community.

Table 5. The main challenges, mitigation proposals and estimated impacts for selected stakeholders

Stakeholder cluster	Main identified challenges	Beehive solution proposal
Cluster 1 - Employees Campus employees, Park/ Incubator employees, External employees	• Workplace far from home and other errands • Coming back to the office as opposed to working from home • Lack of common spaces, networking events, mentoring possibilities • Lack of supporting services (e.g., in the case of foreigners)	• Availability of fresh food for home, freshly prepared meals at Beehive • Help with more personal issues – daily commute, documentation after moving to Slovenia, school or kindergarten for children, etc. • Learning and mentorship opportunities
Cluster 2 - Educational and research establishments University, Local institutes	• Business partners for research and collaboration • Finding internships or jobs for students at the University	• Help with signing up for tenders or signing up for projects • Promoting collaborations between Beehive, University, Institutes • Work opportunities for students, internships
Cluster 3 - Company owners Campus firm owners External firm owners	• Low net value added per employee growth (productivity) • Collaborations and synergies with other companies • Cost optimization • Lack of focus on core business operations	• Sourcing local products, working with the local community, employer branding, availability of younger work force • Help with digitalization, tenders & projects application, internationalization • Mentoring, expertise and financing aid
Cluster 4 - Beehive management Managers of the Beehive/The Beekeepers	• Collaboration between Beehive members • Selection of good Beehive members, internationalization • Access to finance • Governance of the hub/par	• Sustainability and greener operations of Beehive • Increasing recognition of the Beehive model, growth, etc. • Better cooperation with banks/potential investors • Clear governance of the hub
Cluster 5 - Local government Municipality Local community	• "Brain Drain" of capable youth to other regions and countries • Ageing population • Lack of steady cash flows from the classic model • Aim to develop as sustainably as possible • Below average business indicators compared to the region • Lower net value added per employee (productivity) • Lack of employment opportunities	• Long-term development plan of the municipality • Attraction of more foreign capital and funds from tenders • Sustainable architecture and development • Sharing progress of Beehive and firms in Beehive, boosting municipality's image as a business-friendly center • Additional job openings and additional places to sell products
Cluster 6 – The State The Republic of Slovenia	• Lack of a polycentric development of Slovenia • Attraction of foreign talent and foreign investment • Increasing productivity growth in SMEs • Lower net value added per employee compared to Western European countries	• Support for sustainable productivity growth • Sustainable development, supporting local community and improvement of green network while following ESG objectives • Attraction of foreign capital and funds, internationalization • Easier onboarding process of talents from other regions or from abroad • Promoting firms and Slovenia as a business-friendly destination
Cluster 7 - Investors External investors	• Lack of sustainable and profitable investment opportunities • Inflation fears • Commodity prices rising • Volatile markets	• Clear governance and defined business models • Attraction of more foreign capital, internationalization • Additional investments and new business opportunities

Source: Own work.

Table 6. A list of proposed amenities in the Beehive Business Hub

Employee focused	Business focused	Local community focused
Food court	Congress hall	Spa center
Gym	Consulting firm	Gym
Restaurants	SPIRIT Slovenia office	Restaurants
Spa center	Beehive HR	Electric vehicle charging station
Electric charging station	Cleaning service	Marketplace
Marketplace	Študentski servis	
	Marketing agency	

Source: Own work

Conclusion

The proposed business model - Beehive Business Hub based on the "Grow together" governance model - represents a new type of a business zone development, based on the synergies and cooperation among several stakeholders. It encourages sustainable growth not only of the SMEs, but also of the local community, municipality, and the region as well as the state.

Slovenia is often compared to other Western economies in terms of economic growth and development, also in terms of increasing productivity. However, as opposed to other Western economies, we believe we need a different approach in Slovenia for raising productivity. It is more common for firms to operate in smaller systems compared to countries like Germany, which is why the Beehive Business Hub concept is oriented towards a specific economic structure. As a possible solution, it is more geared towards aiding SMEs in overcoming their challenges and improving cooperation, and not as much focused on larger business systems.

Working together as bees can therefore be beneficial for all the shareholders, as it brings a structured and well-designed approach with clear focus on identifying pain points and proper solutions for all participants. The Beehive concept can serve as the model for the sustainable regional development in the future.

The key challenge when establishing the Beehive business zone is the industry selection properly based on natural and human resources available in the region, good choice of the Queen Bee(s), companies, and sound implementation of the synergies. In the following chapter the Beehive concept will be presented on the case of Izola, but it could be applied to any other region in Slovenia or abroad.

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BEEHIVE BUSINESS HUB: CONCEPT INVESTMENT ANALYSIS WITH COST ESTIMATION

Introduction

Building an innovative ecosystem in specific regions is a challenging task for policymakers and regional developers. The new concept of business zones, based on the Beehive model (presented in details in Domadenik Muren et al., 2021), targets the missing part of reaping the synergies by micro and small companies operating in specific industries that fit in the local environment to improve their position on the global market. Such business zones would have a significant positive effect on the whole region as they would increase employment opportunities (especially well-paid jobs in the service sector) and improve the social and economic potentials of the region. The main challenge is how to attract knowledge-intensive and innovative micro and small companies to the region and raise the financial (domestic and foreign) capital.

The purpose of this chapter is to provide a concept investment analysis and cost estimation of the proposed Beehive business hub located in a small municipality of Izola. Moreover, the chapter estimates the potential economic and social benefits for the municipality in order to gain support for the project from the general public, and provides a tool for choosing the best scenario based on predefined stakeholders' goals. The Beehive hub primarily serves as a missing link in the development of the region and the municipality, as it promotes collaboration between micro and small companies and other institutions (universities, institutes), supports the economic development, and consequently improves the well-being of the local community. Furthermore, employment opportunities in the business hub attract talent from other regions, as well as other countries, and prevent young local population to migrate elsewhere. The concept investment analysis could be implemented in any other Slovene region, taking into consideration regional specifics.

The structure of the chapter is as follows. First, the challenges of regional development are discussed, followed by a description of industry selection. The third part presents the investment analysis, while in the fourth part direct and indirect effects are estimated and different scenarios developed. The final section concludes the chapter.

1 Challenges of regional development: The case of Izola

Izola is a municipality located in the Coastal-Karst (Obalno-kraška) statistical region of Slovenia, between the cities of Piran and Koper on the southern coast of the Gulf of Trieste. The medieval town originated next to a port in the southern part of a former island, after which it got its name, and gradually expanded to the north and the east. Downtown Izola is built in a classical coastal town architecture with narrow alleys and stone houses, while the outskirts of it are more modern and industrial (Piciga, 2020).

Due to its favourable position, Izola developed mostly seasonally impacted hospitality, agriculture and food industries with low value added per employee and a low prospect for the younger generation. The lack of development vision resulted in only 76 percent of value added per employee in 2019, if compared with the Slovene average (AJPES, 2020). Therefore, the municipality faces many constraints and challenges related to its future economic development. The land is a scarce resource and to extract most from it for the future well-being, the municipality should have a strong vison of its future economic development. The main strengths, weaknesses, opportunities and threats are presented in Table 1.

The demographic profile of the city reveals positive net migration, but the city is being attractive mostly for the elder (retired) people, while the younger population is moving out. The average age of its population is higher than the Slovenian average (Statistical Office of RS, 2021). Furthermore, the population density is five times higher than the Slovenian average, and it is the highest in this region (Statistical Office of RS, 2021).[1]

1 Looking at its neighbouring cities, Izola is very small, even economically insignificant in comparison to the twice larger city of Koper, where we can find the seat of the Roman Catholic Diocese, an administrative unit and the Scientific Research Center (ZRS) of the University of Primorska, a bilingual radio and television station, the Provincial Museum, the Provincial and Diocesan Archives, a library, and the Port Captaincy. The Maritime Administration of the Republic of Slovenia and the International Maritime Border Crossing are also there, as well as one of the four higher courts in Slovenia. Koper also has the Bonifika Sports Park and a traffic hub with a large bus and train station. Piran, on the other hand, is much smaller than Izola but attracts many more tourists with its boutique tourism, Sečovlje salt pans, fruit production and a beautiful coast.

Table 1. SWOT analysis for the municipality of Izola

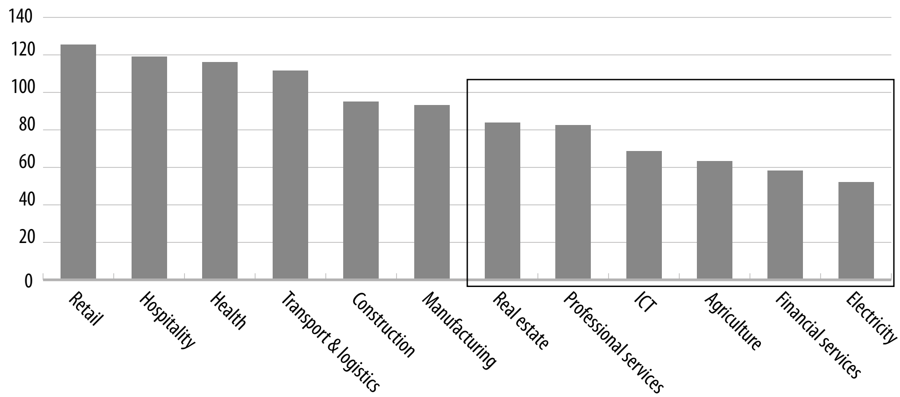
Strengths	Weaknesses
• Slovenian and Italian as official languages (multiculturalism and bilingualism) • Strong cultural heritage • Mediterranean climate with wine and olives as tradition • Safe and green destination • Geostrategic location (proximity to business centres; e.g., Trieste - 26 km drive, Ljubljana - 110 km, motorways and airports) • Part of Mediterranean Slovenia and the Coastal-Karst region as strong and recognizable tourist regions (cycling and running infrastructure already present) • Proximity to EU markets with high purchasing power; tertiary education institutions – the University of Primorska • R&D facilities (e.g., Innorenew CoE, Labs) • Hospital and medical infrastructure • Accessible by land and sea • Positive net migration of the older population	• Negative migration of young people abroad or to nearer business centres (e.g., Ljubljana, Trieste, etc.) • High population density • Low net value added per employee (compared to the region) • Seasonality dependent tourism, with "mass" tourism in the peaks, depending on the dominant segment • Limited accommodation capacity, low utilization of the primary tourist potential (low culinary and cultural content) • Degraded areas (a negative visual impact) • Lack of entertainment (night life) • Car traffic in the city centre • Lack of parking spaces • Poor public transport infrastructure • No uniform architecture arrangement to reflect the visual identity
Opportunities	**Threats**
• Attraction of foreign companies from Italian speaking areas (Italy or Switzerland), as the entire education and public administration systems can be pursued in the Italian language • Building a service-oriented industry, targeting needs of the older age group to attract wealthy individuals (health tourism, wellness, etc.) • Tourism 365 (authentic experience in tourist destinations throughout the whole year), green and active tourist destinations • Availability of development incentives for tourism (co-financing the development of innovative tourism products, digitalisation) • investment locations (many degraded areas) • Collaborations with other municipalities in proximity to create a macro tourist destination	• Overshadowed by neighbouring municipalities • Faster development of competitive destinations (e.g., Italian and Croatian seaside) • Lack of professional workforce (uncompetitive working conditions for seasonal workers in the tourism sector) • Lack of business opportunities • Insufficient financial resources (low interest in investing in the area) • Dependency on tourism (uncertainty about future tourism development) • Legislative and administrative barriers • Lack of common vision for destination development between stakeholders (municipality, private sector, local community, etc.)

Sources: Piciga (2020) and own work.

Izola is a municipality highly limited in building plots, however, there are larger, degraded areas that would be suitable for larger investments. A lot of real estate is used for tourist capacities, while other industries and the local community suffer a lack of building plots (Locus, 2019). Even though Izola is a coastal city and therefore provides a great living environment, the lack of vision for economic development and low support of small and medium-sized local companies discourage businesses to expand their operations in the municipality, forcing them to move to other regions.

As already mentioned, Izola is part of the Coastal-Karst statistical region that had 46,003 euros of net value added[2] per employee in 2019 and is lagging behind the average productivity in Slovenia by 1.7 percent. The gap with the national average increased also the year after (-5.8 percent),[3] however, due to the global pandemic and high dependence of the region on tourism this has been expected. Izola is lagging behind not only with respect to the Slovene average, it is also one of three municipalities (together with Ankaran and Komen) with the lowest value added per employee in the region (AJPES, 2020). As shown in Figure 1, several industries in the region (real estate, information and communication technology (ICT), financial services, electricity distribution) are significantly lagging behind the average national productivity per employee.

Figure 1. Net value added per employee in selected industries in the Coastal-Karst region as a percentage of net value added per employee in the same industries in Slovenia, 2019*



* Companies with at least one employee were included.

Source: Own calculations based on the data from AJPES.

2 Criteria for industry selection

Based on Izola's specifics, land position and area size, we have identified the most suitable industries to fit the purpose of the land. The selection was based on several qualitative and quantitative factors, applying the exclusion criteria methodology. After identifying the relevant industries, expertise and talent availability in the region, we checked the net added value per employee in a particular industry. Since the Beehive business hub is a concept that should

2 NVA=AOP126 (Gross return on business)-AOP129 (Purchase value of goods and material sold)-AOP130 (Costs of goods sold)-AOP134 (Costs of services)-AOP150 (Other business expenditures).

3 In 2020, net value added per employee averaged 44,400 euros, while the national average was 47,161 euros.

address the stakeholders and not only the shareholders' value, the qualitative factors, such as spillover effects, municipality expectations and sustainability of the local environment, have been taken into consideration (Table 2).

Table 2. List of qualitative and quantitative factors for industry selection

Qualitative factors	Quantitative factors
• Standard practices for similar projects • Regional talent availability and development (tertiary institutions present in the region) • Spillover effects • Support and sustainability of the local environment • Already existing expertise • Municipality requirements and specifications, including current industry alternatives	• Average yearly wages and growth • Net value added per employee and growth • Average space needed per employee • Compound annual growth of selected industries

Source: Own work.

To follow the Beehive business hub concept philosophy and incorporate the employee perspective, we checked also the average yearly wages and their growth per industry (Table A1 in Appendix). Higher wages reflect a higher living standard, spilling over the positive effects on the local community, since highly paid individuals spend more and enjoy a more lavish lifestyle (Anker & Anker, 2017). Furthermore, higher wages attract foreign, as well as domestic, talent to the region, supporting development of the local environment even further (Board et al., 2017).

Due to land constraints, the average space per employee needed represents an important factor because industries differ in respect of land needed for their operation and, again, focusing solely on the net value added per employee could be misleading if we want to maximize the stakeholders' value. A good example of how this factor affects the selection is comparing the logistics and manufacturing industries. The logistics industry has a net value added per employee of EUR 46,565.17 and on average requires 80 m^2 per employee in comparison to the manufacturing, which has EUR 40,153.24 net value added per employee and on average requires 47 m^2 per employee to operate. From the municipality/local community perspective this means that in logistics, on average, less people can get employed on the same size area. Compound annual growth of the selected industries provides an overview of how each industry is expanding internationally, based on demand (the expanding rate) and supply factors (industry environment), and identifies the future needs of the region in the long term.

The preliminary analysis, based on qualitative and quantitative factors presented above, identified the six industries (retail, logistics, manufacturing, ICT, financial services, and health)[4] for further evaluation. The purpose of this chapter is not to decide which choice would be the best, but rather present an overview of potential industries for the decision makers, based on realistic assumptions. It might be argued that some of the industries, such as retail and logistics, should be selected even if the factors were less in favour to support the philosophy of maximizing the stakeholders' value because there are private investors (e.g., discount market chains and container logistics terminals) who are interested in the specific plot area presented in the next part.

3 Investment analysis

In our analytical approach, we wanted to compare investment price ranges according to different possible typological solutions applicable in the case of Izola. As the detailed spatial plan is still under construction and does not currently give the exact starting parameters, we used a comparative method, through which we defined urbanistic parameters to be used for investment estimates. The plot is in the south-eastern part of Izola, next to the main highway which connects the Slovenian coastline. The aggregated land, which altogether encompasses 88,475 m^2 of land, was defined by the municipality of Izola (Figure 2).

For the purpose of the analysis, we used the site specific boundary conditions defined by the municipality and spatial regulations, and defined the inputs and assumptions (Table 3) needed for calculating and estimating the factors used in the setup and operating cost estimating methodology.

3.1 Investment and cost projections

Cost estimation that provides a rough estimate of a project cost is an important input needed by all parties involved in the project development, i.e., owner to obtain a reasonable price; engineer to develop engineer's estimate, and contractor to bid a project. There are several methods of cost estimation, some of them being expert judgment, analogous estimate, parametric estimate and detailed estimate (Carr, 1989). Expert judgment determines cost estimates based on expert's experience from the past while an analogous estimate calcula-

4 Table 1 in Appendix provides an overiew of quantitative factors for selected industries.

Figure 2. The map of the area allocated for the Beehive business hub

Source: E-prostor (2021).

Table 3. List of inputs and assumptions used in the setup and operating costs' estimation

Inputs and assumptions	
Building lifecycle	50 years
Solar energy capacity	kwh/year
Space per employee	e.g., 99 m^2 per 1 employee
Energy consumption	kwh/m^2 per year
Water consumption	liter per year
Share of ancillary activity	e.g., x m^2 of ICT y m^2 of restaurant, fitness, etc.
Number of employees	in core business according to the scenario
Height restriction	Ground floor + 2

Source: Own work.

tion is based on similar projects. Parametric estimate applies a parameter like area per square meter, while detailed estimate calculation is based on detail components of the project.[5]

In our analysis and projections we used a mixed methods approach (Figure 3). Analogous estimates first defined the appropriate urban density based on the typology, while later parametric estimates defined the investment and operating costs based on the estimated square meters defined by the projections.

Figure 3. Methodology flow chart

Source: Own work.

3.2 Set of comparable projects

Based on the plot size, limitations, feedback from the municipality and industry selection described in the previous part, we defined five applicable typologies – Office program with mixed used areas, Logistics premises, Manufacturing (production) facility, Private medical centre, and Retail shopping centre.

For each defined typology we selected a comparable project, which served as a basis for calculating the factors used in plot and floor area assessments. When selecting projects, we focused on the quality of urban design, date of construction, investment price and regional location. Thus, the selected projects listed below serve as a benchmark for the final cost projections:

- Manufacturing industry: Iskra mechanisms in Brnik,
- Retail center: Planet Koper,
- Integrated freight & logistics: Cargo Partner in Brnik,
- Office premises (ICT, financial & insurance): Ljubljana Technology Park,
- Health and social security: Mirje Medical Center in Ljubljana.

5 Each method has its own certain level of accuracy, feasibility estimate 25-30 percent, appropriation 15-25 percent, and detailed estimate 5-15 percent of real estate investment value.

3.3 Setup cost estimation

The setup cost estimation is used to determine the size of the required investment to create or modify capital assets. It is used as a benchmark in the early phases when alternative plans are needed to be priced and evaluated. Cost estimation as a deliverable therefore supports the decision-making process as an evaluation tool in selecting among different scenarios.

Factors used for the estimation were derived from the analysis of selected projects by calculating the ratio between plot size and floor area of each factor (office space, mixed use, parking area, garages, infrastructure, etc.). Applying the factors to the plot in Izola provided relevant floor area for all the main components of each scenario.

Approximate prices of construction cost used in the investment projections were obtained from the latest closed public tenders of the Chamber of Architecture and Spatial Planning of Slovenia,[6] as well as from the data available from the set of comparable projects mentioned above.

Total setup costs for each scenario were than determined by multiplying floor areas of the scenario components to relevant construction costs per square meter. As plot utilisation and construction costs vary significantly between individual scenarios, the setup costs range between 48.2 and 134.9 million €, as seen in Table 4.[7]

Table 4. Setup cost estimation per scenario

	Manufacturing	Retail	Transport & logistics	ICT & financial services	Health
The purchase price of the entire plot (EUR)	15,040,877	15,040,877	15,040,877	15,040,877	15,040,877
Total setup cost (EUR) - ready to move in	33,152,103	106,078,091	38,216,818	112,255,652	119,898,720

Source: Own work.

Projections of operating costs are based on a 50-year life span assumption of the project for which the operating costs are estimated. Operating costs vary between industries due to different usages, for example, the top two most energy-intensive industries are food service and retail malls, where refrigera-

6 All public tenders of the Chamber of Architecture and Spatial Planning of Slovenia are published on https://www.zaps.si/index.php?m_id=natecaji_izvedeni.

7 Detailed calculations can be obtained upon request.

tion systems and cooling processes are critical for their business, operating 24 hours a day, seven days a week, 365 days a year. Inpatient services and health care facilities operate 24/7 as well and place a heavy reliance on power-hungry equipment. In contrast, warehouses and offices do not need heavy machinery, indicating industry's lower-level energy intensity and significantly lower energy consumption levels.[8]

Table 5. Operational cost estimation per scenario, for 50 years of operation

	Manufacturing	Retail	Transport & logistics	ICT & financial services	Health
Estimated total operational cost (buildings only) in EUR	129,031,618	222,685,984	49,010,923	64,994,723	72,660,362

Source: Own work.

All in all, the lowest setup costs are in the case of manufacturing and integrated freight & logistics, while the highest are for health and social security (Table 4). The highest operational costs are estimated for retail, while the cost to maintain the ongoing activities in integrated freight & logistics are estimated to be the lowest (Table 5).

4 Direct and indirect financial effects on the municipality of Izola

The evaluation of potential benefits for the key stakeholder, the municipality of Izola, is based on a detailed analysis of estimated monetary inflows and outflows (Table 6). Estimated direct negative financial effects are related to aggregation of land under one owner and would represent a one-time expense of the municipality to purchase the land (not being owned by the municipality yet), purposed for the Beehive business hub, as explained in the third section. Secondly, investments in public infrastructure are needed to equip the area with needed infrastructure. Opportunity costs are related to the potential selling of the land owned by the municipality to interested investors.

On the other hand, the estimation of the future direct income of the municipality is based on the taxes and fees paid by companies, located in the Beehive business hub. The municipality will receive a certain amount of cash flow in each scenario. It is important to note that investors do not pay anything directly

8 Data for energy consumptions for each scenario per square meter were acquired from US Energy Information Administration (EIA, 2018).

into the municipal budget, except for the compensation for the use of building land (NUSZ), and this is approximately 0.8 EUR per square meter of the building (i.e., something similar also per square meter of building plot). Besides that, the municipality receives the administrative fee for the issuance of a building permit value of the building over 420,000 EUR that amounts to 729.42 EUR + 0.01 percent for the difference between the value of the building and 420,000 EUR. Based on these assumptions, estimation of direct financial effects for all six scenarios[9] is presented in Table 6. Other taxes and duties are paid by companies directly to the State.[10]

Table 6. Direct financial effects on the municipality (in EUR)

	Manufacturing	Retail	Transport & logistics	ICT & Financial services	Health
ESTIMATED INFLOWS					
Taxes and fees	20,958,222	25,629,711	20,559,858	19,163,340	25,949,972
ESTIMATED OUTFLOWS					
Purchase of the remaining plots	15,040,877	15,040,878	15,040,877	15,040,877	15,040,877
Investment in public infrastructure	2,582,023	5,633,089	3,122,182	2,315,021	6,014,153

Source: Own work.

Indirect effects, however, are much harder to measure and might require inputs from multiple parties and stakeholders in the project, therefore, we were not able to provide a credible estimation at this point. We evaluated them qualitatively. Higher net value added brought to region will increase wages and spillover also to other businesses, local farmers, fishermen and supporting services. Therefore, higher living standards and expenses paid are expected. With more businesses in the region, also frequency of business travels and arrivals of business partners will increase, providing an off-season source of revenues for the hospitality sector. This is especially relevant in the case of health tourism. Therefore, its impact on the local community must be estimated, considering overnight stays and money spent on leisure activities in the region.

A detailed scenario analysis (Table 7) points out to the most prosperous industries for the municipality of Izola, with potential spillover effects being information and communication technology (ICT), financial and insurance ser-

9 Estimation of operational costs in the ICT industry is based on the same assumptions and has similar characteristics as cost estimation in financial and insurance services. Therefore, we present them jointly.
10 Detailed calculations can be obtained upon request.

vices, and health services. Selected industries would also result in the highest value added per employee, paying the highest wages, and providing between 1,300 and 2,000 new employments. SMEs already operating in the region and tertiary education institutions (e.g., University of Primorska, University of Trieste) could support long-term sustainable growth, from the knowledge and human resource perspective.

Table 7. Scenario analysis

	Manufacturing	Retail	Transport & logistics	ICT	Financial and insurance services	Health
Annual gross wages (in EUR, 2019)	19,092	21,304	16,104	26,751	28,084	23,852
Maximum number of employees	634	722	510	2,077	2,077	1,311
Total net value added per year (in EUR)	24,950,083	34,615,966	19,767,965	103,114,838	120,965,948	182,490,942
Land allocation cost (in EUR)	15,040,877	15,040,877	15,040,877	15,040,877	15,040,877	15,040,877
Setup cost (in EUR)	33,152,103	106,078,091	38,216,818	112,255,652	112,255,652	119,898,720
Operation costs (50 years, in EUR)	129,031,618	222,685,984	49,010,923	64,994,723	64,994,723	72,660,362
Parking spaces	896	2,779	553	2,099	2,099	2,099
Spillover effects	Low	None	Low	High	Medium - high	High
Talent availability	YES	YES	YES	YES	YES	YES

Source: Own work.

It should be noted that the presented scenarios are based on industry clustered activity classification based on Standard Industry Classification (SIC). This means that an IT company operating in the financial sector and an IT company operating in the agriculture sector are in the same cluster despite totally different net value added and could mislead the decision makers. The scenario analysis should not be used as a tool for the final decision making as this is the industry average, but rather to be seen as a good foundation for the next phase of analysis. A more detailed analysis within the mentioned industries is crucial to identify the opportunities on the market and potential hub specialization. A misunderstanding of the industry specifics and needs of the market could lead to failure over time, despite financial capital and willingness to invest and operate.

Conclusion

The municipality of Izola is currently facing a challenging situation about its future economic and social development, due to the scarcity of building plots available, lower productivity and unfavourable demographic structure. As there is no development strategy for the region as such, the municipality is struggling to define its own path to create an innovative and supporting environment for businesses and well-being of its inhabitants. The proposed Beehive business hub concept tries to provide a supporting business environment for micro and small companies that would create new employment opportunities for the local community and attract financial capital and talents from other regions to boost the educational and social structure of the city.

The Beehive business hub concept could be easily applied to any other region or municipality in Slovenia or abroad, as it provides a sound methodological concept for defining proper industries, based on natural, human and capital resources of a particular region.

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Appendix

Table A1: Average and five-year growth rate of net value added and gross wage per employee in selected industries from 2014 to 2019 (in percentage)

	Manufacturing	Retail	Transport	ICT	Financial services	Health	Slovenia
Average growth of NVA per employee	1.9	3.1	0.95	2.0	0.1	3.2	1.8
5 – year growth of NVA per employee	10.2	14.0	2.5	7.7	23.4	19.6	9.2
Average annual gross wage growth	3.1	2.2	1.8	2.9	2.4	2.6	2.6
5 – year average gross wage growth	15.2	10.3	9.8	13.9	12.5	11.5	12.7

Source: Own work.

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FINANCING BUSINESS ECOSYSTEMS: THE CASE OF BEEHIVE

Introduction

Developing appropriate financing solutions for Beehive Business Hub Izola, as well as adapting them to the Slovenian ecosystem, is crucial. The foregoing is also closely related to the idea of the business hub model itself, which is described in more detail by Domadenik Muren et al. (2021). Therefore, the aim of this chapter is to provide a detailed insight into the funding of business hubs and formulate an optimal financing solution for a new generation of business zones in Slovenia, with the focus on Beehive Business Hub in Izola. Ensuring the right type of funding for the business hub is of vital importance, as wrong decisions at this stage can impact the credibility, cost time, and directly determine the outcomes of the project. To identify appropriate options and funding solutions for the specific objectives, an evaluation of best practices from abroad and qualitative research including an analysis of academic literature and interviews with executives from the financial industry were conducted. The first part of the chapter provides a detailed insight into the funding options for business hubs by providing examples of good practices on a global level. Then, effects of government, EU and private sector financing of business hubs were presented. Examining the background of funding programs around the world helped determine the advantages and disadvantages of the above-mentioned financing types. In the second part, the focus shifts entirely on the Beehive Business Hub where the scope of the chapter was narrowed down from the global level to solutions implementable in Slovenia.

1 Financing of business hubs on a global level

The main sources of funding business hubs, specifically hubs in Europe, come from community-based financial organizations, larger formal financial intermediaries, EU funds - national and regional, local governments, and private sector investors (Dyba et al., 2020, Table 1). Also, different types of investments into hubs can be distinguished: initial (direct) investments into the necessary infrastructure for the hub, and investments into intangible synergies of the hub itself, such as various events, incubators, investments into companies (tenants of the hub), and many more (EIB, 2010).

1.1 Public sector financing options (national public funds)

Specialist funding agencies, many of which have strong links with states or international organizations, provide support both for the initial establishment of science parks and business hubs and encourage innovative companies to invest in them. Regional development agencies, due to their unique position (many operate on a not-for-profit basis), can provide facilities specifically designed to promote regional development (EIB, 2010).

Grant funds or (interest) subsidies are typically well suited for the costly start-up phase of hubs, especially for preparatory studies, research support and marketing campaigns. Preparatory assistance is considered crucial to ensure the successful implementation of new parks in line with established economic development criteria, which should reflect market needs and capacity.

The largest advantage of **public sector financing** of business hub projects is that most of these sources are free and do not need to be paid back. Further on, it is available for a wide range of projects and can be found on several levels. Also, through public finance generous amounts of money can be secured and there are opportunities of receiving additional funds after the first one. Receiving public sector financing has a signalling effect as it increases the credibility of the project and hub. On the other hand, public sector financing (from all levels) requires a large amount of in advance planning and the process of receiving funds is time consuming and bureaucratic (Morris et al., 2009).

For example, in the city of Barcelona, the initiative for business hubs largely came from the local authority but was then implemented and partly financed by private investors and the EU. The Barcelona Science Park (PCB) 1997 annual budget was estimated to be 15 million EUR. This includes private sector contracts as well as public sector initiatives and subsidies, with net revenues from private sector initiatives amounting to around 1 million EUR. The Park was opened in 1997 and the total investment amounted to 154.46 million EUR. The EU contributed with 36.52 million EUR, the public sector contributed 106.99 million EUR and private sector investors 10.95 million EUR (European Commission, 2007). Over time, in order to attract investments from universities and private investors, Spain started building business hubs near educational institutions and major cities (Bruhat et al., 1996).

Table 1. Public sector financing overview (national public funds)

Tools	Municipal	• Municipal development funds (MDFs) • Help in acquisition of land • Legislative support
	Regional	• Loan • Specialist funding agencies
	State	• Grants • Strengthening of institutions such as universities • Subsidies • Tax incentives
Advantages	• Mostly non repayable • Widely available (different categories and levels) • Can be received multiple times • Increase credibility	
Disadvantages	• Large amount of pre-planning required • Time consuming • Bureaucratic	
Examples	• Barcelona Science Park • Romania's support for development of the information and communication technology sector	

Source: Own work.

Besides directly financing the hub and building the enabling infrastructure the public sector can also participate by **assisting** in the acquisition of land, developing enabling **regulations and policies**, introducing tax **incentives** for companies in selected industries and strengthening institutions such as universities which can bring more expertise to the hub and present a good tool to attract future tenants (Table 1). A good example of this can be observed in Romania (Bucharest, Cluj-Napoca and Iasi just to mention few of them). In the past ten years, they have become and remained a leading outsourcing destination for IT in Eastern Europe, especially for project relocation and new department settings.

This success arose because of technical and proactive operational capabilities. The main drivers were a highly educated workforce (continuous cooperation with top universities, multilingual nation), skyrocketing of entrepreneurship (products aimed for global markets created in Romania) (Nicuale, 2018), fiscal incentives for ICT companies and their employees, access to structural funds and ease of doing business - the incorporation process of a new company in Romania is relatively easy (Amaral, 2016).

1.2 EU funds

The EU has different funding programmes, depending on the type of business or project, divided into direct and indirect funding (Your Europe, 2021). Financing through EU funds has proven to be important for various projects and the spectrum of potential sources is getting larger and larger. Still, EIB loans and EU structural funds present some of the leading sources of financing (Kollatz-Ahnen & Roick, 2018). The allocation of direct funding is managed by European institutions, namely the European Commission and the European Council. There are two types of direct funding: **grants** and **contracts,** which are managed by the European Commission through the Funding and Tenders Portal. Grants are awarded to specific projects that relate to EU policies, while contracts are issued by EU institutions to buy services, goods, or works needed for their activities, such as studies, training, organisation of conferences, or IT equipment. Indirect funding is managed by national and regional authorities and accounts for almost 80 percent of the EU budget, mainly through five major funds grouped under the European Structural and Investment Funds (Your Europe, 2021).

There are several advantages of EU funds. First, they provide long-term financing, a significant volume of resources and co-management mechanisms. Second, EU funds present an extremely cheap source of financing and considering EU goals and current trends, financing for business hubs projects should be largely available. In addition, cooperation with EU institutions can increase the credibility of the project and attract further potential investors. On the other hand, a disadvantage of using EU funds is the fact that the process of getting funds itself is time consuming and bureaucratic. Moreover, funds received from the EU (in any form) usually come with certain constraints and conditions, which can be both an advantage and disadvantage. On one hand, this limits the scope for which the funds can be used, but on the other, it ensures that there is no misuse of allocated funding. To prevent the misuse, the EU requires regular submission of technical and financial reports and deliverables, such as special reports, technical diagram brochures, lists, software milestones, etc. (European Commission, 2021).

Science Technology Park Belgrade (hereafter STP Belgrade), established in 2015, can be a good example of combining both national and EU financing. The Park has become a new business core for young start-ups and growing high-tech development companies (SMEs and development centres of international companies), in that way facilitating the innovation ecosystem in Serbia by providing a package of various support mechanisms for businesses. STP Belgrade (2021) was established and financed by the Government of the Republic of Serbia (represented by the Ministry of Education, Science and Technological Development), the City of Belgrade and the University of Belgrade, Government of Switzerland and the EU (IPA funds and EBRD). EU grants totalling 3.5 million EUR greatly facilitated the realisation of the project (Simic, 2018). Further on, in 2018, EU Commissioner for Digital Economy and Society Mariya Gabriel announced that as of 2019 the EU will take the responsibility of additionally funding STP Belgrade (2021) in the amount of 1.5 million EUR, which until that point has been financed by the Government of Switzerland (Ministry of European Integration Government of the Republic of Serbia, 2018). Table 2 provides an overview of EU financing.

Table 2. EU financing overview

Tools	• Concessional loans (debt) • Grants • Contracts • Structural funds
Advantages	• Provide long-term financing • Large amounts can be obtained • Co-management mechanisms • Cheap source of financing • Funds come with constraints (no possibility of misuse of funds) • Advanced portfolio management and risk reduction
Disadvantages	• Time consuming process • Funds come with constraints (can only be used as specified)
Examples	• Barcelona Science Park • Science and Technology Park Belgrade

Source: Own work.

1.3 Private sector financing options

Private investment plays an important role in the establishment and development of business hubs. In the past, private investors were less interested in such projects and the government itself had a larger share in financing and ownership. Nowadays, the loyalty of private investors in projects is key to the success of business hubs (APMG, 2016). Thus, private investors also play an important role in the actual implementation of operations and development. In many cases, investments in technology hubs are made by companies that are themselves focused on this industry. However, we should not neglect investors that are not related strictly to technology but to other industries as well, for example, real estate, logistics, education, and the like. These companies invest in promising technologies in hope of gaining access to new innovations and stable returns (Globustrat Consulting Group, 2006).

Financing from the private sector helps in bridging infrastructure (project) financing deficits, diversifies the financing portfolio and brings additional expertise (Prinsloo, 2019). Further on, an improved access to funding and increased value for money through application of best practices and previous experiences can be obtained. It brings greater accountability as private sector investors will have incentives to perform as well as possible and bring long-term efficiencies through maintenance of high-quality standards (Sphere Consulting, 2011). Finally, the manpower and know-how of large private investors might help fast-forward the bureaucratic processes since they have specialized teams dealing with preparation of the required documentation (for example legal teams in banks). On the other hand, the main goal of these investors is to increase the wealth of shareholders of companies or individuals (Di Bella et al., 2013). Therefore, private financiers will favor profit considerations over development in most of the cases, as their main focus are returns (Sphere Consulting, 2011). Secondly, private sector financing can be considerably more expensive than other sources of finance. Finally, private investors might be less inclined towards larger investments but in the case of business hubs they would consider it due to the possibility of additional benefits from the hub itself (Private investors, personal interviews, June 22-23, 2021).

According to the Murray (2016), approximately half of UK science parks are owned by universities and a large number were financed by the private sector. For example, Imperial Chemical Industries (ICI), a former British chemical company, owned Wilton and Hexagon, and IBM owned Langstone Technology Park. One of the largest investors, Angelo Gordon, who manages 22.2 billion

EUR in global funds, has partnered with Trinity Investment Management, a private UK real estate firm, buying five properties from LaSalle Investment Management (BEST Network Portfolio of science parks). Also, the Kent Science Park, where GW Pharma and Novartis are both business hub tenants, is the largest of the five parks in BEST Network, valued at around 78 million EUR. Therefore, M&G Investments company dedicated its 50 percent share to the Oxford Science Park (Murray, 2016). Additionally, Level 39 London, one of the largest incubators in the UK that connects start-ups from cybersecurity, fintech, AI and blockchain, is completely privately owned by the Canary Wharf Group, a British property company headquartered in London (Cotton, 2019).

In the Netherlands, the Leiden Bio Science Park (LBSP) was founded in 1984 and the foundation Leiden Life meets Science was founded by Leiden University in 2005. The Leiden Bio Science Park is near the University and the University Hospital and acts as a business incubator for innovation in the medical field. In this way, they attracted large companies to invest in the development and expanded the opportunities for start-ups to become part of the project. LBSP organises partnerships between national and international innovative entrepreneurs as well as knowledge institutions (Bruhat et al., 1996).

Table 3. Private sector financing overview

Tools	• Bonds • Shares • Commercial investment loan funds • Crowdfunding (debt and equity)
Advantages	• Helps in bridging infrastructure (project) financing deficits • Helps diversify the financing portfolio • Brings additional expertise • Brings a greater access to funding and value for money • Greater accountability • Long term efficiencies through maintenance of high-quality standards • Experience from previous projects can speed up bureaucratic processes
Disadvantages	• Returns over development • Can be more expensive to obtain • Less inclined towards larger infrastructural investments • It dilutes the share of earnings
Examples	• Level 39 London • Other UK hubs • Leiden Bio Science Park • Silicon Allee Berlin

Source: Own work.

Finally, Silicon Allee in Berlin, an institution founded in 2011, has by sharing expertise, running events and giving the local tech scene a voice built a platform that made Berlin a far friendlier place for entrepreneurs, investors and technologists (Silicon Allee, 2021). It was financed from several sources, including EU funds, the government, large investors and crowdfunding. Table 3 provides a detailed overview of private sector financing.

1.4 Public-private partnerships (PPPs)

Public-private partnerships (PPPs) describe a government service or private business venture, which are financed and run through a partnership between the government and one or more private sector companies (investors). This financing option has proven to be successful in infrastructure and development projects and looking at the examples mentioned before, PPPs could present a very viable financing option for business hub projects as well. Additional advantages are risk sharing (transfer of risk), possibilities of further cooperation, savings to the government budget, more transparency, and a decrease of political influence on project execution. The disadvantages are higher transaction costs, reduction of the bargaining position of public authorities, financial and opportunity risks for the public partner, and a political risk for the private partner (Pirvu & Voicu-Oltenau, 2009). Usually, the government can pool risks from many projects and gain support from their taxpayers, but the story is slightly different when they are the public partner in a PPP. When entering a PPP, the government exposes itself to risks of a particular project as well as the private partner. Therefore, they need to determine whether the greater costs involved are or will be justified, as they will still be held accountable to the public for the outcomes (The World Bank, 2020). On the other hand, the private partner's exposure to the public sector increases the political risks, such as government interventions, delay in project approvals and permits, corruption, expropriation and nationalization, and general political instability (Sachs et al., 2007). A private investor needs to carefully screen and assess projects when entering a PPP since any unexpected political changes can increase the risk of failure of the project and cause serious losses (Do Tien et al., 2016). An example of a successful PPP is the educational campus project being done in Austria, where the partners are the City of Vienna and Strabag Real Estate. The project involves the construction of educational facilities by implementing a modern, state-of-the-art concept. Total costs of the project are approximately 102 million EUR, with proposed EIB finance of 47 million EUR (EIB, 2020). Further examples of successful PPPs are the already mentioned Barcelona Science Park, as well as hubs in the UK. An overview of main PPP characteristics can be observed in Table 4.

Table 4. Public-private partnerships overview

Tools	Equity	• Capital shares
	Debt	• Senior debt: commercial and investment bank loans, bonds or project bonds • Junior/subordinated debt provided by third party financial investors • Other debt structures: operational or financial leasing, supplier credits, supplier financing
Advantages	• Proven to be successful in infrastructure and development projects • Risk sharing • Possibilities of further cooperation • Savings to the government budget • More transparent • Decrease of political influence on project execution	
Disadvantages	• Higher transaction costs • Reduction of the bargaining position of public authorities • Financial and opportunity risk for the public partner • Political risk for the private partner	
Examples	• Educational campus project in Vienna • Barcelona Science Park • UK business hubs	

Source: Own work.

2 Financing business zones, start-ups and SMEs in Slovenia

Small and medium-sized enterprises represent 99.8 percent of all companies in Slovenia. They are the backbone of the economy, as they employ almost 70 percent of the population and generate 65 percent of the turnover of all businesses (GOV, 2021). The number of newly established enterprises has increased rapidly over the last 20 years; 19,748 new companies started in 2019, 1.6 percent more than in the previous year (Šivic, 2021). However, looking only at innovation-based start-ups, there were only 223 fully developed and functioning start-ups and scale-ups in Slovenia in the last 15 years, as noted by Startup Slovenia (2021). Looking further into business zones, 653 have been developed in Slovenia as of 2019. By statistical regions, most business zones are in the regions of Gorenjska, Savinjska, Osrednjeslovenska and Goriška (Bizjak, 2019).

In Slovenia, there are many different funding opportunities for start-ups, growing companies and new business developments offered by national institutes and organizations. One of the main sources of public funding for business growth is the Slovenian Enterprise Fund (SEF), which offers a range of financial incentives and assistance with the support of the Ministry of Economic Development and Technology (MEDT). These financial incentives include grants, subsidies, loans, guarantees and equity, mainly intended for research and development, human resources, and investment-oriented activities that are subject to priorities of national or EU programs and policies, as well as equity financing (insurance for Slovenian exporters, vouchers for SMEs and subsidies for employment of specific target groups), prizes (for winners of public tenders), facilitation (tax relief for investments in R&D, investments in equipment, employment of disabled people), public procurement (as a business opportunity), non-financial forms of public support (professional support, consultancy, mentoring, workshops, and training) (Startup, 2020). In 2021, the MEDT is allocating a total of 659.3 million EUR to the economy. Of this amount, 248.8 million EUR are grants and 410.5 million EUR are repayable funds.

In the past ten years, funds for SMEs have been available from several sources in Slovenia. The two main sources of funds were the Slovenian Investment and Development Bank (SID Bank) and the SEF (Fund of Funds), through which 808 million EUR were available in the period 2014-2019 and a total of 545.4 million EUR were granted until 30th September 2019, as seen in Table 5 (OECD, 2020).

Table 5. Funds allocated to SMEs in Slovenia, 2014-2019

Institution	Amount available	Granted until 30/09/2019
Fund of Funds	253 million EUR	72.9 million EUR
SID Bank	555 million EUR	472.5 million EUR

Source: OECD (2020).

3 Proposing an optimal financing solution

To narrow down the financing options identified at the global level to Slovenian circumstances and formulate an optimal financing solution for the Beehive Business Hub in Izola, in June 2021, three interviews with professionals in the investment industry were conducted. Two of them are board members in private investment funds and the third one is a high executive in the insurance industry. The interviews were focused on the case of Izola and the general investment environment in Slovenia. They provided a practical view from the private sector and the perspectives of various investors, as well as some general constraints, requirements and concerns (Table 6). Also, they illustrated opportunities in addressing the ageing population challenge, potential of innovation in the healthcare sector and services in Izola, as well as the importance of cooperation with top universities from the region. One of the main concerns raised through all three interviews was the size of the investment. For example, the

Beehive Hub with a focus on ICT could potentially amount to an investment of approximately 192 million EUR. Out of that, approximately 127 million EUR would be the set-up costs for moving to a new location (15 million EUR for the land and 112 million EUR for the facilities), while the 50-year operational costs would amount to approximately 65 million EUR (Jazbec et al., 2021). A detailed summary of investments for the Beehive Hub with the focus on other suitable industries is identified by Jazbec et al. (2021).

Table 6. Interviews summary

What is needed to receive financing?	• Strong business case • Cash flows and scenario analysis • Clear value proposition for all stakeholders • Importance of hub cross functionality • Involvement of strong universities is beneficial
Financing options	• If presented as one investment (real estate and intangible synergies) would be a –start-up project • Asset managers believe the project should be divided in two separate parts (real estate and intangible synergies) • Ideal split between equity and debt financing is 50/50 • Financing through phases • Use of project financing • Use of collateral (50 percent of collateral value could be received)
Potential investor concerns	• Difficulties in calculating equity and capital provisions • Size of investment • Main competitors: Ireland and Serbia (STP Belgrade)
Investor demands and interests	• Full management and control of project with no external interference • Equity investors would want a place in the governance of the hub • Investing for two reasons: returns and future benefits from the hub • Large strategic investment
Challenges to address	• Ageing population • Large potential for innovation in the healthcare sector in Izola • Increasing number of people (also from the EU) are retiring in Izola
Force of attraction	• Participation of local communities possible • "Queen bee(s)" investment would show leadership in the project • In general, large levels of signaling between investors are involved

Source: Adapted from the text.

Further concerns were raised in terms of how a business hub in Izola would compete with already developed hub centres in Europe, such as Ireland and Serbia (STP Belgrade, 2021). One of the most important pieces of information we gained from our research was that investors, especially from the private sector, will largely look for both positive and negative signals before deciding whether to participate in a project. For example, if the project is backed up by the EU (or if it has already received some funding from the EU), it is a positive signal. If the Queen Bees are some well-known, reputable companies that committed to finance the project or participate in any other way, this is another positive signal.

Building further from the interviews, two potential ways of financing the Beehive Business Hub were developed. The first one focuses on the banking perspective and financing the project largely through commercial loans, while the second one focuses on financing through various private investors (asset-management investors, real estate investors, etc.) (Private investors, personal interviews, June 22-23, 2021).

3.1 Financing through commercial loans

The first solution would be gaining financial resources through banks. The banking perspective is that if the whole investments were to be financed as one, it would be considered as a start-up project and done through project financing (most likely in phases), however, there could be some difficulties in calculating equity and capital provisions. For the bank to properly assess the risks associated with the project, a strong business case, cash flow predictions and a scenario analysis are needed. Further on, the project would have to be backed up by collateral, most likely an increasing mortgage (land and buildings that will be built), where 50 percent of the estimated value could be received. Another option is entering the project with a syndicated loan, where the risk would be split across several banks. As pointed out by one of the respondents, if looking at conditions, for example, in June 2021, a bank would consider financing the investment at an interest rate of four to six percent annually. The second way of financing through banks is to attract different trenches of investors with different claiming rights. Therefore, the banks would be the most demanding investors, asking for collateral or even shares of companies in the hub. According to one of the respondents, a healthy amount of equity financing of the project is a good signal for the bank, and the ideal split between equity and debt financing would be 50/50. For example, having a leading company ("Queen Bee") investing in the project would show leadership and be a good signal for banks. Moreover, when providing financial solutions, we need to consider financing limitations as well. One of the mentioned concerns faced by many projects is the size of investment. This is quite a large investment for Slovenia, and it would need to be financed through phases. Moreover, too much government involvement is not desirable from a private investor's point of view, as it usually complicates things and brings additional risks. Next, special attention needs to be paid when involving banks from abroad due to different tax policies. In general, banks from Slovenia are highly unlikely to enter a project as an equity investor unless they would find an additional benefit or evenly position themselves in the hub. Nevertheless, the above financing solutions propose a realistic and potential financial plan for bringing the Beehive Business Hub in Izola to life.

3.2 Financing through various private investors

Considering the wide scope of the Beehive Business Hub project there is a pool of possible investors that would be interested in collaboration. These investors include venture financing, pension funds, investment funds, real estate investors and various companies ("Queen Bees") that could search for either returns or R&D solutions for the Hub. For example, companies operating in the same hub could experience spill-over effects from sharing the know-how. Since the project is quite large and complex, it would be hard for these investors to determine the risk and therefore potential required returns, making the investment less appealing. To make the project more marketable, a feasible solution is to divide it into two separate parts: (i) investment in the real estate (building of the hub), and (ii) investment in setting up and running the hub (the operational side). The real estate part would enable collecting the initial investments for the hub as it would be much easier to standardize this part of the project, thus making it more appealing for investors from Slovenia and abroad. Here, the crucial part is the future operating model of the hub as it would largely affect the cashflows generated by the hub. Attracting investors for the operational part would be harder as it presents quite a new concept in Slovenia. The key for successfully attracting investors lies in partnering with reputable institutions (such as universities) and building a dynamic cross functionality of the hub from which everyone involved in the project would benefit. One of the interviewees emphasized that in order to finance the hub through various private investors it needs to be "sold" three times: firstly, to various investors and lenders (what is their value proposition, business case, and how they benefit from investing); secondly, to the main company/companies ("Queen Bee(s)") investing and participating in the hub; and thirdly, to future tenants and coming SMEs (how they benefit from being in the hub) (Private investors, personal interviews, June 22-23, 2021).

Conclusion

The aim of this chapter was to define an optimal financing solution for the new generation of business zones in Slovenia, with the focus on the Beehive Business Hub in Izola. Based on the in-depth analysis of good practices of different innovation and technology parks in Europe, the main financing options were identified: public sector financing (national funds), EU financing, and private sector financing. Furthermore, our research has shown that in most cases we speak about an optimal mix of at least two and often all three types, with one predominating, depending on the specific purpose of the hub and the industries present in the hub.

Moving to Izola's business case, the biggest challenge encountered was the lack of potential investors, given the size of the investment for both the infrastructure and intangible synergies of the hub. After conducting the interviews, it was concluded that Slovenia has the potential to implement such a project due to its advantageous geographical location, highly skilled but relatively cheap workforce, and membership in the EU. The proposed business zone solution would also enable development and innovation in various fields through the establishment of a business ecosystem benefiting to all hub tenants and the region of Izola in general. As far as financing is concerned, the interviews showed that although limited, Slovenia still offers opportunities to finance such a project and it would be possible to attract foreign investors as well. We found that an optimal solution would be a combined financing model, consisting of private investors, national and European funds. The final design of the financing model would depend on how the project is to be presented, whether as a start-up (both infrastructure and intangible synergies together) or as separate investments aimed at different investor groups, which are the Queen Bee(s) that will commit to the project and industries that the hub will focus on.

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V.

SUSTAINABILITY AND INTANGIBLES IN NEW GROWTH PARADIGM

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PRODUCTIVITY GROWTH AND THE INTANGIBLE DIVIDE

Introduction

Intangible capital has long been investigated as one of the key sources of growth. This work stretches from Veblen's (1908) definition stressing that *"Intangible assets" are immaterial items of wealth, immaterial facts owned, valued, and capitalized on an appraisement of the gain to be derived from their possession"* to a more systematic analysis of the intensity of the investments as well as their contribution to productivity growth beginning in the 1970s, and further to the work from 2005 onwards of Corrado et al. (2005, 2006) and their definition of intangible capital comprising computerised information, innovative capital, and economic competencies. Intangible investments have been acknowledged as an important source of productivity growth. For example, Van Ark et al. (2009) showed that intangible investments can contribute a significant proportion to total productivity growth.3 In the US, intangible capital deepening contributed 0.83 p.p. out of 2.96 percent annual labour productivity growth between 1995 and 2006 (van Ark et al., 2009). Following the spike in productivity growth with the emerging new economy in the 1990s, productivity growth stagnated and on average declined after the 2008 economic downturn in developed countries (OECD, 2021). Interest in "new" growth determinants thereby increased, and in addition to the focus on technology and innovation,

1 This work is part of the GLOBALINTO project. The GLOBALINTO project has received funding from the European Union's Horizon 2020 programme. The mechanisms to promote smart, sustainable and inclusive growth under grant agreement No 822259. The data analysis is based on linked employer-employee data. For Denmark, the data was prepared based on register data made available by Statistics Denmark, data for Finland was prepared based on register data made available by Statistics Finland, data for Norway was prepared based on register data collected by Statistics Norway. For Slovenia, the data was prepared using the protected micro datasets with of the Statistical Office of the Republic of Slovenia and the support of the User relations section of the Data publication and communication division (Statistical Office of the Republic of Slovenia, 2020).

2 Acknowledgement: The Slovenian data preparation was also supported by Aleš Gorišek and Daša Farčnik. We would like to thank also Matjaž Koman and Polona Domadenik Muren for their contributions.

3 But taking into consideration that also the estimate of value added changes if intangible investment components are no longer treated as expenditure but rather as investments (please, see Corrado et al., 2006, for details).

global value chains, intangible investments are seen as crucial in increasing productivity growth as well as pushing the technological frontier outwards (Hintzmann et al., 2021; Piekkola, 2011).

While it is often superficially assumed that intensive, knowledge driven growth is in particular important for developed economies, the catch-up process in countries such as Slovenia is also heavily dependent on intangible investments. But Slovenia on average lags behind the developed economies, focusing more on tangible investments. For example, the 2020 European Investment Survey showed that in Slovenia, 59 percent of all investments were investments into machinery and equipment and only 20 percent into all intangible capital components combined, compared to an average of 33 percent in European economies. German companies, for example, reported investing 13 percent of all spending into only software, data, IT networks, and further eight percent into training, seven into R&D, and three percent into organizational improvements (European Investnment Bank, 2020). These survey data results are also supported by micro-based estimates, developed within the H2020 GLOBALINTO project (Piekkola et al., 2021b), which using extensive population data show that Slovenia lags behind Finland, Denmark and Norway in intangible assets. On the other hand, results show that intangible capital importantly contributes to value added in all studied economies.

The purpose of this chapter is to examine the importance of intangible investments for productivity growth and present the comparative position of Slovenia using the innovative GLOBALINTO methodology and micro-based estimates of intangible capital.

1 Intangible capital and productivity: theoretical background and empirical evidence

A more in-depth empirical analysis of the growth process began in the 1940s, 1950s and 1960s with the papers of Tinbergen (1942), Solow (1957) and Kendrick (1961), and their analyses of the process of economic growth that showed that the majority of growth was unexplained by either accumulation of capital or labour. Later, Kendrick (1972), who studied the capital stock and tangible and intangible investments between 1929 and 1966, showed that the share of total investments in the US GDP rose, also because of the "increase (…) in the intangible component comprising R&D, education and training, health, and mobility". Despite the evidence that economic growth must be related to intangible capital, capturing the value of intangibles was the main challenge in the empirical analysis and consequently for a long period, the analysis of the impact of "intangibles" was partial, usually limited to either R&D or human resources (education) impact on economic growth (Cameron et al., 2005; Hall, 2011; Hall & Mairesse, 2006; Ibrahim et al., 2014; Lawrence & Murray, 2017; McMahon, 1984; Romer, 1990). This measurement problem of intangible assets and intangible investments came to the forefront of the analysis in the late 1990s and the early 2000s (Lev, 2001; Nakamura, 1999). In 2005 and 2006, a systematic analysis of the intangibles began, based on the definition set by Corrado et al. (2005, 2006), who defined intangible capital using a three-dimensional approach. Intangible capital comprises: (1) computerised information (computer software, computerised databases); (2) innovative capital (which mainly incorporates R&D, but also other innovative expenditure, such as design, mineral exploration, etc.); and (3) economic competencies (brand equity, firm-specific human capital, and organisational structure).

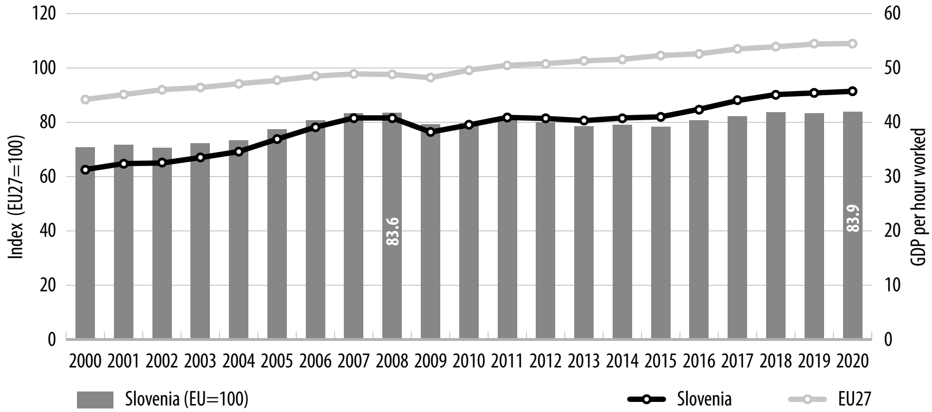
Overall, estimates of intangible investments show that some countries invest a similar proportion in intangibles as in tangibles (e.g. the USA); otherwise, the share of intangible investments is around 5 to 13 percent of GDP, depending on the country and year (CoInvest Project, 2012; Corrado et al., 2009b; Fukao et al., 2009; Innodrive, 2008; van Ark et al., 2009). For example, between 2000 and 2013 the level of intangible investments was on average 9.2 percent in the EU-14 (Jona-Lasinio & Meliciani, 2018). Piekkola (2011) summarised key results on the impact of intangibles on European performance from the EU FP7 Innodrive project. First, if intangibles are considered as an investment and not as costs, GDP increases by 5.5 percent. The differences between European countries (studied between 1995 and 2006/2008) are substantial, but convergence is observed. Primarily high-income countries with a comparatively smaller share of intangible capital have been investing more, which the authors see as a move towards the knowledge economy and convergence. More recent GLOBALINTO industry-level estimates show that intangible investments represent roughly between 4.5 (Greece) and 17 percent (Sweden) of gross value added, which indicates significant differences among EU economies in size (and structure) of intangible investments. The overall contribution of intangibles to growth has been significant, also when considering the interaction with countries' inclusion in global value chains (Roth, 2020; Tsakanikas et al., 2020).

Many other studies also confirm that intangible capital is very important for economic growth in developed economies (that are most represented in the literature). The contributions in other countries were also significant, ranging from around one quarter to around one third of total labour productivity growth (Corrado et al., 2009a; Fukao et al., 2009; van Ark et al., 2009). Further, Roth and Thum (2013b) find a positive and robust relationship between intangible investments and labour productivity growth, in addition stressing that intangibles explain a large share of the unexplained variance in labour productivity growth. This relationship is found to be stronger between 1995 and 2000 than between 2000 and 2005. Corrado et al. (2018) investigate the period between 2000 and 2013. They find that during the crisis, intangible investments were relatively resilient, while tangible investments fell. Intangible investments also bounced back relatively fast. This is consistent with the results of Roth (2020). Jona-Lasinio and Meliciani (2018) also show that between 2000 and 2013 the contribution of intangibles to total factor productivity growth was between 14 percent (Denmark) to even 30 percent or more (the Netherlands, Spain, Finland, and the UK (even 33 percent). According to the authors, the overall decline in labour productivity growth is mostly the result of the TFP slowdown, and not tangible and intangible capital. Piekkola (2020) indeed shows that since the 2009 financial crisis the innovation-labour biased technical change in Finland has not been decreasing, meaning that low growth is related to a decrease in markups, which plays the dominant role in the TFP slowdown (TFP measured as a residual also accounts for pure profit). However, it should be stressed that while the components of intangible capital are on average positively related to productivity growth, the size of the contribution (similarly as the size of investments in a certain component) depends also on the economy's industrial structure and development (Griffith et al., 2004; Hall & Mairesse, 1995; Miyagawa, 2010; Roth & Thum, 2013a; van Ark et al., 2009; Wakelin, 2001).

2 Productivity gap and intangible investments in Slovenia: macro and micro perspectives

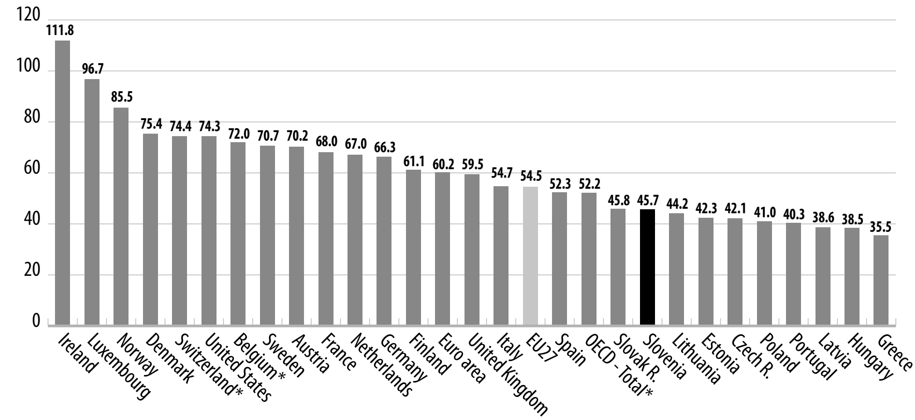
Overall productivity growth has been slower after the 2008 crisis than ever before (Redek et al., 2021). And although in emerging EU economies productivity was growing faster than in old EU members, Slovenia made significant progress in GDP per hour worked (2015 prices in PPP) between 2000 and 2008 (Figure 1). By 2008 it reached 40.8 US$ per hour worked that corresponded to 83.6 percent of the average amount in the EU27. By 2020 productivity basically remained the same in comparative terms, with Slovenian GDP per hour worked increasing to only 83.9 percent of the EU27 average.

Figure 1. GDP per hour worked in Slovenia and the EU27 between 2000 and 2020, in US$ (right axis, 2015 constant US$ in PPP) and index (left axis, EU27=100)



Source: OECD (2021).

Figure 2. GDP per hour worked in 2020*, 2015 constant US$ in PPP



*The asterisk next to a country implies that the data is for 2019.

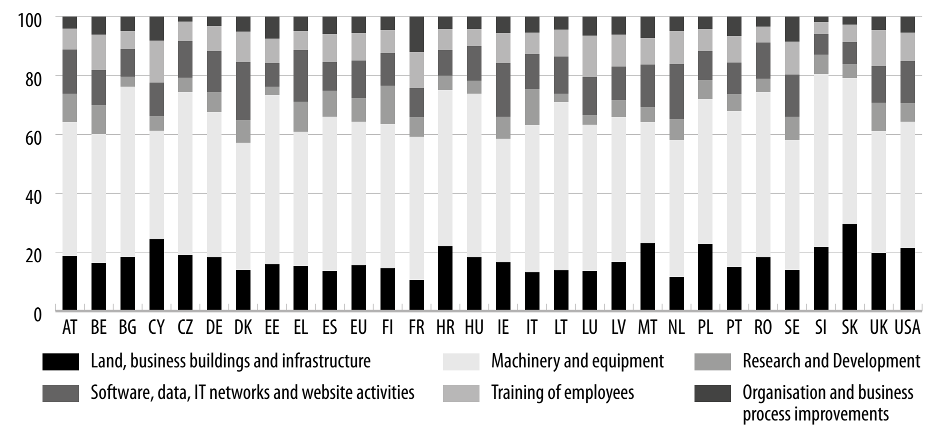
Source: OECD (2021).

Slovenia, which was once the most developed transition economy, is losing its growth momentum and relative development position. In 2020, Slovakia was ahead of Slovenia in hourly output produced, and more importantly, in contrast to Slovenia, it increased its hourly GDP from 54 to 83 percent of the EU27 average between 2000 and 2020, while Slovenia only increased it from 70.8 to 83.9 percent. Similarly, Czechia in the same time period increased its hourly relative output from 58 to 77 percent of the EU average. Although economic theory stresses that countries at the technological frontier grow slower, Denmark for example increased its relative productivity from 131 to 138 percent of the EU average between 2008 and 2020 – in the same period when Slovenia stagnated. With 45.7 US$ per hour worked, Slovenia is well below the EU27 average and even further behind the developed economies it is trying to catch up with (Figure 2, OECD, 2021).

There are numerous factors that affect the trajectories of national growth, from global factors to domestic macroeconomic, institutional, financial and other environmental factors, as well as firm-level determinants of growth. After all, macroeconomic developments reflect firm-level dynamics. Firm-level determinants include investments into tangible and intangible capital components, as well as employment changes, sectoral specifics and other factors, such as technological factors.

In this chapter, we are interested primarily in intangible investments. The most recent widely available data from the European Investment Bank (survey data, 2020) shows that Slovenia invests significantly less in intangible capital than developed EU countries and focuses primarily on tangible investments (Figure 3). This is, following the recent findings in the literature about key contributions of intangibles to growth, myopic and strategically not the best decision for a firm, which also hampers efficient productivity increase and technological restructuring.

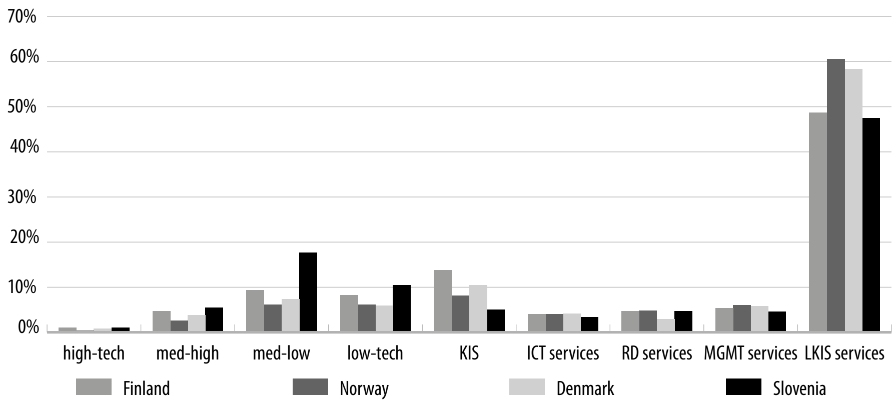
Figure 3. Intangible and tangible investment structure in EU countries, 2020, as percentage of all investments



Source: European Investment Bank (2020).

The analysis in continuing focuses on a selection of key sectors and firms with at least five employees. Slovenia has a significantly different sectoral structure than the three developed economies (Denmark, Finland and Norway). In particular, what stands out are the significantly higher shares of medium-low tech manufacturing, significantly lower shares of medium-high tech manufacturing (albeit low in all countries), and lower shares of knowledge-intense services (Figure 4). Denmark, Slovenia and Finland stand out in their share of high-tech firms. Slovenia was also strong in the medium-high tech sector. However, the share of medium-low tech companies is in Slovenia significantly higher than in other investigated countries, while also having significantly less knowledge-intense services. Norway is a bit specific due to its industrial focus and role of resources, nonetheless, higher-tech sectors are also more pronounced. The sectoral structure on the one hand relates to the comparatively poorer performance of Slovenian companies in terms of value added created (e.g., GDP per hours). On the other hand, low intangible investments will be problematic if the country wants to restructure towards higher value added industries, especially (as shown in our further analysis) when intangible investments are more important in terms of value added in comparison to tangible investments.

Figure 4. Structure of Slovenian, Danish, Finnish, and Norwegian economies by tech and knowledge intensity

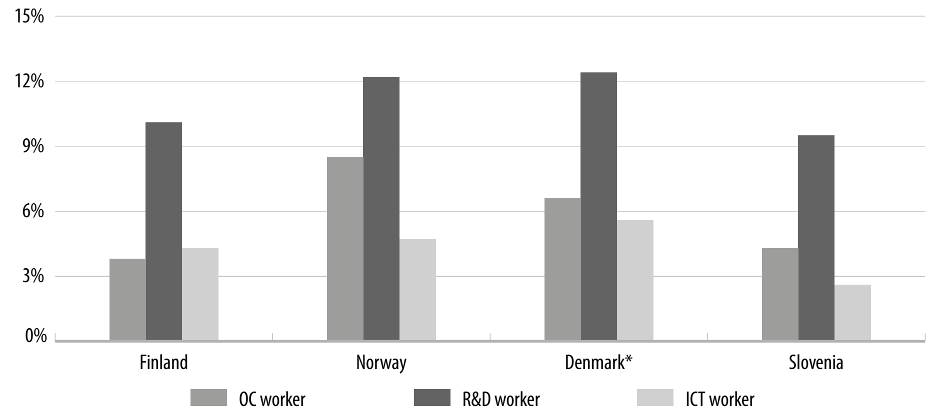


Source: Piekkola et al., (2021a).

3. Firm-level intangible investments in Denmark, Finland, Norway and Slovenia and their contribution to value added

The GLOBALINTO approach is based on assessing investments into intangible capital components based on the occupational structure of employees. To capture the investments, which are divided into different components of intangible assets (R&D, ICT and organizational capital), we apply the number of employees in specific occupations according to the International Standard Classification of Occupations (ISCO) (Table A1 in the Appendix). Furthermore, based on the spending for their wages, the share of time spent on "intangibles" work and the use of non-labour inputs, we calculate the total intangible investments. For example, to measure the amount of ICT investments, the number of employees with occupations such as "Information and Communications Technology Services Managers", "Information and Communications Technology Professionals", "Information and Communications Technicians" are selected.[4] A similar approach is used for the other two categories of intangible capital.

Figure 5. Share of intangible workers as percent of all employees in the private sector, 2017



*Danish data for 2016.

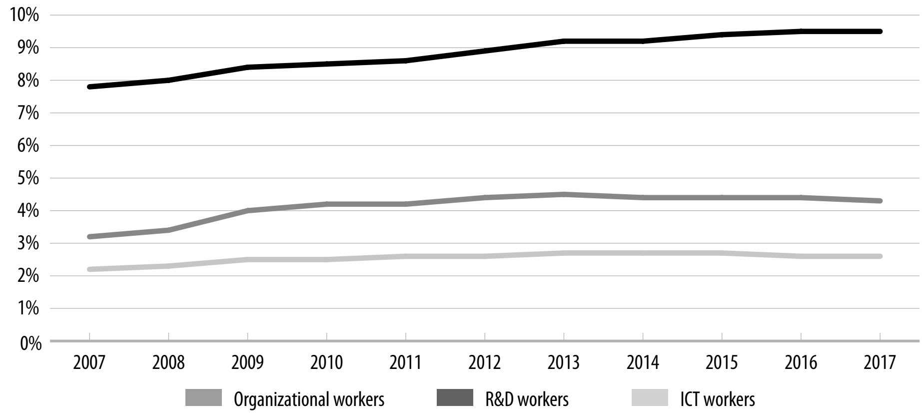
Source: Piekkola et al. (2021a).

Figure 5 presents the shares of intangible workers among all employees in 2017. Overall, Norway had the highest share of intangible workers among all employees in the private sector. In 2017, the organizational, ICT and R&D workers in total represented more than 25 percent of all employees. Denmark followed closely with just under a quarter of all employees being classified in one of the intangibles categories. In Slovenia, intangible workers represented 16.4 percent of all employees. The share of organizational capital workers was 4.3 percent, R&D workers 9.5 percent and ICT workers 2.6 percent. Slovenia lagged significantly behind Norway and Denmark, in particular when considering the total intangible workers' share. The lag was also significant in the share of ICT workers, which was by far the lowest, being less than half of the share in Denmark.

4 Details available in Piekkola et al. (2021b).

Nevertheless, lagging behind the Nordic countries, Slovenian companies have been increasing the share of intangible employees. Their cumulative share (all types combined) increased from 13.2 percent in 2007 to 16.4 percent in 2017 (Figure 6). The increase was most pronounced in the share of organizational workers. All shares were increasing until 2013 and then the change slowed down or even declined a bit (ICT and organizational). This change could be explained by the general labour market trends and the lay-offs caused by the 2009 crisis and the austerity crisis that followed. Companies in particular were more prone to laying off workers who were not their core employees, which often meant it was the production workers who were let go (Prašnikar et al., 2017; Prašnikar, 2010, 2012). However, when growth returned in 2014-2015, the shares either continued to grow (R&D) or declined only a bit, which in view of overall increasing employment means that the number of intangible employees was increasing.

Figure 6. Share of intangible workers as percent of all employees in the private sector in Slovenia



Source: Piekkola et al. (2021a).

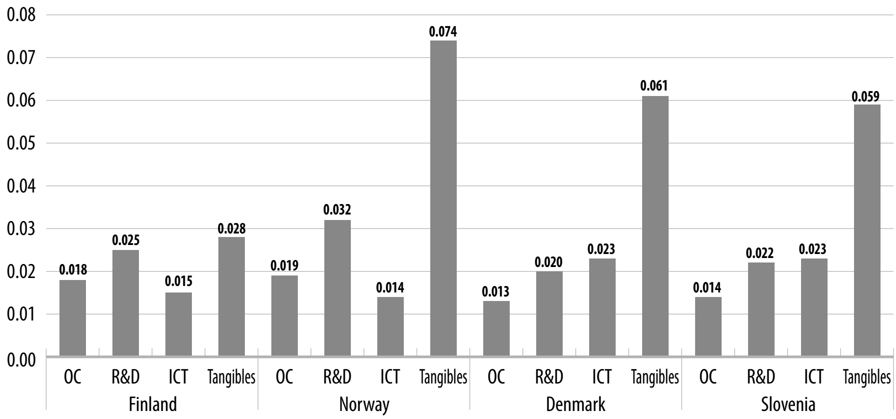
Despite the increasing shares, Slovenia continues to lag behind the other three economies, where the shares of intangible workers also increased in the same period. For example, in Norway the share of all intangible workers combined increased between 2008 and 2017 from 19.7 to 25.1 percent, in Denmark from 17.4 percent in 2007 to 24.6 percent in 2016, while in Finland it remained stable at about 18 percent given the downsizing of Nokia in 2009-2011.

The comparatively lower shares of intangible workers in Slovenia are relevant also in view of the contribution of intangible assets to productivity growth (estimation methodology explained in Piekkola et al., 2021b). The estimation method considered the elasticity of value added to tangible capital, employment (non-intangible workers), average years of education, intangible capital components with relevant controls. The estimation was carried out on the population of companies with 20 or more employees for the period of ten years or more, depending on country samples (details in Piekkola, 2021b).

Comparing the role of intangibles in the creation of value added using the elasticities of value added to intangible and tangible capital components shows that intangible capital in Slovenia is on average as high or higher than in other investigated countries (Figure 7). Overall, the combined elasticity of value added to intangible capital is 0.059 in Slovenia, in comparison to 0.056 in Denmark, 0.058 Finland, and 0.065 in Norway. Norway had the most pronounced role of tangible capital among the economies, due to the characteristics of larger companies in Norway. Importantly, the elasticity of value added to intangible capital in Slovenia (all components combined) is just as high as the elasticity of value added to tangible capital. Overall (see Piekkola et al., 2021b), the elasticity of output is still highest with regards to employment (around 0.6-0.8), however, the contribution of intangible capital is also high, especially if compared to tangible capital.

In view of sectoral differences and the Slovenian economic structure by sector, R&D intangibles were most important in R&D services, where the elasticity of output was between 0.06 and 0.095 in the investigated economies. R&D assets were also very important in the high to middle-high tech sectors, where the elasticity of value added to R&D assets was even 0.08 in Norway and 0.04 in Slovenia. In all Slovenian sectors, the contribution of R&D assets was positive and highly significant. OC assets had the most pronounced effect in knowledge-intense services, where the elasticity of value added to OC assets was between 0.02 and 0.03 in Finland and Norway, respectively. In Denmark, the impact of OC was highest in R&D services, while in Slovenia, it had a relatively balanced effect across the investigated sectors, between 0.011 and 0.016, but the effect was insignificant in R&D services. In the R&D sector in Slovenia, interestingly, the elasticity of value added to "tangible assets" was higher than the average of the economy with 0.086. The elasticity of value added to tangible capital in Slovenia was highest in high and middle-high tech sectors (0.092), followed by the R&D sector and low to middle-high tech sectors (0.081). In Finland and Norway, the elasticity of output in high and middle-high tech sectors was lower than the average of the economy, while in Denmark it was higher. In Slovenia, the elasticity of value added to tangible capital in high and middle-high tech industries was significantly higher than on average in the economy (0.092 and 0.081 in comparison to 0.059), which highlights the importance of Slovenian high and middle-high tech industry companies to increase also their tangible investment. Intangible investments in total had a comparatively higher impact than tangible in low-tech manufacturing and knowledge-intense services. In the case of low-tech manufacturing, this result could also highlight that the comparatively higher returns stem from the catch up process, which is driven not so much by tangible, but rather intangible investments, also implies restructuring towards higher value added sectors. Only in Denmark the impact of intangibles was lower and partially insignificant. ICT assets have the highest impact in KIS market services and ICT services, where the elasticity in Slovenia is around 0.033 (which is comparable to Norway (0.036), but lower than in Finland and Denmark, where it is 0.04 or higher). On average (Figure 7), the elasticity of value added to ICT assets is around 0.022 in Slovenia.

Figure 7. Estimated elasticity of value added to intangible asset types (all sectors, companies with at least 20 employees, random effects estimation)*



*For detailed regression results and an estimation procedure explanation see Piekkola et al. (2021b).

Source: Piekkola et al. (2021b).

Policy implications

Productivity growth in Europe and in developed countries in general has slowed down significantly from the pre-crisis levels. In the level of productivity, Slovenia significantly lags behind developed economies, with its productivity growth remaining low, comparable to the EU average after the 2008 crisis. Productivity growth depends on a number of factors, including intangible capital, which is according to the literature one of the key sources of productivity growth, both in less and more knowledge and technology intensive sectors.

Being significantly behind the EU average also in intangible assets and intangible investments, Slovenia has a number of challenges to face while catching up with the more developed countries. These issues are highly relevant to policymakers as well as managers.

Intangibles have a direct impact on a firm's productivity, which in the investigated economies is higher than the contribution of tangible capital, with primarily R&D and organizational capital being the most important (Piekkola et al., 2021b). In addition, firms' mark-ups strongly depend on intangible assets as well (Piekkola et al., 2021b). Given the strong and positive effects of intangible assets, which by nature are more firm-specific, it can also be expected that within-firm growth, a systematic and strategic approach to generating intangible assets and managing them efficiently could become one of the key sources of growth in the future. In Slovenia, managerial awareness of the role of intangibles should be promoted. The earlier research for Slovenia showed that only the best firms had a systematic approach to managing their intangibles, while the majority, despite in fact acknowledging their lag, did not (Prašnikar et al., 2017).

In the future, due to increasingly more service-oriented economies in Europe, the role of knowledge-intensive services will increase as well. Firstly, their role will increase directly, as their share in GDP continues to grow and their productivity depends largely on human capital (intangibles). On the other hand, knowledge-intensive services can (depending on a country's structure) also strongly cooperate with other sectors, particularly manufacturing, and therefore their increased productivity will also contribute to increased productivity in other sectors, creating a positive growth spiral.

The firm-specific (private) intangibles are one segment of intangible capital covered in the literature. However, public intangibles, as well as "intangible" commons, which may be present within clusters of companies, industries and regions, will additionally spur growth. Such "intangible commons" have been identified to be important in Slovenia also within global value chains (Prašnikar et al., 2017). The state may further promote intangible investments by strengthening public intangibles (Corrado et al., 2017), which includes increasing digitalization, human capital investments and other.

Small and medium-sized companies (SMEs) have long been seen as one of the key sources of growth in Schumpeterian creative destruction. In Slovenia, the majority of firms are small and medium-sized with only a handful of large companies. SMEs rely on their growth through the increased productivity of intangibles workers and are especially dependent on knowledge spill-overs in their industry. The state should promote their development by also considering policies that would increase their interest in intangible investments and their international orientation.

Tangible investments, of course, continue to be important, however, the aggregate picture, revealing high interest of companies in Slovenia to invest in buildings and machinery, may on the other hand be hiding underinvestments in other sectors or sectoral misallocation. In particular, if Slovenia would like to make a shift from low-medium tech industry to strengthen the high and medium-high tech sectors and knowledge-intensive services, both national development policymakers as well as managers should consider the longer-term perspective and the rationality of the investment structure. This is especially important also in view of global competition.

To conclude, it can be said that Slovenia is at the moment lagging behind the developed countries and its growth has been more sluggish in the past decade than before. To increase the pace of growth, a smart national policy approach as well as a firm's strategic focus will be required.

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Appendix

Table A1: List of relevant occupations, used in intangible asset classification and evaluation

1	**Managers**	22	Health Professionals
112	OC Managing Directors and Chief Executives	221	R&D Medical Doctors
12	OC Administrative and Commercial Managers	222	R&D Nursing and Midwifery Professionals
121	OC Business Services and Administration Managers	223	Trad. and Complementary Medicine Professionals
122	Sales, Marketing and Development Managers	224	Paramedical Practitioners
1221	OC Sales and Marketing Managers	226	R&D Other Health Professionals
1222	OC Advertising and Public Relations Managers	23	Teaching Professionals
1223	R&D Research and Development Managers	24	Business and Administration Professionals
13	Production and Specialized Services Managers	241	OC Finance Professionals
131	OC Production Managers in Agriculture, Forestry and Fisheries	242	OC Administration Professionals
132	OC Manufacturing, Mining, Construction and Distribution Managers	243	Sales, Marketing and Public Relations Professionals
133	**ICT Information and Communications Technology Services Managers**	**25**	**ICT Information and Communications Technology Professionals**
134	OC Professional Services Managers	26	Legal, Social and Cultural Professionals
14	Hospitality, Retail and Other Services Managers	3	Technicians and Associate Professionals
2	Professionals	31	Science and Engineering Associate Professionals
21	Science and Engineering Professionals	311	R&D Physical and Engineering Science Technicians
211	R&D Physical and Earth Science Professionals	312	Mining, Manufacturing and Construction Supervisors
212	R&D Mathematicians, Actuaries and Statisticians	313	Process Control Technicians
213	R&D Life Science Professionals	314	R&D Life Science Technicians and Related Associate Professionals
214	R&D Engineering Professionals (excluding Electrotechnology)	315	Ship and Aircraft Controllers and Technicians
215	R&D Electrotechnology Engineers	32	Health Associate Professionals
2151	Electrical Engineers	321	R&D Medical and Pharmaceutical Technicians
2152	R&D Electronics Engineers R&D	33	Business and Adm. Associate Professionals;
2153	ICT Telecommunications Engineers	34	Legal, Social, Cultural Associate Professionals;
216	R&D Architects, Planners, Surveyors and Designers	**35**	**ICT Information and Communications Technicians**

Source: Piekkola et al. (2021).

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HOW SUSTAINABLE ARE SLOVENIAN COMPANIES: SUSTAINABILITY BUSINESS INDEX AND MOTIVES FOR CORPORATE ENVIRONMENTAL AND SOCIAL PRACTICES

Introduction

The concept of sustainability is associated with meeting the needs of current generations (or in the case of a business, current stakeholders) without compromising the needs of future generations (or future stakeholders). It has been almost 60 years since the Friedman doctrine (Friedman, 1962) was written, according to which the only corporate social responsibility is to maximize profits. The current climate and health crises show that we live in a very different world than we did decades ago and that businesses, the natural environment and society are intertwined. There are limits to economic growth and companies should go far beyond thinking that profit is their only social responsibility. To some extent, this was also made clear by the leaders of major European companies, who wrote to the new European leaders calling for a shared vision of sustainability and participation in European Partnerships to deliver solutions to major societal challenges (European Commission, 2021).

Although the literature contains an abundance of different sustainability-related publications, a consensus on definitions, relevant concepts and measures has not yet been reached and many gaps in the literature can be identified (Lucas, 2010). One of the most obvious gaps is that previous studies have focused on only one measure of environmental and/or social performance (e.g., Earnhart & Lizal, 2007; Naila, 2012), neglecting the multidimensional nature of both environmental and social sets of practices. To address this gap, we propose a multidimensional and theory-based conceptualization of corporate environmental and social practices that provides a broader perspective and more insights into the discussion. In other words, our research assesses the sustainable development of Slovenian companies from all three main aspects of sustainability – economic, environmental (ecological) and social – based on which the companies' sustainability business index (SBI) is calculated. Moreover, not only the sustainable practices are examined, but also the motivations and the results of pursuing such practices.

Another obvious shortcoming of sustainability-related studies is their heavy reliance on large corporations and developed market economies (Nollet et al., 2016; Trumpp & Guenther, 2017) as the main study context. Therefore, it remains relatively unclear whether the previous empirical results are applicable in other contexts. To contribute in this regard, our study systematically addresses environmental and social practices in a new geographical (Slovenia) and contextual (small open economy) setting. The research was conducted in collaboration with more than 450 Slovenian companies and data collection took place in 2020.

Despite the health crisis, companies in Slovenia seem to understand that environmental protection and social responsibility are important. However, does this correspond to reality or does it perhaps only indicate a lack of self-criticism? What are the instrumental and moral motives for companies to make sustainable choices? What kind of sustainable activities do they pursue? What are the consequences of such activities? Our study is the first study conducted in Slovenia that addresses these questions in a very systematic way. In the following sections, we first summarize some of the main theoretical considerations on corporate sustainability and then proceed with the presentation of methodology, results and discussion.

1 Theoretical background

1.1 Three dimensions of sustainability

The World Commission on Environment and Development's (WCED) definition of sustainable development, according to which intergenerational sustainability is required (WCED, 1987), calls for a multidisciplinary and long-term agenda where firms should not only worry about profits, but also review how their actions impact a broader society and the natural environment. Hence, the sustainable development is grounded in three main pillars, also known as the Triple P (profit, planet and people) (Dyllick & Hockerts, 2002).

Environmental dimension focuses on protecting the natural environment, the flora and fauna in which the firms operate. The term sustainability derives from biosciences and was first used to describe the prerequisite conditions for self-sustained ecosystem (Holden et al., 2014). Anthropogenic actions are causing a distress and irreversible damage to the natural environment, and therefore, the basic requirement of environmental sustainability is to minimize and reverse such negative impacts (WCED, 1987). This is also very well captured in the UN Sustainable Goals (United Nations, 2015) and the EU Roadmap to Resource Efficient Europe (European Commission, 2011).

Social dimension focuses on the development of a thriving society while simultaneously adhering to the requirements of the other two dimensions. The aspects of social development goals are also well reflected in the UN Sustainable Goals (e.g., zero hunger, quality education, good health and well-being) (United Nations, 2015). Corporate social responsibility helps organizations efficiently manage relationships with various and diverse sets of stakeholders and it became of essential importance when firms started developing diverse sets of voluntary activities for engaging with different stakeholders (customers, suppliers, employees, communities, investors, etc.) (Malik, 2015).

Economic dimension's key question focuses on how to manage economic capital and keep the business sustainable in the long term. In practice, calculating the value of economic capital is quite simple; however, the organizations must consider not only tangible assets but also intangible and look at the differences between book and market value. Since economic sustainability requires diligent and sustainable management of tangible, intangible and financial capital, we adopt the economic sustainability definition coined by Dyllick and Hockerts (2002, p. 133): "Economically sustainable companies guarantee at any time cashflow sufficient to ensure liquidity while producing a persistent above average return to their shareholders."

1.2 Environmental strategy and the conceptualization of environmental practices

We define the environmental strategy as a group of planned and linked activities that a firm performs with a long-term goal to reduce its negative impact on the natural environment, transform to sustainable use of natural capital and thus meet the criteria for ecological sustainability (Aragón-Correa & Rubio-López, 2007; Hart, 1995).

In the sustainability context, studies that are grounded in the natural resource-based view theory oftentimes focus on firms' use of materials, resources, emission and waste generation, process and product development since these are the areas where firms can implement drastic changes to minimize their negative impact on the natural environment (Hart, 1995). Comparably, the joint production model focuses on very similar areas, but the focus of the attention is on the phases of the business process (inputs, processes, outputs) (Lucas, 2010). Drawing from the two models, we conceptualize four groups of corporate environmental practices:

- **Resource use reduction practices** focus on the input section of firms' operations. The focal point is transition to renewable resource consumption and hence lowering the environmental impact of the inputs. For example, these activities relate to material sourcing and the use of water and energy in business processes (Yusof et al., 2016).
- **Greening of processes and products:** These practices relate to the desired outputs of the firms' operations and focus on minimizing the impact on the natural environment through innovating and transforming the organizations' processes (Lucas, 2010).
- **Waste and emission reduction practices** aim to minimize the amount and negative environmental impact of undesired outputs in the processes. These practices also relate to circular economy goals (recycle, reuse, replace, renew and reduce), to create a closed loop system in order to minimize the negative effects on the environment (Hart, 1995; Murray et al., 2017).
- **Supporting ecosystem services** are activities that contribute to environment conservation, climate change protection, sustainable soil use, and similar (European Commission, 2011).

1.3 Social responsibility strategy and the conceptualization of social practices

The socially responsible strategy is a strategy that includes various stakeholders' needs and preferences in organizations' management decisions. The socially responsible strategy is a long-term map for implementing various socially responsible activities to develop thriving relationships with diverse stakeholder groups and achieve an organization's socially responsible goals (Baumgartner, 2014).

Various studies in the field of corporate social responsibility draw from the stakeholder theory and distinguish between corporate social responsibility activities directed to internal and external stakeholders (Hawn & Ioannou, 2016; Scheidler et al., 2019). Hence, we adopted the same approach and divided firms' socially responsible practices into two groups, the internal and the external social practices.

- **Internal social practices** include investments in employee training, health and security of workers, fair pay, healthy work environment, equality, managing diversity, ethical conduct, activities against corruption, privacy and data protection, and corporate governance.
- **External social practices** include job creation, public health and well-being, local and regional development, supporting sport and culture, charity, human rights protection, fair reporting, and fair business conduct.

1.4 Motives for environmental and social strategy/practices

Motivation is an inner desire to make an effort, or the psychological processes that direct, energize and sustain action (Latham & Pinder, 2005). Our understanding of motives that drive sustainability practices is grounded in two schools of thought that offer divergent views on what motivates socially and environmentally responsible practices. The first one is the shareholder theory, which explains the motives for sustainability through the instrumental/strategic motivation perspective and argues that sustainability management matters only if it contributes to increase in profits (Siegel, 2009). Sustainability is therefore viewed as a tool to avoid negative publicity, protect the brand image, and similar (Friedman, 2007; Smith, 2003). In contrast, the stewardship theory explains motives for sustainable behavior through moral/normative lens. It argues that organizations' moral obligation is the driving force in achieving corporate sustainability and profits from such activities are of secondary importance. This means that sustainability is about "doing the right thing" for the broader environment, the community, and it does not center only around a company's profit maximization efforts (Marcus & Fremeth, 2009).

2 Methodology

2.1 Data collection and sample characteristics

The population for our research was defined as large and medium-sized firms in the territory of the Republic of Slovenia. We selected firms from the database of AJPES business entities according to size, whereby the size is determined according to the criteria of the Companies Act (ZGD-1), which is taken into account by AJPES when categorizing firms by size. Firms were called to identify the right contact person for corporate environmental and social practices and then invited to participate in a Web survey. Out of the initial list of 1,478 firms, by the end of the data gathering (October 2020), 242 firms had responded to the Web-based survey on environmental issues and 220 to the survey on social issues of sustainability.

Of the 242 firms that responded to the survey on environmental issues, 69.9 percent were medium-sized (50-250 employees) and 30.1 percent were large (over 250 employees). Most were from manufacturing (47.6 percent), followed by wholesale and retail trade (18.7 percent), transport and storage (6.7 percent) and professional, scientific and technical activities (6.7 percent). Of the 220 firms that responded to the survey on social issues, 70.7 percent were medium-sized and 29.3 percent were large. In terms of sectors, most firms were from manufacturing (43.3 percent), followed by wholesale and retail trade (16.7 percent), professional, scientific and technical activities (6.9 percent), transport and storage (5.4 percent), and water supply, sewerage, waste management and remediation activities (5.4 percent).

The most frequent respondents in the study on environmental issues were quality control employees (28.5 percent), followed by sustainability employees (23.4 percent) and company managers/CEOs (20.0 percent), of whom 76.2 percent work as managers in their field. On average, they have been working in the surveyed firm for 13.4 years (standard deviation 9.3 years) and their work has included aspects of sustainability for an average of 9.6 years (standard deviation 7.4 years). In the study on social issues, the most frequent respondents were employees from the HRM department (59.9 percent), followed by employees working in the field of sustainability (13.6 percent) and company managers/

CEOs (10.3 percent); 75.8 percent of them work as managers in their field. They have been working in the studied firm for an average of 12.7 years (standard deviation 10.0 years), and their work has involved aspects of sustainability for an average of 9.3 years (standard deviation 8.0 years).

2.2 Measures and methods of data analysis

Respondents used a seven-point format to express their agreement with the given statements about instrumental and moral motives for sustainability and three aspects of sustainability practices (environmental, social and economic). Environmental practices included resource use, waste and emissions, greening of processes and products and supporting ecosystem services. We assessed internal social practices with investments in employee education, health and safety at workplace, fair compensation, work environment, equality, managing diversity, ethical conduct, anti-corruption, privacy and data protection, and corporate governance. For external social practices, we measured job creation, public health and well-being, local/regional development, support for sports and culture, philanthropy, protection of human rights, honest product reporting, and fair business practices. In terms of the economic dimension, we measured customer satisfaction and loyalty and employee engagement and satisfaction. To analyze the data, we used descriptive statistics, regression analysis and clustering analysis.

3 Results

3.1 Instrumental and moral motives for sustainable choices/ practices

Regarding the motives for socially sustainable practices, moral motives (large: 6.3, medium: 5.8) tend to prevail over the instrumental ones (large: 4.0, medium: 4.2). In a similar way, also for environmentally sustainable practices, moral motives (large: 6.4, medium: 5.9) are stronger than the instrumental ones (large: 4.9, medium: 4.5). Based on the results, we can conclude that companies behave in a socially and environmentally sustainable way because they feel responsible for and sincerely care about the social and environmental aspects of sustainable development, and less to avoid negative publicity, please shareholders or owners, increase the customer base, avoid high penalties, or gain a competitive advantage.

3.2 Environmental sustainability practices

From the environmental point of view, both large and medium-sized companies believe that they do the most for the environment in the field of waste management (large: 6.2, medium: 6.0), although they do not lag far behind in the field of emissions (large: 6.1, medium: 5.7), the use of non-renewable resources (large: 6.0, medium: 5.8), renewable resources (large: 5.9, medium: 5.6), and ecosystem services (large: 6.1, medium: 5.5). A comparison of activities aimed at developing green processes (large: 5.5, medium: 5.2) and green products (large: 5.7, medium: 5.5) shows that companies focus their activities somewhat more on environmental product improvements and slightly less on process improvements.

3.3 Social sustainability practices

From the social-dimension-perspective, we divided companies' business practices into external and internal. Among external practices, companies rated the fairness of their business practices the highest (large: 6.5, medium: 6.4), followed by honest product reporting (large: 6.4, medium: 6.2), human rights protection (large: 6.0, medium: 5.7) and, in the case of large companies, job creation (large: 6.2, medium: 5.3). The lowest of the external social practices was philanthropy (large: 5.7, medium: 4.8).

In the case of internal business practices, the highest average scores were at concern for privacy and data protection (large: 6.7, medium: 6.6), transparency of corporate governance (large: 6.6, medium: 6.5), diversity management (large: 6.7, medium: 6.4) and concern for equality (large: 6.6, medium: 6.4). The lowest average scores were at the care of the appropriate work environment (large: 5.9, medium: 5.5) and investment in employee education (large: 5.9, medium: 5.4).

3.4 Comparison of environmental and social aspects, indices and business segmentation

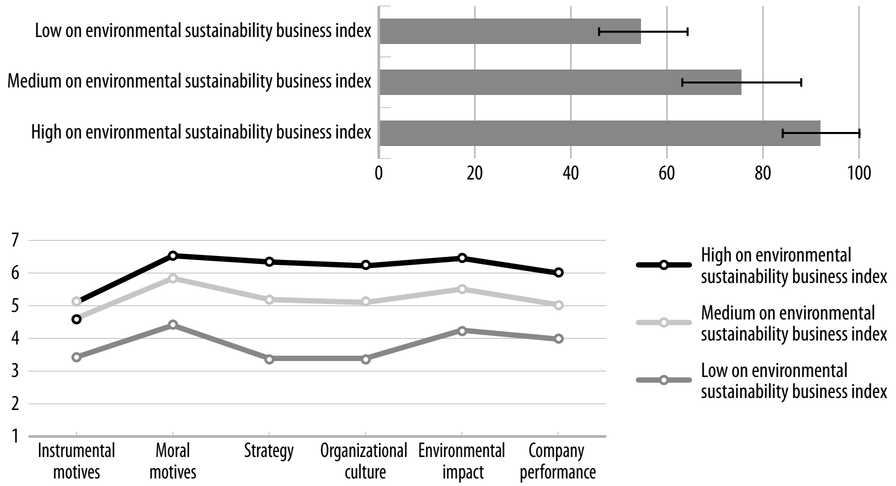
A comparison of the social and environmental aspects yields some interesting insights. In terms of corporate sustainability, large firms are a step ahead than medium-sized firms in formally placing sustainability officers (large: 68.6 percent for environmental aspect and 53.2 percent for social aspect, medium: 57.6 percent for environmental aspect and 36.6 percent for social aspect). In terms of the proximity of the responsible person to top management, the person is a member of top management in only about one third of the cases, which is a relatively low result.

An important factor influencing how good companies are at environmental protection and social responsibility is how they incorporate these issues into their strategies and how they are aware of them in their organizational culture. We did not find significant differences here, however, large companies are systematically slightly higher in both aspects, integrating these issues into their strategies and being aware of them within their organizational culture, which is not surprising. It is already known from the literature that large companies incorporate certain strategic issues more systematically and formally into their strategies than medium-sized and small companies.

We also measured financial and non-financial performance, which includes employee engagement (large: 5.6, medium: 5.5) and satisfaction (large and medium: 5.2), customer loyalty (large: 6.3, medium: 6.1) and satisfaction (large: 6.1, medium: 6.0), and corporate financial performance (large and medium: 5.4). There is certainly room for improvement in the area of employee satisfaction and employee engagement. In terms of financial performance, companies are only partially convinced that socially and environmentally responsible practices contribute to the company's success.

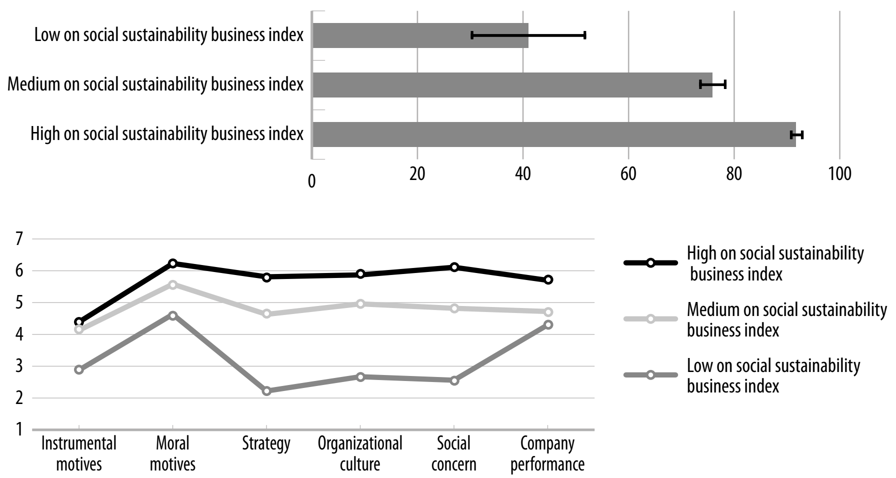
The results were integrated into sustainability business indices that take into account all elements and activities of the environmental and social parts. The index was calculated for the aggregate of all measures for each company, with 100 representing the highest possible score on all elements and activities. The environmental sustainability business index (SBIe) includes all environmental sustainability practices. The average SBIe for companies in Slovenia is 81, with larger companies having a significantly higher value than medium-sized companies. Manufacturing companies have consistently very high index scores. For service activities and construction, there is a significantly larger gap between the estimated indices for individual firms within these activities. We have further grouped the companies into segments (hierarchical clustering) according to the values of the elements of the environmental part of the sustainability business index and have identified three distinctive groups: low (7.2 percent of companies), medium (47.3 percent of companies) and high (45.5 percent of companies) on the environmental sustainability business index (Figure 1). The three groups differ in terms of their motives, environmental responsibility strategy, organizational culture and performance. The highly environmentally responsible companies consist mainly of large manufacturing companies established before 1991 and operating mainly in foreign markets. International experience is considered as an important factor contributing to environmental sustainability practices and a higher sustainability business index.

Figure 1. Environmental sustainability business index (SBIe) and segmentation



Source: Own work.

Figure 2. Social sustainability business index (SBIs) and segmentation



Source: Own work.

The social sustainability business index (SBIs) includes all social sustainability practices. The calculated average (84.5) is higher than for the environmental section. Again, the scores are higher for larger, manufacturing companies than for medium-sized and service companies, e.g. financial services, electricity supply and retail. Segmentation based on the component scores of the index yields three segments: low (6.6 percent of companies), medium (27.2 percent of companies) and high (66.2 percent of companies) on the social sustainability business index (Figure 2). There are relatively few companies in the less sustainable group. Once again, we can observe a consistent story of moral motives of social responsibility and organizational culture.

Discussion and conclusion

The research we present provides the building blocks for a structured approach to monitoring corporate sustainability. We present the sustainability business index (SBI), which takes into account the multidimensional nature of environmental and social sets of sustainability practices and is adapted to Slovenian practices. The index allows us to show the differences between companies in terms of environmental and social sustainability practices. Large manufacturing companies are at the top in both environmental and social practices, with a much larger difference in index scores for service companies than for manufacturing companies. For all practices considered, large firms reported slightly higher values than medium-sized firms, which can be attributed to the fact that larger firms probably find it easier to devote more human and financial resources.

Businesses in Slovenia seem to understand that environmental protection and social responsibility are important. We can summarize that relatively few companies are low or medium on either the environmental (SBIe) or social sustainability index (SBIs). A large group of companies seems to understand that business, natural environment and society are strongly intertwined and it is important to deal with it. This is a current assessment of a very dynamic field and there is certainly a need to monitor the components of sustainability in the coming years.

We also looked at companies' instrumental and moral motives for sustainability. Companies engage in sustainability because they believe it is the right thing to do, not because owners would require it or because they would seek to avoid penalties. This is true for both environmental and social responsibility.

In terms of constraints, we must note that the responses for all constructs are on average well above the mean (i.e., value 4), which is otherwise very encouraging, unless of course there is some partial bias in the responses. Since the measures for all sustainability practices are based on self-report, the results could also indicate a lack of self-criticism among the participants in the study. It is possible that companies are somewhat less critical of their own business practices related to social responsibility and environment than they should be. Another limitation is that in terms of industry comparisons, we can only report a summary for some industries for which we had enough respondents to be able to formulate generalizations.

Nevertheless, the findings of the research presented here can be a starting point for discussing good practices of sustainable business of Slovenian companies and how various successful Slovenian companies overcome challenges and achieve sustainable development goals. By presenting the results of research and good practices, we want to encourage companies in Slovenia to decide for more comprehensive sustainable orientation.

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CONSUMER PERCEPTIONS OF CORPORATE RESPONSIBILITY OF LARGE COMPANIES IN SLOVENIA

Introduction

A growing proportion of consumers are concerned about corporate responsibility. As one of the most important stakeholder groups, they expect companies to act in a socially and environmentally responsible manner and reward or punish them through their purchasing behavior (Kuokkanen & Sun, 2020; Lerro et al., 2018). Therefore, companies have been called upon to take responsibility for their impact on the environment and society (Ait Sidhoum & Serra, 2018). Many of them have adopted sustainable practices that address environmental and social concerns in their business operations, which is referred to as corporate responsibility (CR) or corporate social responsibility (CSR) (Blowfield & Murray, 2014; D'Amato et al., 2009). This chapter assesses consumer perceptions of major Slovenian companies on three aspects of sustainability - social, environmental and economic - and examines the relationships between consumer perceptions of corporate responsibility and consumer brand trust and purchase intentions. The study was conducted with a sample of more than 2,400 Slovenian respondents in the summer of 2021. This is the first study of consumer perceptions of corporate social responsibility on this scale in Slovenia.

In this chapter, we compare consumer perceptions of corporate responsibility for large companies from different industries. This enables us to draw conclusions about how social, environmental, and economic responsibility relates to consumer brand trust and purchase intentions. While turning consumer expectations regarding social and environmental responsibility of brands into business success is challenging (Nave & Ferreira, 2019), we offer some recommendations for environmental, social, and economic practices of large corporations.

1 Theoretical background

CSR has become a highly visible phenomenon in marketing, therefore there are several definitions. The most widely accepted definition of CSR is Carroll's CSR pyramid, which emphasizes four levels: economic, legal, ethical, and philanthropic (Carroll, 1979). While this approach to CSR has been widely adopted, definitions that integrate the triple bottom line approach have also emerged. One such definition describes CSR as "context-specific organizational actions and policies that take into account stakeholder expectations and the triple bottom line of economic, social, and environmental performance" (Aguinis, 2011, p. 855). Social and environmental responsibility of corporate brands changes the rules of branding, balances the tensions between multiple stakeholders, and aims to achieve consistency between corporate branding and social and environmental responsibility (Vallaster et al., 2012). We define corporate responsibility as the consumer's belief that the company acts in accordance with environmental, economic and social expectations beyond the legal requirements and the company's interests (Halme et al., 2009; McWilliams & Siegel, 2001; Walsh & Beatty, 2007).

An extensive literature examines the effects of CSR on financial performance and finds that CSR efforts yield small positive returns (van Doorn et al., 2017, p. 608). Although companies make significant investments in socially and environmentally responsible initiatives (Albuquerque et al., 2019), majority of research has been conducted at the organizational (macro) level. Research on the psychology of corporate social responsibility (CSR) suggests focusing on the micro foundations to gain "comprehensive understanding of CSR" (Afsar & Umrani, 2020, p. 109), specifically on how "social and environmental responsibility makes an impact at the individual level" (Shea & Hawn, 2019, p. 1609).

Previous research on CSR in Slovenia has focused on several stakeholders: companies (Golob & Valentinčič, 2008), employees (Golob, 2011), the media (Becela et al., 2012), and consumers (e.g., Podnar & Golob, 2007), with little attention being paid to the latter. At the corporate level, the results of the European Commission Growth Survey (European Commission, 2018) have shown that the implementation of CSR in Slovenian organizations has increased over the last decade, although insufficient attention has been paid to this issue both in the broader society and in politics (Nedelko et al., 2019). At the consumer level, studies have shown that legal, ethical and philanthropic features of CSR play a predominant role in the perception of Slovenian consumers - they tend to expect companies to comply with social and legal norms. Economic responsibility seems to be less important, which is in contrast to Carrol's CSR pyramid (Podnar & Golob, 2007).

The existing research shows that consumer perceptions of CSR practices influence their behavior outcomes in several ways, including the level of consumer trust and purchase intentions. More specifically, CSR practices help nurture consumer trust in a corporation and consumer trust in turn helps the corporation maintain committed relationships with their customers (Morgan & Hunt, 1994; Park et al., 2014). Furthermore, CSR practices elicit consumers' favorable responses and purchase intentions as they increase customers' positive evaluations of a brand (Ahn & Kwon, 2020). However, some studies show that CSR practices do not always contribute to increased trust and purchase intentions (e.g., Sen & Bhattacharya, 2001).

Given the discrepancies in existing studies, we address the following questions: (1) What is the nature of the relationship between corporate responsibility and consumer brand trust? and (2) What is the nature of the relationship between corporate responsibility and consumer purchase intention?

2 Methodology

2.1 Data collection and sample characteristics

Data collection was conducted in June 2021 in collaboration with a market research agency. We obtained 2,414 complete responses to an online survey. Participants were from Slovenia, between 18 and 65 years old (mean age was 41.91, $SD_{age} = 12.46$), and 51.6 percent were female. After entering the survey, respondents were randomly assigned and asked to rate one of 48 corporate brands. The brands were some of the largest companies (with at least 500 employees) operating in Slovenia and offering their products or services to end consumers (explained in detail in continuing). The brands differed according to criteria such as product category and utilitarian and hedonistic nature of the offering.

2.2 Measures

We used established measurement scales for all constructs: the dimensions of consumers' perception of brands' CSR (i.e., economic, social, and environmental) were measured on adapted items from scales developed by Markovic et al. (2018) and Alvarado-Herrera et al. (2017). The assessment of economic and environmental dimensions was done on three-item scales (e.g., *"[The brand] is trying to always improve its financial performance."* for *the* economic dimension [α =.82], and *"[The brand] seems to be environmentally responsible."* for the environmental dimension [α =.95]). The social dimension was evaluated on a five-item scale (e.g., *"[The brand] is a socially responsible brand."* α =.92). For measuring brand trust and purchase intentions we used three-item scales by Chaudhuri and Holbrook (2001) (e.g., *"I trust this brand."* α =.95) and Putrevu and Lord (1994) (e.g., *"It is very likely that I will buy products from [the brand]."* α =.94), respectively. For all constructs, we obtained participants' responses on a 7-point Likert scale (from *completely disagree to completely agree*).

2.3 Methods of data analysis

We used a bivariate analysis to assess the data collected in the survey. In the first step, we divided the 48 brands into 15 groups according to the industry where their main business interests reside: *automotive* (e.g., Akrapovič), *banking* (e.g., NLB, NKBM), *household goods* (e.g., Steklarna Rogaška, Steklarna Hrastnik), *electricity* (e.g., Elektro Ljubljana, Elektro Maribor), *food manufacturing* (e.g., Perutnina Ptuj, Ljubljanske mlekarne, Žito), *household appliances* (e.g., Gorenje), *insurance* (e.g., Generali, Zavarovalnica Triglav), *job placement* (e.g., Adecco), *pharmacy* (e.g., Krka, Lek-Novartis), *public sector* (e.g., Pošta Slovenije, SŽ), *retail* (e.g., Mercator, Spar, Hofer, Lidl), *sports good manufacturer* (e.g., Elan), *telecommunications* (e.g., Telekom Slovenije, Telemach), *tourism* (e.g., Sava Hoteli, Terme Krka), and *transport* (e.g., Luka Koper).

In the second step, we aggregated the individual responses obtained for all industry brands by calculating the arithmetic means of all participants for each of the five constructs (i.e. consumer evaluations of economic, social, and environmental CSR, trust, and purchase intentions). In order to determine and evaluate the empirical relationships between CSR dimensions (economic, social, and environmental) and outcomes (trust and purchase intentions), we developed graphic representations of the results. The industry means of the three CSR dimensions are presented on the horizontal (x) axis, while the industry means for trust and purchase intentions appear on the vertical (y) axis and are presented in two separate graphs for easier evaluation. Although we measured all constructs on a 1-7 scale, we scaled the axes for CSR dimensions (in both figures) and trust from 4 to 6, and the axis for purchase intentions from three to six for easier evaluation of differences among industries. To examine the statistical significance of differences between the means we performed a MANOVA, which indicated that the differences between the means were significant (Pillai's trace = .285; $p < .001$; Hotelling's trace = .329; $p < .001$). Therefore, we compared relevant pairs of means with one-way ANOVAs.

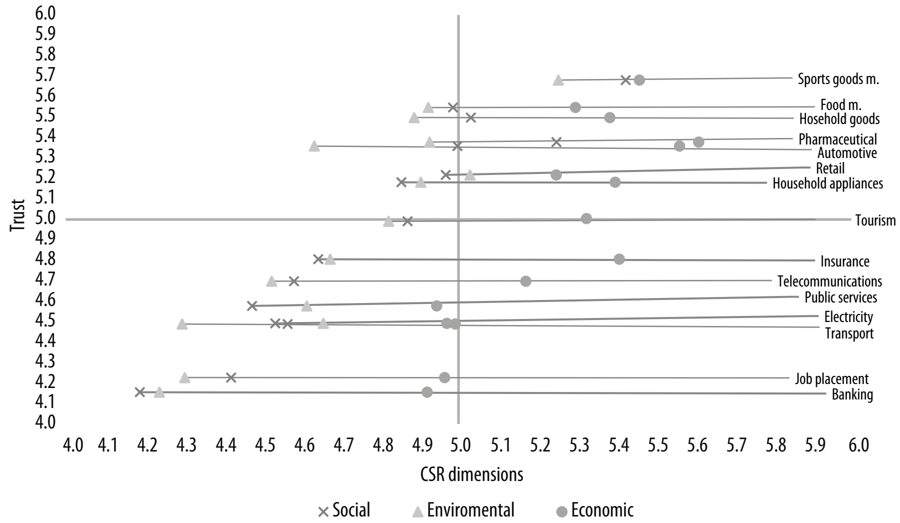
3 Results

Figure 1 shows the results of the analysis of industry means for CSR dimensions and trust. A comparison of industry means for the social, environmental, and economic dimensions of CSR shows that consumers perceive all industries to be most responsible for the economic dimension. The results are less consistent when it comes to the social and environmental dimensions of CSR, as corporate brands in some industries (e.g., automotive and transportation) are perceived as more socially than environmentally responsible, while brands in other industries (e.g., electric energy services and retail) are perceived as more environmentally than socially responsible. The differences between environmental and social responsibility are very small for some industries, for example, banking, insurance and tourism. When comparing the industry means on the same dimension of CSR, we found that 282 out of 630 pairwise comparisons were statistically significant at $p < .05$ level. For instance, most manufacturing industries (e.g., automotive, pharmaceuticals, and home appliances) are perceived as more socially responsible than most service industries (e.g., banking, job placement, and telecommunications).

The scatter plot (Figure 1) also shows a positive linear relationship between CSR dimensions and trust – the higher the CSR dimensions for industry brands score, the higher the consumer trust in those brands. Thus, Figure 1 shows that manufacturing industries, such as manufacturing of sporting goods, consumer goods, food, pharmaceuticals, and automobiles, in particular, enjoy higher consumer trust. Retail is the only service industry where consumers have a relatively high level of trust. In all other service industries (banking, employment services, transport, electricity, insurance, public services, telecommunications, and tourism) consumer trust is relatively low.

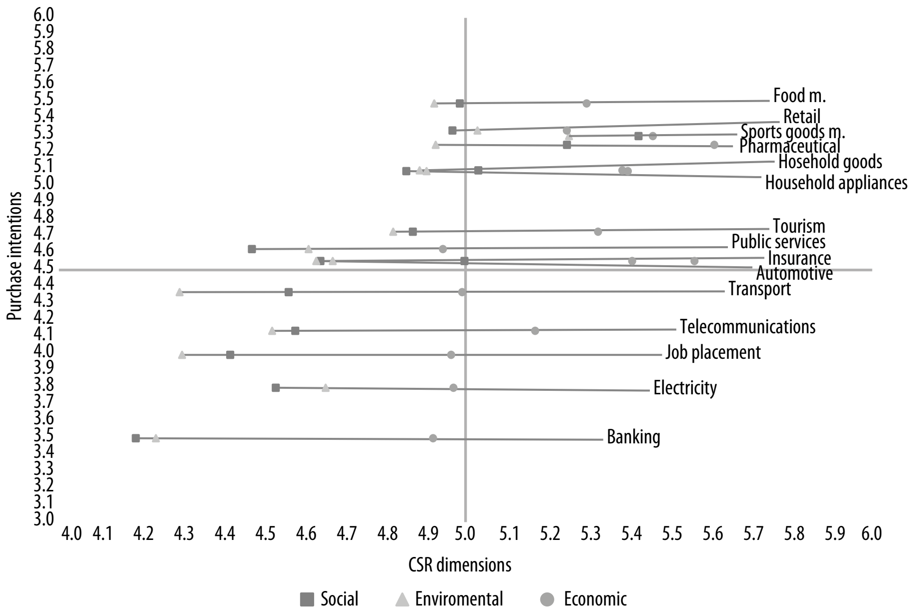
In Figure 2, we present the industry mean scores of CSR dimensions and purchase intentions. Similar to trust, there is a positive linear relationship between CSR dimensions and purchase intentions. In other words, the more positively consumers rate industry brands in terms of CSR, the higher consumers'

Figure 1. Industry means of trust and CSR dimensions



Source: Own work.

Figure 2. Industry means of purchase intentions and CSR dimensions



Source: Own work.

purchase intentions for those brands are. The scatter plot also shows a similar pattern of industry mean scores for purchase intentions as in the case of trust. That is, consumers have higher purchase intentions for brands in manufacturing industries, such as food, sporting goods, pharmaceuticals, consumer goods, and home appliances, than for brands in service industries, such as banking, electricity, job placement, and telecommunications. The only service industry with relatively high purchase intentions is retail.

Conclusion

Our study of consumer perceptions of corporate responsibility allows us to compare consumer perceptions of large Slovenian companies on three aspects of sustainability (social, environmental and economic). In general, large companies in Slovenia from the industries covered in this study are perceived as responsible. Slovenian consumers believe that large companies act in accordance with environmental and social expectations; however, they evaluate the economic dimension of responsibility most favorably. This means that they see companies primarily as striving to improve their financial performance, which is especially true of pharmaceutical, automotive, sporting goods, and insurance companies. Large companies are highly visible and consumers usually have first-hand experience with them. Brands should aim to demonstrate that their efforts in the other two dimensions are relevant and at least as important as their financial performance, and that they should be seen as balanced across all three dimensions of corporate responsibility.

There are certainly differences in how companies from different industries score on each dimension of corporate responsibility. For example, companies from the retail and food industries appear to be the most environmentally responsible, while companies from the pharmaceutical, automotive, and food sectors appear to be the most socially responsible. At the bottom of the list are banks, job placement, and public services. The results appear to be consistent with stereotypes and brand perceptions of brand ability and brand intentions (Kervyn et al., 2012), with financial services and public services scoring low and pharmaceutical brands, which tend to be more admired and well liked, scoring high on the ability and intentions dimensions. These perceptions are valuable predictors of how consumers behave towards these brands.

The results show that large corporate brands are trustworthy and that the relationship between corporate responsibility and brand trust is linear and positive. Brands in industries that satisfy more hedonic consumer needs (e.g., sporting goods and tourism) appear to have higher trust scores, while brands in industries that satisfy more utilitarian consumer needs (e.g., banking, job placement, transportation, electricity, public sector) appear to have a lower level of trust. The relationship between corporate responsibility and purchase intentions is also linear and positive. Purchase intentions are certainly related to the frequency of purchases, with food manufacturing and retail brands at the top of the list. The linear relationship with brand trust and purchase intentions clearly indicates the need to highlight brand sustainability initiatives and efforts in brand communications. In addition, corporate responsibility is an important driver of sales and committed relationships with customers. In order to build lasting relationships with consumers, corporate responsibility activities are relevant in all three dimensions. To conclude, the results of the research among Slovenian consumers presented here can be an interesting starting point for the discussion on good practices of sustainable management of Slovenian companies.

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JOB QUALITY AND LABOUR MARKET MOBILITY IN SLOVENIA[1]

Introduction

European labour markets have been undergoing significant changes in the past 20 years, caused by both economic cycles (e.g., the 2008 financial and economic crisis) as well as long-term trends, such as changes in the economic (sectoral) structure, demographic changes, technological trends, and changes in the preferences of individuals about the work-life balance and job quality as well (Bisello et al., 2020; Fernández-Macías et al., 2017). While it is important that European countries focus their strategies on creating more job opportunities, it is also important to create better jobs. Job quality is a complex, multifaceted, and to some extent, also an intangible concept. In general, factors that contribute to increased job satisfaction are (1) objective work arrangements, such as wages, work hours, employment type; (2) job position which is related also to training and career development opportunities; and (3) work-life balance (Fassang et al., 2007). Mobility across jobs and occupations contributes to increasing individuals' ability to find a better job (Fassang et al., 2007), especially if individuals also gain additional skills.

In Slovenia, the labour market has been undergoing significant changes. Due to the economic crisis, the unemployment almost doubled between 2008 and 2014, real wages were growing slowly, for example between years 2014 and 2015 by only 50 euros at a yearly level to 11,351, while the median wage for example between 2012 and 2013 even declined a bit. The wages started to increase after the economy bounced back and also the share of permanently employed individuals increased from 71 to 77 percent between 2008 and 2014. On the other hand, the share of those in flexible working arrangements (agency workers,

1 This work is part of the HECAT project, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870702.

subcontractors, working in shifts) increased significantly. Mobility between occupations increased during the period of high unemployment, especially between 2009 and 2012, and in the same time, employees moved vertically by changing the levels and horizontally (by changing the field of education). When the economic situation started improving, mobility declined.

This chapter investigates what the characteristics of occupational and job mobility in Slovenia are and whether the mobility increased job quality, if measured by tangible factors, primarily wages and employment type. The empirical analysis relies on the data from the Statistical Register of Active Population in Slovenia. In continuing, job quality is first studied from a theoretical perspective, followed by a discussion of the characteristics of the labour market in Slovenia. The empirical analysis provides first an overview of mobility, followed by a discussion of the job quality and then an investigation of the differences between groups that were or were not mobile. The discussion ends with implications and policy proposals.

1 Theoretical background

Authors typically define job quality as a combination of work and employment-related factors that foster beneficial outcomes for the employee, particularly psychological well-being, physical well-being and positive attitudes, such as job satisfaction (Green, 2006; Warr, 1990). The job quality index, as captured in the European Working Conditions Survey (Eurofound, 2019), measures job quality across six key dimensions:

1. The **physical environment** index assesses physical risks in the workplace.
2. **Work intensity** measures the level of work demands in the job: for instance, working at high speed and under time pressure, and experiencing emotional demands, such as dealing with angry clients.
3. **Work time quality** measures the incidence of long working hours, scope to take a break, atypical working time, working time arrangements and flexibility.
4. **Social environment** measures the extent to which workers experience supportive social relationships, as well as adverse social behaviour, such as bullying and harassment.
5. **Skills and discretion** measure learning and training opportunities in the job.
6. And finally, **prospects** combine a number of indicators, including prospects for career advancement and the likelihood of losing one’s job.

The quality of job is linked to a particular job type. Holman (2013) developed a taxonomy of six job types based on the European Working Conditions Survey data. His taxonomy suggests that there are different types of high- and low-quality jobs. He labels the six high-quality job types as active, saturated and team based. Holman (2013) further links the job types to measures of employee satisfaction. The high- and low-quality job types differ substantially in terms of job satisfaction, and the psychological well-being is a bit higher in high-quality jobs. In the physical well-being dimension, the link is not straight forward, since passive job types, generally deemed as low quality, result in higher physical well-being than high-quality saturated or team-based job types.

The European Working Conditions Survey (Eurofund, 2019) proposed a similar taxonomy of job types, which divides the jobs into five categories. The job quality profile with the highest scores on most of the indicators is the '**high flying**' profile. In the EU28 in 2015, about one in five workers (21 percent) holds a job in this profile. This profile scores higher in skills and discretion, earnings and prospects than the other four. Jobs in this profile typically require tertiary education and are found in service sectors. Jobs in this profile are mostly classified as managers, professionals and technicians. '**Smooth running jobs**' stand out in terms of their low work intensity and high working time quality. At the workplace, the social environment is good: support from colleagues and managers is valued and there is very little abuse. However, the level of earnings and skills and discretion is somewhat lower than for the jobs in the other profiles and the prospects are average. The share of women in these categories is double the share of men, the most typical job category in this profile is clerks. The 'active manual' profile is characterised by more risks in the physical environment. Working time quality in 'active manual' jobs is lower than the average, mostly due to more atypical and shift work. The social environment is good, as a result of management quality, low levels of abuse and an above-average level of help and support from colleagues. Men and secondary educated workers dominate this category; they are mostly employed in industry, agriculture and construction. Craft workers are also typical of this profile. The '**under pressure**' group of jobs is the smallest, comprising 13 percent of workers. The job quality dimension that stands out in negative terms is the social environment. The only exceptions are earnings and the use of skills; discretion in these jobs is high, surpassed only by the 'high flying' profile. Most jobs here are in services, they are however equally spread across demographics. Finally, the '**poor quality profile**' jobs rank lowest in terms of skills and discretion, as well as earnings and prospects. Monthly earnings are about a third of those in the 'high flying' profile. The use of **skills and discretion** is very low in this profile. However,

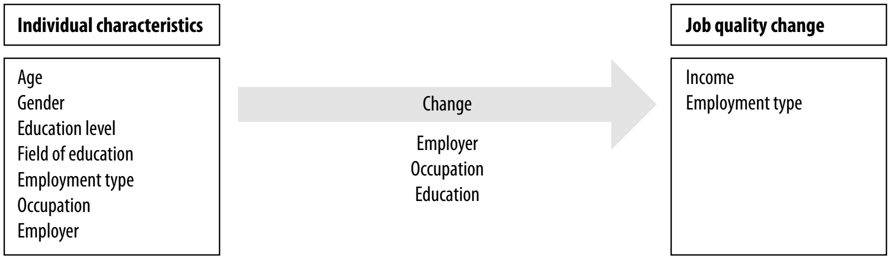
work intensity is slightly better than in the 'under pressure' profile, mostly because of less time pressure, fewer deadlines and less disruptive interruptions. Workers in this category are mostly with primary education only, working in elementary occupations or as machine operators.

Based on the report, the structure of jobs in Slovenia is about the average for EU countries. There is a bit less smooth running and a bit more poor quality jobs. For comparison, Belgium, Luxemburg, as well as all Scandinavian countries, stand out in terms of the share of high flying jobs. On the other hand, Romania, Greece, Hungry, and Latvia show a high share of poor-quality jobs (Eurofound, 2019). While the average situation in Slovenia cannot improve fast comparatively, individuals do attempt to change their labour market position with mobility either across industries, occupations, or by improving their education. In continuing, these aspects are studied in more detail.

2 Characteristics of employment and occupational mobility in Slovenia

In Slovenia, labour market mobility is traditionally not perceived as very strong. People often stay in the same job or company for many years or may even stay in the same company for their entire career. Nonetheless, the mobility is quite significant (Table 1) and the key question is what the impacts of this mobility are. The analysis in this chapter relies on two data sources: the Statistical Register of Active Population and individuals' income statements data with in total 7.89 million observations in the period between 2008 and 2018. The number of observations was lowest in 2012, when only 755 thousand individuals were observed, while in 2017, 833 thousand individuals were observed.

Figure 1. Analytical framework



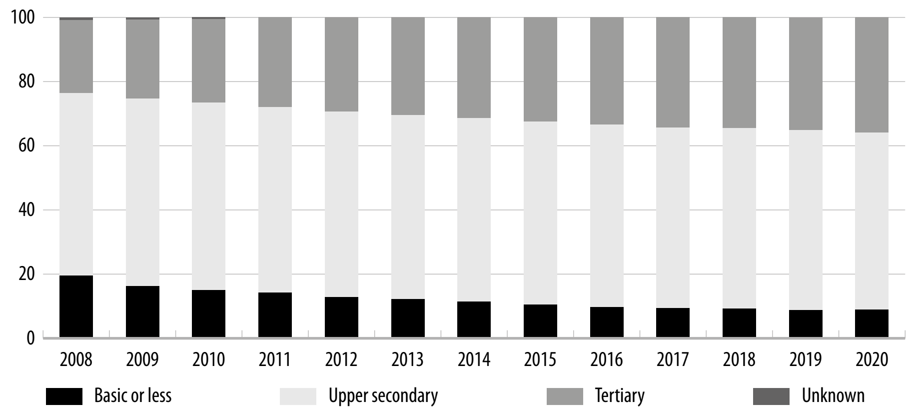
Source: Own work.

2.1 Labour market characteristics

The employment (employed in organizations as well as self-employed) in Slovenia has been growing since 2000 and reached 879 thousand employees in 2008. Due to the crisis, the number of employees dropped to only 793 thousand in 2013; however, by 2019, the number increased by 100 thousand and reached 894 thousand. The 2020 epidemic only mildly affected the number of employees, which fell by around five thousand (Statistical Office of the Republic of Slovenia, 2021b). The majority of employees, in total over 23 percent, work in manufacturing (NACE C), followed by wholesale and retail trade (NACE G) with 12.7, and education (NACE P) with 8.2 percent. Among the key industries (excluding the public sector) are also construction (NACE F, 7.2 percent) and professional, scientific and technical activities (NACE M, 6.3 percent) (Statistical Office of the Republic of Slovenia, 2021b).

The educational structure of employees has improved significantly since 2008, when those with tertiary education represented less than 23 percent of employees. By 2020 the share of those with tertiary education increased to almost 36 percent. Those with upper secondary education represent around half of the employed, with their share being relatively stable, while the share of those with basic education has declined by a half over the past ten years (Figure 2).

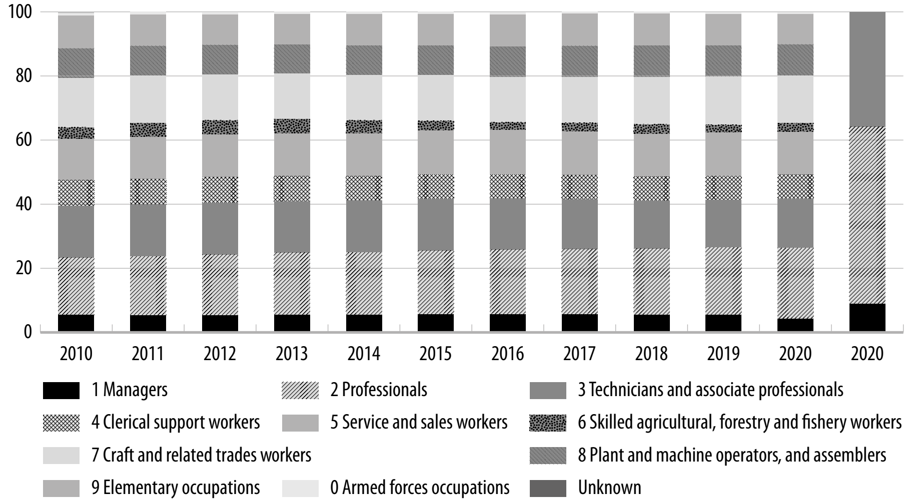
Figure 2. Educational structure of employees in Slovenia, in percent



Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021b).

The structure of employment was changing also from the occupational perspective. The share of workers in the »professionals« group has increased from 17.8 percent in 2010 to 22.1 percent in 2021, while the share of technicians and clerical workers, as well as managers, declined a bit, similarly is true also for the share of workers in the group of elementary occupations (Figure 3). Men represented the majority of the employed with around 55 percent in total.

Figure 3. Occupational structure of employees in Slovenia, in percent



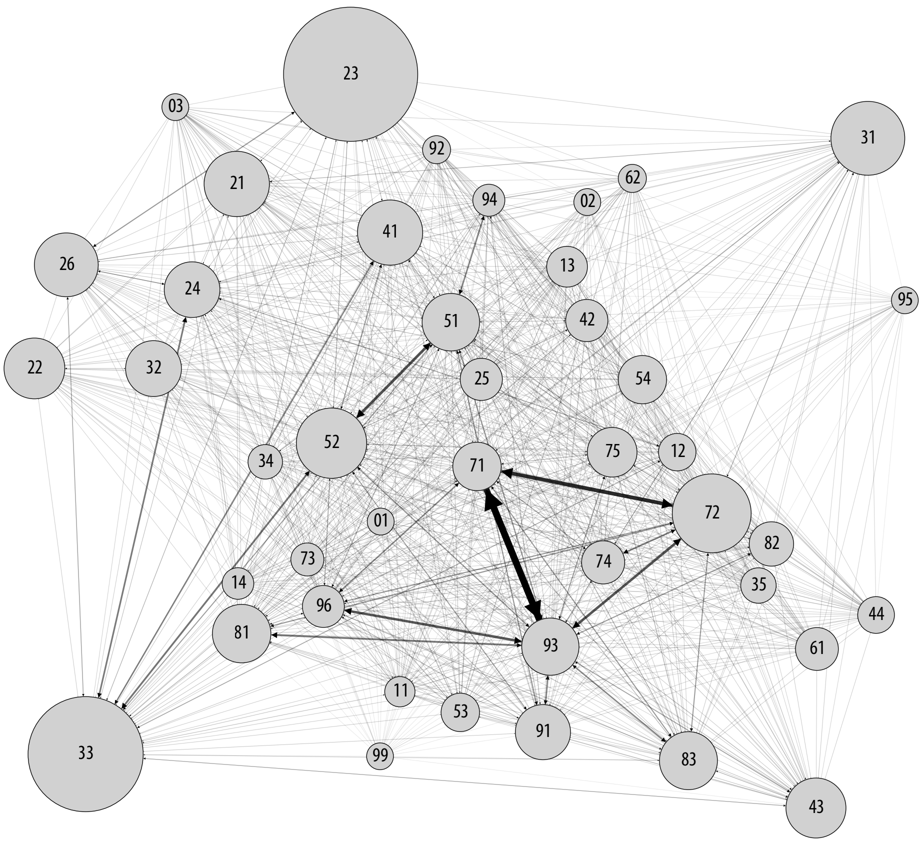
Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021b).

2.2 Labour market mobility

While the aggregated data about the occupational structure reveal little dynamics, there was a lot of dynamics between occupations, if these are examined at Level 2 and higher, according to the International Standard Occupation Code (ISCO). Around ten percent of the employed changed their occupation at the 4th level of the ISCO classification. Here, a more detailed look is provided at Level 2 (Figure 4). The mobility between occupations in the period between 2007 and 2018 was most pronounced between occupations 93 (Labourers in mining, construction, manufacturing and transport) and 71 (Building and related trades workers, excluding electricians); between occupations 93 and 72 (Metal, machinery and related trades workers), as well as between occupations 71 and 72. There was also significant mobility between occupations 33 (Business and administration associate professionals) and 52 (Sales workers), as well as 52 and 51 (Personal service workers) (Figure 4). Moreover, their education level increased by 4 to 6 percent.

The share of the employed who changed their education level was highest in 2011 (3.2 percent) and 2016 (4.2 percent). Between two and three percent of the employed changed their field of education, which was more pronounced especially in 2011 and 2012, when the share increased from only 1.8 percent to 6.2 percent, respectively. However, the share remained high after the crisis, between 4 and 5 percent (Statistical Office of the Republic of Slovenia, 2021a). A closer look at the mobility data also shows that around 20 percent of the employed changed their employer. Interestingly, the mobility between employers was lowest in 2009 (17 percent) and highest in 2011 (26 percent), probably due to the effect of the crisis (Table 1).

Figure 4. Mobility between occupations using ISCO code (Level 2)*



*Size of the circle indicates the initial size of employment in an occupation, while the strength of the arrow indicates the number of transitions between occupations.
Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021a).

Mobility is affected also by individuals' demographic characteristics (Table 1). On average, it has been highest among the young. 30 percent of those younger than 26, and a quarter of those aged between 26 and 35 changed their employer, in comparison to only 12 percent of those aged 50 or more (the data refer to total in the period 2008 to 2017). Mobility is also education dependent. In the analyzed period, 21 percent of those with a PhD changed their employer, mobility among those with master or other tertiary degree was slightly lower, between seven and eight percent, but slightly higher for those with professional qualification. 11.6 and 9.2 percent of highly qualified and qualified workers, respectively, as well as 10.7 percent of unqualified workers changed their employer. Mobility between employers was higher for men, however, a higher percentage of women changed both the education level as well as the education field. Expectedly, mobility differed across employment type. In general, only 15 percent of those with permanent employment contract changed their employer, compared to a third of those with a temporary contract. Also, two thirds of those who started their first job (but with an open end contract) changed their employer.

Table 1. Transitions in the labour market: Percent of employees changing employment (company), education level, field of education, and occupation (at SKP-ISCO, Level 4)

	Change in the labour-market related determinants			
	Company	Level of education	Field of education	Change (SKP level 4)
By age				
Younger than 26	30.67	5.14	6.58	12.79
26 to 35	26.01	4.25	6.62	11.44
36 to 49	17.27	2.17	3.89	7.35
50 or more	12.68	1.07	2.23	5.23
By gender				
Men	20.12	2.55	4.11	8.80
Women	18.47	2.78	4.77	7.67
By time				
2009	17.33	1.52	1.82	4.45
2010	21.36	3.24	3.88	7.52
2011	26.82	3.13	5.79	9.73
2012	21.11	3.04	6.26	10.23
2013	19.92	2.62	5.01	9.17
2014	20.06	2.75	5.00	9.70
2015	20.41	2.77	4.78	9.60
2016	21.54	4.24	6.16	10.74
2017	20.96	2.59	4.88	11.06

	Change in the labour-market related determinants			
	Company	Level of education	Field of education	Change (SKP level 4)
By level of professional qualification				
PhD	21.16	0.91	5.66	5.15
Master of science	7.29	2.04	2.06	2.52
University education	8.11	1.48	2.07	2.63
Higher professional degree	7.86	2.64	2.85	2.08
Secondary education	9.36	1.89	1.90	2.52
Lower secondary	5.16	0.06	0.06	1.04
Highly qualified	11.65	1.40	1.00	2.47
Qualified	9.26	0.52	0.76	2.31
Semi-qualified	8.63	0.21	0.18	1.80
Unqualified	10.71	0.18	0.07	2.77
Contract type				
Open-end contract	14.39	1.80	2.96	4.78
Fixed-term contract	32.62	4.85	8.05	17.45
First employment	66.93	7.66	11.38	22.05
First employment, fixed-term	26.70	10.57	9.29	16.02
Other	0.00	0.00	0.00	0.00

Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021a).

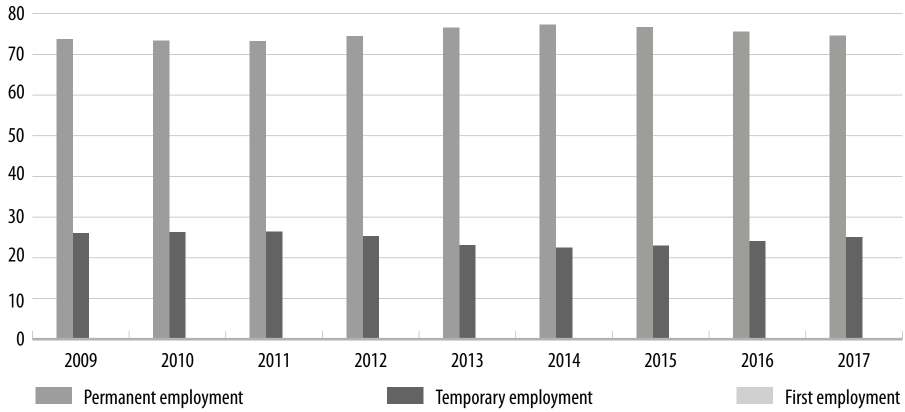
2.3 Job quality

Job quality is measured with two key elements: change in wages and change in contract type, where improvement is considered to be either a move to a permanent employment contract or an increase in the wage. Overall, in the observed population the net real wages were increasing, while the share of workers in an open end increased from 72 percent in 2008 to 77 percent in 2014 (Figure 5).

Data suggests that there is no systematic pattern linking qualification level and quality of employment if measured by the degree of professional qualification, and similar is true also for gender. On average, in the investigated period, 80 percent of the employed had an open end contract. However, the share was only 71 percent among the unqualified workers and even 91 percent among those with a higher professional qualification, followed by those with a master's degree (89.3 percent) and those with a lower professional qualification (89.1 percent). Around

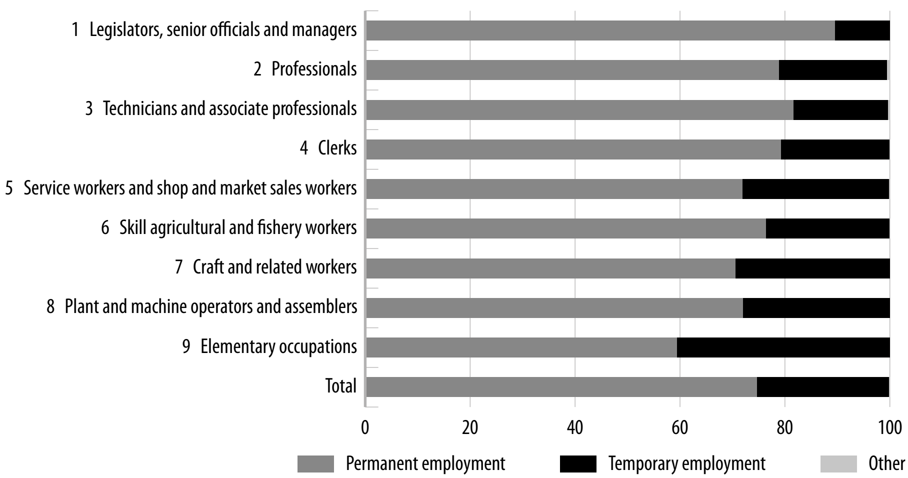
76 percent of women and 74 percent of men had an open end contract. Age, on the other hand, is significantly related to contract type. Almost 63 percent of the young (up to 25 years old) had a fixed-term contract. Roughly two thirds of those aged between 26 and 35 had an open end contract, in comparison to 80 and 87 percent of those aged 36-40 and 50 years or more, respectively.

Figure 5. Employment structure by contract type in the period 2008-2017, in percent



Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021a).

Figure 6. Employment structure of individuals in main occupation groups (ISCO, Level 1) by contract type in the period 2008-2017, in percent

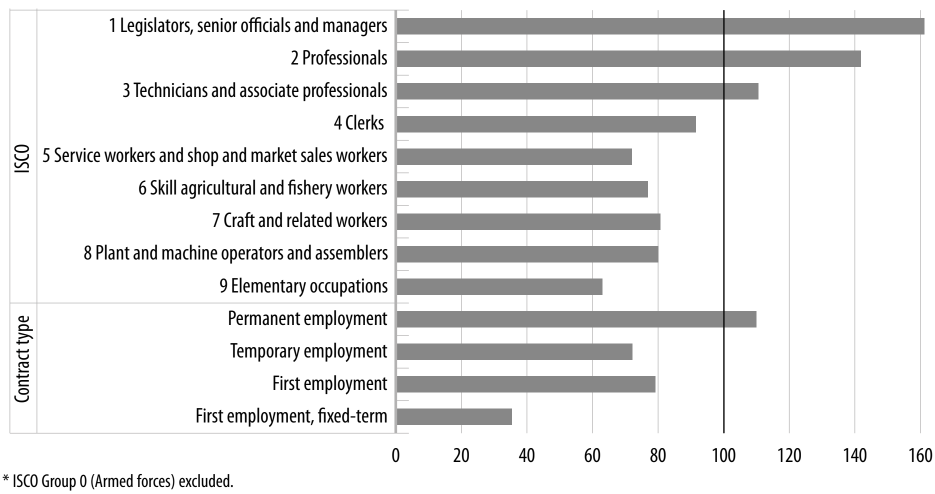


Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021a).

There were however significant differences in the prevailing employment type depending on occupational group. Almost 90 percent of managers (ISCO 1) were employed on permanent employment contract, compared to only 59 percent of those who worked in »elementary occupations« (ISCO 9) (Figure 6). Different professionals also had an above average share of open end contracts, e.g., 81 percent of technicians and associate professionals, and 76 percent of skilled agricultural, forestry and fishery workers, while on average 74 percent had an open end contract.

Wages also differed significantly between occupations and by contract type (Figure 7). Overall, in the analyzed period between 2008 and 2017, the average net wage was 11,070 euros. Those in permanent employment (overall, not taking into account differences in education and occupation) received ten percent higher wages than the average, while those with temporary contracts achieved 72 percent of the average wage. Of course, the professional qualification level and occupation also significantly impacted the wage. If the average wage was roughly 11 thousand euros, the occupations within ISCO Group 1 (Managers) received on average 60 percent higher wage, while those within ISCO Group 9 (Elementary occupations) received only 63 percent of the average net wage.

Figure 7. Wage index by occupation group (ISCO, Level 1*) and contract type in the period 2008-2017 (Average wage=100)



* ISCO Group 0 (Armed forces) excluded.

Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021a).

2.4 Mobility and job quality

Mobility is expected to either keep the individual employed or to improve their labour market position. In Slovenia, over the period between 2008 and 2017, a number of changes had occurred. In total, of the 7.9 million observations (around 800 thousand of individuals over ten years) 1.5 million changed their employers, 210 thousand the field of professional orientation, almost 350 thousand their educational level, and 654 thousand their occupation at ISCO Level 4. The preliminary results (Table 2) show that those that shift to permanent employment experienced a significantly higher increase in wage. Improving the level of education was also positive. Interestingly, obtaining a new/different qualification was in fact on a yearly basis related to a decline in wage. This could be explained either by a change in qualification to avoid unemployment or could also be the result of the fact that somebody who changes occupation has then less experience and therefore initially gets a lower wage. On the other hand, the group that changed the employer also marked an increase in wage, but this increase was lower than in the case of those who did not change their employer. The reason could be similar.

Table 2. Testing the differences in real wages

		Wage change	T-test sig.
Contract	No contract change	364.9	0.0000
	To permanent contract.	987.5	
ISCO change (Level 4)	No change	367.9	0.0000
	Change	-410.4	
ISCO change (Level 3)	No change	364.8	0.0000
	Change	-441.9	
Field of professional qualification	No change	323.0	0.0000
	Change	-187.5	
Level of education	No change	205.7	0.0000
	Change	472.0	
Employer	No change	345.9	0.0000
	Change	124.1	

Source: Own calculations based on the data from Statistical Office of the Republic of Slovenia (2021a).

Discussion and conclusion

Job quality is an important aspect of an individual's well-being and also a determinant of the well-being of his or her family. Generally speaking, mobility across occupations, improving education level and changing jobs, contract types or employers should generally help the individual improve his or her labour market position. This preliminary analysis suggests that the labour market mobility should be studied in significantly more detail in order to assess the individual's position before and after the change, as well as the possible causes of the changes that occurred. The preliminary results suggest that there is moderate mobility in the labour market, being higher among the young, among men, and also among specific levels of education. Expectedly, mobility was also higher among those employed on a temporary basis. However, a change or mobility did not always have positive effects. While a shift to a permanent job contract and an increase in the education level helped improve individuals' well-being, especially in terms of wages, a change in occupation or field of education not necessarily so. It could be that the individuals took on a less-paid job just to avoid unemployment, which requires a further analysis to be carried out in the future.

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Mitja Kovač, Rok Spruk

QUALITY OF LOCAL PUBLIC INSTITUTIONS, PRODUCTIVITY AND FIRM-LEVEL INNOVATION: EVIDENCE FROM SLOVENIA

Introduction

The notion that the institutional quality matters for sustainable growth, productivity, innovation and long-run development can only seldom be disputed (North & Weingast, 1989; Knack & Keefer 1995; Acemoglu et. al., 2005; Rodríguez-Pose, 2013). Without the loss of generality, the conventional wisdom stipulates that an institutional environment with low transaction costs, robust rule of law and high-quality government institutions reduces the costs of cooperation and facilitates both economic specialization and growth. Thus, societies without an impartial and robust rule of law, rigorously controlled corruption and effective government administration can seldom flourish in the long run and are prone to both institutional sclerosis (Rothstein & Teorell, 2008) and economic stagnation. By contrast, societies with an impartial, effective and accountable institutional framework tend to have higher levels of social capital as citizens exhibit a greater degree of social trust, well-being and individual happiness than societies without such a framework (Holmberg et. al., 2009). How much the institutional quality really matters for productivity, innovation and economic development, and which layers of institutions are most important, remains largely unanswered. Namely, most of the studies examine the impact of institutions on growth and development at the country level. Such studies are prone to the statistical identification issues and hardly shade any light on the relationship between legal institutions and economic development (Leamer, 1983; Angrist & Pischke, 2009; Klick, 2010; Helland & Klick, 2011; Klerman et. al., 2011; Helland 2016). The fundamental issue stems from omitted variable bias inherent in cross-country studies. Aggregate correlations between various measures of legal institutions and economic growth can thus hardly provide any evidence on the impact of legal institutions on growth and development (Sobel & Coyne, 2011; Olson, 2010). On the other hand, sub-national variation in institutional quality holds out more hope to identify the effects on growth and development by holding an array of other factors constant, and partially overcome the identification bias inherent in a cross-country setup (Armour et. al., 2009).

In this chapter, we exploit within-country variation in municipality- and regional-level quality of public institutions quality in a cross-section of Slovenian municipalities. The main ambition is to shed light upon the interrelationships between the patterns of innovation, productivity and the local public institutional quality. In this respect, this chapter examines the contribution of different layers of institutional quality generated by different Slovenian municipalities and regions on the firm-level innovation.

The rest of the chapter is organized as follows. First, we provide a theoretical framework linking institutional quality on the different sources of economic growth and show the recent innovation patterns. Next, we discuss the data and construction of key variables. In Section three, we present the results, robustness checks, the counterfactual scenario and policy implications. We conclude in the last section.

1 Conceptual framework

It is generally accepted that inclusive and broad-based economic and social development cannot be sustained without raising productivity growth. Yet, attaining high productivity growth is not possible without an institutional framework that supports open markets under a robust rule of law, low transaction costs, effective government administration, and no opportunities for corruption. Such an institutional framework has an innate tendency to generate low transaction costs, which spurs allocative efficiency and fosters economic specialization (Coase, 1937, 1961, 1988, 1998). In a world of positive transaction costs, the institutional environment should play a crucial role in determining how resources are used and consequently also have a crucial impact on productivity, innovation and economic growth (Coase, 1994). The existing empirical evidence promulgates the notion that the institutional framework may be one of the root causes of the differences in economic growth and development in the long run (Glaeser et. al., 2004, Rodrik et. al., 2004). In addition, North (1990, 2005) advances that the inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment in the third world. Williamson (1996, 1985, 1975) and Matthews (1986) on the other hand stress the vital importance of transaction costs in long-term relationships and argue that institutions do matter and are susceptible to analysis.

The question that remains is whether institutional differences at the subnational level matter for firm-level innovation, specialization and complexity. The existing subnational evidence suggests that a more inclusive institutional framework is associated with a better long-run economic performance (Bruhn & Gallego, 2012; Michalopoulos, & Papaioannou, 2014), higher levels of trust (Charron & Rothstein, 2018) and more complex and diversified productive structures (Hidalgo & Hausmann, 2009; Chávez et. al., 2017; Gao & Zhou, 2018; Reynolds et. al., 2018; Davies & Maré, 2021).

Identifying the effect of institutional quality on subnational innovation is impossible without plausibly exogenous sources of variation. Most of the existing measures of such variation are prone to the problems of omitted variables or may be conceptually unsuitable to establish the proposition that institutions invariably may be the root cause of innovation or other economic outcomes (Helland & Klick, 2011), since they tend to change slowly over time, reflect factors other than institutional quality itself, or coincide with major wars of revolutions.

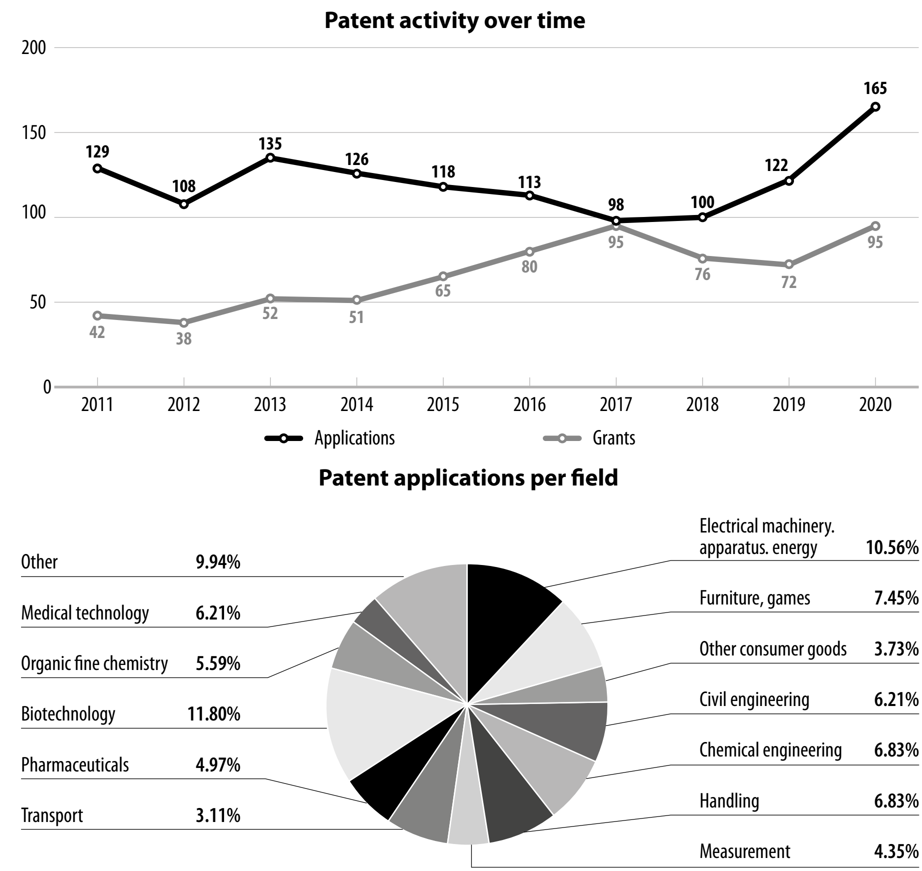
Moreover, the economics of property rights in intellectual goods is now well understood and has been extensively discussed in the ground-breaking literature (Kitch, 1977; Merges & Nelson, 1994 Landes & Posner, 2003; Posner, 2011). Institutional framework conditions have been identified as important factors influencing innovation activities of companies, industries and whole economies (Carlin & Soskice, 2006; Crafts, 2006; Blind, 2012). It has to be emphasized that not all patentable inventions are patented, since in some cases, firms rely instead on trade secrets or simply because patent protection, due to very difficult and costly copying, may not seem worthwhile. In order to achieve better understanding of the extent to which various firms make use of the patent system, Mansfield (1986) suggests the exploration of the propensity to patent as a proxy for firm-level innovation.

2 Data and methods

2.1 Dependent variable

Our dependent variable is the number of valid patents granted by the European Patent Office (hereinafter EPO) and US Patent and Trademark Office (hereinafter USPTO). Patent intensity is captured two-fold as (i) binary indicator of firm-level presence of the valid patent in the municipality and as (ii) the number of valid patents. Our data on the legal status of patent applications is from the EPO's PATSTAT and USPTO Patent Database which contains bibliographic and legal status firm-level patent data from leading industrialized and

Figure 1. Aggregate patent activity in Slovenia, 2011-2020



Sources: European Patent Office, Patent Register.

developing countries for the period 1995-2015. Patent presence is detected in 15 percent of the municipalities whereas the number of valid patents ranges up to 41 patents per municipality. Albeit imperfect, a patent granted by the EPO and the USPTO serves as a crude proxy for the firm-level innovation and high productivity. Namely, to acquire a valid EPO or USPTO patent grant, firms must pass a rigorous examination by the US or EU patent administrators and have to show a genuine, global innovation, which also, among other factors, reflects very high productivity rates of the firms.

Figure 2. Spatial distribution of patenting activity across Slovenian municipalities

Source: Own work.

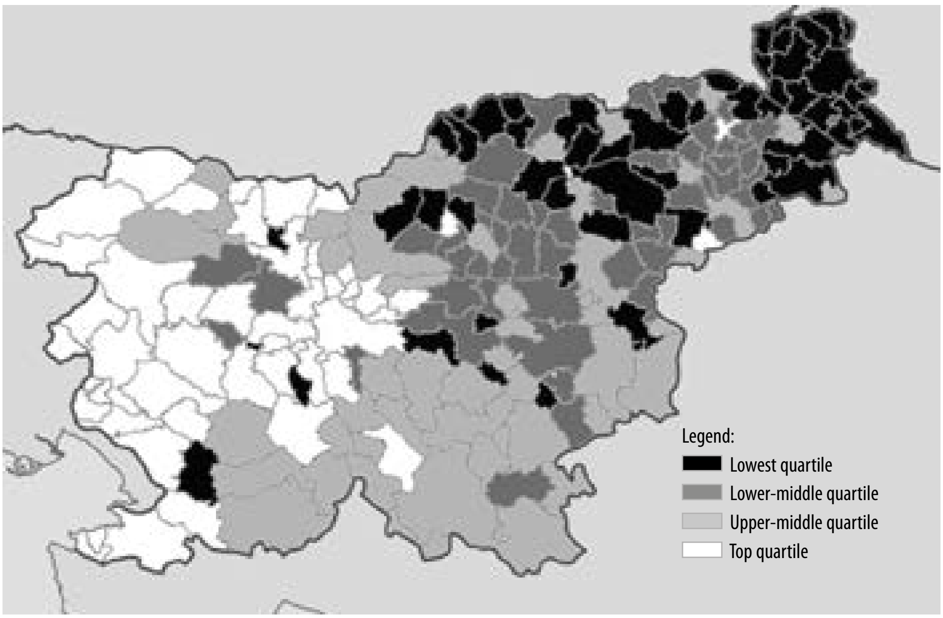
In Figure 1, we present the Slovenian EPO's patent activity for a number of patent applications and grants (valid patents) for 35 technology fields in the 2011-2020 period and patent applications per technology field. As shown, the number of patents and patent applications has been steadily increasing and may be employed as a circumstantial evidence of an increased productivity and innovative activity of Slovenian firms. Figure 2 presents the spatial distribution of firm-level innovation across the full cross-section of Slovenian municipalities. The shaded areas represent a dummy variable indicating whether or not a valid EPO or USPTO patent grant is present in the municipality. Although patent activity appears to be somewhat more prevalent in western municipalities, notable contrasts in the intensity of patenting activity are perceptible among the municipalities hosting a firm with a valid patent grant. For instance, one valid patent is found in the municipalities of Kamnik and Ajdovščina, whereas 33 patents and 41 patents are present in Ljubljana and Domžale, respectively.

2.2 Measuring institutional quality

Our approach to measure institutional quality of Slovenian municipalities is constrained by the lack of observable and measurable characteristics providing an insight into the variation in institutional quality. To address these concerns, our approach relies on the extraction of the residual component of the institutional quality from the observable subnational institutional quality series. Our aim is to extract a latent variable component of institutional quality from the higher-aggregation level and project it to the local level, using a set of pre-determined characteristics that cannot be manipulated. In this respect, our approach is similar to Magnusson and Tarverdi's (2020) method of estimating governance quality combined with the plausibly exogenous characteristics used for a linear projection of the institutional quality to the local level. Our set of the institutional quality variables comprises well-recognized and established indicators of (i) government quality, (ii) impartiality of government administration, and (iii) prevalence of corruption. Our definition of government quality relies on Rothstein and Teorell (2008), encompassing the traditions and institutions by which local authority is exercised, including the process of selection, monitoring and replacement, capacity of the local institutions to effectively formulate and implement sound policies, and respect of citizens for the institutions that govern economic and social interactions among them (Kaufmann et. al. 2011). Secondly, the definition of government impartiality is more complex and directly hinges on the exercise of public power. Hence, an impartial government official shall not take into consideration anything about the citizen/case that is not beforehand stipulated in the policy or the law and shall be unmoved by special relationships or personal preferences, treating citizens irrespective of personal relationships and personal likes and dislikes (Strömberg 2000, Cupit 2000). And thirdly, our definition of corruption emphasizes the abuse of public power on behalf of government officials for private gain. Herewith, we attempt to combine both perception-based and experienced-based measures to estimate the extent to which public power is exercised for private gain that is not limited to cases of petty or grand forms of corruption, and also pertains to special interests of elites and private interests that may pose a source of local state capture.

To this end, we exploit the subnational variation in the quality and impartiality of government administration, and prevalence of corruption at NUTS 2 regional level in the European Union using the updated version of institutional quality data[1] from Charron et al. (2019). Due to the constrained availability of the governance data at the subnational level in Slovenia, our focus in the empirical analysis is on the most recent year, although a longitudinal approach would be preferable. Following Magnusson and Tarverdi (2020), our goal is to extract the residual component of each governance indicator from the available NUTS 2 regional level of aggregation based on the set of pre-determined time-invariant covariates that are orthogonal to the institutional quality variable of interest. This allows us to residualise the regional institutional quality to the municipal level.

Figure 3. Institutional quality across Slovenian municipalities



Source: Own calculations based on Charron et. al. (2019) using Stata statistical software package.

Figure 3 depicts the institutional quality across Slovenian municipalities. Specifically, the figure displays the first principal component of quality, impartiality and prevalence of corruption variables. Municipalities are clustered into four quartiles ranging from low (in black), lower-middle (in dark grey), upper-

1 The dataset contains estimates of governance quality, impartiality and prevalence of corruption for 208 regions for the time period 2010-2021 at NUTS2 regional level. The dataset is based on the largest survey ever undertaken to measure perceptions of quality of government collecting the opinions of over 129,000 respondents across the 27 EU member states (Charron et al., 2021).

middle (in light grey) to high (in white) quality. The first principal component of institutional quality ranges from -1.56 in the municipality of Grad to 4.68 found in the municipality of Lenart. The municipalities with the lowest institutional quality are also Ljubno, Vuzenica, Apače, and Ravne na Koroškem, whereas the municipalities with the highest institutional quality are Gorje, Kranjska Gora, Ajdovščina, and Vipava. The general thrust of this comparison suggests that the institutional quality is substantially better in western and north-western Slovenia whilst the level in eastern municipalities is considerably lower.

Table 1 compares the institutional quality of Slovenian NUTS3 regions with their European Union peers. Specifically, the quality of governance, impartiality of government administration and prevalence of corruption is compared to the set of best-performing and worst-performing regions whilst providing the regions with the closest estimated level of institutional quality. A glimpse of the comparison reveals that the regions with the best institutional quality can be predominantly found in Northern and Central Europe, although this is not uniform. For instance, the best performing region in terms of the estimated governance quality is La Rioja in Spain, whereas regions from Denmark, Sweden, Austria, Luxembourg, Germany and the Netherlands consistently exhibit the highest scores in institutional quality. In terms of impartiality in government administration, regions such as Styria (i.e. Steiermark) and Lower Austria (i.e. Niederösterreich) can be found among the benchmark cases. By contrast, the lowest level of institutional quality is found in South-Eastern Europe, particularly Bulgaria and Romania, as well as in southern Italy, in regions such as Campania and Calabria. The institutional quality of Slovenian regions appears to be quite far from the upper tier. Our estimates suggest that western regions, such as Litorale-Carso (Obalno-Kraška) and Gorizia (Gorica), consistently exhibit the highest scores of institutional quality and are comparable with regions of Coimbra in central Portugal, Castile and León in Spain, and Upper Normandy in France. Central Slovenian regions appear to score mediocrely in terms of governance quality and are comparable with the Region of Murcia in Spain, whereas eastern Slovenian regions score significantly lower than the average and are mostly comparable with southern European regions with lower per capita income, such as Algarve in Portugal, Notio Aigaio in Greece, or central-eastern European regions, mainly from the Czech Republic and Romania. The general thrust of this comparison reinforces the notion of a stark east-west gap in institutional quality that can be invoked from within-country variation in institutional quality.

Table 1. Institutional quality in Slovenian regions

Quality of governance			Impartiality of government administration			Prevalence of corruption		
Best-performing regions								
1	La Rioja (ES)	4.454	1	Aland Islands (SE)	4.326	1	Aland Islands (SE)	4.320
2	Aland Islands (SE)	4.099	2	Steiermark (AT)	4.320	2	Oberpfalz (DE)	3.104
3	Helsinki-Uusimaa (FI)	3.997	3	Niederösterreich (AT)	3.326	3	Oberfranken (DE)	2.870
4	Jönköping (SE)	3.130	4	Pohjois Itä-Suomi (FI)	2.796	4	Helsinki-Uusimaa (FI)	2.848
5	Oberpfalz (DE)	3.081	5	Jönköping (SE)	2.766	5	Jönköping (SE)	2.792
6	Pohjois-Itä-Suomi (FI)	3.038	6	Helsinki-Uusimaa (FI)	2.720	6	Trier (DE)	2.549
7	Västmanland (SE)	2.946	7	Oberösterreich (AT)	2.678	7	Luxembourg City (LU)	2.498
8	Midtjylland (DK)	2.691	8	Kronoberg (SE)	2.448	8	Rheinhessen-Pfalz (DE)	2.467
9	Uppsala (SE)	2.617	9	Kärnten (AT)	2.401	9	Remich (LU)	2.373
10	Örebro (SE)	2.403	10	Drenthe (NL)	2.395	10	Pohjois-Itä Soumi	2.326
…				…		…	…	…
158	Centro PT	0.252	**95**	**Gorizia**	**1.173**	**153**	**Litorale-Carso**	**0.331**
161	Gorizia	0.220	**96**	**Litorale-Carso**	**1.172**	154	Castilla y León (ES)	0.293
…	…	…	97	Weser-Ems (DE)	1.146	…	…	…
…	…	…	…	…	…	156	Gorizia	0.281
164	**Litorale-Carso**	**0.201**	**111**	**Central Slovenia**	**0.981**	157	Champagne-Ardenne (FR)	0.278
165	Haute-Normandie FR	0.191	112	Hannover (DE)	0.975	…	…	…
…	…	…	**113**	**Upper Carniola**	**0.951**	**161**	**Central Slovenia**	**0.251**
…	…	…	…	…	…	162	Hainaut (BE)	0.136
177	**Central Slovenia**	**0.057**	**222**	**Mura**	**-0.787**	…	…	…
178	Región de Murcia ES	0.055	**223**	**Lower Sava**	**-0.793**	167	Navarra (ES)	0.052
…	…	…	224	Galati (RO)	-0.794	**168**	**Upper Carniola**	**0.040**
…	…	…	…	…	…	…	…	…
189	**Upper Carniola**	**-0.098**	230	Bacs-Kiskun (HU)	-0.841	**200**	**Litorale-Inner Carniola**	**-0.558**
190	Picardie (FR)	-0.123	**231**	**Southeast Slovenia**	**-0.844**	201	Razgrad (BG)	-0.567
…	…	…	…	…	…	**202**	**Lower Sava**	**-0.573**
192	Crete (EL)	-0.155	234	Vrancea (RO)	-0.872	203	Sibenik-Knin (HR)	-0.585
193	**Lower Sava**	**-0.178**	**235**	**Central Sava**	**-0.873**	…	…	…
194	**Southeast Slovenia**	**-0.189**	236	Buzau (RO)	-0.891	**207**	**Central Sava**	**-0.615**
…	…	…	…	…	..	208	Silistra (RO)	-0.616
198	**Litorale-Inner Carniola**	**-0.248**	**237**	**Drava**	**-0.899**	…	…	…
199	Nicosia (CY)	-0.259	**238**	**Savinja**	**-0.901**	**210**	**Southeast Slovenia**	**-0.631**
…	…	…	…	…	…	211	San Gwann (MT)	-0.640
201	**Mura**	**-0.273**	**240**	**Litorale-Inner Carniola**	**-0.916**	…	…	…
202	Southeast Czech Rep.	-0.278	241	Hunedoara (RO)	-0.920	216	Larnaca (CY)	-0.706
203	**Central Sava**	**-0.288**	…	…	…	**217**	**Mura**	**-0.714**
…	…	…				…	…	…

Quality of governance			Impartiality of government administration			Prevalence of corruption		
206	Savinja	-0.335	248	Carinthia	-0.968	224	Drava	-0.759
207	Notio Aigaio (EL)	-0.337	249	Caras Severin (RO)	-0.972	225	Arad (RO)	-0.761
…	…	…	…	…	…	…	…	…
210	**Drava**	**-0.345**	…	…	…	**228**	**Savinja**	**-0.795**
211	Central Czech Rep.	-0.356	…	…	…	**229**	**Carinthia**	**-0.803**
…	…	…	…	…	…	230	Northeast Czech Rep.	-0.817
218	**Carinthia**	**-0.439**	…	…	…	…	…	…
219	Algarve (PT)	-0.445	…	…	…	…	…	…
…	…	…	…	…	…	…	…	…
Worst-performing regions								
385	Ilfov (RO)	-3.501	385	Dobrich (BG)	-2.719	385	Blagoevgrad (BG)	-2.994
386	Constanta (RO)	-3.515	386	Campania (IT)	-2.771	386	Bucharest (RO)	-3.054
387	Campania (IT)	-3.850	387	Lombardia (IT)	-2.898	387	Botosani (RO)	-3.055
388	Calabria (IT)	-4.105	388	Sardegna (IT)	-3.054	388	Suceava (RO)	-3.104
389	Constanta (RO)	-4.377	389	Lubelskie (PL)	-3.057	389	Ilfov (RO)	-3.316
390	Tulcea (RO)	-4.511	390	Calabria (IT)	-3.745	390	Campania (IT)	-3.330

Source: Own calculations based on Charron et. al. (2019) using Stata statistical software package.

2.3 Covariates

The set of confounding variables that, aside from the quality of local institutions, simultaneously affect the patent activity, consists of municipal-level observable variables, namely (i) population density (i.e. defined as the number of inhabitants per km2), (ii) physical size of the municipality (i.e. in km^2), (iii) mean annual temperature (in °C), (iv) average age of residents, (v) number of graduates per capita, and (vi) birth rate per 1,000 residents. The set of covariates is also used to partially mitigate the inherent omitted variable bias, whereupon the effect of institutional quality could be driven by the demographic, human capital, or other auxiliary differences between the municipalities. The corresponding data used to construct these variables is from the latest issue of *Slovene Statistical Regions and Municipalities in Numbers* by the Statistical Office of the Republic of Slovenia (2019). Table 2 presents the descriptive statistics for the outcome variables and institutional quality measures.[2]

2 Due to space limitations, descriptive statistics on covariates is omitted.

Table 2. Descriptive statistics

	# obs	Mean	StD	Min	P25	P75	Max
Panel A: Outcomes							
Valid EPO and US patent	212	0.15	0.35	0	0	0	1
Number of valid EPO and US patents	212	0.76	4.26	0	0	0	41
Panel B: Treatment variables: institutional quality scores							
Quality of local government	212	-0.25	0.32	-0.56	-0.47	-0.11	2.20
Impartiality of local government	212	-0.37	1.02	-1.19	-1.08	0.87	1.87
Corruption in local government	212	-0.59	0.54	-1.12	-1.00	-0.09	1.02

Source: Own calculations using Stata statistical software package

3 Empirical strategy, results, counterfactual scenario and policy implications

Our aim is to consistently examine the contribution of institutional quality to the local firm-level innovation. To this end, our empirical strategy is to estimate the following cross-sectional specification:

$$y_{i\in N} = \hat{\theta}_0 + \hat{\theta}_1 \cdot Q_{i\in N} + \mathrm{X}'_{i\in N}\hat{\beta} + \varepsilon_{i\in N}$$

where γ is the firm-level innovation variable in i-th municipality, $\hat{\theta}_0$ is the constant term, Q is the estimated institutional quality, X is the vector of covariates, and ε is the random error. Standard errors are clustered at the municipality level using the Huber-White sandwich variance-covariance estimator. Our key coefficient of interest is $\hat{\theta}_1$ which captures the contribution of local institutional quality to the firm-level innovation at the municipal level. Several variants of the estimating equation are considered to capture dichotomous and other measures of innovation.

Table 3 reports the estimated effect of institutional quality on local level innovation. To capture the multifaceted firm-level innovation at the local level, we estimate both probit and logit specifications deploying the dichotomous nature of innovation. In these specifications, the dependent variable is whether an EPO and USPTO patent grant is present at the local level. We further capture the intensity of firm-level innovation by constructing the knowledge-intensity variable which roughly captures the share of total patent grants at the local level. To this end, we estimate a simple tobit model with right-tail observational censoring given that the value of the intensity variable is zero in municipalities without valid patent grants.

Table 3. Institutional quality and local innovation

	LPM	Probit	Logit	Tobit
	(1)	(2)	(3)	(4)
	Valid EPO and US Trademark Office Approved Patent			Knowledge-intensity: share valid EPO and US patents
Panel A: Treatment variable: quality of local government				
β	.129[a] (.085)	.097* (.054)	.076* (.041)	.252** (.126)
Panel B: Treatment variable: impartiality of local government administration				
β	.041[a] (.026)	.030* (.017)	.024* (.014)	.072* (.041)
Panel C: Treatment variable: prevalence of corruption in local government administration				
β	.095** (.047)	.072** (.034)	.057** (.029)	.160** (.083)
# municipalities	212	212	212	212

* Notes: The table reports the estimated effect of institutional quality on firm-level innovation across the full cross-section of Slovenian municipalities. Standard errors are adjusted for the arbitrary heteroscedasticity and serially correlated spatial stochastic disturbances using the Eicker-Huber-White sandwich estimator. Heteroscedasticity-consistent standard errors are denoted in the parentheses. Asterisks denote statistically significant coefficients at 15% (a), 10% (*), 5% (**), and 1% (***), respectively.

Source: Own calculations using STATA statistical software package.

Column 1 reports the linear probability estimated effect of institutional quality on the probability of valid EPO and USPTO patent grants. The evidence suggests that improving the institutional quality is associated with significantly higher probability of a valid patent grant. In particular, the estimates suggest that the probability of a valid patent grant increases by 13 percent in response to one standard deviation improvement in the quality of local government. In addition, statistically significant effects of improved government impartiality are perceptible. The point estimate suggests that the equivalent one standard deviation improvement in the impartiality of local government administration tends to increase the probability of a valid patent grant by 4.1 percent. In addition, a more rigorous anti-corruption framework at the local level tends to foster the probability of patent grant by 9.5 percent. The point estimates confirm the importance of institutional quality for firm-level innovation at the local level. Columns (2) and (3) present the corresponding probit and logit estimated effects of institutional quality on innovation. Compared to the linear probability models, probit and logit estimates suggest that improving the quality of public local governance tends to increase the propensity to patent in the range between 7.6 percent and 9.7 percent. The point estimates are both statistically significant at a ten percent level. Similar to linear probability estimates, the magnitude of the coefficient on the impartiality of the government administration in Panel B is noticeably smaller whilst statistically significant, thereby reaffirming the notion that a more impartial local government tends to reinforce firm-level innovation more considerably. In a similar vein, the higher level of corruption prevalence variable (i.e. which corresponds to the lower prevalence of corruption) tends to increase the propensity towards a valid patent grant in the range between 5.7 percent and 7.2 percent. The estimated coefficients are statistically significant at five percent, indicating a detrimental effect of corruption on firm-level innovation that is reasonably robust across the multitude of our specifications. Column (4) reports tobit estimated effects of institutional quality on local innovation using the left-censored knowledge-intensity dependent variable. The estimates uncover a somewhat greater elasticity of innovation, with respect to institutional quality compared to the specifications with binary innovation outcomes. In particular, estimates in column (4) arguably highlight a marked positive contribution of improved local government quality. A reasonable improvement in governance quality by one standard deviation is associated with 25 percent knowledge-intensity increase whilst the equivalent improvements in impartiality and prevalence of corruption augment the intensity by 7.2 percent and 16 percent, respectively. Both point estimates are also statistically significant at ten percent and five percent, respectively, which implies that improving the quality of institutions matters and may further ameliorate the lack of innovation.

Perhaps one of the most pressing policy-relevant questions behind our estimates arises from the counterfactual scenario. In particular, what would be the potential level of firm-level innovation at the local level if municipalities improved the quality of local institutions to a certain attainable threshold? Although the attainable benchmark of institutional quality frontier may be disputable and subject to rigorous theoretical discussions, we set the benchmark at the attainable level by seeking a nearest counterpart of Slovenian municipalities and regions where two criteria are met: (i) a high level of overall institutional quality and (ii) geographic proximity to ensure that the institutional quality frontier is both easily interpretable and plausible. One such candidate region is the Austrian region of Styria (Steiermark) which ranks 21st among EU regions from Table 2 on the institutional quality dimension, 4th on the impartiality of government administration and 67th on the prevalence of corruption, and scores well above the level of Slovenian regions and municipalities. Our strategy is to predict the hypothetical level of innovation if the observed institutional quality of municipalities would improve to the frontier level exemplified by Steiermark using our preferred probit specification from column two.

The counterfactual estimations for the full cross-section of Slovenian municipalities reveal an increase in the probability beyond the baseline predicted municipal-level probabilities of valid EPO and USPTO patent grants if the score of institutional quality at the local level were the same as that of Steiermark. We also build the counterfactual distributions for the baseline probabilities at the observed level of institutional quality and the probabilities in response to the benchmark level of quality. The evidence suggests that the probability of a valid patent grant increases by 15 to 42 percent beyond the baseline predicted probability in response to getting the institutional quality to the level of Austrian's province of Steiermark. Although the augmented probabilities are fairly uniform across the municipalities, western municipalities tend to gain somewhat more than their eastern peers. The estimated counterfactual is somewhat lower for the impartiality of government administration where the probability of patent grant improves in the range between seven percent and 16 percent, with western municipalities exhibiting somewhat greater increase than their eastern peers. Similar improvement in the probability of patent grant is found with respect to the hypothetical improvement in the prevalence of corruption where the counterfactuals indicate an increase in the probability beyond the predicted level between 1.5 percent and eight percent. A closer look at the counterfactual distributions also suggests that improving the institutional quality across all dimensions is associated with less spatially dispersed patent granting probabilities. Comparing the peaks of the distribution functions implies that the scaled counterfactual distributions exhibit about four times higher probability of patent granted compared to the real observed distributions. These insights underpin a deep importance of institutional quality for firm-level innovation. This particular notion is further bolstered by the peak-to-peak comparison of the distributions implying that the implied probability of the peak of the scaled counterfactual distribution is noticeably higher than the actual level with the observed density, further indicating relatively large firm-level innovation gains from improving institutional quality to the feasibly attainable institutional frontier.

Conclusion

In this chapter, we examine the contribution of institutional quality to firm-level innovation across the full cross-section of Slovenian municipalities. Using a novel dataset of institutional quality leveraging municipal- and region-level indicators of quality, impartiality and corruption in the government administration, we estimate the observed and unobserved governance components relying on Magnusson and Tarverdi's (2020) parametrization in the presence of cluster dependence for the full sample of NUTS2 and some NUTS3 regions in the European Union, building on the subnational institutional quality dataset from Charron et al. (2019). Leveraging the observed and unobserved components of institutional quality at the local level, we effectively compare the institutional quality scores of Slovenian municipalities with the rest of Europe, and uncover a substantial gap between eastern and western Slovenia. In particular, the institutional quality scores of western Slovenian municipalities generally tend to be similar to those typically found in western European regions in France, Spain and Belgium. By contrast, the estimated institutional quality in eastern Slovenian municipalities is comparable with south-eastern European regions in Greece, Bulgaria and Romania, and with some central European regions in the Czech Republic and Hungary.

Our estimates suggest that better institutional quality, more impartial government administration and lower prevalence of corruption at the local level are associated with significantly higher probabilities of patent grant by the European Patent Office and the US Trademark and Patent Office. The counterfactual simulations uncover large and broad-based gains from improving the local institutional quality to the frontier level. In turn, the predicted institutional quality robustly explains the cross-municipal differences in the intensity of innovation.

Our normative implications for the policymakers invariably highlight an important interplay between the institutional quality and firm-level innovation. In particular, improving the governance of local administration both in terms of quality (human capital), merit-based remuneration and selection procedures, and impartiality, whilst drastically reducing both the scope and opportunities for corruption, nepotism, adverse selection and particularism, can substantially accelerate the pace of innovation. Moreover, improving the institutional quality environment at the local level appears to be superior to the generous subsidy schemes in the active pursuit of industrial policy which may present a source of ex-ante opportunities for opportunism, corruption and pursuit of special interests which, in the end, may have clear and strong countervailing effects on firm-level innovation.

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