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FOREWORD

Dear Colleagues,

Dear Colleagues,

The proceedings you are reading contain the papers presented at the 13th International conference "Challenges of Europe: Growth, Competitiveness, Innovation and Well-being", held in May, 2019 in Bol on the island of Brač in cooperation with European Commission. The proceedings contain only a selected subset of papers, which, in this way, tend to be scientifically evaluated by researchers.

This is an opportunity to recall our first conference that was held in 1995 under the name "Enterprise in Transition". It was launched with the aim to help primarily the economies of Central and Eastern Europe, i.e. former socialist countries, in their efforts to adapt to the changes required by market economy.

In terms of shifting the post-socialist countries' economies of Central and Eastern Europe to a market one, transition-related issues have lost their importance over time. In 2009, the conference was renamed to "Challenges of Europe" with the aim of emphasizing the need to explore various economic topics and issues that is faced by the global and integrated European economy.

In doing so, we had in mind the need and the opportunity to connect business entities in order to achieve synergy effects. This has in no way excluded the possibility of addressing the economic problems from the perspective of other economies or the need of achieving universal economic knowledge. This was therefore the basis for our conference which focused on growth, competitiveness, innovation and well-being. Moreover, it was in no way limited to the European context, which is confirmed by the fact it was attended by researchers from all over the world.

As conference organizers, we are particularly proud of our distinguished guests. After we were hosts to Professor Joseph Stiglitz and Professor Jean Tirole, Nobel Prize winners and world-renowned scientists, in 2015 and 2017, respectively we had the privilege to host two more Nobel laureates in economics: Professor Eric Maskin and Professor Oliver Hart. It is important to mention other distinguished guests and keynote speakers such as Professor Olivier Blanchard, president of the American Economic Association, Professor Edward Glaeser from Harvard University, Professor Koen Paulwels from Northeastern University, Debora Revoltella, chief economist from European Investment Bank and Sergei Guriev, chief economist at the European Bank for Reconstruction and Development. They have all helped us raise the excellence and prominence of the conference, as well as of the papers presented.

It is worth noting that during the conference plenary panel discussion entitled "Investments for convergence: How can (EU) financial institutions foster growth and convergence by facilitating investments" was held. Furthermore, the conference was also a good opportunity for young researchers and PhD students who during the conference held their presentations as a part of their doctoral workshops. Besides, PhD students were able to meet all the distinguished keynote speakers at the informal breakfast meeting.

The "Challenges of Europe" conference, as well as the proceedings in your hands, would not be possible without the many volunteers who devoted their time and energy into organizing the conference. In this sense, we are especially thankful to the members of the international

programme committee and the organizing committee who took large burden. We would like to extend our sincere gratitude to all the reviewers who participated in a double-blind review process that has enabled us to present the selected papers for this conference.

We would like to thank all others who have generously contributed in any way to the conference and the publication of the proceedings without which scientific thought would be deprived of new cognitions presented in these papers.

Split, December, 2019

Programme Committee Chairperson
Professor Ivan Pavić

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XIII

CONFERENCE PROCEEDINGS

PRINCIPLES AND REQUIREMENTS FOR AN INCLUSIVE WELL-BEING ECONOMY

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Key words: *Well-being economy, Inclusive growth, sustainability*
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ABSTRACT

As demonstrated by the Sustainable Development Goals (SDGs), the need for economies to become more inclusive and focused on well-being is critical for advancing sustainability. Aspects like green growth and inclusive growth are integral to addressing economic inequality and growing problems such as jobless growth.

Among 21st century developments in the global economy is the emergence of a sharing economy, placing emphasis on economic inclusivity. To adequately capture priorities related to moulding an inclusive 'well-being economy' in policy formulation and theoretical frameworks, identifying key principles and requirements are critical. The paper investigates these with the aim of assembling some crucial components of that which make an economy inclusive and geared towards achieving collective well-being. This is part of new economic thinking in exploring the essentials of genuine economic progress.

1. INTRODUCTION

The post-world war II era made economic growth the central focus of any development agenda. However, first the Millennium Development Goals (introduced in 2000) and then in 2015 the Sustainable Development Goals were deliberate global initiatives to move beyond this focus to reinterpret growth in a broader context. The emphasis on 'inclusivity' and 'well-being' are standout features in this quest for sustainability. Inclusive economics has thus evolved from this outgrowth, which sensibly introduces a 'care mindset' to the economy that involve two vital elements facing erosion in society: social inclusiveness and environmental safekeeping.

While the post-cold war era of globalisation is recognised for outstanding improvements in areas such as life expectancy, technological innovation and food production, it is equally and widely recognised that it has insufficiently addressed serious environmental and humanitarian disasters unfolding on the planet. According to Talberth (2008:19), it also 'mask gross inequities in the distribution of resources, and … fail to register overall declines in well-being that stem from loss of community, culture, and environment'. It thus raise the need to develop a comprehensive economic framework that focus on inclusivity and well-being. Instrumental to this is identifying key principles and requirements to fit/bind the framework together. This is the objective of the paper – for the purpose of clarifying key concepts and also clarifying what a transition to a more sustainable economic system would entail in light of new priorities.

2. CONCEPTUAL FRAMEWORK

Since it is still an evolving concept, no official definition for inclusive economics exist. As rather a framework of understanding, more than a concept to be defined, it represents an alternative discourse intrinsic to what genuine human well-being and progress should entail (Pouw and McGregor, 2014). Inclusive economics aims to broaden the scope for dealing with issues relative to economic exclusion and that which makes development unsustainable. Such issues include: poverty, environmental degradation, loss in productivity and well-being. As Stiglitz (2013:18) states: 'it is about broadening the growth base; about addressing the social characteristics and economic fundamentals of human well-being, not just welfare'.
It is worth asking what is meant by inclusion or inclusiveness or inclusivity? According to the Commission on Growth and Development (2008:2) the concept of inclusiveness 'encompasses equity, equality of opportunity, and protection in market and employment transitions'. Equality of opportunity refers to access to markets, resources and unbiased regulatory environment for businesses and individuals. The Commission considers systematic inequality of opportunity as 'toxic' as it severely excludes many. Gupta et al. (2015:548) highlight further that inclusiveness is a relational concept, 'which requires us to analyse the underlying forces and actors … driving inequalities'. This implies that power relations within and between societies must be addressed to stop/discourage powerful groups from excluding the poor and vulnerable – and empower the latter groups – thus placing the emphasis on collective well-being.

Coulthard et al. (2011:6) defines human well-being as 'an outcome that is continuously generated through conscious and sub-conscious participation in social, economic, political and cultural processes'. As a broader concept than just growth or growth per capita, well-being includes the full variety of elements that influences what we value in living. Whereas welfare mainly refers to income, well-being is a more holistic concept. It is 'a state of being

with others and the natural environment that arises where human needs are met, where individuals and social groups can act meaningfully to pursue their goals, and where they are satisfied with their way of life' (Pouw and McGregor, 2014:16). Human well-being can be viewed in an individual or a collective (societal) context. Inclusive economics holistically assimilates three dimensions of individual and collective well-being – (1) material, (2) cognitive/subjective and (3) relational (e.g. community) – in a value-driven economy, geared towards reducing possible trade-offs between the different types of well-being. Synergies (between collective and individual well-being) and empowerment (better decisions for better quality of life) become primary goals. Verstappen (2011) furthermore identifies family relationships, work, friends, health, personal freedom, and spiritual expression as all essentials of well-being. Stiglitz et al. (2009) concur with this multi-dimensional understanding of well-being, and adds to this list: education; political voice and governance; and reducing existential/survival-insecurity. Collective well-being, specifically, focusses strongly on contributing to and optimising the common good, i.e. that which is of shared interest to a community/society as a whole; and/or that which is optimal in the context of the 'shared interest' and holistic well-being (Daly and Cobb, 1990).

Shedding further light on economic inclusivity and well-being, a fundamental distinction should be made between collective and communal action. According to Rosefielde and Pfouts (2015), collective action strives to cooperate for better individual utility outcomes (personal benefit), while communal action does not separate private and group utility, and thus cooperate with a shared consciousness (communal benefit the first priority). While the former fits into the paradigm of collective well-being, the latter exemplifies it even better, given its remarkably inclusive nature. Another essential question regarding inclusive economics is: What is genuine economic progress? It involves economic growth, but more specifically inclusive growth and a rise in low-income group revenue. It involves development, but more specifically a more inclusive version of it (i.e. a pro-poor model where all marginalised and excluded groups are stakeholders in development processes (e.g. job creation)). It involves economic governance, but specifically inclusive governance (i.e. participative decision-making processes involving all stakeholders with the aim to make common good decisions that satisfy the majority).

It is lastly important to differentiate between well-being and utility. According to Rosefielde and Pfouts (2015:xii), well-being 'is a state of physical, psychological and spiritual health (being well) that allows, but doesn't require people to be fulfilled and content'. By contrast, utility is an experience that does not require individuals to be 'well'. They are therefore not always positively correlated since 'what feels good' may not be good for a person in that it is not 'healthy', as assumed in the well-being function. Maximising well-being is more encompassing than maximising utility, yet people could incorporate well-being into their marginal utility choice making. This would increase the possibility of not just rational but also emotional satisficing . Even 'contextual' satisficing could be possible, referring to increased relational quality and ecological harmony due to making specific choices. Inclusive economics appreciates that the combination of these different types of satisficing between persons will be diverse, confirming that there is not one universal explanation of economic behaviour – both in people's intentions and responses. What is a shared expectation, though, is genuine progress.

3. PRINCIPLES OF AN INCLUSIVE WELL-BEING ECONOMY

As outlined in its Agenda 2030 resolutions, the United Nations (2015:6) supports a common focus towards 'shared principles and commitments' for sustainable economic progress. In the inclusive economic framework principles would serve to be the nuts and bolts that join the structure together. These are common principles that would be shared by all in any community.

3.1. Reciprocity

Reciprocity starts with 'inclusive thinking', as opposed to 'exclusive thinking'. The latter is a form of antagonistic thinking that has sneaked into the pursuit of self-interest and competition in the economy, which has led to selective cooperation (groupings) and thinking biased towards 'either/or' (and not 'and'). The former 'proceeds fundamentally from the point of view that my well-being cannot be gained at the expense of the other. I can have it only if at the same time I advance the well-being of the other' (Boerwinkel, 1975:187). Reciprocity and shared interest, not just self-interest, therefore becomes the basis of economic decision-making to improve collective well-being. Such a principle gives priority to the common good in society.

The reciprocal nature of a well-being economy is such that it strengthens social and natural capital while generating human development. This creates a 'virtuous circle' where value that is measured by well-being feeds the progresses in natural and human capital upon which the creation of value is contingent (Fioramonti, 2017). The principle of reciprocity is then applied through a 'circular economy' model of resource recycling and upcycling, and integrated into typical business models, thus reducing the negative impact on the environment. Improved human relations and 'human-to-nature' connections then become the main drivers of growth instead of purely production/output, which on its own, can be very extractive (non-reciprocal).

3.2. Genuine economic progress and quality of life

Since the concept of progress is profoundly complex, scholars increasingly acknowledge that a broader or more holistic measurement should be developed than simply gross domestic product (GDP) per capita (Stiglitz, 2013; Piketty, 2014; Fioramonti, 2017). It is well-known that growth in itself, while necessary, does not mean there is genuine progress. More is needed. The Happiness Index – a subjective indication of people's well-being – is an example where greater emphasis is placed on social and ecological factors (Helliwell et al., 2018). Genuine economic progress – not just perceived/assumed economic progress (e.g. increased GDP per capita) – is fundamental to comprehensive improvement in people's quality of life. This more holistic approach includes social and ecological elements as well as personal factors in advancing progress. As such, true 'progress is measured by improvements in well-being rather than by expansion of the scale and scope of market economic activity' (Talberth, 2008:21).

Genuine progress occurs when future consumption capacity increase without an increase in long term costs (environmental and social). Sustainable development requires a non-declining level of well-being for future generations. A guiding principle is thus: 'that social, environmental and economic needs be met in balance with each other for sustainable outcomes in the long term' (UNCED, 1992:41). On balance, higher levels of consumption

may or may not have any relation to a higher quality of life if it is detrimental to personal health, to others, or to the environment. In summary, genuine economic progress would include (and exclude):

- achieving a high quality of life with only the needed consumption (without making mountains of throwaway artefacts and waste);
- quickly building renewable energy platforms and investing in human capital (and discourage wasteful consumption and valueless capital);
- developing an economic system that rewards cooperative frameworks for solving humanity's most urgent problems (rather than ruthless competition among businesses);
- firm appreciation of the earth's ecological limits and our shared ethical values to guide economic decision-making (and halt pushing the boundaries of our eco-capacity); and
- an economic system that is diverse, adaptable and resilient (contrary to the status quo).

To capture this, a Genuine Progress Indicator (GPI) has been developed to assist with the limits of GDP, and eventually become the primary indicator of a nation's economic progress. It is designed to measure sustainable welfare by adding to a country's total income nonmarket activities (e.g. volunteering and parenting), and subtracting costs associated with income inequality, environmental degradation and international debt (Talberth, 2008). For instance, when a country's GPI is half of its GDP it implies that about half of that country's economic activity that year was unsustainable, and did not contribute to genuine progress. It is a sobering measure and a vital principle for preventing an economy from overstepping the 'threshold effect', i.e. when the environmental and social benefits of growth are offset by their costs.

3.3. Ubuntu (humanness)

The African concept of 'Ubuntu' could well be the missing link in the conventional economics we are used to but concerned about, given its ability to take the social science – as a principle – to a new level of effectiveness. According to Broodryk (2006:22), Ubuntu is based 'on the values of intense humanness, caring, sharing, respect, compassion and associated values, ensuring a happy and qualitative communal way of life, in the spirit of family'. Mutual support, non-discrimination, respect for human dignity, and cooperation are central features. It shifts the emphasis from 'I think therefore I am' to 'I am human because I belong' (Tutu, 1999:61).

In economic terms Ubuntu represents a form of relationship-based economics, also known as 'Ubuntu-economics' . It is strongly related, but more than, social capital. Collective well-being and community is not seen as 'exterior', as in the Western individualistic view. It is seen as exterior and interior, stressing a direct dependence between individual and societal well-being (Migheli, 2017). Ubuntu implies a communal society where seeking advantage for the group/community ranks equal to personal benefit, but without the latter being the main/final goal. Importantly, this does not mean that utilitarian neoclassical economics and Ubuntu are mutually exclusive. Instead, Ubuntu incorporates individualism and utilitarianism. Each individual continues to operate in society for the good of both the community and him/herself, thus community and individual interests coincide in this pursuit. A fusion occurs

between the social and the individual levels of interest, decision and action. The same with utilitarianism in the sense that the decisional process of each community is led by the will of maximising the society's utility through individual utility maximisation by its members. A transposing of utilitarianism from an individualistic to a social level occurs. The key is explicitly valuing the importance of shared economic interests. By raising the collective consciousness, Ubuntu works to compensate for the excesses of individualism. Ultimately Ubuntu does not represent alternative goals for the economy, but opens up an alternative road for reaching the same goals (growth, utility maximisation, welfare optimisation, progress and sustainable development).

Returning to the symbiosis between Ubuntu and social capital, Lin (2000) defines social capital as the resources embedded in a network that can be accessed by the members of the network in order to gain a benefit. Networks could be groups or communities. Ubuntu also entail networks where the interpersonal relationships may be either horizontal or vertical, with the emphasis on open democratic processes. Thus, as Migheli (2017:1225) points out, 'Ubuntu translates from theory to practice thanks to interpersonal networks, which constitute the social capital of a community'. Social capital eventually becomes the means through which Ubuntu facilitates and allows the community of individuals to pursue common goals. As follows, 'by embracing Ubuntu-economics, the vibrant complexity of human behaviour can be released from the shackles of traditional rationality, and appreciated as an unrestrained force of culture, development, and true sustainability' (Sheneberger and Van Stam, 2011:33).

Apart from the shared values that Ubuntu embed in society and the economy, it also adds value in a number of ways that fills the vacuum or missing link in contemporary economics:

- Productive social cohesion: Ubuntu leads to improved teamwork, solidarity, mutual trust and loyalty in human relationships. Engelbrecht (2008) finds that communities with strong Ubuntu are more successful in responding positively to public programmes of development; and the members of these communities are less likely to be alcohol or drug addicted. Spitzer et al. (2014) highlight that Ubuntu has been used to appease ethnic conflicts in Burundi. An Ubuntu-person cares about his/her community and the common good by definition.

- Participatory leadership: Ubuntu's leadership philosophy enhances collectivism through a democratic way of decision-making: the leader's role in society is in a mediating capacity where matters are discussed with the other members of society and viewpoints compared. Only after this s/he formulates a syncretic decision that represents what the community deems 'good'. This is we-thinking and we-rationality that is inclusive and consensus-based. Such mediation facilitates a balance between individual goals/preferences and social goals, which result in greater ownership by the community and higher productivity to reach them.

- Public accountability: Having Ubuntu principles shared by society, it, collectively, places responsibility on public authorities to put effective institutions and policies in place as per the needs of the people. Breier and Visser (2006) show how the presence of Ubuntu has a positive effect on the community-based provision of essential services in rural South Africa.
- Embedding inclusivity: 'Ubuntu makes the members of a society feel linked to the other members of the same society in what we call 'community' and work to benefit it' (Migheli, 2017:1228). Gathiram (2008:153) shows the importance of Ubuntu 'to

achieve equalisation of opportunities and the economic development of physically disabled people' in South Africa. Enhancing economic performance even further, Ubuntu fosters the social inclusion of women through women's organisations and regulation that protect women's interests.

- Sustainable job creation: Contributing to economic stability, Ubuntu stimulates cooperation among community members to start new entrepreneurial ventures and create 'safe jobs'. It entrenches a mindset of wanting to be 'developed', thus refining and acquiring new skills.

- Local empowerment: Supporting local businesses is a critical outcome of Ubuntu, resulting in keeping and generating wealth within communities for reinvestment. Empowering the youth through quality education by Ubuntu-type involvement in schools, universities, etc.

- Ecological intelligence: The collective awareness brought about by Ubuntu attunes a community to the importance of responsible and effective natural resource management.

3.4. Shared responsibility

Few would dispute the fact that the global economy suffers from a number of imbalances. One particular subtle imbalance is that of a profit-driven/consumerism/supercapitalism economy that are creating structural inequalities and is out of sync with a much-needed 'economy of care' (Goudzwaard and De Lange, 1995:88). The 'at all costs' pursuit of profit have made the economy a machine that mostly benefit the few at the expense of a growing number of excluded and marginalised people. Such an economy is unsustainable and even self-defeating. On the other hand, the answer is not simply taking from the rich and giving it to the poor. Such classic redistribution models have also contributed little in making the 'trickle-down' effect work. The answer lies in taking mutual responsibility. Communities and economies must explore avenues for enhancing shared responsibility, such as pursuing local community economic development and emphasising mutual responsibility in child and adult education. Locating new ways of democratising important decisions about investments and their financing are critical. In a responsible society this implies, at least, that those who wield economic power must become more accountable for their decisions. People's right to own and participate in the significant economic decisions that affect their lives and communities deserves much broader inclusion. A people that take shared responsibility grow in maturity and start working together to make decisions in the best interest of everyone. This promotes a sense of belonging and a sense of collective ownership in a community, which result in greater care taken by all.

Development is care. And care is the main pillar of a well-being economy (Fioramonti, 2017). An economy of care requires more, in terms of economic needs or ends, than what production output processes can satisfy. It include also what human culture needs to survive: a minimum level of care for the sustainability of the environment; a minimum level of care for sustaining human communities, so that people's care for each other will acquire continuity and shared values; and a minimum level of care for employment opportunities and the quality of work (Goudzwaard and De Lange, 1995). Furthermore, one of the major, if not the main, source of inequality in society is 'the separation of production and consumption, which leaves consumers on the receiving end of the growth process' (Fioramonti, 2017:33). A responsible

economy of care brings in a personal element, thus preventing overconsumption, overproduction and the exploitation of resources – human and natural. This would also involve promoting business practices which have fewer negative externalities and more positive ones. In this way collective well-being become something that economic participants take shared responsibility for.

The emphasis on collective well-being places the 'common good' of society at the centre. Responsible management of the common good means taking collective ownership of the redistributive system related to the common good, and not the shared assets themselves. This means the shared responsibility is focused on how these assets are used and taken care of (and even optimised), not who controls them. This provides a way for a community to manage their common goods together to rebalance economic imbalances. While the role of the government remains vital in a shared responsibility context, governance, including economic governance, needs to move away from 'top-down hierarchies that hold the majority of people captive by self-appointed elites, unaccountable to the people and inefficient in dealing with social complexity' (Fioramonti, 2017:127). What is needed is inclusive and participatory governance that involve collective decision-making through inclusive processes and managed outcomes.

Transparency is key. Taking shared responsibility requires us to think creatively about redistribution of income where donors have a say over how the money will be used and can choose between a variety of options how to make their public contributions or pay taxes. Combining such top-down and bottom-up approaches would enable dealing more effectively with problems like structural inequality (Fioramonti, 2017). In the case of taxes, for instance, the state can become a 'manager' of funding choices to be considered by taxpayers themselves, though based on a predetermined set of categories (education, housing, health, social security, etc.). Taxpayers can then choose which sectors to spend their money on, depending on the scope available for each sector as per the national budget, until all sectors are covered. For full transparency, they could be enabled by the government through technology to keep track of their funds' distribution as well as the actual impacts. Such active involvement in the welfare choices of society would strengthen ownership, participation and accountability. Reconnecting citizens with the original purpose of tax would motivate them to invest even more in collective well-being – and put positive pressure on the state to fulfil its responsibility of service delivery.

3.5. Integrative reality

Globalisation has intensified the interdependency of economies and shaped an integrated existence through technology, trade, investment flows, etc. unlike the world has arguably seen. This integrative reality has also started to take shape within economies and communities as the need to collaborate increase. Resource sharing and shared community interests have grown in importance in contrast to a parallel rise in individualism, self-sufficiency and self-interest. Adaption to an inclusive reality evolving organically is vital to society and the economy. A new development model that integrates rather than separates social and ecological dynamics has become most critical (Fioramonti, 2017). The relationship between consumption and production is impersonal, with no real human connection. As a matter of principle and fitting to the global economic integration taking place spontaneously, the economy should also be integrative in the sense that it must locate systems of consumption and production within the broader biosphere. Reconnecting individuals with their communities and their ecosystems, while participating in global networks, are key building

blocks in the pursuit of well-being (not just growth) as the ultimate objective of genuine economic progress and a sharing economy.

Research over a number of decades in medicine, biology and psychology concluded that a healthy relational and natural environment is what contributes most to long and fulfilling lives (Dasgupta, 2001; Vemuri and Costanza, 2006). In life's 'rat race' the surge for collective well-being could become our most important balancing factor, since it is well-proven that people who are active in their communities enjoy higher levels of well-being. As another matter of principle this also applies to eradicating the 'convenient dissonance' between, for instance, managers in a corporation taking decisions far away from the people living the consequences of those decisions. When people are in 'closer proximity' to each other – sharing concern for their collective well-being – there is no place for purely abstract machine-like decisions. Such concern would also open new avenues for the informal economy, which is essential for those excluded by formal production and consumption systems, to become a crucial contributor to social development for everyone. A reversal of policies designed to replace informal systems can then facilitate inclusion of those left behind by the system.

4. REQUIREMENTS FOR AN INCLUSIVE WELL-BEING ECONOMY

In the inclusive economic framework, requirements would be the steel beams that hold the structure tightly together. They are the non-negotiables without which the economy would effectively continue to exclude many role players and/or waste valuable components/factors.

4.1. Social consciousness and civic engagement

The dignity of the human person, the common good and stewardship of resources are all vital components of inclusive thinking with regards to the economy. Greater sensitivity to social consciousness is the direct and commendable result of the increasing emphasis on economic sustainability. Whatever people's race, gender, background or belief, they should be included as economic participants. So also should prioritising the common good transcend individual interests, and the good management of resources not just be a concern for ourselves, but for posterity. Such social consciousness can be a strong unifying ideal and raise productivity.

While globalisation and emphasis on the 'global village' is expected to intensify, the World Bank (1999:2) acknowledges that localisation 'will be one of the most important new trends in the 21st century'. Through economic localisation a community can reduce its dependence on the global economy by investing more in its own resources for self-sustainable production of goods, services, food and energy. This requires greater inward civic engagement and inclusivity in terms of taking shared responsibility for collective well-being. Giving preference to, for instance local produce, stimulates the local economy and contribute to community vitality. Local procurement can be instrumental in regenerating the latent potential of communities and creating productive opportunities. Paying living wages is a further way to promote community vitality as it 'take into account the cost of living at the local level and seek to provide a wage that fulfils the basic needs of workers and their families' (Talberth, 2008:30).

Following a holistic approach to development, a vital aspect to this is more citizen involvement through inclusive/participative governance. It is a form of 'governance from below' that takes hands with government to deeply transform societies. The transition to a truly inclusive well-being-based economy tend to be slow, which makes civil society leadership crucial. Talberth (2008:30) points out that 'civil society can also participate in legal and administrative processes to enforce policies already in effect'. Opportunities do exist for communities to collaborate with government to change an economic system out of line with social and environmental realities. A number of areas exist for citizens and governments to bring alignment with public interest. Firstly, sustainable procurement policies should be applied where all levels of government insist that companies they do business with demonstrate progress towards reporting their eco and social responsibility. Secondly, regulatory powers should be used, not only in terms of taxes (e.g. carbon tax) or subsidies, but also to create markets for biodiversity, water purification, carbon sequestration services, etc. by requiring offsets for power plants, forestry operations and urban development projects. Communities should insist on such disclosures of companies' sustainability metrics (e.g. their recycling rates, water and energy intensity and living wage ratios) as part of annual reports, tax returns and permit applications.

4.2. Inclusive growth and organic/adaptive progress

Inclusive growth stimulates equitable opportunities for all economic participants during the growth process, focussing specifically on reducing poverty (Ranieri and Ramos, 2013). Both the pace and pattern of growth is significant, as well as benefits to be incurred by every section of society. Accelerating growth is necessary for poverty reduction, but it needs to be broad-based across sectors and inclusive of the majority of a country's labour force, to be sustainable. Inclusive growth underscore the importance of structural transformation for economic diversification and competition. Taking a longer term perspective, it places a larger emphasis on productive employment than on direct income redistribution as a means to increase the incomes of excluded groups (World Bank, 2009). Significantly, the relative definition of pro-poor growth does form part of its objectives, namely: to have the incomes of the poor improve relative to those of the non-poor (i.e. reducing inequality). This then needs to be complemented by shared growth where the fruits of growth are shared in such a way that poverty is eliminated. Although inclusive growth is characteristically fuelled by market-driven sources of growth, the government plays a meaningful facilitating role. It must, though, be tailored to country-specific circumstances to ensure not only employment growth, but also productivity growth.

For growth to be inclusive and sustainable it must be expressly non-discriminatory and disadvantage-reducing, meaning that it must create equal opportunities in terms of access to markets, resources, and an unbiased regulatory environment (Ali and Son, 2007). The poor are often constrained by circumstances or market failures that disable them to make use of such opportunities. Hence, together with equal access to opportunities is the creation of an enabling environment for the poor and dealing effectively with negative externalities that often accompany growth. The emphasis on 'green growth' is included here, not just from an ecological well-being point of view, but also from a 'new economic opportunities' point of view. Having the poor productively involved in green growth processes reduce harmful effects and may also result in new entrepreneurial activities. On the importance of including 'nature' into the growth equation, it is vital to be reminded that the economy is a subsystem of the ecosystem. Wright (2005:5) succinctly notes: 'If civilisation is to survive, it must live on the interest, not the capital, of nature'. Goods and services received from nature are its interest

(e.g. wild areas, healthy soil, genetic diversity, etc.), while its capital consists of properties such as foods, medicines, organic fertilisers, raw materials, etc. Inclusive growth treasures these.

As a final part of the growth debate, it is worth taking note of what Fioramonti (2017:46) points out: 'in the well-being economy, growth lies not in increasing material output but in the value generated through improving human relations and their connection with nature'. The vertical 'trickle-down effect' should be adapted to a horizontal structure that involves more integrative organic systems of consumption and production (e.g. low-impact production processes) where consumers have better access to, and are much more in touch, with the real sources of products. This would reaffirm the interconnectedness of the human economy and its natural ecosystems. Combining inclusive growth with inclusive development would also open up new forms of productivity and economic utility through collaborative, horizontal entrepreneurial initiatives.

4.3. Holistic development and social safety nets

Inclusive or holistic development is central to a well-being economy where a wider variety of human development factors are taken into consideration to ensure genuine progress. Of course factors such as quality education (especially at an early stage of development), good health and nutrition, and an enabling environment remain fundamental to higher productivity and income levels. But innovation is key to unlocking holistic development. Geo-technologies, for instance are becoming vital to support urban monitoring, planning and governance processes, leading to more inclusive urban development (Baud, 2016). Since it is expected that by 2050 two-thirds of the world's people will be living in cities, geo-technologies would enable local governments and communities to intervene and react much quicker to local stresses and future threats, but also gather enough data to design cities better tailored to the needs of the people (Prefer and Verrest, 2016). This would make communities more inclusive, safe, resilient and sustainable since innovation would also play an instrumental role in employing especially poor people in value chain production and market structures. Innovative systems in agro-ecology and organic agriculture (that outperforms commercial farming) are examples of this in what is called 'smart villages' in Africa and Asia. They also include decentralised renewable energy systems and production of goods and exchange of services that are integrated across households.

Fioramonti (2017) furthermore emphasise that the very meaning of work will start to change as human beings become productive in ways that transcend traditional labour frameworks. Inclusive development value and support a wide range of roles performed by individuals, not just as workers, but also as parents, caregivers, designers, community leaders and more. It opens up even more roles for the poor to become productive community members. Such human development, as defined by the United Nations Development Programme (UNDP, 1990), is a process of enlarging people's choices. This should be complemented by effective social safety nets. Having various mechanisms in place for protecting individuals from acute deprivation or inadvertent declines in income are crucial for achieving inclusive development. These may take the form of social safety net programmes and targeted interventions by government to help the vulnerable (e.g. social services in health and education), to provide social assistance programmes (e.g. old age and disability pensions) and income generation programmes targeted to the poor (e.g. public works programs). It may also take the form of private safety nets to protect persons or households in a community and help mitigate adverse outcomes in welfare.

4.4. Conscious capital, fair competition and equal opportunity

As a key microeconomic objective for improving well-being and a sustainable business, corporate focus is taking more and more cognisance of the value of social and environmental responsibility. Not only due to people's expectations, but also to become more effective. Grodnitzky (2014) shows that firms that prioritise stakeholder interests, not just shareholder interests, perform on average better than 'less conscious capital' competitors. Even employee behaviour and performance, which drive organisational success, becomes exceptionally productive due to firms' ability to balance the needs of all stakeholders, based on social norms. A number of 'new' and more inclusive corporate objectives are contributing towards re-shaping firms that are more conscious, are fairer in how they compete and that promote equal opportunity because they value collective well-being. Such objectives include (Talberth, 2008):

- Certification of products, operations and supply chains: informing consumers more about the firm's labour and environmental practices has led to increased accountability and closing the gap/disassociation between consumers and producers. Many goods are now certified as 'humane' or 'sustainably produced'. One example is Unilever's policy to buy all its fish from sustainable sources and helping to improve marine stewardship;

- Zero waste: working with non-governmental organisations, companies are publishing their greenhouse gases, water pollution and recycling rates as part of zero waste strategies. 3M's Pollution Prevention Pays program has been instrumental in this, initiating innovative waste reduction and carbon neutrality projects (e.g. wind energy).

- Eco-efficiency: motivated also by potential financial savings (e.g. reduced water and electricity bills, raw material cost and regulation hurdles), firms are reducing their amount of chemicals, water, energy and raw materials used per unit of output;

- Workplace well-being: the creation of sustainable workplace environments are gaining significance, resulting in companies giving more priority to worker health and safety, open decision-making, fair compensation, meaningful and satisfying work, and worker empowerment (e.g. surveys where they can evaluate their supervisor's performance). The aim of improving workplace well-being is to also contribute to community vitality.

4.5. Valuing the unpaid economy and empowering communities

The challenge we have in a purely growth-driven economy is that it is largely oblivious to not only social and environmental costs, but also to the positive contribution of non-money systems of exchange, such as productive activities occurring within the household or in communities. In the transition to a well-being economy it is vital that the role and contribution of the unpaid or non-market parts of the economy that go unrecognised, be valued and included. For instance, the free-riding of those who serve their communities for free and homemakers whose unpaid contribution to personal and ecological well-being go undervalued, should come to an end by valuing/compensating them properly. Fioramonti (2017:42) stresses that 'many of these roles carry both monetary and social rewards, well beyond the reductive category of 'jobs''. It calls for new rewards and incentives in an

economy not just defined by the market. A collaborative economy is emerging that blurs the lines of traditional roles and functions where consumers are also producers (called 'prosumers'), leisure activities are mixed with work-related activities and distinctions between social classes, private and public spheres, and market and non-market activities lose relevance. Integrative and collaborative frameworks are becoming requisites.

A vital aspect of an inclusive well-being economy is that it organically empower all involved. One example of this is the 'Honeycomb' model by Jeremiah Owyang (2016). In this way, an economy build resilient structures that enable access, sharing and growth of resources among community members. Worker support, learning, wellness and beauty, mobility services, logistics, etc. are all part of this integrated network of empowering systems and relations. This fits perfectly into the 'circular economy' model developed by the Ellen MacArthur Foundation (2018), which is 'restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles'. People are empowered when they are included in productive processes, given more options and function in environments that progress organically like this.

5. CONCLUSION

The principles and requirements outlined are not exhaustive, but constitute key building blocks for shaping a more inclusive and well-being-oriented economy. It is now clear that given both developed and developing country conditions, some form of intervention is necessary to steer away from the supercapital mode of neoliberal economics moulding an increasingly unequal and unsustainable world economy. Inequality excludes, and exclusion eventually means self-defeat. It is important to note that the shift in emphasis from a consumerist-driven to an inclusive well-being economy is not with an idealistic intent, but in fact for a more realistic purpose. The motive is not to suggest that it is more noble or nice to advance the well-being of the other, but that it is more sensible, especially when prioritising economic sustainability. It is furthermore important that such principles and requirements coincides with introducing a better system of rewards and incentives, underpinned by different values (Fioramonti, 2017). An adjusted system of social coordination is needed where people can interact according to principles that are mutually rewarding: a symbiosis of self-interest and shared benefits.

In view of this, the concept of 'Ubuntu' becomes a central theme, capturing the essence of an inclusive well-being economy. The price our economy is paying for poverty, inequality, etc. is the result of shunning the full potential of the Ubuntu-based model of economic rationality. Sheneberger and Van Stam (2011:33) warns 'there is a human predilection to value only those systems that can be effortlessly observed, deconstructed, and ultimately, controlled'. It is a sobering wake-up call, together with our eco and humanitarian crisis, to activate a virtuous process of bridging social capital from Ubuntu, and vice versa, in a double spiral process.

Neoclassical economic theory assumes that the 'market' is rational, i.e. that it organises the production of goods and services in the best interests of society. Daly and Cobb (1990) disagree, pointing to the concern shared by many that the type of economy we currently have is unsustainable. The further concern is that the neoclassical view falsely labels the well-being economy as irrational and subjective due to its altruistic emphasis because it is not centered on growth. In truth, the inclusive well-being economy reflects a higher level of rationality and

insight, and is more realistic in terms of resources management and collaboration, which goes further than mere bounded rationality and is not stuck in shortermism like supercapitalism.

In a way, inclusive economics is reinterpreting what economics is truly (and originally) about. Neoliberal supercapitalism has fabricated a skewed perception of what the economy essentially is, i.e. a hurried consumption-driven chase after success/prosperity/profits. Evidently it is not genuine economic progress given increasingly high inequality and social and environmental costs. Building an inclusive economy restores and optimises the economy's original meaning and intent: well-being, access, growth, shared prosperity, care and responsibility (Goudzwaard and De Lange, 1995). Unpaid work and other non-money systems, plus the informal economy, are properly valued. Economic inclusivity thus paves the way to building a healthy economy.

Fioramonti (2017:207) justly points out that 'development is not production and consumption. Development is care. We create value by taking care of the household, preparing meals with our families, raising veggies in the backyard, producing the renewable energy that keeps the lights on'. What keeps the economy together is not higher and higher profits, but trust. Without trust there is no economy; it will stagnate due to suspicion and decreasing economic interaction. The premise of inclusive economics is: trust sustains the economy. It brings a restoration of trust, which reemphasises strong relations through building an inclusive economy of mutuality and well-being. It is also becoming a prerequisite for building a more just and equitable economy. The price of inequality (i.e. exclusion) and environmental cost that we are paying – increasingly so – is incompatible with a sustainable future. A change of course is ineluctable. A realistic solution, for instance, for hunger and poverty is when different economic role players take collective responsibility for it. There is enough food and resources for all, so the problem is distribution and stewardship. Taking collective responsibility enables problem-solving collaboration that causes those in power to care and those that are marginalised to take productive responsibility. This synergy effect, set in motion through caring and altruism, unlocks new possibilities in the economy outside conventional thinking, thus making a truly sustainable economy possible. Intensified awareness of shared interest is the critical factor. The economy has reached a point where most of our economic challenges will not be solved through more competition but through effective collaboration (Fioramonti, 2017). When collective well-being is the ultimate aim, inclusivity is a natural approach.

Central, however, is inclusive growth, which is needed for the effective pursuit of growth with poverty reduction (Lin and Rosenblatt, 2012). Policies need to adjust to address shortcomings in the growth process, such as the need for active intervention to manage distributional failures. A collaborative economy would instantly create better distribution networks, stimulated by rewards and incentives that are broader than what the market offer. For a transition to a well-being economy to be effective, inclusive principles and requirements have to be phased in gradually, but assertively through policy, public-private partnerships and community-level initiatives. Progressing towards an inclusive well-being economy requires innovative thinking at all levels. Continuing research in this area is paramount, with the greatest need being refining inclusive economic measurements and methods of implementation. It is critical that the new measures of sustainability be acknowledged and publicised. No indicator exist that can capture all the components of sustainable development from a holistic point of view, but governments would activate change by supporting a wider range of creative indicator initiatives that provide a more accurate picture of genuine progress in favour of both people and planet.

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HAPPINESS' RELIGION PREMIUM IN EU/EEC COUNTRIES 2002-2012

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ABSTRACT

There is no convergence in the empirical literature on the effects on religion on subjective wellbeing, although religious denomination increasingly is used as an important explanation of different developments in modern societies. In this study we assess whether religious denomination affects happiness controlling for a wide range of background factors. Data are from the European Social Survey covering the years from 2002 until 2012. Descriptively results indicate a premium when belonging to the Protestant denomination. Once we control for numerous background factors this premium is reduced heavily. Although the premium is statistically significant it has a low magnitude, e.g. in practical terms there is no happiness premium for religion. In contrast there is a huge effect of the degree of religiosity, while praying intensity and frequency of visiting places of worship is negligible. The results are generally stable across survey years and across countries in Europe, and also rather insensitive to applying life satisfaction as the subjective wellbeing measure.

1. INTRODUCTION

With the increased globalization and large flows of immigrants, religious denomination has gained as an explanation for structural problems or solutions faced by societies. Regarding the relationship between religion and subjective wellbeing, different theories have been put forward, but empirical evidence so far has not reached consensus on how religion affects subjective wellbeing. Among the theories are, that religious involvement insures individuals' Subjective Wellbeing (SWB) against stressful events (divorce, unemployment, death of loved ones, etc.) that almost necessarily occurs during a life span, and it is explained by religious persons' ability to recover due to favourable personalities in terms of value systems, attitudes, and norms (Maltby & Day, 2003). Religious people can also be a part of religious networks that can be helpful during times of adverse instances, and more concretely be helpful when individuals are liquidity constrained at times of income or business losses (Dehejia, DeLeire & Luttmer, 2007). Also one should not underestimate the peace of mind when the complexities of the world is systemized and made meaningful through belief systems. In short, religion provides meaning in life and also operates as an effective coping mechanism (Pargament & Park, 1997; Park, 2005). Religion is a multidimensional phenomenon, and broadly can include religious denomination, the degree of religiosity regardless of religious denomination, including frequency of prayer, and formal and informal religious practices. For further and other explanations, see Steiner, Leinert, and Frey (2010) for an extensive review of the relation between economics and religion and SWB, and Ellison (1991) regarding sociological theories for religion and SWB. The economics science has a particular and somewhat explicit link to SWB since contrary to popular perception one important starting point in economic theory regarding individual optimization involves the concept of utility, e.g., the pleasure derived from consumption, rather than income per se. According to Diener, Suh, Lucas, and Smith (1999) and Sandvik, Diener, and Seidlitz (1993) respondents' answers to happiness or life satisfaction questions are reliable measures of experienced utility. On an operational level the link breaks down a little since Economic Theory (see any introduction to microeconomics, e.g., Salvatore, 2003) usually assumes that utility is not comparable between individuals, while SWB analysts happily are ready to make interpersonal comparisons of SWB, and in practice treat the ordinal SWB measure as a cardinal measure of SWB. But, in economics many results are obtained using the weaker assumption requiring utility to be only ordinal, which means we are back at how SWB is actually measured in surveys (including European Social Survey; ESS), for example as an ordinal measure (see Method section). Empirically, the disagreement on effects of religion on SWB is found in numerous studies (e.g., Clark & Lelkes, 2006; Eichhorn, 2012; Ellison, 1991; Mochon, Norton, & Ariely, 2008; Stark & Maier, 2008).

Another strand of the literature on religion and happiness investigates whether there is a difference in the reported wellbeing depending on denomination, which is justified by the differing value system and institutional structures of churches. The assumption is that Protestants derive greater utility due to a higher autonomy in their belief, due to the collective identity and due to better social integration (Steiner et al., 2010). Both in the present study, because of data limitations, but also most frequently in other studies, denomination is usually

in terms of broad religious groups, which means likely sub-group differences are disregarded. For example, one could expect SWB differences among Protestant sub-denominations like Lutheranism, Reformed churches, and Pentecostalism, etc. In terms of empirical evidence some studies points to higher SWB among Protestants or Christians (Ellison, 1991; Steiner et al., 2010; Tao, 2008), others point to lack of an effect in Western (Greene & Yoon, 2004) as well as Eastern Europe (Hayo, 2007), while Popova (2014) and Lelkes (2006) finds that religion insures against adverse effect of economic reforms in transition countries. None of Greene and Yoon (2004), Hayo (2007), and Tao (2008) uses a linear regression (OLS) approach but instead relies on ordered logit models with varying number of levels on the SWB Scale. In contrast, the Steiner et al.'s (2010) study for Switzerland in 2007 applies an OLS using 0-10 scale of SWB (life satisfaction). The Steiner approach is also used here, but with multiple years, various countries and background variables, and a higher number of religious denominations. Fidrmuc and Tunali (2015) also utilize the ESS, but for the years 2000-2008, while our data also includes the two rounds after 2008, e.g., the financial and economic crises. Their analysis is comparable to this study since the same happiness measure and also OLS is applied in addition to the main regressions using an ordered logit model. They conclude that happiness is higher for people belonging to an organized religion - Protestants, Roman Catholics, Jewish, and Muslims, but not Eastern Orthodox - when excluding the religiosity variable. This effect is reversed to significantly negative happiness effects for several organized religions (Protestants, Roman Catholics, Eastern Orthodox, and Muslims) once they control for religiosity. The contribution of this paper is to reduce bias in estimates by including controls for survey years, countries, and other religions such as Other Christian, Eastern religions, Other non-Christian, No religion, and Missing religion. Furthermore, in this study ESS variables are not entered as interval variables (except for the response variable SWB), which would have meant that observations with invalid values (missing, don't know, will not answer, etc.) have to be discarded. The approach pursued here also adds in terms of examining the sensitivity of religious denomination results over time and across nations.

2. METHOD

2.1. Sample

The primary data source is the bi-annual European Social Survey (ESS) covering the years from 2002 to 2012, representing all available six completed survey rounds (ESS 2015). A few macro variables (purchasing power adjusted GDP per capita, relative GDP change, the Gini coefficient, and the poverty rate) were obtained from Eurostat (Eurostat 2015). A subset of sixteen countries was selected for analyses since a survey for these countries was carried out in all six rounds. A closer investigation of the data showed that information on religion was missing for the following countries (missing year/substituted with nearest year): Finland (2004/2006), France (2002/2006 and 2004/2006), Great Britain (2004/2002 and 2006/2008), and Hungary (2004/2006). An overview of sample sizes is displayed in Table 1. Each survey round varied with between 1,254 and 3,013 respondents, with an average of 1,918 respondents. But the statistical modelling was conducted at a more aggregated level, e.g.,

years (covering all countries) and countries (covering all years). The yearly sample sizes were 29,906 - 31,487 with an average of 30,688, which shows very small variation over time. In contrast the country sample sizes showed much greater variation starting from 8,336 (Slovenia) to 17,384 (Germany), and with an average of 11,508 respondents. In any case we see large sample sizes in absolute terms. The total sample size is 184,125.

Table 1. Sample size by year and country. 2002-2012.

	2002	2004	2006	2008	2010	2012	Total	Average
BE Belgium	1,891	1,775	1,797	1,757	1,704	1,869	10,793	1,799
CH Switzerland	2,036	2,135	1,800	1,817	1,506	1,489	10,783	1,797
DE Germany	2,913	2,858	2,906	2,739	3,013	2,955	17,384	2,897
DK Denmark	1,489	1,481	1,490	1,603	1,571	1,645	9,279	1,547
ES Spain	1,703	1,655	1,874	2,570	1,884	1,885	11,571	1,929
FI Finland	1,995	1,894	1,894	2,191	1,877	2,193	12,044	2,007
FR France	1,982	1,982	1,982	2,071	1,726	1,968	11,711	1,952
GB Great Britain	2,051	2,051	2,352	2,352	2,418	2,277	13,501	2,250
HU Hungary	1,678	1,508	1,508	1,535	1,553	2,007	9,789	1,632
IE Ireland	2,033	2,274	1,794	1,764	2,570	2,621	13,056	2,176
NL Netherlands	2,359	1,878	1,885	1,776	1,826	1,842	11,566	1,928
NO Norway	2,034	1,755	1,748	1,546	1,548	1,619	10,250	1,708
PL Poland	2,101	1,711	1,715	1,601	1,680	1,875	10,683	1,781
PT Portugal	1,501	2,048	2,174	2,361	2,142	2,142	12,368	2,061
SE Sweden	1,989	1,934	1,920	1,827	1,495	1,846	11,011	1,835
SI Slovenia	1,510	1,433	1,466	1,280	1,393	1,254	8,336	1,389
Total	31,265	30,372	30,305	30,790	29,906	31,487	184,125	
Average	1,954	1,898	1,894	1,924	1,869	1,968		1,918

2.2. Variable definitions

Happiness is defined using question "C1" phrased as: "Taking all things together, how happy would you say you are? Please use this card". The card refers to Card 17 with the possible answers listed as: "00 01 02 03 04 05 06 07 08 09 10 88".
The answer 00 is denoted as "Extremely unhappy" on the card and 10 is denoted as "Extremely happy", while 88 is denoted as "Don't know". The number 00 and 10 together with their labels are further away from their neighbour compared to the internal distance between 01 to 09, which means visually the distance to the two extremes is larger than between the other happiness scores, which is a (further) indication that the end values (00 and 10) are indeed extreme happiness values. In sum, an ordinal eleven-point scale from 0 - 10 is used for happiness. Although this is an ordinal variable it is treated as an interval variable in this study since this gives a much simpler and intuitive representation of data while at the same time being a good approximation (Ferrer-i-Carbonell & Frijters, 2004).

The central control variables measures different issues related to religion. First of all there is religion or denomination, where the possible answers are: Roman Catholic, Protestant, Eastern Orthodox, Other Christian denomination, Jewish, Islamic, Eastern religions, and Other nonChristian religions. The religiosity of respondents is measured on an eleven-point scale (just like happiness), where 00 represents "Not at all religious" and 10 represents "Very religious" (the exact question is "Regardless of whether you belong to a particular religion, how religious would you say you are? Please use this card"). Information on praying and services attendance intensity is obtained through the question "Apart from when you are at religious services, how often, if at all, do you pray? Please use this card" and the question "Apart from special occasions such as weddings and funerals, about how often do you attend religious services nowadays? Please use this card". The possible answers are listed in descending order: "Every day", "More than once a week", "Once a week", "At least once a month", "Only on special holy days", "Less often", "Never", and "Don't know".

Background control variables includes (number of categories): gender (2), age (7), household size (6), whether having children (2), marital status (5), educational level (5), health (5), income sufficiency (4), unemployment (2), and loneliness (2). Marital status was aggregated for the last four rounds (2006 - 2012) in order to make it comparable to the initial two rounds (2002 – 2004). Respondents are classified as unemployed regardless of whether or not they were looking for a job during the past seven days. Lonely people are defined as those who never or less than monthly socially meet with friends, relatives or colleagues, and who much less or less than most take part in social activities compared to others of the same age.

In addition to the individual and household level variables, four macroeconomic indicators were included: real change in per capita GDP, the PPS adjusted GDP per capita, the Gini coefficient, and the poverty rate (60 % of contemporaneous national median poverty line). Finally, year and country indicators were included when appropriate, e.g., when pooling data across years and/or across nations. All individual/family variables were transformed into 0/1 dummy variables. For nearly all these variables a missing category was almost always created in order to avoid leaving out an observation based on one or more missing variables. The missing category includes missing observations in the data sets as well as people refusing to answer or who did not know the answer. No missing category was created for children, loneliness or unemployment. In contrast, all four macroeconomic indicators were entered as interval variables. A few missing observations regarding the macro indicators were imputed (details available from the author upon request).

Table 2. Variable averages. Unweighted. 2002 and 2012.

		2002	2012
	Happiness	7.46	7.47
Religion/denomination	Roman catholic	0.352	0.340
	Protestant	0.210	0.178
	Eastern Othodox	0.004	0.006
	Other Christian	0.014	0.012
	Jewish	0.001	0.001
	Islamic	0.011	0.020
	Eastern religions	0.003	0.005
	Other non-Chr.	0.003	0.003
	No religion	0.396	0.427
	Missing religion	0.006	0.007
Religiousity	0	0.123	0.160
	1	0.050	0.056
	2	0.073	0.075
	3	0.087	0.082
	4	0.068	0.065
	5	0.183	0.158
	6	0.103	0.097
	7	0.119	0.111
	8	0.102	0.099
	9	0.038	0.038
	10	0.049	0.052
	Missing	0.005	0.006
Praying frequency	Never	0.361	0.400
	Less often	0.175	0.167
	Special holy days	0.031	0.034
	At least monthly	0.057	0.056
	Once a week	0.058	0.059
	More than weekly	0.084	0.077
	Every day	0.221	0.194
	Missing	0.013	0.012
Attending religious services	Never	0.341	0.373
	Less often	0.209	0.209
	Special holy days	0.185	0.176
	At least monthly	0.095	0.091
	Once a week	0.132	0.112
	More than weekly	0.027	0.026
	Every day	0.007	0.007
	Missing	0.003	0.005
Year	2002	1	0
	2004	0	0
	2006	0	0
	2008	0	0
	2010	0	0
	2012	0	1
Country	Belgium	0.060	0.059
	Switzerland	0.065	0.047
	Germany	0.093	0.094
	Denmark	0.048	0.052
	Spain	0.054	0.060
	Finland	0.064	0.070
	France	0.063	0.063
	Great Britain	0.066	0.072
	Hungary	0.054	0.064
	Ireland	0.065	0.083
	Netherlands	0.075	0.059
	Norway	0.065	0.051
	Poland	0.067	0.060
	Portugal	0.048	0.068
	Sweden	0.064	0.059
	Slovenia	0.048	0.040
Macro var.	GDP pc, PPS	23.1	28.9
	GDP change, %	1.2	-0.6
	Gini	27.5	28.5
	poor	14.0	15.0
Gender	Male	0.480	0.475
	Female	0.519	0.525
	Missing	0.001	0
Age	- 20	0.078	0.070
	21 - 30	0.140	0.132
	31 - 40	0.189	0.155
	41 -50	0.180	0.173
	51 -60	0.165	0.171
	61- 70	0.126	0.154
	71 -	0.117	0.143
	Missing	0.006	0.001
Household size	1	0.182	0.205
	2	0.318	0.343
	3	0.182	0.183
	4	0.194	0.171
	5	0.083	0.066
	6	0.040	0.031
	Missing	0.001	0.001
Children?	No	0.330	0.313
	Yes	0.668	0.687
	Missing	0.002	0.000
Marital status	Married	0.503	0.505
	Separated	0.014	0.008
	Divorced	0.063	0.088
	Widow(er)	0.081	0.082
	Never married	0.273	0.310
	Missing	0.066	0.008
Education	Primary	0.150	0.138
	Lower secon.	0.210	0.167
	Upper secon.	0.387	0.356
	Post seconda.	0.018	0.048
	Tertiary	0.229	0.284
	Missing	0.006	0.007
Health	Very good	0.226	0.239
	Good	0.447	0.442
	Fair	0.249	0.243
	Bad	0.065	0.063
	Very bad	0.013	0.012
	Missing	0.000	0.000
Income feelings	Comfortable	0.348	0.322
	Coping	0.463	0.442
	Difficult	0.144	0.167
	Very difficult	0.035	0.060
	Missing	0.010	0.009
	Unemployed	0.057	0.080
	Loneliness	0.059	0.073

An overview over the entire set of variables is displayed in Table 2. The respondents of this data set for the European Union/European Economic Community countries for six years are characterized by a large fraction without a religion (40 %), and primarily Roman Catholic (35 %) or Protestant (20 %) in case of belonging to a religion. Nevertheless, 85 % are religious to some degree, but not so often by attending religious services apart from special holy days (35 % attends at least weekly) or by praying (only 15 % prays at least weekly). There is an equal distribution across genders. The modal age group shifts from 31-40 years (18.9 %) in 2002 to 41-50 years (17.3 %) in 2012 reflecting the ageing population in Europe. The most common household size is two persons (1/3) and having children is also common (2/3). Half of the sample is married while 30 % have never married. In terms of educational attainment upper secondary school is the largest group, but tertiary education has gained momentum over the analysed decade. Nearly half of the respondents report good health, while about a quarter report very good respectively fair health. A very large fraction's feelings about present household income is positive (1/3 is living comfortably and nearly half is coping), but the fraction with difficulties has increased 5 percentage points from 2002 to 2012, and similarly unemployment has increased, which is a reflection of the ongoing economic crisis which started as a financial crisis back in 2008. Loneliness only increased modestly.

Although there was some change in some variables during the survey period 2002-2012, one of the most striking features of the data set is an extreme degree of lack of change of characteristics. One prime example is the response variable happiness, which only changed 0.01 points from 7.46 to 7.47. In fact the year to year correlation coefficient between the averages is at a staggering 0.997 to 0.999. And even for the two series ten years apart presented in Table 2, we see a correlation of 0.994. When excluding the year dummies we are even closer to perfect correlation. This does not at all imply that peoples' circumstances are constant over time, but at the aggregate level many of these changes at the individual level nets out.

2.3. Missing observations

As mentioned in the previous section nearly all control variables' were created such that it was not necessary to exclude any observations, e.g., a missing category was formed. Because we have chosen to include subjective wellbeing as an interval variable, we are not able to similarly create a missing category for happiness. Individuals with missing information on happiness are therefore simply excluded from the analysis. This does not represent a problem because it only affects 600 respondents or .32 % of the original sample containing 184,725 observations. The distribution of the missing observations across countries is nevertheless briefly presented in the next section.

2.3. Regression approach

Since happiness is an ordinal variable the theoretically correct statistical model is the ordered logit model when we disregard the "don't know" and "missing" categories. Nevertheless, we here apply the simpler ordinary least squares model since it has a reasonable fit (Ferrer-i-

Carbonell & Frijters 2004). The OLS regressions are conducted with all years and countries pooled, and then regressions are conducted for each year separately (pooling all countries) and for each country separately (pooling all years).

3. RESULTS

3.1. Descriptive measures

Regardless of religion and regardless of whether or not belonging to a religion or denomination, the modal self-reported happiness level is always 8, and this is the single happiness level most often chosen by any religious disaggregation (Table 3). Protestants are particularly inclined to this happiness level (31.1 %), while people with the Islamic faith are less so (24.4 %). A peculiarity is that the happiness distribution is bimodal with the other mode being the happiness level 5. This level is probably "overrepresented" in the sense that people without firm sense about their happiness level just chose something "easy in between", which is the round number 5.

Table 3. Religions distribution across the happiness scale and the religion premium. All countries, 2002-2012.%.

	Roman Catholic	Prote-stant	Eastern Orthodox	Other Christian	Jewish	Islamic	Eastern religions	Other non-Chr.	No religion	No infor-mation	Total
Extremely unhappy	0.5	0.3	1.2	0.9	0.0	0.8	0.3	1.0	0.4	0.4	0.5
1	0.5	0.4	0.7	0.7	0.0	0.5	0.0	1.2	0.4	1.0	0.5
2	1.1	0.8	2.8	1.1	5.0	1.2	0.6	2.1	1.1	1.3	1.1
3	2.2	1.5	3.1	2.8	1.0	3.8	2.1	4.8	2.2	2.5	2.1
4	2.8	2.2	2.7	2.2	3.2	2.7	3.5	2.6	2.8	1.3	2.7
5	10.8	6.4	9.5	7.7	12.9	11.2	8.9	6.2	9.5	12.8	9.5
6	9.2	6.4	6.2	5.6	7.3	10.1	11.0	8.3	8.4	11.2	8.4
7	19.2	17.1	16.4	17.0	21.5	16.8	24.4	14.7	19.5	20.3	18.9
8	28.3	31.1	29.5	28.1	29.5	24.4	24.9	28.5	30.1	24.8	29.4
9	14.2	20.6	16.6	19.8	6.9	13.5	13.7	12.4	15.6	11.3	15.9
Extremely happy	10.6	12.9	11.3	13.6	11.9	14.6	10.3	18.2	9.7	9.4	10.8
Refusal	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.1
Don't know	0.3	0.1	0.0	0.7	0.9	0.4	0.3	0.0	0.1	1.5	0.2
No answer	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.3	0.1
Total	100	100	100	100	100	100	100	100	100	100	100
Average happiness	7.29	7.71	7.24	7.54	7.07	7.25	7.31	7.36	7.35	7.1	7.38
Religion premium	-0.06	0.36	-0.11	0.19	-0.28	-0.10	-0.04	0.01	0	-0.25	0.03
Protestantism premium	0.42	0	0.47	0.17	0.64	0.46	0.40	0.35	0.36	0.61	0.33

At the bottom of the table an average happiness level is calculated for people who gave a valid answer, e.g., gave an answer between 0 and 10. The average happiness level is 7.38, which is close to the happiness level reported by people without a religion (7.35). A first attempt to estimate the religion effect is thus any excess happiness compared to this happiness level, and a religion premium as reported in the second to last row of Table 3. A positive

religion premium is, to a varying degree, seen for Protestants (.36), Eastern Orthodox (.19), and other Christians (.01). The remaining religion groups have a lower happiness level, e.g., no or rather a negative premium in the range 0.04 - 0.28 (Eastern religions respectively Jewish at the two ends). This religion premium distribution means that Protestants reports the highest happiness level (7.71). The excess happiness for Protestants is .46 compared to the largest religion in the data set (Roman Catholic) and even larger (.68) compared to smallest religion in data set (Jewish).

The highest happiness for Protestants more technically is decomposed into a systematically higher proportion (plus more than 10 percentage points) at the top happiness levels 8 – 10 and a lower proportion (minus more than 10 percentage points) in the lower happiness levels 0 –7.

For the other available religion variables we see the happiness pattern presented in Table 4. Low to middle religiousness levels leaves happiness practically unaffected (7.27 – 7.32), while higher religiousness is associated with higher happiness (7.43 – 7.67). Similarly frequent visits to attend religious services is associated with higher happiness, while there is a dis-connect between praying intensity and happiness.

Table 4. Happiness by religious practice. All countries, 2002-2012. Average.

Religiousity:		Praying:		Attending religious service:	
Not at all religious	7.27	Every day	7.37	Every day	7.67
1	7.28	More than once a week	7.34	More than once a week	7.48
2	7.32	Once a week	7.42	Once a week	7.35
3	7.32	At least once a month	7.42	At least once a month	7.41
4	7.27	Only on special holy days	7.29	Only on special holy days	7.45
5	7.32	Less often	7.42	Less often	7.42
6	7.43	Never	7.38	Never	7.33
7	7.47				
8	7.57				
9	7.67				
Very religious	7.59				
No answer	7.08	No answer	7.18	No answer	6.92
Total	7.38	Total	7.38	Total	7.38

In general, the happiness level show only small variation over time (7.29 - 7.52), but it varies considerably across nations with Danes (8.28 - 8.38) at the top and Hungarians (5.94 - 6.42) at the bottom.

The huge happiness variation across countries and possible variation across background variables (mentioned in Table 2), makes the religion premium (displayed in Table 3) uncertain. For example, it is necessary to control for background factors in order to investigate whether any religion premium is present after controlling for changes in other factors than those related to religion. This happens in the next section where a wider set of happiness determinants will be included using a regression approach.

Table 5. Happiness by year and country. Average.

	2002	2004	2006	2008	2010	2012	Total
BE	7.76	7.75	7.67	7.65	7.83	7.69	7.72
CH	8.05	8.10	8.11	7.98	8.06	8.08	8.07
DE	7.23	7.07	7.07	7.27	7.45	7.71	7.30
DK	8.32	8.31	8.33	8.37	8.28	8.38	8.33
ES	7.48	7.33	7.64	7.69	7.57	7.59	7.55
FI	8.03	8.00	8.00	8.02	7.96	8.09	8.02
FR	7.26	7.26	7.26	7.23	7.13	7.29	7.24
GB	7.62	7.62	7.52	7.52	7.50	7.56	7.55
HU	6.32	6.40	6.40	5.94	6.42	6.11	6.27
IE	7.88	7.98	7.77	7.54	7.00	7.14	7.53
NL	7.86	7.79	7.72	7.81	7.88	7.95	7.84
NO	7.88	7.90	7.93	7.98	8.01	8.16	7.98
PL	6.43	6.72	6.96	7.15	7.31	7.33	6.98
PT	6.97	6.54	6.55	6.62	6.71	6.49	6.64
SE	7.89	7.84	7.89	7.83	7.91	7.82	7.86
SI	6.93	7.18	7.24	7.23	7.28	7.26	7.19
Total	7.32	7.29	7.33	7.39	7.43	7.52	7.38

3.2. Regression estimates

The importance of controlling for additional variables is illustrated in Table 6. An initial regression controlling for nothing else than whether persons belongs to a religion or not shows a positive but insignificant parameter (.002), e.g., there is no effect of belonging to a religious community. Including all controls on the other hand gives an estimate at .031, e.g., happiness is .031 points higher for people belonging to one of the eight mentioned religions compared to not belonging to a religion.

Table 6. Religion premiums (estimates) in happiness OLS regressions. All years and countries pooled.

Controls:	None	All	Year, country	Year, country, gender, age	Other religion related	All
Any religion	0.002	0.031**				
Roman Catholic			0.103***	0.163***	0.034*	0.004
Protestant			0.233***	0.294***	0.195***	0.086***
Eastern Orthodox			-0.009	-0.022	-0.181**	-0.101
Other Christian			0.194***	0.212***	-0.032	-0.018
Jewish			-0.114	-0.112	-0.220	-0.312**
Islamic			-0.159***	-0.249***	-0.482***	-0.234***
Eastern religions			0.003	-0.020	-0.192**	-0.118
Other non-Chr.			0.002	0.001	-0.193*	-0.039
Missing religion	-0.273***	-0.117*	-0.057	-0.029	-0.114	-0.127*
R2	0.000	0.271	0.084	0.093	0.104	0.272
Adj. R^2	0.000	0.271	0.084	0.093	0.103	0.271
N	184125	184125	184125	184125	184125	184125

In the next set of regressions the different religions enter the regressions separately. When we furthermore only control for year and country, there is a positive religion premium for Protestants (.23 points higher happiness compared to individuals without a religion), other Christians (.19), and Roman Catholics (0.10), while there is a negative religion premium for

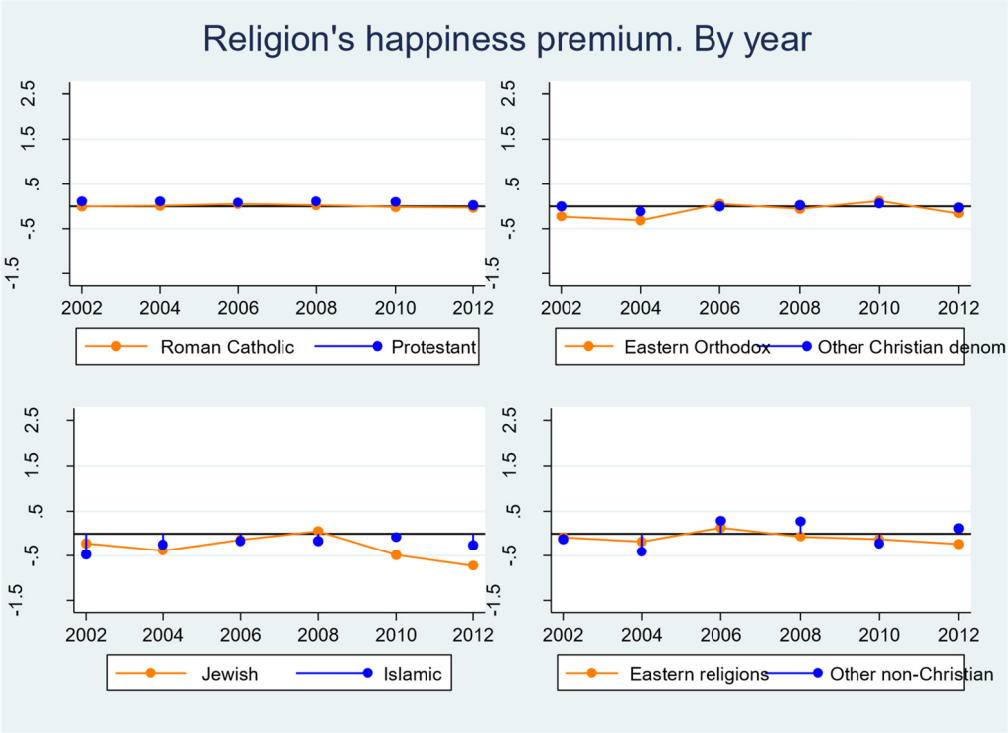
Islamic (-.16). The remaining religions have positive respectively negative premiums, but they are all insignificant.

When we control for gender and age, the significant parameters have a higher (absolute) magnitude. But interestingly the initially three Christians denominations' religion premiums are reduced once taking into account other religion related controls (religiosity, and frequency of praying and attending religious services), and the premium for other Christians even becomes insignificant (and negative), while the negative premium for Islamic becomes even more negative.

The full regression including all controls is displayed in the last column of Table 6. The only significant (positive) religion premium remaining is for Protestants (.09), while Jewish (-.31) and Islamic (-.23) have significantly negative religion premiums. There is thus no religion premium associated with other types of Christianity (Roman Catholic, Eastern Orthodox and Other Christian) or other religions (Eastern Religion and Other non-Christian).

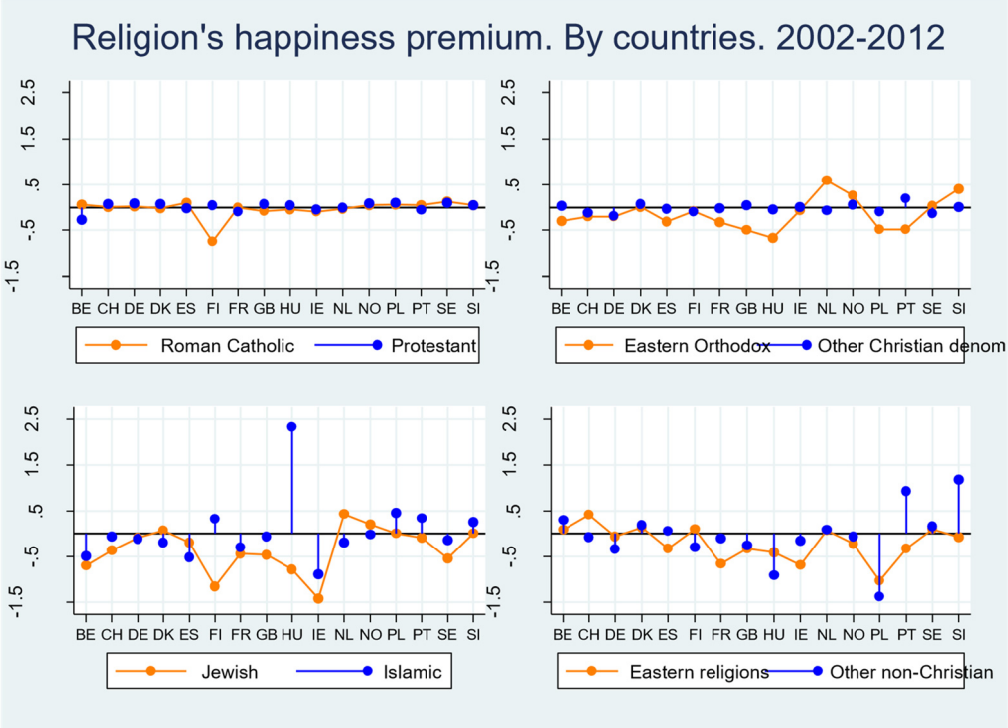
These regression results are temporally very stable regarding all religions (Figure 1), where the religion premium estimates from yearly regressions are displayed. The Jewish denomination seem to show some variation in the religion premium over the years, but the variation is not significant (p ranges from .09 to .37 regarding year to year change, and p = .11 for start to end year change). Thus, an overall view for all countries shows that the positive religion for Protestants is positive and stably positive, while Jewish and Islamic have a stable negative religion premium.

Figure 1.



This temporal stability is somewhat also present when scrutinizing religion premiums across nations (Figure 2). And certainly there is not as much instability although sometimes large (positive/negative) religion premiums are present because these can all be traced back to small country-religion specific sample sizes as mentioned in the note to Figure 2. Nevertheless, some interesting deviations from the general picture are still present. For Protestants in Belgium we see a rather large negative religion premium (-.27), but this is statistically insignificant. While Eastern Orthodox usually has a negative premium, it is rather high and positive and significant in the Netherlands (.59) and Slovenia (.41). The somewhat high positive premiums for Jewish in the Netherlands and Norway are both insignificant. The high positive premiums for Islamic in Finland, Poland and Portugal are all insignificant. The high positive premium for Eastern Religion in Switzerland (.42) is significant, which goes against the overall pattern of a negative religion premium for these religions. The few results going against the overall picture is thus, that Eastern Orthodox in the Netherlands and Slovenia, and the Eastern Religions in Switzerland have a positive religion premium, while it was negative in general, thus people with those religions in these three countries have a significantly higher happiness level than the people without a religion in the countries.

Figure 2.



Note: Sample sizes are particularly low for the following samples (counts); Finland-Roman Catholics (11), Hungary-Other Christians (3), Finland-Jewish (2), Hungary-Islamic (3), Ireland-Jewish (4), Hungary-other non-Christian (10), Poland-Eastern Religions (3), Poland-other non-Christian (2), Portugal-other non-Christian (9), and Slovenia-other non-Christian (9).

There are many other variables in the regressions than those related to religion (tables A1 - A3 in the Appendix), but their effects will not be commented upon in detail, but generally many of the estimates resembles similar signs of parameter estimates as in previous studies (Fidrmuc & Tunali, 2015; Steiner et al., 2010).

The R^2 is .27, which is higher than many studies in the area. Unfortunately, this determination coefficient cannot be compared to Fidrmuc and Tunali (2015) since they do not report it. In Steiner et al. (2010) the R2 is down at .08 - .09. There are issues with multicollinearity, but using the VIF to exclude variables such that all VIFs are below 5, we do not see major differences regarding the religious denomination variables (estimates available from author upon request).

3.3. Sensitivity analysis using life satisfaction

The exact definition of subjective wellbeing is debatable and the operationalization even perhaps more so – both with good reasons. Here we try to take the criticism into account by performing the above regression analysis applying another subjective wellbeing measure also present in the European Social Survey, namely life satisfaction. Both happiness and life satisfaction measure somewhat the same phenomenon but they are not at all perfectly correlated. The correlation between the two measures is .68 for the pooled sample, but only .56 in Portugal and .73 in Sweden. Figure 3 thus show that quite a fraction of people answering at a given level regarding one measure (life satisfaction) also answers at the same level for the other measure (happiness), e.g., the diagonal often has large shares. At the same time a not so negligible fraction answers outside the diagonal of Figure 3, e.g., their SWB level differs regarding happiness and life satisfaction. Nevertheless, the main results regarding the happiness premium in the preceding section holds even when we apply life satisfaction as the SWB measure.

Figure 3.

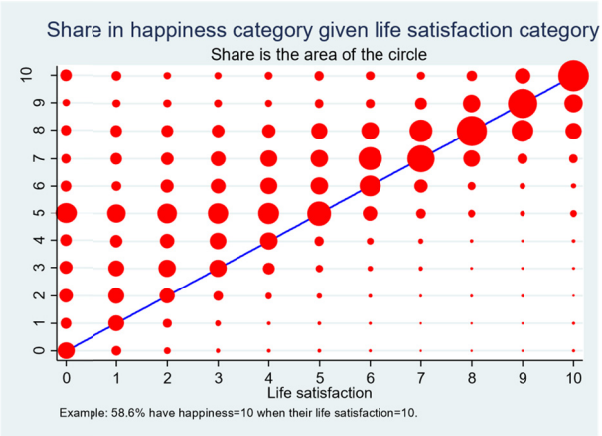


Figure 4.

This is illustrated in Figure 4, which shows that the estimated coefficients from regressions using the two measures are close to the 45 degree line, which represents perfect equality of coefficients. The close relation translates into a correlation coefficient of .97 between parameter estimates from regressions using the two SWB measures. For the eight religious denomination estimates we also see a correlation at the same level when using happiness respectively life satisfaction as the SWB measure. Also, the religion premium variation across years and across countries reflects figures 1 and 2. Thus, using the pooled sample (years and countries) the religion premiums are still .09 for Protestants, .05 for Roman

Catholics (now significant), -.15 for Eastern Orthodox (now significant), -.07 for Jewish (no longer significant), still -.23 for Islamic, and with the remaining three still being insignificant (all estimates available from the author upon request).

3.4. The magnitude of religion premiums

Going back to the main regressions modelling happiness as the SWB measure we did see some effects for Protestants, Jewish, and Islamic (Table 6). All three effects were clearly significant. At the same time we also see that the magnitudes were between -.31 and .09, which is not a lot when taking into account that the general happiness level among these three religions is 7.1-7.7 (Table 3), meaning the effects as a percentage of the happiness levels is between -4.4 % (Jewish) and 1.1 % (Protestant). Thus, although there are some statistically significant religion premiums, it is not the case that the effects of belonging to a religion are large in a relative sense.

3.5. Other religion results

While there are not many significant results regarding religious denomination, there are more significant and larger effects of the three other religion variables (Table 7). First of all we can here reconfirm that religiosity is significantly associated with happiness such that low levels of religiosity (0-4) actually negatively affects happiness (-.11 to -.06) while high levels positively affects happiness (.10 to .72). In fact the largest religion effect is the mentioned.72, which is found for very religious people, e.g., they are roughly 10 % happier (ceteris paribus).

Any intensity of praying has a clearly significant and negative association with happiness (-.180 to -.081). Low levels (less often or only on special holy days) of religious services attendance have no significant effect on happiness, and frequent attendance (at least monthly) has a significantly negative effect (-.08 to -.04), while attendance daily has positive effect (.18 points more happiness).

Table 7. Religion practice premiums in happiness OLS regressions. All years and countries pooled.

Religiousity:		Praying:		Attending religious service:	
Not at all religious	0	Every day	-0.089***	Every day	0.182**
1	-0.105***	More than once a week	-0.180***	More than once a week	-0.081**
2	-0.064***	Once a week	-0.165***	Once a week	-0.057**
3	-0.079***	At least once a month	-0.144***	At least once a month	-0.042*
4	-0.069***	Only on special holy days	-0.113***	Only on special holy days	0.02
5	0.104***	Less often	-0.081***	Less often	0.00
6	0.147***	Never	0	Never	0
7	0.252***				
8	0.431***				
9	0.576***				
Very religious	0.719***				
Missing	0.215***		-0.047		-0.065

4. CONCLUSIONS

A long series of regressions with happiness as the response variable were made such that the religion premium could be estimated controlling for other factors including religious practice. All six rounds of the European Social Survey were used for the years covering 2002 - 2012. The regressions had many significant parameters and comparatively high explanatory power. The overall results are that a religion premium is only present for Protestants, while there is a negative premium for Jewish and Islamic. The results holds over the years and across nations with a very few exceptions, and it also holds once we apply life satisfaction as the subjective wellbeing measure. Although these religion premiums are significant in a statistical sense their magnitude are so low that their practical significance is not large (-4 to 1 % effect relative to the happiness level). The conclusion is thus, that a few religion premiums are found but they are relatively small. This is seemingly in contrast to the popular debate where different religious denominations sometimes are used as explanations for good or bad behaviour.

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APPENDIX

Table A1. OLS happiness parameter estimates. Years and countries pooled.

		All
	Constant	3.894***
Religion/denomination	Roman Catholic	0.004
	Protestant	0.086***
	Eastern Orthodox	-0.101
	Other Christian	-0.018
	Jewish	-0.312**
	Islamic	-0.234***
	Eastern religions	-0.118
	Other non-Chr.	-0.039
	No religion	Base
	Missing religion	-0.127*
Religiousity	0	Base
	1	-0.105***
	2	-0.064***
	3	-0.079***
	4	-0.069***
	5	0.104***
	6	0.147***
	7	0.252***
	8	0.431***
	9	0.576***
	10	0.719***
	Missing	0.217***
Praying frequency	Never	Base
	Less often	-0.081***
	Special holy days	-0.113***
	At least monthly	-0.144***
	Once a week	-0.165***
	More than weekly	-0.180***
	Every day	-0.089***
	Missing	-0.045
Attending religious services	Never	Base
	Less often	0.003
	Special holy days	0.019
	At least monthly	-0.042*
	Once a week	-0.057**
	More than weekly	-0.081**
	Every day	0.182**
	Missing	-0.060
Year	2002	Base
	2004	-0.061***
	2006	-0.083***
	2008	-0.037
	2010	-0.015
	2012	0.057*
Country	Belgium	Base
	Switzerland	0.058*
	Germany	-0.264***
	Denmark	0.355***
	Spain	-0.036
	Finland	0.364***
	France	-0.337***
	Great Britain	-0.107***
	Hungary	-0.504***
	Ireland	-0.308***
	Netherlands	0.063**
	Norway	-0.005
	Poland	-0.310***
	Portugal	-0.519***
	Sweden	0.007
	Slovenia	-0.300***
Macro var.	GDP pc, PPS	0.013***
	GDP change, %	0.021***
	Gini	-0.014***
	poor	0.029***
Gender	Male	Base
	Female	0.107***
	Missing	0.402**
Age	-20	Base
	21 - 30	-0.107***
	31 - 40	-0.294***
	41 - 50	-0.417***
	51 - 60	-0.377***
	61 - 70	-0.230***
	71 -	-0.060*
	Missing	-0.518***
...size	1	Base
	2	0.270***
Household...	3	0.229***
	4	0.291***
	5	0.305***
	6-	0.372***
	Missing	0.050
Children?	No	Base
	Yes	0.097***
	Missing	0.009
Marital status	Married	0.312***
	Separated	-0.315***
	Divorced	-0.055**
	Widow(er)	-0.218***
	Never married	Base
	Missing	0.147***
Education	Primary	Base
	Lower secon.	-0.037*
	Upper secon.	-0.055***
	Post seconda.	-0.035
	Tertiary	-0.077***
	Missing	-0.159*
Health	Very good	2.419***
	Good	1.986***
	Fair	1.526***
	Bad	0.848***
	Very bad	Base
	Missing	1.647***
Income feelings	Comfortable	1.612***
	Coping	1.274***
	Difficult	0.671***
	Very difficult	Base
	Missing	1.162***
	Unemployed	-0.349***
	Loneliness	-0.713***
	R2	0.272
	Adj. R2	0.271
	N	184125

Table A2. OLS happiness parameter estimates. Year specific regressions.

		2002	2012
	Constant	3.195***	2.904***
Religion/denomination	Roman Catholic	-0.004	-0.027
	Protestant	0.105***	0.029
	Eastern Orthodox	-0.238	-0.161
	Other Christian	-0.007	-0.026
	Jewish	-0.228	-0.725*
	Islamic	-0.471***	-0.259***
	Eastern religions	-0.085	-0.232
	Other non-Chr.	-0.123	0.121
	No religion	Base	Base
	Missing religion	-0.060	0.089
Religiousity	0	Base	Base
	1	-0.070	-0.111*
	2	-0.088*	-0.040
	3	-0.100*	-0.040
	4	-0.094	-0.064
	5	0.102*	0.142***
	6	0.178***	0.171***
	7	0.226***	0.345***
	8	0.374***	0.526***
	9	0.615***	0.663***
	10	0.776***	0.695***
	Missing	0.012	0.120
Praying frequency	Never	Base	Base
	Less often	-0.037	-0.111***
	Special holy days	-0.138*	-0.121*
	At least monthly	-0.096*	-0.165***
	Once a week	-0.144**	-0.230***
	More than weekly	-0.142***	-0.229***
	Every day	-0.125**	-0.152***
	Missing	-0.189*	-0.058
Attending religious services	Never	Base	Base
	Less often	0.018	0.064*
	Special holy days	0.069*	0.069*
	At least monthly	-0.005	-0.052
	Once a week	-0.036	0.012
	More than weekly	-0.034	-0.001
	Every day	0.192	0.372**
	Missing	0.136	-0.142
Year	2002	Base	Base
	2004	0	0
	2006	0	0
	2008	0	0
	2010	0	0
	2012	0	0
Country	Belgium	Base	Base
	Switzerland	-0.168*	-0.147**
	Germany	-0.175***	-0.014
	Denmark	0.415***	0.236***
	Spain	0.180**	0.000
	Finland	0.362***	0.387***
	France	-0.068	-0.555***
	Great Britain	0.000	-0.233***
	Hungary	0.000	-0.531***
	Ireland	0.000	-0.631***
	Netherlands	-0.182**	0.000
	Norway	-0.312***	0.000
	Poland	0.000	0.000
	Portugal	0.159*	-0.840***
	Sweden	0.076	-0.007
	Slovenia	-0.181**	-0.111
Macro var.	GDP pc, PPS	0.051***	0.019***
	GDP change, %	0.0	-0.024*
	Gini	0.0	0.041**
	poor	0.0	0.0
Gender	Male	Base	Base
	Female	0.115***	0.109***
	Missing	0.360	0.000
Age	-20	Base	Base
	21 - 30	-0.016	-0.173***
	31 - 40	-0.246***	-0.355***
	41 - 50	-0.373***	-0.459***
	51 - 60	-0.320***	-0.395***
	61 - 70	-0.169**	-0.254***
	71 -	0.108	-0.097
	Missing	-0.403**	0.047
...size	1	Base	Base
	2	0.291***	0.217***
Household...	3	0.226***	0.204***
	4	0.320***	0.237***
	5	0.323***	0.315***
	6-	0.420***	0.338***
	Missing	-0.055	0.653
Children?	No	Base	Base
	Yes	0.058*	0.142***
	Missing	-0.285	-0.349
Marital status	Married	0.355***	0.284***
	Separated	-0.361***	-0.224
	Divorced	-0.037	-0.120**
	Widow(er)	-0.188***	-0.265***
	Never married	Base	Base
	Missing	-0.101	0.087
Education	Primary	Base	Base
	Lower secon.	-0.060	-0.086*
	Upper secon.	-0.090*	-0.023
	Post seconda.	0.020	-0.010
	Tertiary	-0.146***	-0.085*
	Missing	0.071	-0.052
Health	Very good	2.355***	2.314***
	Good	1.957***	1.872***
	Fair	1.481***	1.424***
	Bad	0.785***	0.810***
	Very bad	Base	Base
	Missing	1.439*	1.243**
Income feelings	Comfortable	1.623***	1.666***
	Coping	1.307***	1.326***
	Difficult	0.664***	0.711***
	Very difficult	Base	Base
	Missing	1.191***	1.185***
	Unemployed	-0.336***	-0.303***
	Loneliness	-0.653***	-0.690***
	R2	0.265	0.297
	Adj. R2	0.263	0.295
	N	31265	31487

Table A3. OLS happiness parameter estimates. Country specific regressions (samples).

		Denmark	Hungary
	Constant	5.830***	4.119*
Religion/denomination	Roman Catholic	-0.017	-0.037
	Protestant	0.074*	0.052
	Eastern Orthodox	0.014	-0.667
	Other Christian	0.081	-0.048
	Jewish	0.071	-0.774
	Islamic	-0.193	2.334***
	Eastern religions	0.139	-0.403
	Other non-Chr.	0.194	-0.911
	No religion	Base	Base
	Missing religion	-0.124	0.117
Religiousity	0	Base	Base
	1	-0.178*	-0.203*
	2	-0.052	-0.277**
	3	-0.170**	-0.255**
	4	-0.157*	-0.126
	5	0.028	0.022
	6	0.011	0.117
	7	0.025	0.242*
	8	0.248**	0.493***
	9	0.358**	0.773***
	10	0.002	0.684***
	Missing	-0.939**	0.048
Praying frequency	Never	Base	Base
	Less often	-0.108**	0.027
	Special holy days	-0.043	-0.040
	At least monthly	-0.179*	-0.053
	Once a week	-0.307***	-0.129
	More than weekly	-0.276***	-0.269*
	Every day	-0.110	-0.056
	Missing	0.095	-0.325
Attending religious services	Never	Base	Base
	Less often	-0.008	0.145*
	Special holy days	0.067	0.170*
	At least monthly	-0.031	0.065
	Once a week	0.158	0.077
	More than weekly	0.126	-0.416
	Every day	-0.370	0.564
	Missing	0.602	0.101
Year	2002	Base	Base
	2004	0	0
	2006	0	0
	2008	0	-0.366***
	2010	-0.076	0
	2012	0	0
Country	Belgium	Base	Base
	Switzerland	0.000	0.000
	Germany	0.000	0.000
	Denmark	0.000	0.000
	Spain	0.000	0.000
	Finland	0.000	0.000
	France	0.000	0.000
	Great Britain	0.000	0.000
	Hungary	0.000	0.000
	Ireland	0.000	0.000
	Netherlands	0.000	0.000
	Norway	0.000	0.000
	Poland	0.000	0.000
	Portugal	0.000	0.000
	Sweden	0.000	0.000
	Slovenia	0.000	0.000
Macro var.	GDP pc, PPS	0.0	-0.1
	GDP change, %	0.0	0.080*
	Gini	0.0	-0.1
	poor	0.0	0.3
Gender	Male	Base	Base
	Female	0.057*	0.171***
	Missing	-4.713***	0.000
Age	-20	Base	Base
	21 - 30	0.151	-0.450***
	31 - 40	0.055	-0.564***
	41 - 50	-0.079	-0.647***
	51 - 60	0.040	-0.786***
	61 - 70	0.158	-0.672***
	71 -	0.323**	-0.348*
	Missing	0.085	-1.309**
...size	1	Base	Base
	2	0.362***	0.340***
Household...	3	0.361***	0.213*
	4	0.284***	0.379***
	5	0.407***	0.402***
	6-	0.455***	0.652***
	Missing	-0.665	0.000
Children?	No	Base	Base
	Yes	0.123**	0.289***
	Missing	1.317*	1.769***
Marital status	Married	0.245***	0.293***
	Separated	-0.397*	-0.537*
	Divorced	0.023	-0.199
	Widow(er)	-0.057	-0.314**
	Never married	Base	Base
	Missing	0.041	0.342
Education	Primary	Base	Base
	Lower secon.	-0.206*	0.216
	Upper secon.	-0.254**	0.048
	Post seconda.	0.000	0.159
	Tertiary	-0.404***	0.309*
	Missing	-0.497	0.407
Health	Very good	1.515***	3.190***
	Good	1.234***	2.408***
	Fair	0.936***	1.829***
	Bad	0.468	1.010***
	Very bad	Base	Base
	Missing	1.214*	1.557**
Income feelings	Comfortable	1.170***	1.922***
	Coping	0.835***	1.467***
	Difficult	0.626**	0.745***
	Very difficult	Base	Base
	Missing	0.822**	0.976***
	Unemployed	-0.285***	-0.268**
	Loneliness	-0.986***	-0.634***
	R2	0.156	0.281
	Adj. R2	0.149	0.276
	N	9279	9789

UKRAINE'S INTERNATIONAL COMPETITIVENESS IN THE CONTEXT OF INSTITUTIONAL WEAKNESSES OF NATIONAL INNOVATION SYSTEM

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ABSTRACT

The aim of the article is to identify the main institutional weaknesses of Ukraine's National Innovation System (NIS) and to try to determine their consequences for the competitiveness of the Ukrainian economy in terms of international trade in high-technology and medium-high-technology goods, i.e. those created in industries based on knowledge and modern technologies. In other words, to examine whether and how Ukraine's competitiveness in trade in these goods is changing in the face of the existing institutional weaknesses of its NIS. In order to analyse the country competitiveness in international trade, B. Balassa's method of analysing revealed comparative advantages was applied.

The in-depth analysis of the dynamics of the revealed comparative advantages in Ukrainian exports in the years 2001-2016 clearly shows that the Ukrainian economy not only did not have any long-term comparative advantages in trade in high-technology and medium-high-technology goods in this period, but also its competitive position deteriorated in this respect. This should be attributed to strong institutional weaknesses within Ukraine's NIS, which significantly lower the effectiveness of this system and also reduce the ability to create and commercialise knowledge and innovation, as reflected in the lack of competitiveness of its economy in trade in high-technology goods.

1. INTRODUCTION

Nowadays, amid the growing internationalisation of economic activity and its international cooperation, as well as the dynamically progressing ICT revolution, an increasingly important role in the economic growth and development of countries is played by factors, which did not use to be so important only a few decades ago. These undoubtedly include the quality of human capital, the level of development and the quality of the so-called soft infrastructure responsible for the creation and diffusion of knowledge, the efficiency and effectiveness of institutions, as well as the innovation of the economy (Miozzo and Walsh 2010). In addition, due to the changing structure of global demand, goods and services characterised by high technological advancement are becoming more and more important (Weresa 2014).

In view of the state of the modern world economy as discussed above, including above all the aforesaid increase in the importance of innovation and innovativeness, more and more often both economists and politicians in charge of the pursued economic policy try to take a systemic and comprehensive approach to the issue of creating an appropriate institutional system, adapted to the economic, social and political realities of a given country, conducive to innovation and innovativeness. Therefore, so-called National Innovation Systems are being created and developed, whose efficient and effective operation is intended to effectively increase the international competitiveness of their countries' economies (Joly 2017; Roland 2016; Weresa 2014, Weresa 2012a; Lundvall 2007).

This term was used for the first time by Ch. Freeman in 1987. In his definition, the National Innovation System is a network of public and private sector institutions whose activities and interactions initiate, import and disseminate new technologies (Freeman 1987). In turn, Ch. Edquist defines NIS as all important economic, sociological, political, organizational, institutional, and other factors that influence the development, diffusion, and use of innovation in a given country (Edquist 2004). A detailed review of the various ways in which this concept was defined has been carried out, i.a., by Weresa (2012), OECD (1997), and Nelson (1993).

For the purposes of this article, the National Innovation System shall be understood, using the Triple Helix concept (Etzkowitz 2008; Ranga and Etzkowitz 2013), as a system of three interrelated sectors, i.e. the science and education sector, the enterprise sector and the government sector, which cooperate to develop an effective innovative environment within which innovations will be created and implemented in an open economy.

The main aim of this article is to identify and briefly discuss the main institutional weaknesses (institutional bottlenecks) of Ukraine's National Innovation System and to try to determine their consequences for the international competitiveness of the Ukrainian economy in the field of trade in high-technology and medium-high-technology goods, i.e. those which are created in industries based on knowledge and modern technologies, in the scope of which the creation and commercialization of knowledge and innovation depends to a large extent on the efficiency and effectiveness of the National Innovation System. In other words, to check whether and how the competitiveness of Ukraine in trade in these goods is changing in the face of the certain existing institutional weaknesses of the National Innovation System implemented there.

A general assumption has been made that the occurrence and improvement of long-term comparative advantages in the export of a given country, especially in technologically advanced goods created in industries based to a large extent on knowledge and modern technologies, are a direct result of the efficiency of the operation of the National Innovation System implemented in this country, significantly shaped by the institutional solutions present there. The lack of such comparative advantages or the loss of those already possessed may indicate serious institutional weaknesses of the entire National Innovation System, effectively reducing the effectiveness of this system, which will have a negative impact on the ability of the economy of a given country to create and commercialise innovative production solutions, thus reducing its international competitiveness in the field of technologically advanced goods. Of course, one should be aware of the fact that the efficiency and effectiveness of operation of the National Innovation System may be one of many factors determining this competitiveness.

This article puts forward a thesis according to which the lack of long-term comparative advantages in foreign trade of Ukraine in the field of high-technology and medium-high-technology goods, created in industries based, to a large extent, on knowledge and modern technologies, should be attributed to the strong institutional weaknesses present within Ukraine's National Innovation System, which – by significantly lowering this system's effectiveness – also reduce the ability to create and commercialise knowledge and innovation, which has a negative impact on the competitiveness of the Ukrainian economy in the trade of technology advanced goods.

The choice of the Ukrainian economy as the subject of research was not accidental. Ukraine's economic potential, as well as its geostrategic location, especially the political and economic context of its neighbourhood with Russia and the EU, mean that Ukraine is increasingly subject to various types of economic research and analysis. However, there is a definite lack of in-depth research on the international competitiveness of the Ukrainian economy, both in Polish and international economic literature, from the point of view of its shaping by the existing, albeit highly dysfunctional, National Innovation System, considering the existing institutional weaknesses of this system. This article is intended to fill this research gap.

Moreover, the results of the research conducted as well as the recommendations made are important from the point of view of both Ukraine and Poland, Ukraine's direct neighbour, who cannot be indifferent to the country's development, which is greatly influenced by the competitiveness of the Ukrainian economy on the international arena.

2. LITERATURE REVIEW

The issue of international competitiveness of the Ukrainian economy in the context of the country's National Innovation System, considering the existing institutional weaknesses of this system and their consequences for the competitiveness of Ukraine's foreign trade, is de facto not present in economic literature. Although, for example, Falkowski (2018b) analyses the impact of institutions on Ukraine's competitiveness, his analysis does not take into account aspects related to the competitive position of the Ukrainian economy in international trade. This does not mean, however, that these issues are not subject to analysis or economic research separately from each other; on the contrary, although unfortunately a large part of them is not published in English, which significantly reduces their dissemination in the international scientific community. Below is a summary of valuable, in-depth studies on this subject, referring to the entire Ukrainian economy, published in English in recent years.

A comprehensive assessment of the competitiveness of the Ukrainian economy is carried out annually by the World Economic Forum of Davos in its annually published Global Competitiveness Reports. In the latest issue of this report from 2017, Ukraine was ranked 81st among 137 economies in the world (WEF 2017). Ravi and Vnukov also pointed out that Ukraine has much lower competitiveness than its potential would suggest (2014). Skavronska (2017) also draws attention to insufficient use or even "wasting" of its potential, especially intellectual potential, from the point of view of the possibility and need to create the so-called creative industries in Ukraine, which would ultimately also significantly increase the competitiveness of the entire economy. Kharlamova and Gumenna (2018) also emphasize the need for Ukraine to take advantage consciously of its resources in the conditions of the digitalizing modern world in order to build a creative, knowledge-based economy, which will be able to compete effectively on the international arena. In a similar vein, the need to transform Ukraine's economy from factor-led economy to an efficiency-led economy, without

which it is impossible to effectively increase the competitiveness of the country's economy in the modern world, resulting in an improvement in their position in the international division of labour, was very clearly highlighted by the OECD (2012). An interesting analysis of competitiveness of the information economy industry in Ukraine was conducted by Ponomarenko *et al.* (2018). They came to the conclusion that one cannot disagree with it, namely that the fact that the Ukrainian state does not support high-tech sectors of the economy, such as information technology, is a strategic mistake as such support is a precondition for further development of these industries in the country, and it is these sectors that could become a driver of Ukraine's development as a whole and could contribute to improving the long-term competitiveness of its economy. One of the important, even crucial, reasons of low competitiveness of Ukrainian companies on international markets is highlighted by Kolosok and Trusova (2015), who emphasise that a relatively large part of Ukrainian companies still use obsolete technologies, which leads to their weaker competitive position internationally.

Turning to selected scientific studies about Ukraine's National Innovation System, it is worth mentioning first the results of the research presented in the report entitled "Peer Review of the Ukrainian Research and Innovation System", commissioned by the European Commission (EC 2017b). Its authors (experts from various countries) conducted a thorough, critical analysis of Ukraine's NIS, pointing to a number of difficulties in the operation of this system, which should first be eliminated in order to effectively increase the innovativeness and, consequently, the competitiveness of the Ukrainian economy. This report even clearly states that it is necessary to re-orientate the country's National Innovation System towards higher socio-economic significance and effectiveness, as well as a stronger focus on innovation. The origins of the current problems with development and the efficient and effective operation of the existing, at least formally, National Innovation System in Ukraine Yegorov (2008) derives not so much from Soviet times as from the slowness of the Ukrainian authorities in the first years since the regaining of independence and complete ignorance of this issue in the then conducted economic policy of the state. Fedulova (2015), who explicitly states that in Ukraine the problems of scientific, technological and innovative development have been ignored lately, articulated this problem even more strongly. A similar diagnosis is made by Yegorov (2015), according to whom Ukraine is plagued by little innovation activities and the fact that the gap between the industry and research institutions is widening, both in state and higher education institutions. Very similar conclusions are also drawn by Kasych and Vochozek (2017), who additionally suggest that in order to improve Ukraine's NIS, it is imperative to launch "bottom-up" processes of innovation creation and thus reduce the role of the state (central institutions) in this respect, as is the case with the National Innovation Systems in developed countries. An interesting analysis of Ukraine's NIS from the point of view of its functioning within the framework of innovation infrastructure in the context of the key role it plays in the effective operation of the entire system was carried out by Kniazevych *et al.* (2018), who state that in the situation of current serious weaknesses in this infrastructure it is necessary to develop management mechanisms for forming and running the National Innovation System that would be based on the effective innovation infrastructure of the country. In turn, Martovoy and Gagliardi (2011) state that over the last decades Ukrainian sectors of science and technology have changed considerably in an attempt to shift its scientific resources away from military towards civilian purposes and to improve its domestic capacity for advancing innovations. Despite that, they conclude, the Ukrainian system of innovation has not done well while the failure of Ukraine's NIS has contributed to the low level of innovation among Ukrainian companies.

3. METHODOLOGY AND DATA

In order to determine the significance of the existing, previously identified, so-called institutional bottlenecks in Ukraine's National Innovation System (NIS) for the international competitiveness of the Ukrainian economy, the existence and, more importantly, the improvement of long-term comparative advantages in international trade in technologically advanced goods (i.e. high-technology and medium-high-technology goods), created in industries based to a large extent on knowledge and modern technologies, are a direct effect of the effectiveness of Ukraine's NIS, which in is significantly shaped by the existing institutional solutions.

It is worth noting that the concept of international competitiveness itself, due to its multidimensional and complex nature, does not have a single, commonly used definition in economic literature. This is mainly due to different approaches taken to the subjective scope of competition as a whole and to its sources, as well as to the diverse systems of values followed by economists in defining it (Bhawsar and Chattopadhyay 2015; Delgado *et al.* 2012). The definition of international competition has been synthetically reviewed, i.a. by Bhawsar and Chattopadhyay (2015), Misala (2014), Balkyte and Tvaronavičiene (2010).

However, for the purposes of discussing the issue being the subject-matter of this article what needs to be defined is a particular aspect of international competitiveness, namely the competitiveness of an economy in international trade. According to Carbaugh (2017), and this definition is applied in the article, such competitiveness is limited to the ability to develop, manufacture and sell goods and services that are more attractive in terms of price and/or quality than the export offer of other countries, which will have a measurable effect on the growing share of a country in the sale of these goods to other countries on international markets.

In order to verify the research hypothesis put forth at the beginning, to determine the competitiveness of the Ukrainian economy in contemporary international trade, and above all to identify potential comparative advantages in Ukrainian exports and their possible changes over the analysed period, the method of analysing Balassa's revealed comparative advantages (RCAs) (1965, 1989) has been applied, using the following formula:

$$RCA_{ij}^{K} = \ln\left(\frac{x_{ij}^{K}}{X_{j}^{K}} \Big/ \frac{x_{i}^{j}}{X^{j}}\right)$$

where:

RCA_{ij}^{K} – the revealed comparative advantages index of the K country for the i goods category in relation to the j country or a group of j countries
x_{ij}^{K} – exports of the i goods category from the K country to the j country or a group of j countries
X_{j}^{K} – total exports from the K country to the j country or a group of j countries
x_{i}^{j} – exports of the i goods category from j country or a group of j countries
X^{j} – total exports from j country or a group of j countries
i – goods category
K – the analysed country
j – rest of the world

By using the logarithmic form of the above formula, we obtain positive or negative values of the RCA_{ij}^{K} indicators, which greatly facilitates their interpretation. We can speak of a revealed comparative advantage in exports of a given goods category only when its share in total exports of a given country is higher than the share of that goods category in total global exports, so when the $RCA_{ij}^{K} > 0$ (Falkowski 2018a).

With view to the adopted research assumption, the competitiveness of Ukraine's exports of technologically advanced goods (i.e. high-technology and medium-high-technology goods) was analysed in detail. To this end, the OECD classification of basic goods categories based on their technological advancement (OECD 2011; Hatzichronoglou 1997). According to this classification, high-technology goods include the following subcategories: aircraft and spacecraft; medical, precision and optical instruments; office, accounting and computing machinery; pharmaceuticals; and radio, TV and communications equipment, whereas the subcategories of the medium-high-technology goods category include: chemicals excluding pharmaceuticals; electrical machinery and apparatus; machinery and equipment; motor vehicles, trailers and semi-trailers; and railroad equipment and transport equipment.

The analysed period covers the years 2001-2016 and all data used to analyse the subject-matter issue are derived from the United Nations Commodity Trade Statistics Database.

4. UKRAINE'S NATIONAL INNOVATION SYSTEM – AN ATTEMPT TO IDENTIFY INSTITUTIONAL BOTTLENECKS

In the case of Ukraine, from a formal point of view, we can speak of the existence of an elaborate National Innovation System. The core of this system are three main elements (corresponding to the Triple Helix concept), that is the R&D sphere, together with the educational base, responsible for the creation of innovations; the industrial sphere, responsible for the commercialisation of innovations; and the sphere of public authority, responsible for the creation and efficient functioning of the institutional system of regulations and rules of cooperation between the individual elements of NIS, so that the process of creation and commercialisation of innovations is carried out efficiently and without interruptions.

In order to understand the present institutional conditions of the National Innovation System in Ukraine, it is necessary to be aware of the fact that all the time, despite the fact that almost 30 years have passed since the collapse of the USSR, the Ukrainian economic system is to a large extent a conglomerate of institutional solutions (both formal and informal) from the times of the USSR and those introduced with various results during the never-completed transformation of the system in the times of the already independent Ukrainian state. As a consequence, even Ukrainians themselves refer to this system not as a "rule of law", but as a "rule alongside the law".

Undoubtedly, from the point of view of efficient and effective operation of the National Innovation System, which is supposed to translate into gradual improvement of the innovation and competitiveness of the economy of a given country, the quality and transparency of legislation and its effective enforcement play an extremely important role. When analysing the legal system in Ukraine, several of its characteristics should be emphasized. First of all, the enacted laws and regulations do not have the status of mandatory standards in practice. Moreover, legal regulations may be changed arbitrarily, often to a specific "order" of a particular economic lobby or a group of politicians. In addition, they are very often "vague" and "unspecified", which, combined with the frequent lack of uniform interpretation of legal

regulations and the multitude of institutions enforcing this law, constitutes a serious obstacle to the creation of long-term projects of cooperation between the R&D sphere and the industrial sphere. In addition, it also increases the uncertainty of doing business, including investment activities, also in the scope of venture capital, which is so important for financing new, ambitious and innovative start-up projects. Interestingly, in 2016 the value of venture capital financing innovative R&D projects was only 2.1% of the European Union's respective total R&D venture capital expenditures (EC 2017a). Moreover, the low efficiency of Ukraine's judicial system is also a serious problem. The independence and efficiency of the judiciary in Ukraine was rated so poorly by economists from the World Economic Forum that among 137 economies from all over the world, Ukraine was ranked only 129th(!) in the latest Global Competitiveness Report (WEF 2017). The inability to effectively pursue rights, defend against official decisions or enforce claims is a serious barrier to the development of Ukraine's National Innovation System.

The situation in Ukraine described above reinforces, on the one hand, the very strong significance of various informal ties on the level of both economic and socio-political, and on the other hand, the instrumentality in the application and observance of the existing law, very often in the name of particular interests and benefits of civil servants, entrepreneurs and ordinary citizens. A direct consequence of this is the huge scale of corruption in Ukraine. Suffice it to say that, in the latest Corruption Perceptions Index 2017 ranking 180 countries and territories from all over the world, Ukraine was ranked as low as 130th (Transparency International 2017).

Another very important problem – the institutional bottleneck of Ukraine's NIS is the issue of protection (or rather lack thereof) of intellectual property. It is absolutely unquestionable that, in order to think about the effective creation and implementation of new innovative solutions in industrial production, it is absolutely essential to effectively safeguard the rights of natural and legal persons to benefit from their own creative work. This still has not been achieved in Ukraine, as evidenced by the country's position in the latest Global Competitiveness Report in the area of property rights protection, where Ukraine was ranked 128th out of 137 world economies, while in the area of intellectual property rights protection it was ranked only slightly higher, i.e. 119th (WEF 2017). Due to such a dramatic situation, the International Intellectual Property Alliance has placed Ukraine on the Priority Watch List due to persistent deficiencies in its legal and enforcement regime, paying special attention to: 1) denial of adequate and effective protection of intellectual property rights, 2) failure to implement effective and systemic means to fight widespread online infringement of copyright and related rights, 3) unfair, non-transparent administration of the system for collecting societies (International Intellectual Property Alliance 2018). From the point of view of the functioning of Ukraine's NIS, the actual lack of effective protection of property, including intellectual property, not only significantly excludes the possibility of using foreign technological solutions, but also effectively limits the possibilities of creating own, domestic innovations.

Another important institutional problem of Ukraine's National Innovation System is the way it is managed by the state administration, both at the central and local level. Despite significant improvements in this area in recent years, there is still, to a relatively large extent, overlapping and, on the other hand, paradoxical blurring of competences of various institutions (including the government) in the area of supporting pro-innovative activities in practice, despite the existing formal regulations in this area (On scientific... 2016). This obviously reduces the effectiveness of the state's pro-innovation efforts in Ukraine.

As regards the R&D sphere in Ukraine, especially the educational base, from the point of view of the existing institutional weaknesses determining the efficiency of the entire NIS in that country, one should pay attention to the absence of a clear and properly articulated vision of the development of higher education sector in general and individual universities (Nikolaiev 2017), as well as to the quality and profile of education in Ukrainian schools and universities. Despite these changes, they are still largely out of step with the challenges of today's digital world. Therefore, in 2017 the law on education was passed, which is supposed to improve the situation in this respect. Interestingly, the need for a new law was justified (in 2017) by the fact that the previous law on education has long become obsolete, like the Soviet system of education it represented. Moreover, according to Ukraine Crisis Media Center, the issues of academic integrity, corruption and nepotism in education are becoming even more pressing, there is widespread plagiarism, results of educational and scientific activities are fabricated and falsified. Schoolchildren complain about teachers' biased evaluation of their progress. External data can often prove these complaints, in particular by comparing school ratings with the results of external independent testing in the same subjects (Ukraine Crisis Media Center 2017). The consequence is an increase in demand for private education, which can, however, be afforded by few and even mass emigration of young Ukrainians, especially from Western Ukraine, to study abroad. Between 2009 and 2016 alone, the number of Ukrainians studying abroad increased by 129%, reaching, according to official statistics, nearly 60,000 students, most of whom study in Poland, Germany and Russia. From the point of view of the Ukrainian economy, however, the problem is that later these young educated, creative people, not seeing their future in Ukraine, take up employment outside its borders, thus not increasing the active, educated labour resources in the country, which significantly lowers the pro-innovative human potential of the country.

Another issue, although the existing network of various institutions and research centres in Ukraine is impressive (some of them operate under the auspices of the National Academy of Sciences, which, by the way, "consumes" more than half of the public funds allocated to the R&D sphere with little impact on its activities on the Ukrainian market innovation), is not reflected in the number of commercially available new solutions and products (Yegorov 2015). One may even come across an allegation that the Ukrainian R&D sector still functions as if alongside the economy, which significantly reduces its innovative potential. Aware of the existing realities in this area and in order to change it, the Ukrainian authorities have assumed in their new development strategy that financial and organizational support will be concentrated only in several selected areas, i.e. nuclear science, new materials, IT technologies, physics and astronomy, engineering, biotechnology, agricultural technologies and aerospace technologies (On scientific... 2016). One can only wonder whether such a wide range of priority areas of research will not have a negative impact on their actual results.

Still another important institutional problem in the National Innovation System in Ukraine is the transfer of knowledge between the R&D sphere and the industrial sphere responsible for its commercialisation, which is largely determined by legal (lack of clear regulations on how and with whom such cooperation can be undertaken) and financial considerations. Definitely, knowledge transfer to industry would be faster and better if R&D projects were commissioned and financed by the industrial sector. In 2015, BERD (Business Expenditure on R&D) in Ukraine accounted for only 18.7% of total R&D expenditure (World Bank 2017), which is most clearly shown by its very strong dependence on public funds from the state budget. What is also extremely important, the expenditures of Ukrainian companies on innovations (innovative products), to a very large extent concern the purchase of machines, devices or software, based on existing technology; what's more, they are often imported

goods, and do not result from the awareness and need to finance completely new, domestic modern innovative solutions. Recognising this problem, some leading research institutes have taken matters into their own hands and have already transformed themselves into research-production companies, which have preserved some R&D activities while creating a dozen of spin-offs that are conducting business activities, including manufacturing of goods, on the base of formerly-existing institutes. However, there are not many such examples among technology-oriented institutes in Ukraine (Yegorov 2015).

This is also connected with another issue. It should be noted that the economic transformation desired in the new geopolitical conditions, the privatization process initiated, and attempts made, with varying results, to dismantle the planned Soviet economic management system in the early 1990s resulted in the disassembly of the existing post-Soviet economic structures in Ukraine, but unfortunately very often without the construction of new ones (Falkowski 2017). As a result, to a large extent the ability to create own innovative production solutions (industrial innovations with high added value) and to commercialise them has been effectively replaced by almost exclusively reproductive activity. A very good example of this can be found in the Ukrainian automotive industry, which was developing very dynamically during the Soviet era and became, in fact, an assembly plant for foreign car brands during the independent period of Ukraine. Companies such as ZAZ or Bogdan Corporation assemble foreign cars, mainly Chinese and Korean. It is worth mentioning here that one glorious but only exception in this respect is the manufacturer of huge construction and specialist trucks (still hailing from the communist era) called KrAZ, who for many years have been in high demand mainly in the countries of the former Soviet Union, but also in the Philippines, Cuba, Indonesia, and are even sold to the USA.

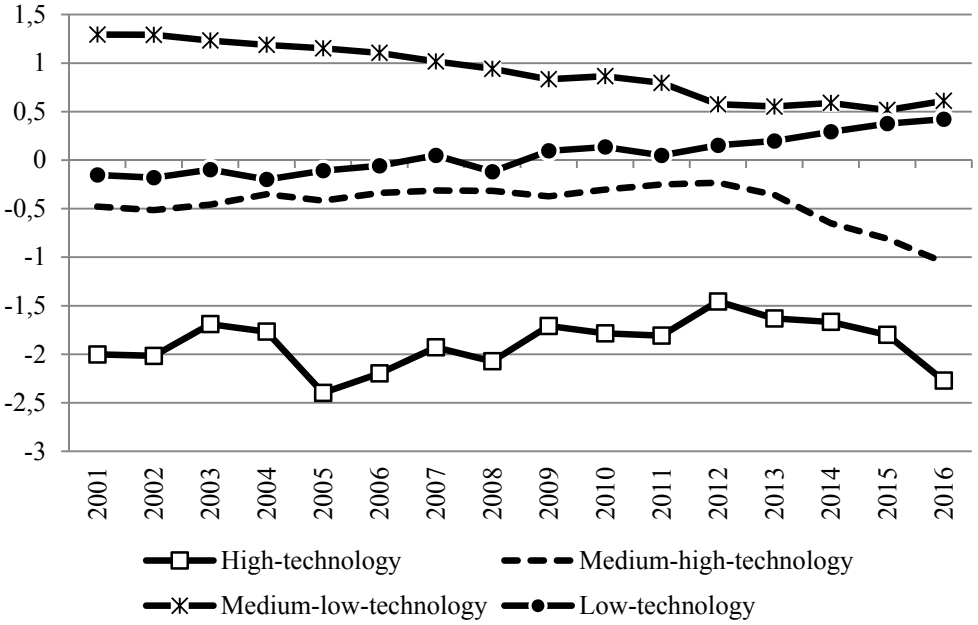
Taking into account all the institutional bottlenecks described above (institutional weaknesses), it is difficult to expect that the tried and tested solutions concerning the National Innovation Systems existing in the countries of Western or Central Europe and operating in diametrically different institutional conditions, will work in the same way in Ukraine, which would be reflected in the gradual improvement of innovation and, consequently, the competitiveness of its economy on the international arena.

5. UKRAINE'S COMPETITIVENESS IN INTERNATIONAL TRADE OF HIGH- AND MEDIUM-HIGH-TECHNOLOGY GOODS IN THE YEARS 2001-2016

The detailed analysis of the development of the disclosed comparative advantages in Ukrainian exports in the years 2001-2016 clearly shows that the country is competitive on international markets in the area of trade in medium-low-technology and low-technology goods (Fig. 1). Moreover, it should be added that in the case of Ukrainian exports of low technology goods a gradual improvement in the competitiveness was observed over the analysed period (including recording comparative advantages since 2009). This was due to a very significant increase in the competitiveness of Ukrainian products from the food, beverages and tobacco goods subcategory (in 2016, RCAs for this subcategory was 1.36, as compared to 0.42 in 2001). In the case of the traditionally most competitive goods category in Ukraine's foreign trade, i.e. medium-low-technology goods, there was a very worrying trend of gradual deterioration of their competitiveness in international trade. Although Ukraine still holds comparative advantages in trade in these goods, they have very clearly decreased (from 1.29 in 2001 to 0.61 in 2016). This undesirable trend was the result of reduced international competitiveness of goods from Basic metals and fabricated metal and Coke, refined petroleum products and nuclear fuel subcategories (while in 2001 the RCAs for these

subcategories were 1.81 and 0.81 respectively, in 2016 it stood at 1.12 and –1.59 respectively).

Figure 1. Revealed comparative advantages (RCA) in Ukraine's exports within the basic categories of goods according to the OECD classification in 2001-2016



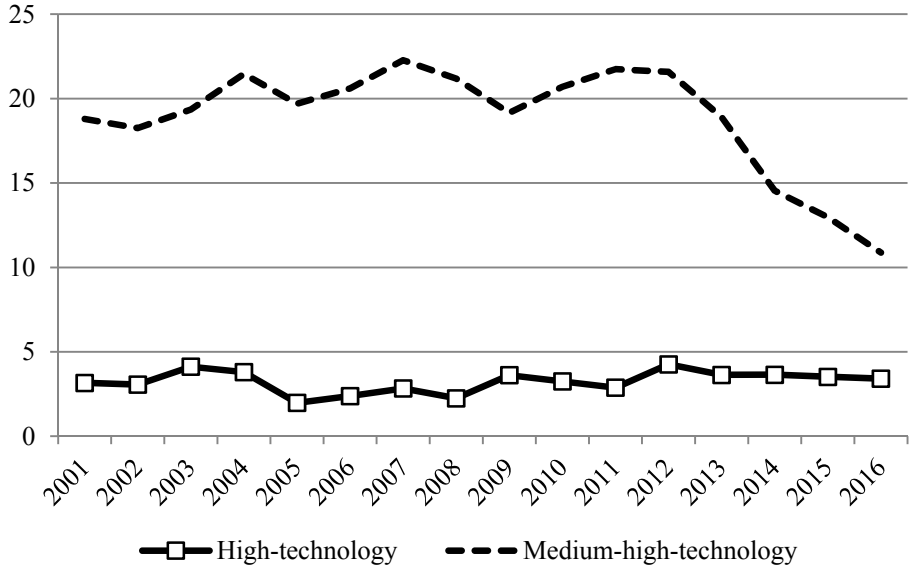
Source: Own elaboration based on data from the United Nations Commodity Trade Statistics Database.

In turn, from the point of view of the research issue discussed in this article, particular attention should begiven to the dynamics of the RCAs for high-technology and medium-high-technology goods (Fig. 1). It appears that during the analysed period Ukraine did not have any comparative advantages in respect of goods from these two goods categories, which proves that the Ukrainian economy is not competitive in international trade in such goods. The situation is particularly bad in the case of trade in high-technology goods, for which the value of the RCA index in the analysed period ranged from –1.46 (in 2012) to –2.40 (in 2005). On the other hand, although the values of the RCA index were negative for medium-high-technology goods, in the years 2001-2012 they did not fall below –0.52 and were gradually improving (decreasing negative values of the RCA index). This was the case until 2013, when this trend was reversed and the RCA values for this goods category started to fall very sharply (an increase in the negative RCA values). Interestingly, a similar situation (in terms of direction and strength) was also observed in the case of high-technology goods. One of the main reasons for this was the collapse of trade with Russia in connection with the escalation of tensions in mutual relations, especially with the annexation of Crimea in March 2014 and accusations against Russia of supporting separatists in eastern Ukraine. It should be noted at this point that most Ukrainian goods, especially the medium-high-technology ones, were mainly exported to post-Soviet countries, mainly to Russia as they were not able to compete effectively on the demanding European markets because of both their quality and technological advancement.

In turn, if we look at the importance of high-technology and medium-high-technology goods in Ukrainian exports in the years 2001-2016, it will appear that in the case of the former ones it was rather minimal (Fig. 2), with the share of this goods category in total exports ranging from 1.98% in 2005 to 4.26% in 2012. The importance of the latter ones in Ukrainian exports, on the other hand, was much greater, and their share in total exports over the years oscillated

around 20% until 2013, when it began to decline dramatically. Suffice it to say that while medium-high-technology goods accounted for 21.58% of Ukrainian exports in 2012, in 2016 – only for 10.88%. The main reason for this has already been mentioned above.

Figure 2. Share of high and medium-high technology goods in Ukrainian exports between 2001 and 2016 (%)



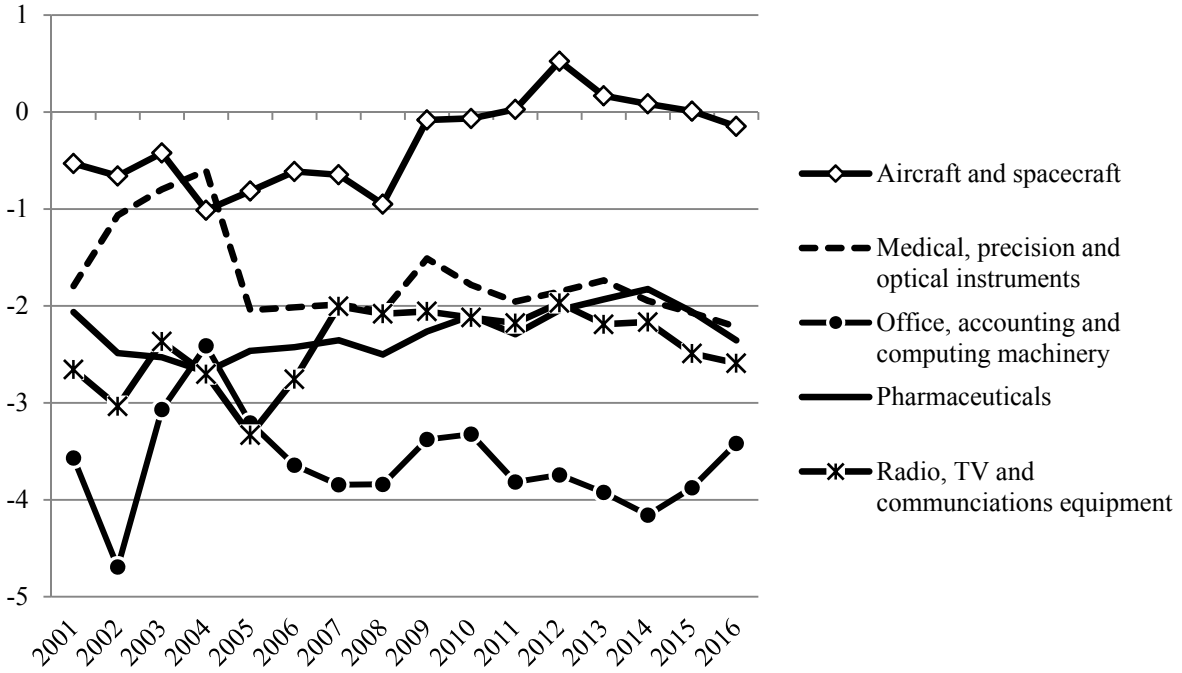
Source: Own elaboration based on data from the United Nations Commodity Trade Statistics Database.

When analysing Ukraine's competitiveness in the area of high-technology and medium-high-technology goods in international trade, it is worth exploring in more depth the development of the RCAs for the main subcategories of goods within each goods category in order to identify more precisely the level and scale of non-competitiveness of these goods in the international markets (Fig. 3 and Fig. 4).

For the high-technology goods category, the trade in goods from the Aircraft and spacecraft subcategory looked relatively good during the analysed period, with Ukraine even recording comparative advantages in the years 2011-2015, which from 2012 onwards were markedly decreasing to reach a negative value in 2016 (RCA = –0.15). However, for all the other subcategories of this goods category, Ukraine has been very uncompetitive and has had practically nothing to offer on international markets for many years, as evidenced by the very high negative values of the RCA index for these goods subcategories (Fig. 3). By far the most uncompetitive is Ukraine in the trade of goods from the Office, accounting and computing machinery subcategory (the average value of the RCA index for the years 2001-2016 is –3.62).

It is also worth noting that no improvement (with very few exceptions) has been observed in terms of the value of the RCA index for individual subcategories of goods within the high-technology goods category, which proves that there has been no improvement in competitiveness within these goods, and partly also no improvement in the efficiency of NIS in Ukraine.

Figure 3. Revealed comparative advantages in Ukraine's exports within high-technology goods according to the OECD classification in 2001-2016

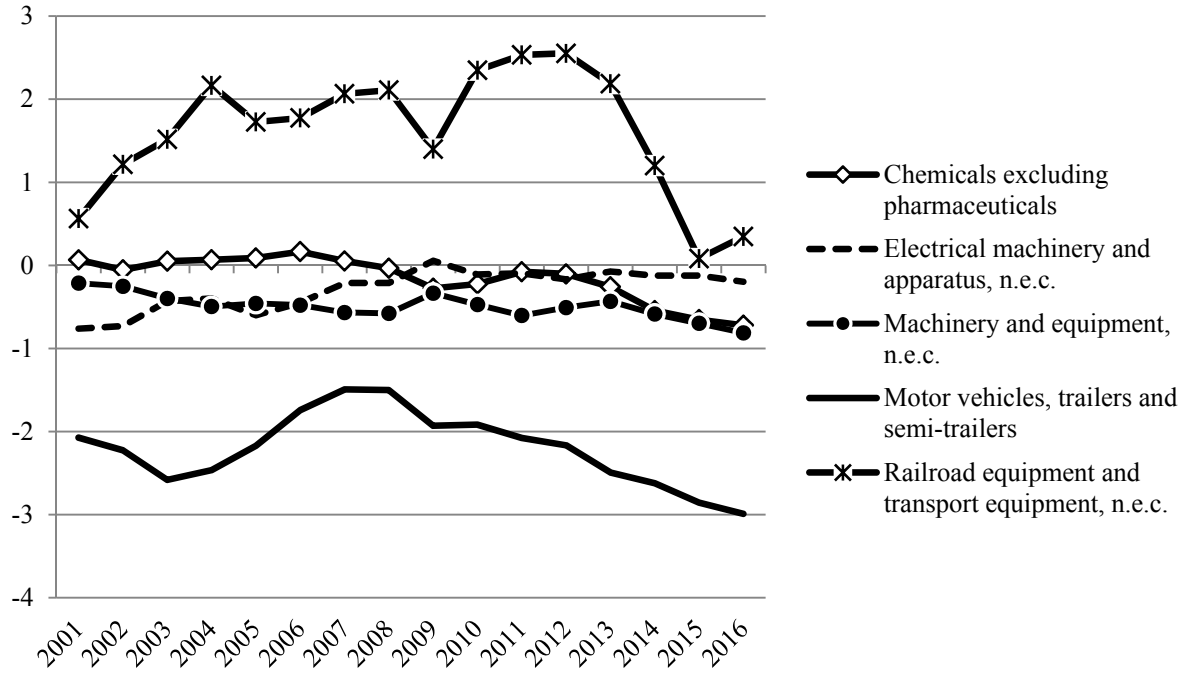


Source: Own elaboration based on data from the United Nations Commodity Trade Statistics Database.

In the case of the medium-high-technology goods category, Ukrainian exports of goods from the Railroad equipment and transport equipment subcategory is characterised by the highest competitiveness (Fig. 4). This export specialisation of Ukraine and its strong position, especially in the former USSR, gradually strengthened year by year in the analysed period, as evidenced by the growing values of the RCA index, to deteriorate sharply from 2013 onwards for the reasons already stated above. With respect to the other three subcategories of the medium-high-technology goods category, i.e. Chemicals excluding pharmaceuticals; Electrical machinery and apparatus; and Machinery and equipment, Ukraine did not have any comparative advantages in international trade (with the exception of Chemicals excluding pharmaceuticals in the years 2001-2007) although the values of the RCA index for these goods subcategories were relatively stable (the goods remained uncompetitive all the time) and ranged from 0 to –1. By far the worst situation in this respect concerns the goods from the Motor vehicles, trailers and semi-trailers subcategory, with respect to which Ukraine not only does not have any comparative advantages, but also the values of the RCA index for this subcategory have been very dramatically decreasing since 2009 (the negative RCA is growing), which proves their growing uncompetitiveness in international trade.

Like in the case of high-technology goods, the fact that there has been no improvement in the competitiveness of Ukrainian goods in international trade is also very clearly noticeable here, and such a situation can and should be connected with the effectiveness of NIS in Ukraine.

Figure 4. Revealed comparative advantages in Ukraine's exports within medium-high-technology goods according to the OECD classification in 2001-2016



Source: Own elaboration based on data from the United Nations Commodity Trade Statistics Database.

6. CONCLUSION

The aim of this article was to identify the main institutional weaknesses of Ukraine's National Innovation System along with an attempt to determine their consequences for the competitiveness of the Ukrainian economy in the international trade in technologically advanced goods created in industries based, to a large extent, on knowledge and modern technologies, the development of which is strongly influenced by the efficiency and effectiveness of Ukraine's NIS.

The analysis of the development of the revealed comparative advantages in Ukraine's exports in the years 2001-2016 clearly shows that the country is competitive in the trade of medium-low-technology and low-technology goods, although – in the case of medium-low-technology goods – this competitiveness significantly decreased over the analysed period (as evidenced by the decrease in the relevant values of the RCA index). In the case of trade in high-technology and medium-high-technology goods, Ukraine proved not competitive on the international arena, which, from the point of view of the realities of the modern world economy and the ever-growing demand for goods with high and medium-high technology advancement, should be considered a clearly negative phenomenon. High-technology goods fared particularly badly in this respect. Moreover, for these two groups of goods in total, there was practically no improvement during the analysed period (except perhaps for the Aircraft and spacecraft subcategory); on the contrary, after 2013 the competitive gap in trade in these goods started to widen rapidly and substantially, which was also linked to the decrease of exports of these goods to the Russian market as a result of the deterioration of political relations between Kiev and Moscow.

All this leads to the conclusion that the strong institutional weaknesses present within Ukraine's National Innovation System, lowering the effectiveness of the entire system, effectively block the growth of the innovative capacity of the Ukrainian economy to create and commercialise knowledge and innovation, which translates into a lack of improvement in its competitiveness in international trade in technologically advanced goods, i.e. goods from the high-technology and medium-high-technology categories.

In this situation, it is fully justified to state that without the effective elimination of the existing (and identified in this article) "institutional bottlenecks" in Ukraine's National Innovation System, it will not be possible to improve its economy's competitive position in international trade in technologically advanced goods, which is so desirable from the point of view of growth of the entire Ukrainian economy. Therefore, among the main recommendations for the Ukrainian authorities aimed to eliminate these institutional weaknesses and increase its economy's competitiveness in the afore-mentioned area, these should mainly be listed: (i) development and consistent implementation of a comprehensive and coherent long-term national innovation policy; (ii) creation of a transparent legal framework (including the elimination of inconsistencies) to ensure effective protection of intellectual property rights, as well as to secure the implementation of innovative projects at every stage, including their financing from private or public sources; (iii) development and implementation of policies to support long-term private innovation or start-up projects that require access to risk capital, an appropriate investment insurance scheme or the leasing of high-tech equipment; (iv) creation of efficient knowledge transfer mechanisms from research centres to industry, thus increasing the commercialisation of knowledge; and (v) undertaking an effective fight against corruption and bureaucracy in the country, both at the central and local levels.

Although at least some of these desirable measures will not be easy to implement, especially now, during the civil war in eastern Ukraine, amid the difficult macroeconomic situation and the lack of broad public support for the direction of political and economic changes in the current government formation, Ukraine, if it wants to become a more competitive economy in international trade, and thus more independent of the Russian economy, must make every effort to implement the above-listed measures to eliminate the institutional weaknesses that exist today in the National Innovation System implemented there.

From the point of view of further research on the international competitiveness of the Ukrainian economy in the context of institutional weaknesses of the country's National Innovation System, the need to determine the extent to which these institutional weaknesses are an important factor (as compared to others) shaping the ability and, consequently, the competitive position of the Ukrainian economy should be deemed fully justified. It should be checked whether this is the absolutely most important determinant or its importance in this context is not so crucial. This should be treated as a challenge and a direction for future, in-depth research on the competitiveness of the Ukrainian economy.

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THE ORGANIC MILK PRODUCTION IN THE EU AND ECONOMIC RESULTS OF SPECIALISED ORGANIC DAIRY FARMS IN POLAND

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ABSTRACT

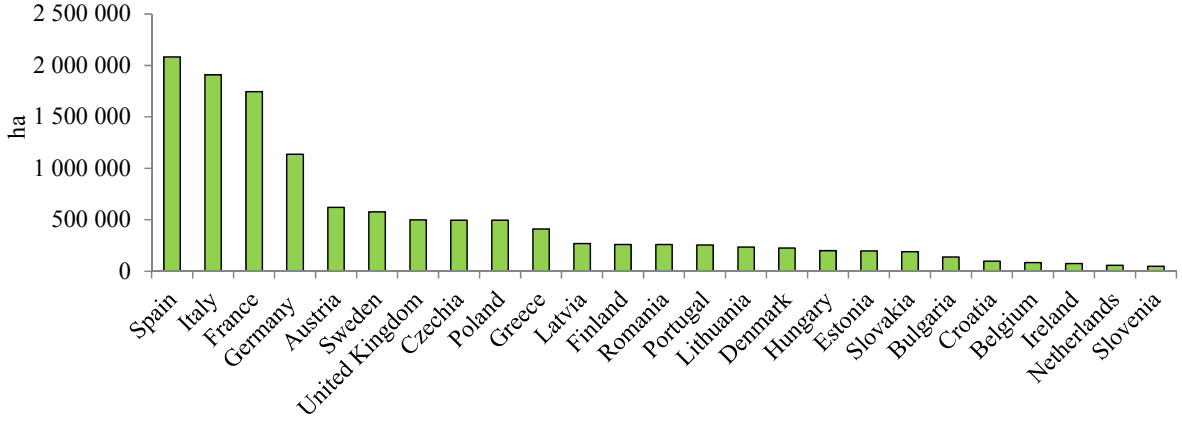
Organic milk production still constitutes to a small part of the total milk production in the EU countries but the demand for the organic milk and dairy products is increasing constantly. Therefore, from the farmer's point of view the organic dairy farming is considered to be a profitable agricultural production. The purpose of this article is to present the organic milk production in EU countries and to reflect the economic results of organic dairy farms in Poland. Based on the survey of Polish FADN system, the results of specialised organic dairy farms demonstrate the profitability of the milk production. In comparison with conventional dairy farms the production results are weaker but the production costs are significantly lower. Due to the financial supports programs the organic farmers may count on partial coverage of the lower production results due to extensive and more environmental-friendly way of production. The organic dairy farms could not compete economically with the income results of the intensive conventional milk production but they forms the basis of the organic dairy products market.

1. INTRODUCTION

1.1. Organic farming and milk production in organic farms in EU countries

The organic farming in the European Union has been showing significant growth over the past years. According to the statistical data in 2017 the organic production sector in the European Union covered 12.6 million hectares of organic agricultural area (in 2012 it was about 10.0 million ha) (EUROSTAT 2018). The largest area of organic land in 2017 was indicated in Spain, Italy, France and Germany, which together accounted for 54.7% of the total organic area in the EU-28 (Fig. 1). However, despite the continuous growth, the area under organic production is only about 7% of the total agricultural area in the EU. The percentage share of organic area in the total area of arable land varies significantly between EU countries – the largest share was recorded in Austria (23.4%), Estonia (19.6%), Sweden (19.2%), Italy (14.9%). In Poland, this share was about 3%.

Figure 1. Total organic area (fully converted and under conversion) in EU countries in 2017.

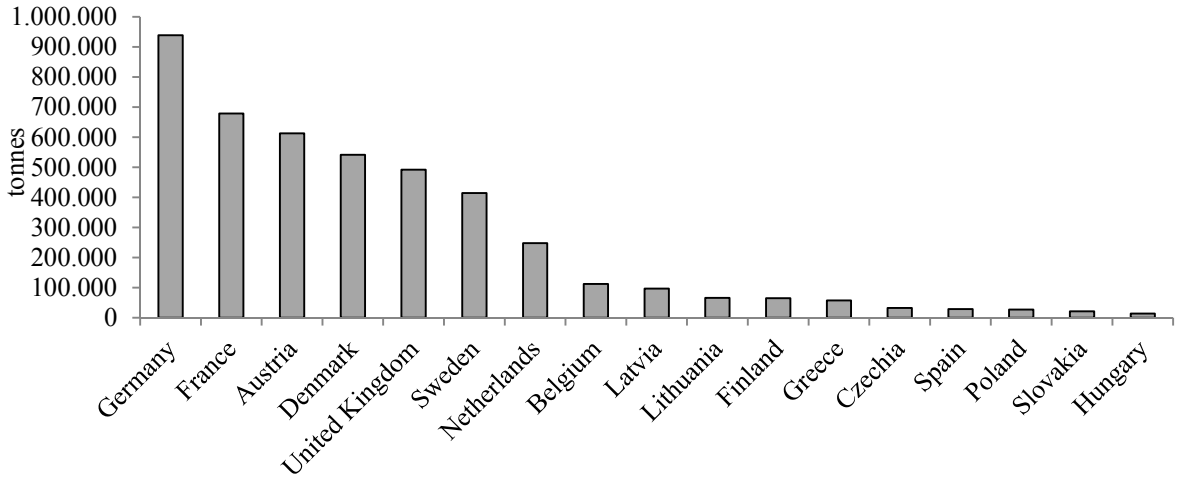


Source: EUROSTAT, 2018.

In the structure of the organic production in the EU countries, the largest share was organic arable land about 5.5 million ha, which was about 45% of the EU-28 total organic agricultural area, followed by permanent grasslands – pastures and meadows mostly used for grazing organic livestock (44%) and permanent crops (11%). The organic livestock production mainly included poultry, bovines, pigs and sheep. But still the organic production (crop and livestock production) was very limited when compared with the total agricultural production in each EU country. According to the Eurostat statistics, the biggest share of organic livestock in total livestock production in selected EU countries was: for live bovine animals – Latvia (about 24%) Austria (about 22%), Sweden (21%), Czechia (about 18%); for pigs – Denmark (about 3%), Austria (about 3%), Sweden and France (about 2% each); for sheep and goats – Latvia and Austria (about 35% each), Slovakia (25%), Lithuania (15%) and for dairy cows – Austria (about 21%), Sweden (about 17%), Latvia, Greece and Denmark (about 13% each).
The number of dairy cows in organic farms in EU countries, in 2017 was about 888 thousands heads (an increase of 32.8% compared to 2012) which stated for 3.8% of all dairy cows kept in the EU countries. The highest number of dairy cows in organic farms was maintained by farmers in Germany (23% of all organic dairy cows), France (14.6%), Austria (13.1%), UK (8.7%) and Denmark (8%).
Milk production in organic farms in EU countries in 2017 was around 4.4 million tonnes. The leading producers with the largest share of milk production from organic farms, according to

available statistical data in 2017, were Germany (21%), France (15%), Austria (14%), Denmark (12%) and the United Kingdom (11%) (Fig.2).

Figure 2. Total raw milk production available in organic farms in EU countries in 2017.



Source: EUROSTAT, 2018.

In Poland, according to statistical data from 2017, the number of dairy cows in organic farms remains 11.4 thousand heads, which accounted for less than 1% of the population of dairy cows in the country. But the number of dairy cows in organic farms is still decreasing, in 2012 it was over 20.0 thousand heads. The reason is probably the abandonment of certification of livestock production (it is possible to run parallel production - organic crop production and conventional livestock production at the same farm), as well as more general concentration of milk production and the loss of smaller dairy farms from the market.

1.2. The economic aspects of milk production in organic dairy farms

According to economic studies, the increase of the profitability of agricultural farms focused on milk production depends on the possibility of reducing unit costs of production (Mańko 2007, Ziętara 2007). Organic dairy farms carrying out an extensive production method are less dependent on the purchase of expensive goods and services. If organic farms produce their production mainly on the basis of own resources, they bear lower costs, however, the consequence may be lower production results and limitations in the number of dairy herds maintained. In the case of organic dairy farms, smaller milk yields are observed when compared with the yields of dairy cows in conventional farms. The reported differences of milk yields in some EU countries are minimal, in Sweden, Denmark, Netherland and United Kingdom was only 3-13% lower than conventional, and in case of Italy and Belgium the organic milk yields were the same or even higher than conventional (Offermann, Nieberg 2000). In Poland amongst the specialised organic dairy farm (based on the group of specialised organic dairy farms in Polish FADN system), the milk yield was only 75-80% of the milk yield achieved in the conventional specialised dairy farms.

Organic farms that produce milk and maintain dairy cows must meet relevant standards, mainly concerning the quality of feed. Feed must come from an organic farm (preferably its own), and it is necessary to ensure the sufficient forage area. More and more often, attention is drawn to the fact that feeding animals based on permanent grassland is beneficial both for the natural environment and for the economics of production (Radkowska 2012). Other

studies showed, that the profitability of milk production is dependent on relatively inexpensive and good quality own feedstuffs production. And the source of the cheapest feedstuffs, rich in protein and minerals, is permanent grassland (Okularczyk 2002). From the other hand, the organic fodder from purchase is very expensive, and their availability on the market is still very limited. Additionally, the existing restrictions in animal nutrition prohibit the use of industrial concentrates and complete mixtures.

In the case of dairy farms, the sale price of the raw material is an important factor influencing the obtained value of milk production. This price is shaped by the supply of products on the market and the direction of sales. When selling directly on the farm or at the marketplace (at the farm-gate prices), the milk from organic farms can get higher prices compared to conventional farms. Reports from the European market indicate that it may be a difference of even 42% as in the case of Austria, 37% in Germany, 36% in France and 34% in the Netherlands (KPMG 2018). Typically, the price premium for organic milk is around 10-40%. However, in the case of the sale of raw material for processing, organic farmers can expect identical prices for suppliers, unless the processing plants carry out organic processing then the quality of the raw material can be rewarded with a higher purchase price. In comparison to milk from conventional farms, the difference in the retail prices can be: 43% in France, 41% in Austria, 25% (Denmark), 16% (Germany), 12% (United Kingdom) and 9% in Netherland (KPMG 2018).

The organic farm's owners can also expect the financial support in the form of subsidies, which significantly affect the level of the income achieved from the agricultural activity. In the case of dairy farms, the subsidies to the forage area are taken into account, which include supplementary, organic and animal payments. In addition in Poland, there are opportunities to obtain financial support from animal genetic resources protection programs. Moreover, the dairy cows breeds covered by this program are mostly preferred in the system of extensive milk production, especially in organic farming. An example of such a breed of dairy cattle is the Polish red breed (maintained mainly in the southern part of Poland), which is characterized by high resistance and animal health, longevity, very good fertility, light births, high calf life and ease of rearing. These special characteristics can also lead to reduction of production costs, as an example a longer productive life of cows, which directly translates into the lower costs of herd replacement (Żukowski 2009).

The purpose of this article was to reflect the economic situation of organic milk production in Poland based on the surveys of Polish FADN. Based on the comparative analysis of the milk production results, costs of milk production and obtained economic effects in relation to the results of conventional farms has been carried out. The main objective was to examine the profitability of milk production in organic farms, as well as to determine the impact of subsidies for operational activities on the income of organic dairy farms.

2. THE ECONOMIC RESULTS OF SPECIALISED ORGANIC DAIRY FARMS IN POLAND

2.1. Material and methods

Due to low number of surveyed organic dairy farms the results obtained were not representative for national average results for the organic dairy farms. These are only average results for the surveyed sample of farms. However, the calculations carried out provide a reliable economic situation in organic dairy farms in Poland.

The material for this study were the actual accounting data collected in 2016 and 2017 in organic farms specialised in milk production (and as a comparison the economic results of conventional specialised dairy farms were taken into account). The groups of studied farms have been selected due to the agricultural type TF8 (based on the applicable typology of farms in the FADN system) and the farms specialised in milk production have been selected (type of farming: Milk). The agricultural type of the farm is determined based on participation of individual agricultural activities in creating of the total Standard Output value of the farm and reflects the system of production of the holding (Floriańczyk et al. 2018, Bocian et al., 2014). The studied farms came from a sample of the farms of Polish FADN and they were the market-oriented and were also stronger economically than average farms in the country.

The results obtained in 2016 and 2017 in conventional and organic specialised dairy farms have been shown in a tabular form, on average, for the studied groups. The studies used a comparative analysis regarding the parameters characteristic of the production potential of the studies groups of the farms i.e. the structure of land resources (utilised agricultural area – UAA), labour resources (expressed by the number of full-time employees in Annual Work Unit – AWU), the total assets and the structure of the total costs of production.

The selected indicators were used to assess the productivity of studied dairy farms, as follows:

- Total output per dairy cow,
- Total output per 1 AWU,
- Total output per 100 Euro assets.

The analysis covered the intensity of livestock production, which is measured by the amount of inputs per unit of production. In the studies, the measure of the intensity of production was:

- total livestock expressed in livestock units – LU (dairy cows = 1 LU) per total UAA
- stocking density of ruminant grazing livestock (in LU) per unit of forage area (i.e., the area occupied for fodder crops (fodder roots and brassicas, other fodder plants, temporary grass, meadows and permanent pastures, rough grazing)
- ratio of total livestock output and livestock products to total number of livestock units (LU)
- ratio of livestock specific inputs to total number of LU (i.e. the actual amount of the inputs for the means of livestock production)

The following indicator was used to describe the economic efficiency:

- Output profitability [%] = (Total Output + Total Subsidies excl. on investments) / Total Input.

The economic condition of the studied groups of farms based on the farm income was evaluated. The categories of the farms income, representing payment for production factors in the surveyed farms, have been presented i.e.:

- Farm Net Value Added expressed per annual work unit - AWU, which is payment for involving production factors regardless of the type of ownership,
- Family Farm Income expressed per family work unit - FWU, which is payment for production factors owned by a farming family.

2.2. Results of the study

The characteristics of studied group of farms was presented in Table 1. On average in the group of organic dairy farms the economic size was 7,083 euro, and it was 40.4% lower than in group of conventional farms. Total output generated by the organic farms was 2.7-times lower than in conventional farms. In the studied groups of specialised dairy farms, both organic and conventional, milk production generated a significant part of the total production value, 72.6% and 74.3% respectively. According to the information presented, the surveyed organic farms kept on average 16 dairy cows with average milk yield about 4,108 kg/cow, which was 35.9% lower yield than dairy cows on conventional farms. A small number of dairy cows indirectly indicates a small scale of milk production in organic farms, but the main cause of lower yield is often the extensification of the feeding. Considering the stocking density of dairy cows per 100 ha of UAA, on average in 2017 it was 61 dairy cows in the group of organic farms and 81 dairy cows in conventional farms.

Table 1. The characteristics of surveyed conventional and organic specialised dairy farms in 2017.

Specification		On average on dairy farms	
		organic	conventional
Sample farms		46	2,588
Economic size	[EUR]	7,083	11,884
Total output	[EUR/farm]	26,531	70,794
of this: animal production	[%]	92.0	88.0
Share of the production value of milk and milk products in total output	[%]	72.6	74.3
Total livestock units	[LU]	23.6	41.8
of this: dairy cows	[LU]	16	26
Milk yield	[kg/cow]	4,108	6,414
Milk price	[EUR/100kg]	31.6	30.2

Source: own studies based on PL FADN, 2019.

The potential of production in surveyed specialised dairy farms was determined by the resources of farms (Table 2). Organic farms had smaller agricultural land resources, but more of agricultural land as a forage area was used (82.4%). It should be noted that the total labour input remained at lower level in organic farms (1.83 AWU against 1.99 AWU in conventional farms) but in both surveyed groups of dairy farms mostly it was family labour input.

Table 2. The characteristics of farm resources of surveyed conventional and organic specialised dairy farms in 2017.

Specification		On average on dairy farms	
		organic	conventional
Utilised Agricultural Area (UAA)	[ha]	25.4	32.1
Share of the forage area in the UAA	[%]	82.4	65.0
Total labour input	[AWU]	1.83	1.99
Unpaid labour input	[FWU]	1.78	1.91
Total assets	[EUR/farm]	191,087	351,631
Machinery	[EUR/ha UAA]	1,183	2,062
	[EUR/1 AWU]	16,420	33,256

Source: own studies based on PL FADN, 2019.

The value of total assets of surveyed organic dairy farms was lower by 45.6% than in conventional farms. But in both surveyed groups the high share of fixed assets was observed

(over 90%). The machinery (including machines, technical equipment and means of transport) played an important role amongst the fixed assets as a technical infrastructure of land and labour. The level of mechanisation of the agricultural land (a level of equipping land with machinery, technical equipment and means of transport) was lower in organic farms by 42.6% compared to conventional farms. The technical labour productivity (expressed by the value of machinery, equipment and means of transport per AWU) was lower by 50.6% in organic farms.

When considering the economic results of the milk production, it can be noticed that the total output in surveyed organic dairy farms was 2.7-times lower than conventional farms (Table 3). On the other hand, the total costs in organic farms was lower by 62.5% mainly due to lower total specific costs. Total specific costs of the livestock production per 1 LU in organic dairy farms was EUR 190 in comparison to EUR 429 in conventional dairy farms. The main reason was that organic farmers spent less expenses on the feed for grazing livestock than in conventional farms. The relation of total output and total input was at the same level in both studied groups of dairy farms – table 3.

Table 3. The output and costs of production of surveyed conventional and organic specialised dairy farms in 2017.

Specification		On average on dairy farms	
		organic	conventional
Total output	[EUR/farm]	26,531	70,794
Total costs	[EUR/farm]	17,999	48,021
of this: Total specific costs	[EUR/farm]	5,702	25,313
Total farming overheads	[EUR/farm]	6,329	10,919
Depreciation	[EUR/farm]	4,980	9,473
Total external costs	[EUR/farm]	988	2,316
Total output/total input		1.47	1.47

Source: own studies based on PL FADN, 2019.

The selected measures was used to evaluate the productivity of studied dairy farms (Table 4). The value of production (total output) per 1 milk cow corresponded with the milk yield of dairy cows in the analysed groups of farms. Organic farms reached productivity of 1,658 euro/LU. The results obtained were lower by 39.1% compared to the group of conventional dairy farms. Labour productivity (the value of production achieved per 1 full-time employed person) informs about the value of production achieved at a given workload. This index was lower in organic farms with a lower number of cows in the herd (Table 4). The next index, the capital productivity was calculated as the value of production per 100 euro of assets involved indicated the level of capital's use. In case of organic dairy farms, this index amounted to 13.9 euro and was by 30.8% lower than in conventional dairy farms.

Table 4. The selected factors of productivity of surveyed conventional and organic specialised dairy farms in 2017.

Specification		On average on dairy farms	
		organic	conventional
Total output per dairy cow	[EUR/LU]	1,658	2,723
Total output per 1 AWU	[EUR/1 AWU]	14,498	35,575
Total output per 100 Euro of assets	[EUR]	13.9	20.1

Source: own studies based on PL FADN, 2019.

The livestock production intensity indicators of studied organic and conventional dairy farms was shown on Table 5. The livestock production intensity may be identified by

number of total livestock (in LU) on 1 ha of the utilised agricultural area (UAA) which provided the information on the level of agricultural management intensity. Also it can indicated the scale of the environmental burden of natural fertilizers. The stocking density (total livestock units per forage area) allowed to measure the productivity of forage area, which is the agricultural land providing feedingstuff for grazing livestock. In surveyed organic farms per 1 ha of the forage area there were only 0.89 LU, when in conventional farms it was even lower – 0.50 LU. When analysing the livestock production intensity, the total livestock output and specific livestock costs was calculated per number of animals. The results confirmed lower level of the output (by 30.6%) and the costs (by 55.7%) in specialised dairy organic farms – table 5.

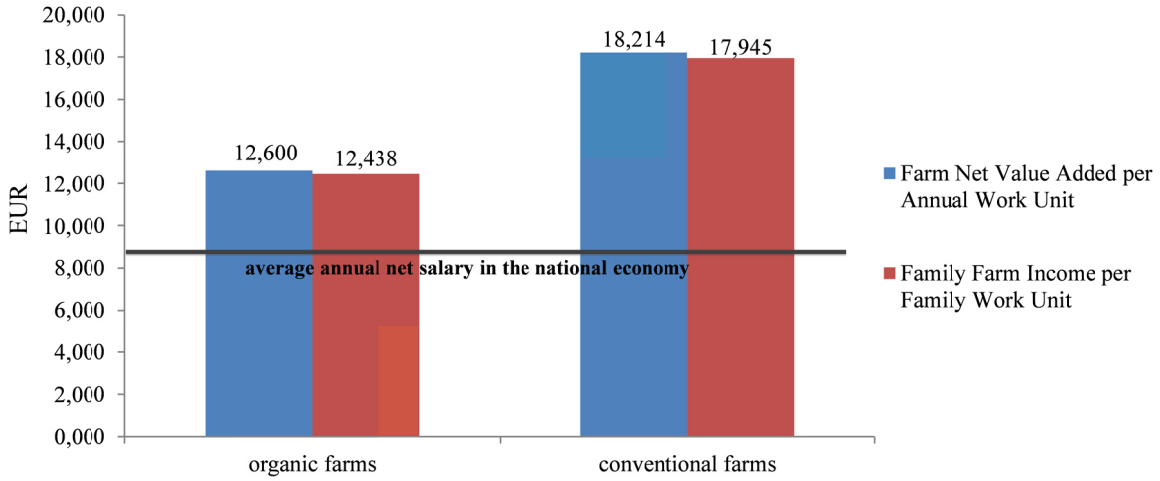
Table 5. The livestock production intensity of surveyed conventional and organic specialised dairy farms in 2017.

Specification		On average on dairy farms	
		organic	conventional
Total livestock unit per UAA	[LU/ha]	1.06	1.96
Stocking density per forage area	[LU/ha]	0.89	0.50
Total livestock output per LU	[EUR/LU]	1,034	1,490
Specific livestock costs per LU	[EUR/LU]	190	429

Source: own studies based on PL FADN, 2019.

When analyzing the economic efficiency, the output profitability index was calculated. This index in organic dairy farms was at the level of 224% compared to 171% in conventional farms. The higher value of profitability index was mainly resulted in lower by (62.5%) total costs of organic milk production and a higher (by 21.0%) level of subsidies involved.

Figure 3. The income results per person in surveyed conventional and organic specialised dairy farms in 2017.



Source: own studies based on PL FADN, 2019.

When compared to the average annual net salary in the national economy, the organic farmers may be satisfied with the results of the income (Fig.3). The net salary in the national economy in 2017 was EUR 8,598. The family farm income of the organic dairy farms could cover fully the payment for involving work of the farmer and farmer's family and even exceeded this parity level by 46.5%. In case of studied conventional dairy farms the income per person was 2.1–times higher than average salary level.

3. SUMMARY

Based on the analyses carried out in a studied groups of specialised dairy organic compared to the results of conventional dairy farms, some conclusions can be drawn, as follows:

- Considering the production results, lower milk yield (by 35.9%) but more favourable milk price (higher by 4.6%) was observed. Therefore the total output of organic farms was lower 2.7 times than in conventional farms. However, the lower total costs of milk production (by 62.5%) mainly due to lower total specific costs which were associated with lower costs of feedingstuffs.
- The average herd size of dairy cows in organic farms was 16 compared to 26 dairy cows in conventional farms. For this reason, the milk production may be considered as a small scale of milk production for both studied groups of farms.
- The resources of the utilised agricultural area of studied organic farms (25.4 ha) was smaller than in conventional farms (32.1 ha) but the share of the forage area involved in feeding of organic dairy cow was bigger (82.4%).
- The labour inputs in organic farms farms was lower (1.83 AWU) than in conventional farms (1.99 AWU) but in both cases mostly unpaid work (the work of the farmer and farmer's family) was engaged.
- The potential of production in studied organic dairy farms was determined by the value of total assets and it was significantly lower (by 45.6%) but a high share of fixed assets was observed (over 90%) in both studied groups of farms. The level of mechanisation of the agricultural land and the technical labour productivity were lower in organic farms by 42.6% and 50.6% respectively.
- The limitation of the forage area (limited possibilities of own feedingstuff production) determined the stocking density which was low in organic farms (0.89 LU per 1 ha of forage area). The production intensity (per number of animals – LU) was lower in organic dairy farms, the lower level of output (by 30.6%) and the lower level of costs (by 55.7%) was observed.
- The economic efficiency in the case of organic farms was relatively high (224%), compared to conventional dairy farms (171%) and mainly resulted in lower total costs (by 62.5%) and higher level of subsidies involved (by 21.0%). The milk production in organic farms seemed to be more dependent on the financial support than in conventional dairy farms.
- The lower income per person (FWU and AWU) was achieved in organic dairy farms, but in comparison to the average annual net salary in the national economy, the costs of farmer's and his family work was fully covered, and exceed this parity level by 46.5%.

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EFFICIENCY OF PUBLIC BIOMEDICAL LABORATORIES IN THE EXAMPLE OF A TERTIARY HEALTH INSTITUTION

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ABSTRACT

Biomedical laboratories are a part of public health services in Slovenia. Public laboratory services are implemented at all healthcare levels, i.e. at primary, secondary, and tertiary levels. Public funding of these laboratories is not equally regulated, which leads to a different scope of financing and pricing of the same tests. This partially affects their efficiency. The paper utilises the example of a public healthcare institution to show that the efficiency of all laboratories in a single institution differs. Data from eight laboratories operating within the institution was used. The data envelopment analysis (DEA) method was used. The results have shown that two laboratories lie at the efficiency frontier and all the laboratories, with the exception of the worst one, have an efficiency score ranging from 25% to 69%.

1. MEASURING EFFICIENCY IN HEALTHCARE USING THE DEA METHOD

In public healthcare, studies based on the DEA methodology mainly focus on inter-hospital comparisons and comparisons of health systems. The majority are case studies which focus on determining the efficiency of public health institutions as a whole. The most extensive review of literature and studies from this field is provided by Kohl, Schoenfelder, Fügener & Brunner (2018), who review 262 papers on DEA applications in healthcare. The main finding of this review is that the DEA is a successful method for establishing efficiency in healthcare; it is used both for analysing individual units and for the entire healthcare system. There are only a few studies on the efficiency of public laboratories, and John et al. (2015) call for new economic studies, whose findings could be used in models aimed at improving the financing of laboratories, while research would help shape studies measuring the potential effect of value added services.

In addition to the provided and presented studies, the DEA was used in studies aimed at establishing the efficiency of public healthcare institutions, by Farantos & Koutsoukis (2016), for Greek hospitals utilising the CCR, BCC, and super efficiency models, Van Ineveld et al. (2016) for Dutch hospitals (CCR and BCC models), and Linna, Hakkinen & Agnussen (2010) for Norwegian hospitals (also using both models). They all use similar inputs (health professionals, costs, and medical equipment) and outputs (number of examinations, revenue, and number of hospital days).

In the last three years, there have been several studies including the activity of laboratories. Vitezić, Šegota and Setnikar-Cankar (2017) analysed the efficiency of twelve units of the Croatian Institute of Public Health. This study is close to the present one, as it includes laboratories at the level of a public tertiary institution. The authors used the BCC DEA model, focusing on inputs. These were employee salaries, direct costs, investments, and number of samples. Outputs included total revenue and the number of analyses The result of the study is the possible application of the DEA as an effective tool for assessing the efficiency of individual departments within a single institution, which further confirms the use of the DEA in our study. Another interesting study associated with laboratories and using the same method, is the work of Taheri, Jahromi & Lotfi (2015), which analyses ten laboratories at the Shiraz University of Medical Sciences. Using an input-oriented DEA BCC model, the technical efficiency of laboratories was determined. The number and type of instruments and the number of personnel were used for inputs, and the number of tests in individual fields were used for outputs. It was established that the majority of the observed laboratories demonstrate a high efficiency. We shaped our model similar to these two studies, i.e. on the basis of similar/same inputs and outputs.

The efficiency of individual departments within healthcare institutions, i.e. radiology departments, was studied by Ozcan & Legg (2014). Data was acquired through a survey conducted among the members of the American Society of Radiologic Technologists. They

obtained 923 usable responses. The data was analysed using an output-focused DEA BCC model. Staff measured by full time equivalents, the number of radiology units, and the number of advanced radiology units were used as inputs and the number of radiology services and the number of advanced radiology services were used as outputs. The main finding was that the majority of the departments featuring basic diagnostic radiology were technically efficient. However, as the complexity of technologies increase (e.g. computed tomography, magnetic resonance, etc.), a smaller percentage of departments are efficient.

Liu (2009) focuses on how to integrate an optimal weights restriction model and an absolute restriction method to restrict weight flexibility in DEA, so that the evaluation result can be more realistic. The efficiency assessment, average efficiency assessment, and the number of efficient DMUs below weights restriction, have shown a declining tendency before weights restriction. The more accurate the weights restriction, the greater the DEA ability. Similarly, Amirteimoori & Cordrostami (2013) determine a linear programming model, which is used in the cross-efficiency calculation.

In consideration of the frequency of using DEA for establishing the efficiency of public health institutions and examples for laboratory services, our study applied the DEA methodology, i.e. the CCR model, which we exposed to the objective weights restriction by calculating cross-efficiency. This method was used to check *whether laboratories within a chosen tertiary health institution differ in terms of efficiency*. We further checked the cross-efficiency of laboratories, which enables the objectivisation of the weights for the chosen inputs and outputs. The objective positioning of weights is an essential factor for the correct assessment of the efficiency of individual DMUs, and can help in establishing possible improvements for individual laboratories.

The results of this study can be used by the public institution to improve the efficiency of its laboratory activity. This can improve the technical efficiency of hospitals and health systems, consequently leading to savings in public health coffers. In the long run, this enables the improvement and expansion of access to high-quality healthcare.

The paper is structured so as to first provide a review of literature, followed by a shorter review of funding of biomedical laboratories in Slovenia, and by positioning the chosen institution in the Slovenian health arena. This is followed by a review of the methodology and study results. The final part presents the findings, study limitations, and possible changes in the institution's operations aimed at increasing efficiency.

2. FUNDING OF BIOMEDICAL LABORATORIES IN SLOVENIA

Rohr et al. (2016) established the importance of laboratory diagnostics in healthcare. Their study shows that laboratory diagnostics account for 60–70% of clinical decisions. In Slovenia,

patients are first involved with laboratory services at a primary healthcare level, followed by secondary and tertiary healthcare levels.

In Slovenia, laboratory services are mainly financed from the funds of the Health Insurance Institute of Slovenia, and according to EUROSTAT's statistics, cover 3.6% of healthcare expenditure in the context of ancillary services to healthcare (such as laboratory testing or the transportation of patients). These percentages vary for other comparable Central and Eastern European countries: the Czech Republic (5.2%), Croatia (9,4%), Poland (4,8%), and the Slovak Republic (8,5%). It is also estimated that in-vitro diagnostics account for 1.4 to 2.3% of total healthcare expenditure and less than 5% of hospital costs (Report by the Lewin Group). Even though laboratory diagnostics comprise a small share of healthcare costs, they account for a major percentage of clinical decisions (Wilke, Schenker and Hoffmann, 2002). It is precisely due to these facts that medical laboratories represent an important stakeholder in correct and high-quality patient care.

The systemic regulation of the laboratory activity is rather branched in Slovenia, as it is regulated differently at different healthcare levels and consequently differently funded. The payment of laboratory services depends on several types of funding, i.e. through the diagnosis-related group system (DRG), the diagnostic grading system, and the capitation system. The different types of funding of the laboratory activity can cause inefficient spending of funds for the laboratory activity in Slovenia, as they allow for the doubling of tests on the same patient at different levels, non-transparent payment of these services, etc. The different systems of funding the laboratory activity force specific groups to use their laboratory resources more effectively, or to shift tests to a higher healthcare level. On the other hand, at secondary level, due to indirect funding through the DRG, individual laboratories invest in technology which does not meet the appropriate effectiveness of use, as the laboratory is not large enough and does not employ the right experts. Consequently, due to the higher price of reagents and laboratory services, its services are more expensive than would be appropriate with regard to the scope of tests.

The largest public institution at tertiary level in the Republic of Slovenia, the University Medical Centre Ljubljana (UMCLj) was chosen for the study into the technical efficiency of laboratories. There are several laboratories operating in the context of the UMCLj, and one of them is the largest institute from the field of laboratory biomedicine, i.e. the Institute of Clinical Chemistry and Biochemistry (ICCB). The ICCB is an independent organisational unit within the UMCLj, and is subdivided into several laboratory departments. The laboratories at the ICCB provide diagnostic services in haematology, biochemistry, haemostasis, and immunology. A total of eight laboratories were included in the study.

3. METHODOLOGY

The method used in this paper is based on benchmarking or comparative analysis methods. "*Benchmarking is the process of measuring products, services, and practices against leaders in a field, allowing the identification of best practices that will lead to sustained and improved performance*" (Galloway & Nadin, 2001). The paper utilises the DEA (data envelopment analysis) method to show the most technically-efficient ICCB laboratory in the UMCLj. *"(DEA) evaluates the relative technical efficiency with a 'linear programming model', by using (input & output) variables from similar and homogeneous DMUs.*" (Kassam & Ali, 2017). In economic terms, efficiency is determined using Pareto efficiency. With Pareto efficiency, it is assumed that the provision of services or production run in accordance with the best available technology (Došenovič, 2014). In our study, it is important to correctly define technical efficiency, as the total technical efficiency and allocative efficiency make out economic efficiency (Makheti, 2017). A service provider is deemed technically-efficient if they produce a level of output in the scope enabled by available inputs. In-vitro diagnostics can reduce direct and indirect healthcare expenditure, if the objective is more accurate and faster medical diagnostics. The DEA model can be input- or output-oriented. An output-oriented DEA model leads to maximising outputs with constant inputs, while an input-oriented DEA model leads to minimising inputs by achieving constant outputs. Numerous DEA models have been tested; however, two models with various versions are mostly used: the Charnes-Cooper-Rohdes (CCR) model and the BCC model. "*In the CCR model, a mathematical optimisation method for determining the efficiency is applied through converting multiple inputs and outputs of a single unit to a virtual input and a virtual output, and the BCC model is a model of blind analysis of data that assesses the relative efficiency of variable yields to scale deals.*" (Taheri, Shayan Jahromi & Lotfi, 2016).

A basis for the main choice of variables for our paper is also provided by the case study by Taheri, Jahromi and Lotfi (2016), and the paper by Vitezić, Šegota and Setnikar-Cankar (2017). The inputs which are analysed in the paper are the number of working hours recorded and the number of biomedical analysers. The number of basic and special tests determine the outputs. By using the cross-efficiency method and transferring weights models of individual laboratories to the analysed laboratory, and by transferring the weights of an individual laboratory to all other laboratories, the average efficiency of individual laboratory departments was determined. One of the methods of weighting inputs and outputs is the assessment of the weights on the basis on an expert opinion. When using expert opinions, there can always be a dilemma as to the bias of the opinion, which can be reduced by increasing the number of respondents; however, an objective way to calculate cross-efficiency is available. The present study in laboratory medicine used the objective weighting of inputs and outputs with the cross-efficiency method. According to Doyle and Green (1994), cross-efficiency, with its intuitive understanding, has fewer possibilities for subjective elements and limitations which derive from the subjective opinions of individuals.

Technical efficiency was defined on the basis of Charnes, Cooper, & Rhodes (1979):

$$E_o = \frac{\sum_{i=1}^{r} U_r . Y_{rj}}{\sum_{i=1}^{m} V_i . Xij}$$

Yrj is the quantity of output r produced by unit j
Ur is the weight attached to the output r
Xij is the quantity of input i used by unit j
Vi is the weight attached to input i
Eo is the laboratory efficiency indicator which lies between 0 and 1

As mentioned before, the analysis included 8 ICCB laboratories, operating in the context of the UMCLj. The data was retrieved from records managed by the laboratories. On the basis of studies by other authors and the availability of records of individual laboratories, inputs and outputs were determined for all the chosen laboratories. Table 1 shows the inputs and outputs used in the analysis.

Table 1: Inputs and Outputs Table

INPUT 1	NUMBER OF WORKING HOURS RECORDED
INPUT 2	NUMBER OF BIOMEDICAL ANALYSERS
OUTPUT 1	NUMBER OF BASIC TESTS
OUTPUT 2	NUMBER OF SPECIAL TESTS

Source: own research

Using the DEA method, we measured the technical efficiency of eight DMUs (decision-making units). Especially in healthcare, it is possible to anticipate constant outputs and on the basis of this fact, our DEA method is input-oriented. The analysed DEA data processing model is based on the CCR, by assuming proportional changes to both inputs and outputs. The mentioned CCR model was chosen, as it allows us to use a smaller number of observed units to obtain a smaller number of DMUs lying on the efficiency frontier. In order to have objective input and output weights, the study also includes the calculation of cross-efficiency and a cross-efficiency matrix.

4. RESEARCH RESULTS

Two of the ICCB laboratories which were analysed using the DEA method and presented in Table 3, lie on the efficiency frontier (laboratory 1 and laboratory 6). The lowest efficiency is achieved by laboratory 7 (5.56%). The other analysed laboratories have an efficiency score ranging from 25% to 69% (laboratories 2, 3, 5, and 8). Among the most efficient laboratories, laboratory 6 most frequently manifests itself as a model for other laboratories (six times). As mentioned before, laboratory 7 records the lowest efficiency with the assigned automatic weights. A model for laboratory 7 is laboratory 6. In order for laboratory 7 to achieve the efficiency frontier, it would have to reduce costs of reagents and materials by 94.44%, the

number of working hours by 96.97%, or increase the number of basic tests by 66.55%. This result is the logical consequence of the main activity of laboratory 7, as its main activity is that of a research laboratory, which mainly does not perform routine diagnostic testing. It is therefore necessary to know the activity of individual laboratories before checking, determining, and comparing their efficiency. The special characteristics of laboratory 7 clearly show that its efficiency cannot be compared to that of other laboratories, due to its main activity. It would be more sensible to compare this laboratory to similar laboratories in other tertiary institutions.

The analysis further shows (Table 2) that none of the laboratories distribute the input/output contributions equally among all the provided variables, but the weights are distributed differently for each laboratory. More details on the distribution are provided under inputs.

Table 2: Input/output contributions (%)

DMU	Input 1	Input 2	Output 1	Output 2
1	18.3	81.7	100.0	0.0
2	100.0	0.0	72.7	27.3
3	18.3	81.7	6.7	93.3
4	18.3	81.7	3.9	96.1
5	18.3	81.7	12.8	87.2
6	18.3	81.7	3.7	96.3
7	100.0	0.0	0.0	100.0
8	100.0	0.0	28.0	72.0

Source: own research

Linear programming automatically weights the variables, and further analysis includes calculations of average efficiency of individual laboratories by transferring weights models of other laboratories to the analysed laboratory, and the behaviour of the laboratories as a whole by transferring the weights of an individual laboratory to all other laboratories. The results of cross-efficiency of the laboratories are presented in Table 3.

Among the individual weights models of laboratories, which are used on all other examples of weights, the highest contribution to the total average efficiency of the group is provided by the model where input 1 contribution is 100% and input 2 contribution is 0%. The weights model, which is used to calculate the efficiency of laboratory 2 and laboratory 8, is proven to be the most efficient for the total group of laboratories (52.79% efficiency). Of course, the laboratories are the most efficient as a group, if linear programming runs free (total efficiency of laboratories is 55.10%) and consequently the chosen weights model shows every laboratory in the best possible light with regard to other laboratories. However, the same IO contribution of inputs and outputs is not used for all laboratories, which means that we do not use the same conditions when analysing the efficiency of individual laboratories.

Table 3. Efficiency and cross-efficiency of ICCB laboratories (%)

	Score	Average of peers	1	2	3	4	5	6	7	8
Score	**55.1**		100.00	25.29	58.49	68.10	38.98	100.00	5.56	44.35
Average by peers			89.55	16.98	49.88	56.81	31.97	88.08	3.67	30.25
1	100.00	17.26	100.00	12.16	5.13	3.50	6.67	4.67	0.09	5.87
2	25.29	**52.79**	100.00	25.29	54.39	59.71	33.21	100.00	5.40	44.35
3	58.49	51.66	100.00	16.45	58.49	68.04	38.78	100.00	3.23	28.32
4	68.10	51.66	100.00	16.39	58.52	68.10	38.83	100.00	3.22	28.24
5	38.98	51.66	100.00	16.21	58.61	68.30	38.98	100.00	3.19	28.01
6	100.00	51.66	100.00	16.63	58.40	67.84	38.63	100.00	3.25	28.56
7	5.56	37.69	16.38	7.41	51.11	59.31	27.48	100.00	5.56	34.30
8	44.35	52.79	100.00	25.29	54.39	59.71	33.21	100.00	5.40	44.35

Source: own research

When calculating the average efficiency of laboratory 1 by using all weights models of the other laboratories included in the analysis, it can be seen that the average efficiency of laboratory 1 drops to 89.55%, which is to be expected, as by definition, the most optimal conditions of weights for laboratory 1 have not been chosen. The greatest difference between the determined efficiency (automatic weights) and calculated average efficiency by using all weights models on the analysed laboratory, can be established in laboratory 8 (a difference of 14.1%), and the smallest difference can be seen in laboratory 7 (1.9%). Laboratory 1 has been determined as the peer model with a 100% efficiency already by linear programming (DEA).

The use of the results of calculating technical efficiency for a descriptive proposal of measures, can be seen in the example of laboratory 3. Laboratory 3 records technical efficiency scores of 58.49%. The models for laboratory 3 are laboratory 1 and laboratory 6. In order for laboratory 3 to reach the efficiency frontier, it would have to reduce the number of working hours by 45.61%, and the number of biomedical analysers by 40.59%. It is difficult to influence the reduction of the number of biomedical analysers from the viewpoint of diversity of tests which are conducted in the laboratory, and consequently individual tests can be done only on a specific analyser. Only a better utilisation of the existing biomedical analysers would contribute to a better technical efficiency of the analysed laboratory 3. One of the possible solutions is to join same-type laboratories and consequently utilise biomedical analysers better. An improvement of the technical efficiency of laboratory 3 could therefore be possible by reducing the number of employees in laboratory 3, or by transferring excess employees to other laboratories which have a higher load, according to the number of outputs.

Furthermore, the results of calculating cross-efficiency again show that laboratory 7 deviates from the other laboratories and it needs to be checked why its deviation is larger, i.e. if weights models of all other laboratories are transferred to laboratory 7, laboratory 7 has an average efficiency score of only 3.67%.

The solution to the problem of real or correct weighting of individual variables, lies in the calculation of cross-efficiency, where the average efficiency of individual laboratories can be established by transferring all other weights models to the analysed laboratory. However, with such a calculation, none of the laboratories lie at the efficiency frontier, but the method still enables effective ranging of laboratories and exposing them to the same weights conditions. The average assessment of efficiency of the whole group of laboratories enables the determination of the second most optimal weighting of input and output variables, which, with a small number of observed units, can help us in the further analysis of efficiency of medical laboratories.

5. CONCLUSION

Our study is the first to measure and compare technical efficiency of biomedical laboratories in Slovenia. Cross-efficiency was used to rank individual laboratories. The analysis enabled us to descriptively determine measures which should be adopted for an individual laboratory, in order to achieve average efficiency with regard to the compared laboratories. For laboratories where the number of working hours negatively affects their efficiency (e.g. too many employees with regard to the number of conducted tests), it might be reasonable to consider a reallocation of the labour force to laboratories where working hours are lacking. With the inputs and outputs chosen for this study, the special characteristics of input 2 must be considered, as they indicate the need for a better utilisation of devices; however, in such a case, the DEA should focus on outputs. When dealing with similar tests, laboratory efficiency should be equivalent; however, there are still differences among the compared laboratories. The realisation of the proposed measures can lead to a greater efficiency of the presented public service. This would reduce the use of public funds allocated to healthcare. Greater total efficiency would contribute to a greater efficiency of use of public funds.

The main limitation of the study is undoubtedly the small number of units, and it would be sensible to continue the study in the direction of comparisons with laboratories from other tertiary public institutions. In such a case, greater value could be placed on the internal comparison of laboratories. It needs to be emphasised that it is difficult to obtain these types of data, as they are not publicly available, are recorded differently, etc.

Using the DEA method also requires researchers to be familiar with the activity of the individual observed units which are being compared. Lack of familiarity with the content of the work can classify a laboratory as being inefficient, even though the laboratory cannot be compared to other laboratories due to the nature of its work. This was also the case with the present study, as the lowest efficiency was achieved by a laboratory which cannot be compared to other laboratories in terms of its services. The same laboratory could achieve the highest efficiency if outputs focused on its activity (e.g. number of patents, innovations, etc.). In such a case, the efficiency ranking of the compared laboratories would be different. When

using the DEA, the choice of appropriate inputs and outputs is therefore of key importance for determining efficiency.

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POLAND. CURRENT MACROECONOMIC PERFORMANCE, PROSPECTS FOR THE FUTURE AND STRATEGIC FRAMEWORK OF DEVELOPMENT

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ABSTRACT

In the following article we will discuss the assumptions of the Poland's 2019 budget in the context of both the country's recent macroeconomic performance and its development perspectives delineated in the nation's mid-term development strategy – The Strategy for Responsible Development (SRD), which since February of 2017 constitutes a beacon for development and socio-economic policy actions in Poland (Ministry of Economic Development, 2017). The Strategy's main objective is to create conditions for increasing incomes of all Polish citizens, while at the same time assuring social, economic, environmental and territorial cohesion. The Strategy is therefore oriented at attaining inclusive social and economic development and assumes that improved social cohesion will constitute the main driving force of development. The Strategy for Responsible Development introduces interdependence between main types of objectives - on one hand it subordinates actions in the economic sphere to achievement of objectives related to the quality of life, while on the other it stresses that attainment of social objectives will depend upon securing economic goals. It should be also underlined, that the Strategy places emphasis on the needs of those citizens and areas, which so far have been left outside the development policy's positive effects. It is expected that in the long term the Strategy's implementation will allow citizens to secure both higher income levels and quality of life improvement.

1. POLISH ECONOMY - MAIN MAKROECONOMICS INDICATOR

The rationale behind the elaboration of the SRD s a realization on the part of policy makers that the dominant economic model introduced in 1989 led to Poland's falling into five development traps – defined as: the middle-income trap (as reflected by the country's GPD per capita at PPP, and wages in comparison to developed western economies), the imbalance trap (adverse BOP and NIIP developments), the average product trap (insufficient innovativeness of enterprises and low R&D expenditure in relation to GDP with enterprises basing their competitive advantages on the availability – which has recently started to peter out – of relatively inexpensive labor), the demographic trap (one of the lowest fertility rates in the EU) and, last but not least, the weak institutions trap (as evidenced by i.a. large gaps in tax collection – which, fortunatAely, have been effectively addressed in the last two years, leading to much lower fiscal deficits). Under the previously applied development model the fruits of development were accruing disproportionately to certain social layers in agglomerations and large cities, while the public policy was reactive, with insufficient focus placed on anticipating and preventing adverse phenomena and on identifying and tapping potential opportunities. We will attempt to illustrate that the feeling of complacency, which was prevalent under many successive governments is in danger of returning – we discern signs of such a complacency in the budgetary assumption for 2019. It is to be avoided at all costs in order to secure "strategic determination" required for the implementation of the Strategy for Responsible Development in what appears to be much less conducive external environment.

The "specific objective I" of the Strategy entails achieving "sustainable economic growth increasingly driven by knowledge, data and organizational excellence". The most important long-term economic effects of efforts in these areas should lead to expanding the role of innovations in the GDP creation. This should, in turn, be instrumental in accelerating convergence of the income level to the EU average figure. When it comes to the institutional dimension, the Strategy's implementation should allow for the creation of a more friendly state for citizens and entrepreneurs, and in the social dimension for reducing social exclusion, poverty and social disparities, with the overarching objective of establishing strong social capital and harnessing it into the development processes.

The actions undertaken under these strategic objectives will be at the same time congruent with the need to ensure a lasting macroeconomic stability, including in the area of fiscal policy. It's necessary to maintain the stability of public finance while promoting inclusive economic growth. The above-mentioned activities will be supplemented by the implementation of infrastructural projects and introduction of modern regulatory and institutional frameworks in such areas as: the development of human and social capital, digitalization, transport, production and distribution of energy and the maintenance of a good environmental conditions.

Since it is not our purpose to describe in detail the numerous objectives and progress indicators present in the said Strategy, but to present it as a reference for the economic performance and perspectives, we would like to synthetize this part of our analysis in the form of table 1. The table in question presents the respective main indicators of the objective's realization, the starting conditions in 2016 (the year preceding the launch of the Strategy), the numerical target values set for 2020 and for 2030, as well as 2017/2018 data, to show the progress attained so far in meeting the said goals.

Table 1. Selected Monitoring Indicators of the Strategy for Responsible Development

	2016	2017/18	2020	2030
Main objective – creating conditions for growth of incomes and for social, economic and territorial cohesion				
Real adjusted gross disposable income of households per capita at PPP (UE28=100)	70.3	70.3 (2016)	76-80	100
People at risk-of-poverty or social exclusion	21.9	19.5 (2017)	20.0	17.0
GDP per capita at PPP (EU28=100)	69.0	70 (2017)	75-78	95.0
Gini coefficient - distribution of income	29.8	29.2 (2017)	30.0	27.0
Detailed Objective 1 – sustainable economic growth based on knowledge, data and organizational excellence				
Share of manufacturing in gross value added (%)	20.4	20.0 (2017)	20.0	21.0
Share of net revenues from sales of products of entities classified as high-tech and medium high-tech production (%)	34.8	34.1 (2017)	34.0	40-45
Expenditures on R&D in relation to GDP (%)	0.97	1. 03 (2017)	1.70	2.50
Business enterprise sector expenditures on R&D in relation to GDP (%)		0. 67 (2017)	0.80	1.30
Investment rate (%)	18.1	18.0 (2018)	22-25	25.0
Average annual growth rate of export of goods since 2015	5.6	7.1 (2017)	7.2 (2015-20)	6.8 (2021-30)
Share of export of high technology products in total exports	8.5	8.4 (2017)	10.0	15.0
People at-risk of extreme poverty rate (%)	4.9	4.3 (2017)	5.5	4.5
People at-risk of poverty rate after social transfers	17.3	15.0 (2017)	14.0	12.0
Percentage of children aged 0-3 covered by various forms of institutional care	9.1	10.4 (2017)	10.0	33.0
Employment rate (LFS)	69.3	72.8 (Q3 2018)	71.0	73.0

Sources: Strategy for Responsible Development, Ministry of Economic Development, 2017, Eurostat, Central Statistical Office of Poland

In our opinion the progress achieved in the first two years of the Strategy's implementation, which incidentally turned out to be - very successful from the macroeconomic perspective, hasn't been –as evidenced by the attached data - overly satisfying, despite the acceleration in the GDP growth observed in the period 2017-2018. Therefore the question arises, what could happen to the attainment of the above mentioned objective under less beneficial economic developments globally (and attendant slowdown in the country's economic growth). To start this part of our analysis, we would like to underline that in January of 2019 Polish legislature has approved the budgetary bill for 2019, which - according to the comment by the Minister of Finance (Professor T. Czerwinska): "ensures the necessary stability of public finances, is an inclusive one and contains pro-development impulses - it is a budget that will serve Poland well". (Ministry of Finance, 2019).

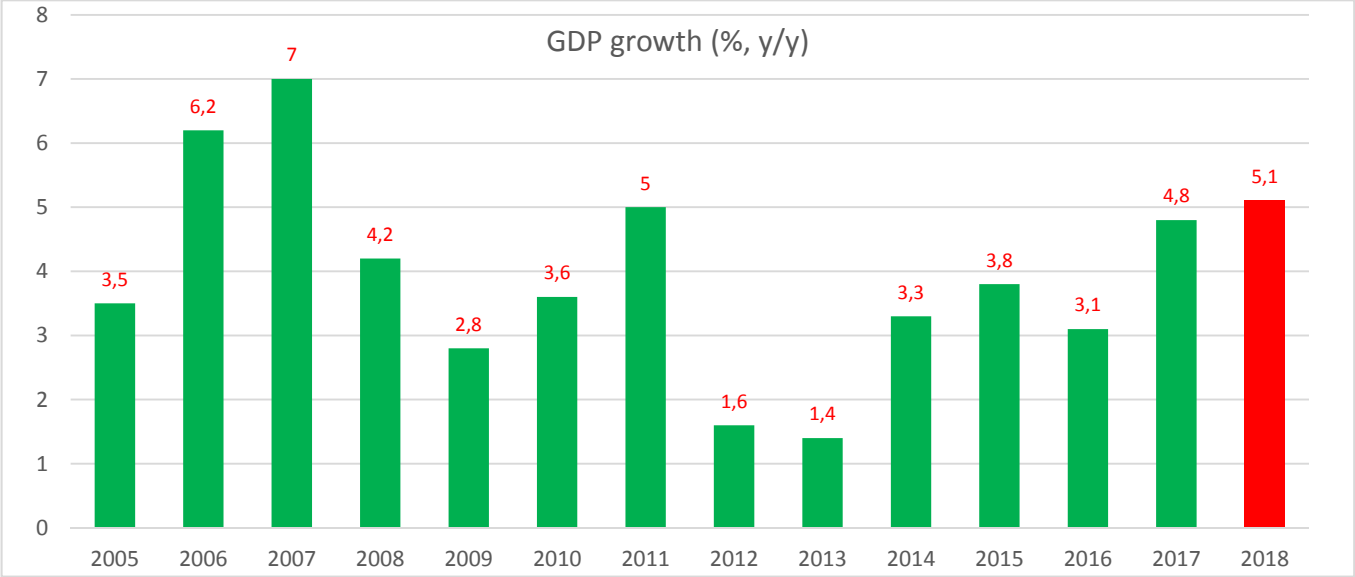
The macroeconomic assumptions of the budgetary bill, which were prepared in the summer of 2018, stipulate i.a. that:

a) the general government's deficit (based on the EU methodology) will not exceed 1.7% of the GDP,
b) real GDP growth will amount to 3.8% and the average annual CPI inflation to 2.3%,
c) both the average annual wage in the national economy and pensions will increase – in nominal terms - by 6% while,

d) the private consumption will expand by 5.9% in nominal terms (Ministry of Finance 2018).

In the Parliament's announcement we read that "The government's priority is to maintain the stability of public finances, while supporting economic growth and solidarity-oriented social policy". In the latter part of our article we will present our own assessment of the validity of the budget's detailed assumptions and philosophy, taking into account the changing economic context, both nationally and globally. Moving forward will are going to present both the economic developments of the last few years and selected forecasts of basic macroeconomic indicators for 2019 and in a mid-term perspective. Following the subdued economic growth in the years 2012-2013 (when the Polish economy expanded in real terms at an annual rate of approximately 1,7%), and a noticeable acceleration recorded in the period 2014-2016 (with the annual average GDP growth doubling to 3.5%), the years 2017-2018 proved remarkable for Poland, with the real GDP growth accelerating, to respectively to 4.8% and 5.1%. (Central Statistical Office of Poland, 2019).

Chart 1. GDP growth, annual figures 2005-2018



Source: own elaboration based on the data of the Central Statistical Office

Domestic demand constituted - similarly as in 2016 and 2017 - the main engine of growth, thanks chiefly to the contribution from private consumption.

Authors of the budget assumed also that from 2018 investment's contribution to the GDP would significantly expand, at the same time underlining, however, that private consumption - supported by optimistic consumer expectations and healthy situation on the labor market - was to remain the main engine of the economic growth. Macroeconomic estimates embedded in the budgetary package indicated that in both 2018 and in 2019 the real GDP should expand by 3.8% per annum (as we have already indicated, it turned that in 2018 GDP grew by as much as 5.1%), with the domestic demand remaining the main growth factor, supported additionally by the measures taken to improve the efficiency of the tax administration, and hence budgetary revenues (Central Statistical Office of Poland, 2019).

Table 2. Contributions to the GDP growth (p. p.)

	2015	2016	2017	2018
Net exports	0.6	0.8	0.1	0.0
Domestic demand	3.2	2.3	4.7	5.1
Consumption	2.2	2.7	3.5	3.3
- in it, households sector's consumption	1.8	2.3	2.9	2.6
Accumulation	1.0	-0.4	1.2	1.8
- in it gross fixed capital formation	1.2	-1.6	0.7	1.3

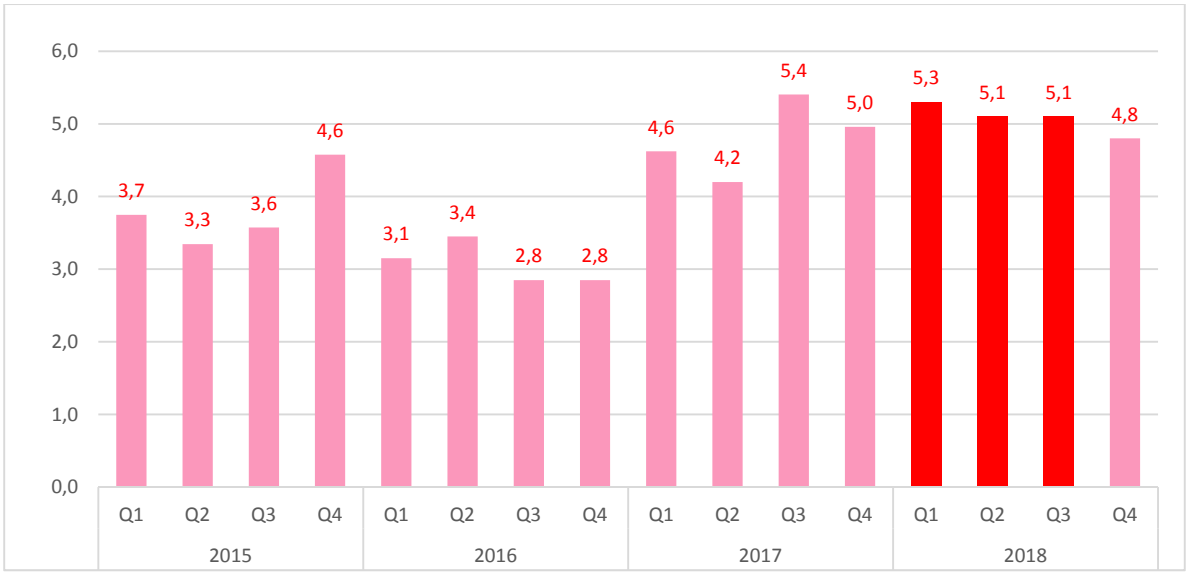
Source: own elaboration based on the data of the Central Statistical Office

The government's objective of maintaining the stability of public finances while supporting inclusive economic growth, which calls for a budgetary policy aware of the limitations placed by the fiscal rules aimed in turn at ensuring the public finances' stability. A growth-friendly budgetary policy, conducive to economic recovery and not jeopardizing the sustainability of public finances is not only congruent with the European Council's recommendations but also reflects the development needs of Poland.

The process of eliminating leaks in the tax administration is oriented mainly at assuring expansion of the VAT collection and on combating VAT-related frauds. At the same time, stabilizing expenditure rule will determine the rate of expenditure growth at the level consistent with the eventual attainment of the mid-term budgetary objective – MTO (defined as the structural deficit not exceeding 1% of the GDP)[1].

The GDP growth was accelerating since Q1 2016, recorded the highest growth in Q3 2017 (5.4%), and exceeded 5% until Q3 2018. In the Q4 2018 the GDP growth slowed down to 4,8%, as portended by the monthly slowdowns in industrial production, construction and assembly production, retail sales and negative contribution of net exports recorded in the individual months of that quarter (Central Statistical Office).

Chart 2. Quarterly GDP growth (% change, over the same quarter of the previous year)



Source: own elaboration based on the data of the Central Statistical Office

[1] In addition, to the limitations resulting from national regulations, EU regulations enshrined in the Stability and Growth Pact will also be respected, including the 3% of GDP limit on the general government's deficit.

In our opinion the most important difference between the high rate of economic growth recorded in 2017 and the high rate posted in 2018 boils down to the external environment in which this growth transpired. While in 2017, the economic situation in the EU countries continued to improve (the GDP growth rate of 2.4% - compared to 2.0% in 2016), the 2018 brought about significant slowdown in economic growth (to 1.9% on average in the EU), i.a. pulling down demand for Polish exports and translating into neutral contribution of net exports to the country's GDP growth (in 2017 the contribution of that category was positive). Therefore, it was domestic demand (in particular private consumption) which once again constituted the main source of economic growth 2018, with a positive contribution of investment outlays (investment outlays grew in both 2017 and 2018 making a positive contribution to growth - as opposed to 2016 - with particularly strong rebound of public sector's investments. Surprisingly, the contribution of net exports to growth turned out to be neutral in the 2018 as a whole (0.0 p.p.), despite being negative sometime during the year (Central Statistical Office, 2019)

Estimates – based on the methodology of the European Commission - of the potential growth rate of the Polish economy, indicate certain slowdown due to the global financial crisis - which since 2013 resulted in the surfacing of the negative output gap – at that time the dynamics of potential GDP were not compensated by the strong downward trend in the equilibrium unemployment rate (NAWRU), observed since 2002. Along with the continued growth in the demand for labor, a gradual increase in growth rate of productivity was observed. It is estimated that in 2017 the potential economic growth rate increased by 0.2 p.p. - to about 3.2%, compared to the actual GDP growth rate (4,8%), leading to the opening of a positive output gap of almost 2% of the GDP (Ministry of Finance 2018).

Taking into account the annual changes in the GDP, the last two years (2017-2018) were therefore among the record-highest ones since the country's EU accession (with higher annual growth rate recorded only in 2004 and in the period 2005-2007). Consequently, the average annual growth rate in the period 2016-2018 amounted to approx. 4.3%, as opposed to less robust – taking into account the country's still sizeable development needs – 3,2% recorded in the years 2008-2015.

An important place in Poland's economic policy is occupied by the issue of income convergence towards the most economically developed EU Member States. Therefore, the progress observed in recent years in terms of "catching up" to the average development level in the European Union deserves attention. Although the scale of progress achieved in this respect in 2018 is not yet known, we would like to emphasize, that in 2017, Poland narrowed the said distance by 2 percentage points (compared to the year 2016), reaching the symbolic threshold of the 70% of the EU average. Since, we can safely assume that the robust convergence rate was maintained in 2018, as certain analyses estimate that in 2018 Poland reached 71-72% of the average EU-28 GDP per capita figure. Therefore the country is making great strides towards achieving by the year 2020 around 75-78% of the said average (as set in the SRD).

As far as the prices movements are concerned, growing prices of commodities (especially of crude oil) at the turn of 2016/2017 translated into rapid increase in the dynamics of energy prices in Poland. Consequently, CPI inflation accelerated in Q1 2017 to 2.0% (as against 0.2% a quarter earlier), but remained relatively stable in the following quarters of that year. Consequently, after two years of deflation, in 2017 the average increase in the prices of consumer goods and services amounted to 2.0%. However, in 2018 inflation decelerated to

1,1% y/y towards the year's end, and remained below than the National Bank's of Poland target (defined as 2.5% +/- 1 p.p.) for six years now. Despite highly positive labor market developments and the high rate of private consumption's growth, core inflation (excluding energy and food prices) remained moderate throughout 2017 - 2018. Moderate risk of inflationary pressures allow the central bank to National Bank of Poland to keep the policy-controlled interest rates at an unchanged level (the main interest rate - reference rate - remained at the level of 1.5% since 2015).

It should be also stressed that in 2017 current account recorded a surplus of 0.3% of the GDP, for the first time since mid-1990s; however in 2018 it moved into the negative territory again (recording a deficit of around 0.6% of the GDP).

The acceleration of economic activity in the period 2017 - 2018 was conducive to further improvement of the situation on the labor market. In December of 2018 the average employment in the enterprise sector was 11.8% higher than in January 2015, with the simultaneous decline in the number of unemployed registered in employment offices decreased by almost 48% (though towards the years end it started growing slightly from the record low figure recorded in October 2018). Growing employment was accompanied by a dynamic increase in wages – from January 2015 to December 2018 the average monthly gross salary in the enterprise sector increased by over 25%, for the first time crossing the symbolic level of PLN 5000 (in real terms it grew by about 16%) – which was equivalent to (slightly less than EUR 1200).

Positive effects of changes in the labor market are attested to not only by the creation of new jobs, but also by improvement in the qualifications of employees and their better adaptation to the changing conditions on the said market. Moreover, the processes taking place on the labor market determine to a large extent the level and dynamics of social development. The improvement in the labor demand limits the scope of an array of adverse phenomena related to long-term unemployment or inactivity (such as: poverty, social pathologies, apathy, sense of resignation and helplessness), which in turn contributes to improving social mood in a given country/region, increases its investment attractiveness, boosts the volume of goods and services produced and hence real wealth. At the same time, it should be emphasized that the observed inflow of foreign employees allowed to reduce the tensions related to the demand for employees and to relieve inflationary pressures.

In this context, the declining unemployment rate, was encouraging. According to the Central Statistical Office, the rate of registered unemployment dropped from 11.5% in Q1 2015 to 5.7% in November of 2018 (it subsequently rose to 5.8% as of December), while the unemployment rate based on the Labor Force Survey decreased from 4,3 % (in December of 2018) to 3.5% in December of 2018 being the third lowest in the EU, according to the Eurostat data - and much lower than the respective averages for the euro area (7.9%) and for the EU-28 (6.6%)[2] (Eurostat, 2019).

Upon entering the European Union, Poland was characterized by the lowest employment rate (people aged 20-64) and despite the progress achieved in the following years, in Q1 2015 the respective indicator (66.7%) was by nearly 2.5 p.p. lower than the then EU average. However, the distance vis-à-vis the said average narrowed - according to our estimates - to less than 1 p.p. in Q3 2018, when the figure for Poland (72.8%) was higher than the average for

[2] Lower unemployment rate was recorded only in case of two EU countries (the Czech Republic and Germany).

Eurozone (72.2%) and only slightly lower than the average EU-28 figure (73.5%). The progress achieved stemmed from the much faster growth in this indicator in the last 3 years in Poland than on average in the EU. (Eurostat, 2019).

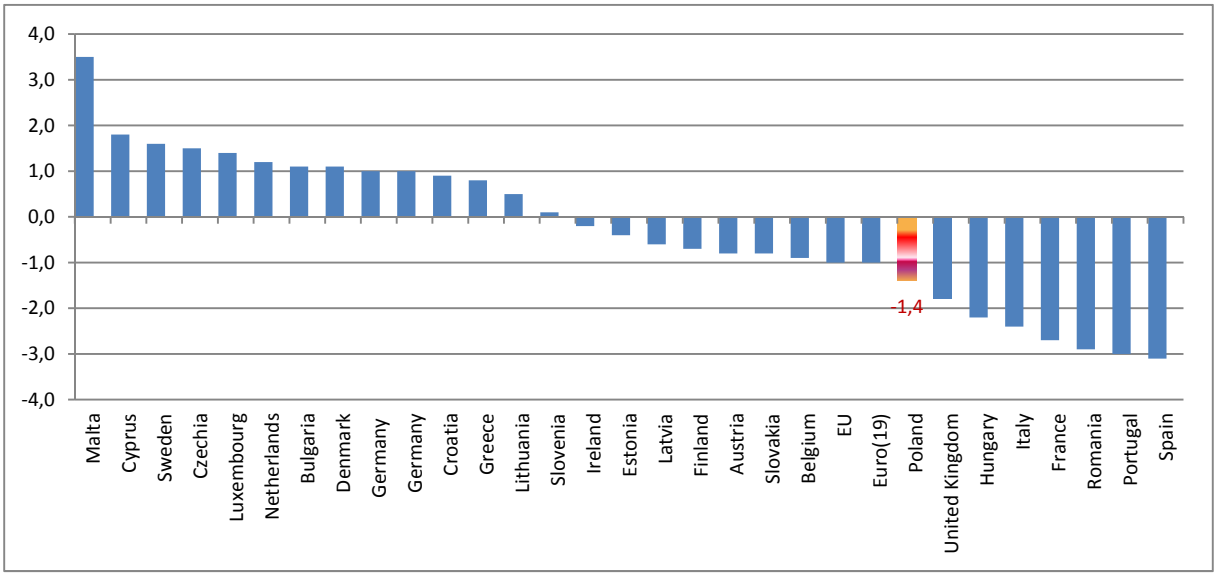
The high rate of economic growth and improving labor market situation, were conducive to the conduct of inclusive economic and social policy (including the Family 500+ Program of direct payments to families with children) which translated into an improvement in the population's standard of living, as evidenced by progress made in combating poverty and social exclusion.

Even though the Eurostat's information on the risk of poverty and social exclusion in 2017, does not fully reflect the successes Poland achieved in this sphere in 2018, we expect – based on the results of the study conducted by the Central Statistical Office in 2018 - that there was a further visible improvement in this field. As the Eurostat data show that already in 2017 the situation in Poland was better not only than the EU average one, but also than in 16 other EU Member States - the risk of poverty and social exclusion indicator (19,5%) was significantly below the EU average (22.5%). Moreover, compared to 2008, Poland recorded the greatest progress in counteracting the analyzed threat (with the respective indicator declining by 11 p.p.).

The Eurostat's findings are confirmed by the results of the Social Cohesion Survey published by the Central Statistical Office, which indicates that in 2018, compared to 2015, there was a marked decline in the scope of all analyzed forms of poverty[3]. Consequently the so-called multidimensional poverty shrunk from 3.4% to 2.1% and affects now only every fifty household in the country (as against every thirtieth one three years ago). The improvement of living conditions of the inhabitants is also confirmed by dynamic growth in retail and housing construction. In case of retail sales of goods, quarterly data from the Central Statistical Office indicate that in the Q1 of 2018 its real increase (8.1% over the same period of the previous year was) the highest in recent years, it should be emphasized that all quarters of 2017 saw a record high growth rate of retail sales in the last few years. However, starting from the Q2 2018, their growth slightly slowed down, and their disappointing performance in December 2018 came as a surprise to some analysts, since continued robust consumer demand underpinned by the growing purchasing power of residents and the increase in their population's material aspirations constitutes the main power engine of the Polish economy. Despite this slowdown it is expected, that the high contribution of individual consumption to the growth of the Polish economy will be maintained in 2019, which, combined with the expected further revival of investment activity (whose signs gradually intensified in 2018) should create a strong growth impulse in 2019. At the same time the negative contribution of net exports is expected, on account of deteriorating business cycle conditions in Poland's main trade partners.

[3] The so called poverty of living conditions decreased from 8.5% to 4.8%, the poverty of the household's budget deficit declined from 11.1% to 7.8%), while income poverty narrowed from 14.4% to 13.2%.

Chart 3. General government's surplus/deficit as a percentage of the country's GDP



Source: Own elaboration based on the Eurostat data

Continuation of responsible fiscal policy allowed to significantly reduce the budget deficit in 2018, thanks to an increase in budgetary revenues stemming from not only expanding economic activity (favorable cyclical position) and resultant expansion of the tax base, but also from growing tax compliance and a sharp increase in the number of foreign employees. It is estimated that in 2018 the ratio of the central government's budget deficit to GDP reached a record low level of approx. 0.6% of the GDP. Nevertheless, when we look back at the fiscal outcome recorded in 2017 - when Polish economy was growing almost equally fast as in 2018 - in comparison with other EU Member States, the 2017 general government deficit turns out be higher – as a ratio to the GDP- than the EU-28 and Eurozone average, as well as one of the highest in the European Union (only 7 countries recorded higher deficit), at a time when 14 Member States recorded surpluses ranging from 0.1% of the GDP (Slovenia) to 3.5% of the GDP (Malta), which can be interpreted as a sign of squandered opportunity to build a sufficient fiscal space for policy actions should the need arise for stimulating the economy. (Eurostat, 2019).

This caveats notwithstanding, the progress achieved by the Polish economy has been recognized by international economic organizations - which throughout 2018 were consistently upgrading the country's growth forecasts for that very year and for subsequent years - and by rating agencies. On October 12, 2018, Standard & Poor's (S & P) rating agency upgraded the long-term credit risk rating for the foreign-currency denominated Polish sovereign debt (from "BBB +" to "A-") and long-term credit rating of domestic currency debt from "A-" to 'A' in a reversal of that agency's decision from the beginning of 2016 to lower the rating of our country (on the basis of the than one-sided interpretation of internal political conditions and their potential negative impact on the economy). Such decisions should boost investors' interest in Poland, and thus ultimately help to increase the investment rate, even though bringing it close to the medium-term objective of the Responsible Development Strategy (25% of the GDP in 2030) will demand much more concentrated investment activity by the private sector than observed today.

1.1. Assumptions for Polish Budget Law

When analyze the macroeconomic assumption for the 2019 Budget and Ministry of Finance (and international organizations) mid-term (up to 2022) forecasts, and assess them in the context of the signals coming from the world economy, few important caveats become evident. First of all, 2018 with its actual GDP growth of 5,1% (far in excess of initial forecasts and assumptions) appears be the last year with the GDP growing significantly faster than the potential rate would indicate.

The budget's assumptions stipulate that in 2019 the real GDP growth rate will amount to 3.8%, and the share of investments in the GDP will rise (thanks to i.a. the impact of the increasing use of the EU funds under the 2014-2020 financial perspective). However, it is also stressed that private consumption supported by optimistic expectations of Polish consumers and a good situation on the labor market will remain the most important component of economic growth.

Experts responsible for the budgetary assumptions profess also that continued good economic situation of Poland's main trading partners in 2019 and the price competitiveness of Polish products will allow to expand the share of domestic production on export markets, which, combined with a high level of domestic economic activity will be conducive to companies' achieving relatively high profitability. In recent years, Poland was characterized by a high degree of capacity utilization, even though – thanks to low interest rates - the cost of capital remains relatively low. These factors should point out to the possibility of enterprises' accelerating their investment activity.

However in 2018, such optimistic assumptions on companies' investment activity, which were formulated for that particular year, did not fully materialize, with a slight uptick of investment expenditures being driven mostly by the public sector (on the back of the EU cohesion policy's payments and investments expanding on account of the local elections in October of 2018). The national elections scheduled for 2019 will probably help to keep public investments quite dynamic, while the perspectives for the private sector's investments are more problematic – despite the budgetary experts' assertion that the consistent implementation of the measures aimed at boosting economy's investment rate, innovativeness and productivity will stimulate the private sector's investment demand.

Simple, back of the envelope calculations, show the problems inherent in such a wishful thinking. Since the budgetary assumptions for 2019 were formulated in the summer of 2018, it was stipulated that in the latter year the ratio of the private sector's gross fixed capital formation to the GDP will amount to 14.1%, and in the next year it will expand to 14.8%. Therefore, the contribution of private investments to the GDP growth was projected to reach 1.3 p.p in 2018 (which turned out to be actually the case), while the national economy's investment rate is supposed to increase from 17.7% in 2017 to 19.4% of GDP in 2019. However, the investment rate reached in 2018 the level of mere 18% - not a significant improvement from 2017 and quite below the objective set for 2019.

It is further projected in the 2019 budget, that the continued improvement of the labor market situation will be conducive to the increase in nominal wages in the national economy, which were projected to increase by 5.7% in 2018 and by 5.6% in 2019 (as against a 5.4% growth in 2017), thus strongly boosting households' disposable incomes, with the latter being

additionally expanded by the government's income support within the framework of the continued implementation of the Family 500 plus program.

Beneficial situation of the households' incomes, coupled with positive mood of customers was therefore expected – to stimulate private consumption's real growth to 3.8% in 2018 (with the actual growth recorded at the level of 4.5%). and by 3.5%, and in 2019.

It was also further assumed that the real increase in public consumption will be conditioned by the government's actions aimed at observing the obligatory fiscal rules and striving to achieve the medium-term budgetary objective – hence this category was projected to post real growth by 3.0% in 2018 and by 2.2% in 2019 (Ministry of Finance, 2018).

Authors of the Budget underline that since Poland's accession to the EU, the economy has been opening to international trade, which, by 2017 brought the share of exports in the GDP to a record level of 54%, thanks to growing competitiveness of Polish enterprises (which were forced to look for the new foreign markets i.a. by periods of relatively weak domestic demand - especially in 2012 and 2013). The budgetary forecast for the period 2018-2019 saw further – albeit slower one - growth in the share of exports.

Table. 3 Macroeconomic assumptions for the 2019 Budget Law (data for 2017-2019) and Ministry of Finance's Guidelines for estimating the financial consequences of regulations (2019-2022)

	2019 F	2020 F	2021 F	2022 F
GDP growth	3.8	3.7	3.6	3.5
Exports	6.0	6.0	5.0	5.0
Imports	6.9	5.2	5.2	5.1
Domestic demand	4.2	3.7	3.6	3.6
Consumption	3.2	3.2	3.1	3.1
- private	3.5	3.5	3.5	3.5
- public	2.2	1.9	1.8	1.9
Accumulation	7.7	5.8	5.2	5.0
- Gross Fixed Capital Formation	8.4	6.4	5.7	5.6
Inflation (CPI) anual average	2.3	2.5	2.5	2.5
GDP deflator	2.3	2.5	2.5	2.5
Average monthly nominal wage in the national economy (gross)	5.6			
Average monthly real wage in the national economy (gross)	3.3	2.9	2.9	2.9
Average employment in the national economy	0.5	0.2	0.0	0.0

Source: own elaboration based on the data of the Ministry of Finance and Central Statistical Office

However, in our opinion, the authors of the 2019 budget espouse an overly optimistic perspective. Assessing the real processes in the global economy we believe that in the short to medium term the probability of radical changes in the said economy (both in the real economy and in the institutional sphere) is higher than that of the continuation of positive trends of just a few months ago (when the budget's assumptions were elaborated). The global economy is undergoing tectonic shifts, which generate potential threats and real challenges which cause the risks for the economic activity to be the highest in the recent history.

3. MID-TERM FORECAST FOR POLAND IN CONTEXTN INTERNATIONAL MACROECONOMIC ENVIRONMENT

We believe that among the "megatrends" which will determine the probable paths of the economic developments globally, are i.a.:

a) mounting protectionist policies in international trade relations,
b) the US authorities introduction of severe economic sanctions against Iran - following the unilateral revocation by the former country of the nuclear contract with the latter,
c) adoption of new important provisions by the Shanghai Group (including departure from the dollar and espousing the national currencies in mutual transactions),
d) the shape of the proposed EU 2021-2027 multiannual budget, with proposed significant reduction in the cohesion policy allocation for Poland and other CEE countries.

Significant deterioration of the business cycle in the European Union can't be ruled out (especially when we take into account the additional burden of probable "hard Brexit") and hence of utterly new reality for the functioning of the global economy and of its regional components in the coming years.

Such a transformational international macroeconomic environment establishes context for the conduct of Poland's economic policy in the coming years. Looking back to the collapse of financial markets in the period 2008-2009 and to its profound negative impact on the development of the Polish economy (as evidenced i.a. by significant slowdown in the GDP growth and noticeable growth in unemployment), we are convinced that the uncertainty stemming from the international context could weigh heavily not only on the ongoing macroeconomic situation of the country per se, but also on the possibility of successful implementation of the Strategy for Responsible Development.

Therefore the question arises, what will happen to the national economy were the external shocks to occur? Moreover, it has to be underlined that the prospective deterioration in foreign trade (especially the acceleration of import growth) could have profound negative impact on the Polish economy.

Therefore, we are deeply concerned by the fact, that the assumptions behind the national budgetary bill for 2019 do not devote sufficient attention to the already evident and potential future threats - lack of their proper identification in such an important document makes us wonder whether the country possesses well-developed quick-reaction mechanism to address unexpected changes.

The budget's assumptions should attempt to answer whether, there is a real threat of an external shock (with further elaborating on its possible concrete character – e.g. financial markets collapse or collapse in the international trade). Moreover, one has to remember that the deterioration of foreign trade outcomes (especially the acceleration of import growth), resulting from the strengthening of the Polish currency (as projected in the budget documents) may have a more negative impact on the Polish economy than assumed herein.

In our opinion the risk of serious crisis on global financial markets, which is currently no lower than 10 years ago, is additionally expanded by the extremely unfavorable developments in international political situation. A deep violation of the rules of free trade has become a fact, and the threat of currency war is looming.

We find it imperative for the economic to address such new phenomena and processes that will exert a significant influence on economic conditions in 2019 and in the following years, as:

a) progressive erosion of the economic and financial order in which the global and European economy has been functioning for the last over 20 years,
b) the progressive move away from the prevalent liberal economic model to the protectionist one, which strongly stresses the interests of individual countries or regions,
c) initiation, in 2018, of the restrictive customs policy and retaliation of countries affected by it, with the attendant strong impulse for currency competition among three currencies (dollar, euro, yuan),
d) "politicization", on a long-unheard scale, of the sphere of economic activity (particularly of foreign trade exchange).

A significant reconstruction of the global economic architecture cannot be ruled out in its institutional and regulatory dimension. This will stem from the gradual reduction – observed since the end of the 20th century - of the share of the most-developed Western economies in the global GDP for the sake of aspiring economies (mainly China, India, Brazil, and Russia). The OECD forecasts that in the next 20 years there will be a symmetrical reversal of their respective shares in the global product.

The European Union, as a single economic zone, has been burdened by numerous crises and adverse tendencies (both in the real economy and in its institutional sphere), while excessively delaying significant attempts at necessary reforms. Such a "temporizing" in case of reforms can be explained by the prevailing fear of strengthening the centrifugal tendencies.

However, such an approach will not make these adverse phenomena disappear on their own, but could make them become even more firmly entrenched. The fundamental idea of solidarity among the EU members is being replaced by growing and unresolved contradictions of their interests, leading to the rise of strong national economic egoisms and to the growing sense of asymmetry of benefits among the Member States.

Moreover, the effects of the possible customs war in the Euro-Atlantic area could prove particularly dangerous for small and medium-sized economies. In such circumstances, it is indispensable for policy-makers to prepare a worst-case scenario based on a cautionary forecast of possible negative effects of such a trade war on the Polish economy. Unfortunately, we do not discern such a realization in the assumptions on which the 2019 state budget was founded.

The scale of transformation of external conditions is demonstrated by a radical change in the economic climate between the EU and the USA. Not so long ago, a trade agreement - one aimed at the liberalization of economic relations and the creation of the Euro-Atlantic common economic space - was being negotiated between these two subjects,. However, the protectionist measures undertaken in 2018 not only limit the practical application of the free trade doctrine but also make a threat of a trade war more ominous. Few years ago an attempt at shaping friendly economic relations with the US constituted the defining factor for the economic and trade activity in the European Union. Nowadays, the EU faces the protectionist pressures originating across the Atlantic, and it would be naïve to expect that the said pressures will disappear in the coming few years. Such an outcome could weaken Europe's

competitive potential in relations with the US, and would therefore necessitate serious effort at "substitution" – implying attempts at expanding the UE presence in other trade markets.

It can be assumed that the successful implementation of the US protectionist policy measures may significantly reduce the American demand for the EU products, thus having a serious negative effect on domestic demand (within the EU) in countries which are the largest exporters to the US market. In case of the failure of the above-mentioned "substitution policy" by European countries we should expect Polish companies to face problems selling their products on the European market.

Consequently, the projected growth in investment activity will become hard to attain, posing a serious threat to the successful implementation of the Polish Strategy for Responsible Development. Since in case of economic relations in the "transatlantic area" becoming more antagonistic, the possibility of maintaining the community of political interests in the said area would be threatened - threatening the very survival of the European Union. As of the moment of this writing, the so-called "hard Brexit" appears unavoidable with all its attendant consequences, including i.a. the possible growth of skepticism towards the EU in a growing in number of countries.

At the beginning of 2019 The World Bank has published the report on the perspectives of World Economy entitled Global Economic Prospects. Darkening Skies, in which it revised downwards - in comparison to the June 2018 forecast, earlier predictions for the world economy for the period 2019-2021 (World Bank, 2019).

The scale of the economic slowdown is expanding and accommodative monetary policy in developed countries is being withdrawn. The rationale for lowering forecasts of economic growth is, among others, the weakening dynamics of international trade (on account on trade-related tensions and investment). This disturbing trend is reinforced by rising interest rates, which further weakens the dynamics of economic growth, especially in "emerging markets" (some of them painfully felt "pressure from international financial markets). It should be therefore emphasized, that while in the beginning of 2018 the global economy was working "at a full swing", its dynamics weakened during the year, and in 2019 it could enter on much more bumpy path.

The World Bank's experts assert, however, that under the "central scenario" the probability of a recession in the United States is still low, and that the slowdown in the Chinese economy should be gradual, (even though the growth in the latter country will be much less dynamic than under earlier forecasts). The developments in the two largest economies in the world could have a serious, negative impact on the outlook for the global economy (International Monetary Fund, 2019).

It is, therefore, projected by the World Bank that the growth rate of the global economy will decrease to 2.9% in 2019 (against an estimated increase of 3.0% in 2018), and in 2020-2021 it will be further reduced to 2.8%. For the Eurozone, the growth rate is forecasted at 1.9% in 2018 (a downward revision of 0.2 pp); 1.6% in 2019 ("downgrade" of 0.1 pp) and by 1.5% in 2020 (no change over the previous forecast). As far as economic growth of Poland is concerned, the World Bank's forecast that in 2019 it will reach the level of 4.0% (upward revision by 0.3 p.p.), in 2020 will amount to 3.6% (i.e. 0.1 p.p. higher), and in 2021 to 3.3%. (World Bank, 2019).

According to the quarterly pool of forecasts conducted under the auspices of the National Bank of Poland in December of 2018 macroeconomic survey, in the next two years the weakening GDP growth will be accompanied by a gradual increase in CPI inflation, which in 2020 should be close to the NBP's inflation target (2.5% +/- 1 p.p.). According to the central forecast – which averages out the projections of pooled analysts - the GDP growth rate will slow down in 2019 to 3.8% (consistent with the state budget's assumption and slightly lower than the World Bank's forecast. Moreover, on January 16 of 2019, Standard and Poor's presented its own forecast for Poland which posits that the country's economy will expand in 2019 by mere 3.4%.

Experts surveyed by the NBP predict also that in the period 2019-2020 the registered unemployment rate will be at just over 5.5%, and expect slight slowdown in wage growth (from around 7% annually in the period 2018 - 2019 to around 6% in 2020). They also expect a stable PLN / EUR exchange rate at approx. 4.25 in the coming years (which has important implications for the value of funds available under cohesion policy).

The survey also includes questions about the external environment of the Polish economy, with the respondents pointing to the following challenges:

a) weakening of the economic growth in the euro area (projected decline from 2.0% in 2018 to 1.7% in 2019 and 1.5% in 2020),
b) uncertainty about the effects of monetary policy changes in the euro area and in the US (what comes next to the so-called normalization of the monetary policy by the central banks?),
c) the economic slowdown in China and the related development of oil prices on the global market,
d) impact of the opening of the German labor market to foreign employees on the Ukrainian workers currently employed in Poland, and on the situation on the labor market in Poland (labor shortages, wages growth). (National Bank of Poland, 2019).

In our opinion the list of internal and external factors that will have significant impact on the economic developments in Poland in the coming years, should contain also:

a) growing quantitative and structural (skill-based) shortages in the labor market, especially those related to highly skilled workers in industry and construction sector as well as low-skilled jobs (this phenomenon is called the "polarization of employment deficits"),
b) deficits in power generation - since for many years there gap between the dynamics of electricity demand and the growth rate of installed production capacity has been widening, coupled with high probability of increased costs of energy secured from external sources,
c) the threat of serious strengthening of factors which reduced private sector's interest in investing caused by the above-mentioned demand constraints,
d) deteriorating conditions in the agriculture and in food processing; with the European market being subject to growing surplus in this area, and growing pressure of external competition from Ukraine and Russia)
e) high relative dynamics of labor costs vis-à-vis the one of productivity, which may lead to undermining of the macroeconomic equilibrium.

Since the significant deterioration of the external - and to a lesser extent internal - conditions of Poland's economic performance is likely to take place in the coming years, significant barriers to maintaining of recent GDP growth rates are to be expected, accompanied by

significant expansion of business risks in many areas (especially in case of investment activity). In such a context, we find the forecasts and assumptions on which the budgetary bill for 2019 was founded overly optimistic.

Moreover, we are convinced that the looming threats to the attainment of the socio-economic policy's objectives should motivate the authorities to perform periodical stress-tests focused on sensitive areas of economic activity (in particular of the banking sector) and of the budgetary revenues.

Lack of active approach to tackling the challenges stemming from the ongoing and expected changes could undermine the existing economic growth potential. This signifies that business conditions could become more demanding due to elevated risk level - particularly for small and medium-sized economies – which do not have ready access to institutional financial and banking structures. In case of a breakdown of financial and capital markets, the state budget could require profound modifications. On many accounts, the possible increase in the risk of deteriorating conditions for the pursuit of macroeconomic and budgetary objectives of Poland appears to be much higher than the chance of maintaining relatively favorable conditions which dominated throughout the first three quarters of 2018.

It shouldn't be ruled out that these radical changes in internal and external conditions for the conduct of the economic policy will continue in the coming years, limiting the country's economic, fiscal and monetary authorities leeway in influencing the economic outcomes. This exposes the need for quickly and accurately identifying the expected changes and analyzing their potential on the functioning of the Polish economy, including on the budgetary objectives.

In such circumstances it would be advisable for the Polish economic policy establishment to further stress the importance of the Multiannual Financial Framework, and to strengthen the national research and analytical centers to espouse the strategic perspective in order to provide the said establishment with comprehensive knowledge about possible scenarios for the development of the global economy and about the resultant threats for the country.

Moreover, in our opinion it would be reasonable for the national economic policy establishment to prepare the strategic action program, which addresses the possible directions of the reconstruction of the global economic architecture and its potential impact on the functioning of the Polish economy. Such an proactive approach could become a significant additional "non-tangible" development impulse, while an absence of such a strategic vision may lead to an reactive socio-economic policy, capable of only ex-post adjustments and per se become a potential source of destabilization.

In such a context it should be stressed that the economic policy of the period 2017-18 was underpinned by the strong fiscal effect achieved thanks to the application of effective measures aimed at strengthening of the tax system's efficiency - which created the basis for an active policy aimed at expanding household incomes (restoration of a lower retirement age, 500+ program of Family support, increase in the minimum wage). These, in turn, boosted consumer spending - which was the main factor behind expanding domestic demand. At the end of the day it all led to an acceleration of economic growth, with resultant additional fiscal effect, as evidenced mostly by robust revenues from the VAT and excise taxes.

However, by the end of 2018, the positive effects of income and fiscal policy's contribution to the GDP creation have already been largely harnessed and in the coming years one should not expect an additional, incremental (marginal) contribution from their side. Consequently, it will be very difficult for the Polish economy while relying solely on the domestic growth engine to sustain the GDP growth rates at the level of 3-4%, particularly when we take into account the following observations:

a) reliance on the domestic consumer demand could, under the pressure of external protectionist policies, undermine the potential for exports by reducing competiveness of domestic goods (due to growth in the labor costs - which in the last few years have been growing faster than the labor productivity),
b) faced with the growing barriers to external demand (resulting from the possible customs war/tensions), the stabilization of the dynamics of internal demand may have an adverse influence on the private sector's companies willingness to invest, which even in the circumstances of the recent dynamic economic growth hasn't been at the desired (e.g. assumed in the Strategy for Responsible Development) level.

The need for not only strategic vision, but – and most of all – for its effective implementation is preponderant. In recent years, the processes and phenomena have surfaced which indicate quite visibly that the largest global economies are departing from the fundamental principles of the liberal market economy (i.a. by direct involvement in saving large enterprises and financial institutions, direct government's borrowing at central banks, purchase of government debt securities by the European Central Bank, the initiation of protectionist policies, the regulatory protection of local labor markets, or the prohibitive tariff policy etc.).

These tendencies will continue to bring very specific consequences in terms of conditions for running businesses, even more, new forms of state's intervention in the economy could be used to defend the broadly understood interests of nation states. Conflicts of interests will be solved - to a greater extent than in the past - rather at the level of governmental (institutional) than through the competitive outcomes originating in the open market. Therefore, Polish governmental agencies should firmly embed this new framework for their actions and engage in active economic policy, including strategic approach to development. Therefore, we perceive the Polish Strategy for Responsible Development and the plans to build the Central Communication Port as the steps in the right direction. Since the investment outlays necessary for building the Central Communication Port are beyond the means of even the largest business entities, it is necessary for the state to step in.

In our opinion the idea, espoused by the government, of building the Central Communication Port - CCP (national hub which will integrate all means of transport around the large scale airport) could serve as the focal point of the country's economic development for the years to come. Given the potential importance of this "project" for the economic future of the country a wide range of stakeholders should be involved in its development and support. Just as Gdynia has become a maritime window to the world before World War II, Central Communication Port should become such a "window" in the modern times - to a large extent, it would depend on the effective opening of the country towards economies of Asia and on integrating the CCP space with the broadly understood national infrastructure.

CONCLUSIONS

However, for such an intervention to be justified, the multiplier effects generated by this project are big enough to allow for overcoming the above-mentioned barriers to growth. The cumulative and multiplier economic effect of the strategic acceleration of growth project can have a significant impact on mitigating the growth barriers mentioned above. However, it requires a holistic and target "embedding" in the strategic dimension (e.g. by renewed focus on the implementation of the Strategy for Responsible Development).

Such an effort appears necessary since the current growth path based on the internal demand constituting the dominant - if not the sole important - factor behind the GDP growth is not a welcome situation from the perspective of a long-term development strategy. Namely, the space for stimulating internal demand in the short and medium term is limited by numerous factors and expansion of demand mainly through aggressive income policy aimed at the households sector may trigger strong inflationary pressures, excessive indebtedness of the population and, consequently, a reduction in the GDP growth rate going forward.

Moreover it should be stressed that – contrary to the expectation of the Strategy for Responsible Development which stipulated expanded role of the domestic capital in development - foreign entities are a significant final beneficiary of the internal consumer demand stimulated by the government's policy (including via imports of consumer goods and sales in the networks of large-surface stores - which are to a large extent owned by companies from Western Europe - whose share in retail sales in the last 15 years has increased from 26% to 56%.

From the perspective of both, building strategic economic security and strong foundations for responsible development, the diversified structure of growth sources, one with a dominant share of investments and foreign trade, would be more welcome since it contains much stronger modernization elements.

It can be assumed that the continuation of stimulating the GDP growth, will depend - to a decisive extent - on the effectiveness of measures aimed at significant and permanent increase in the investment rate to the level exceeding 20% of GDP (in line with the provisions of the Strategy for Responsible Development). In our opinion achieving such an objective will not be feasible, without gaining access (opportunities) to additional external demand in markets outside of Europe.

Against such a background, it should be emphasized, however, that simultaneous implementation, in a long run, of aggressive income policy and of a policy of strong investment stimulation always causes serious tensions and threats to macroeconomic equilibrium with all attendant negative consequences and raises the question of sources of financing such a strategy. Therefore the question arises whether such a strategy would still reflect the definition of "responsible development" as espoused by the authors of the Strategy for Responsible Development?

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DETERMINANTS OF THE DEFENSE EXPENDITURE: CASE STUDY IN REPUBLIC OF INDONESIA

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ABSTRACT

Defense is defined as a public good that are non-rivalry and non-excludable, so the government is obliged to provide strong military defense through the defense budget to conduct defense spending. The purpose of this study is to identify the determinants that influence the amount of defense expenditure in Indonesia. This study used secondary data that was obtained from the World Bank which consisted of data on defense expenditures, Indonesia's gross domestic product (GDP), populations, and exchange rates in the period 1985 to 2016. This study uses a partial adjustment model (PAM). The researcher conducted a t-test to measure the influence of the independent variables on the dependent variable partially, the F-test to measure the influence of the independent variables on the dependent variable simultaneously. This study shows that demography and amount of GDP have a positive

impact on short and long term to defense expenditures, and exchange rate has a negative impact on short and long term to defense expenditures.

1. INTRODUCTION

Public goods consist of goods formed by norms (peace, order, and good governance) for physical goods that provide collective benefits independently of any norm. These public goods are defined in two criteria: non-rivalry (non-competition) and non excludable (cannot be excluded) (Cooter and Ulen, 2000:42). Economic theory has emphaamountd the role of the private market in efficient supply of goods since Adam Smith's time, but economists and others have realized important limitations in the ability of the private sector to produce efficient results and meet certain basic social needs such as public goods (Stiglitz, 2000:22). Furthermore, the limited fulfillment of the need for public goods by the private sector led to the need for government presence as an intervention. Government intervention in the economy is realized through the provision of public goods.

Therefore, defense is a public good that is non-rivalry and non-excludable. Defense has a general definition as an effort to maintain the integrity of the nation and state. Defense has received little attention from economists even though the defense has long been the primary account spending at central government level. Military experts have taken the lead in determining how to achieve national defense goals, but defense spending is basically a matter of allocating resources and therefore depends on economic reasons (Stiglitz,2000:333).

The ever-changing development of the strategic environment changes the complexity of the threats faced and impacts on national defense. The threat spectrum is classified into various threat dimensions in the form of military threats, non-military threats and hybrid threats. Moreover, the national defense requires collaboration between military defense and non-military defense through efforts to build strong and strong national defense forces and capabilities in the future (Ministry of Defense of Indonesia, 2015:1).

Procurement of defense facilities is an important part of the development of defense forces and is a support for national development, both through local procurement mechanisms and the procurement of imports. The use of the defense budget to meet defense needs can be actualized through defense spending in accordance with the amount of the proportion agreed in one fiscal year. The conditions that occur in the world as a whole are that the two countries make a trade-off between social expenditure and military expenditure, and developing countries are not exempt from this difficulty (Kilian, 1998).

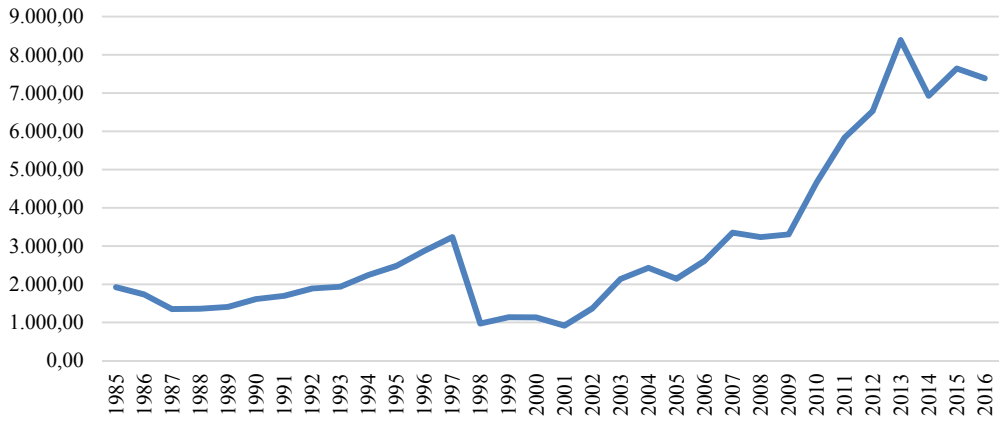
Military expenditure is the amount of financial resources allocated by a country to defend the armed forces and other important services for defense purposes (Kumar, 2017). The financial resources of a country are contained in the country's budget plan. Indonesia has a financial plan known as the State Budget (APBN) where the defense sector has its own post in the APBN. The amount of Indonesia's defense budget is in the range of 0% - 1% of annual GDP, part of the defense budget in GDP has increased substantially, but there are still trade-offs between defense and other public expenditures in the budget (Oxsenstierna, 2016). This condition is a consequence of choice when the government faces a trade off between gun and butter.

Defense related government expenditures are adjusted to the threats to be faced. Research conducted by Sheikh and Chaudhry in 2013 stated that strategic factors such as atomic

threats, internal threats and war had a positive impact on defense spending in India and Pakistan (Sheikh and Chaudry, 2013). Indonesia as a broad country has its own threats, both military and non-military, which can occur at any time such as terrorism, natural disasters, regional boundary violations, and other forms of threats.

Defense expenditure is recorded in central government expenditure for ministries and institutions, the rest is used for central government expenditure for non-ministerial and non-institutional expenditure sent. The budget deficit system used in the State Budget (APBN) system allows state expenditure to exceed revenues with a tolerance limit of three percent of Gross Domestic Product (GDP). The government can seek foreign and domestic loans to cover the amount of the deficit.

Figure 1. Defense expenditure chart of the Republic of Indonesia period 1985-2016 (in million US $)



Source: World Bank, 2019

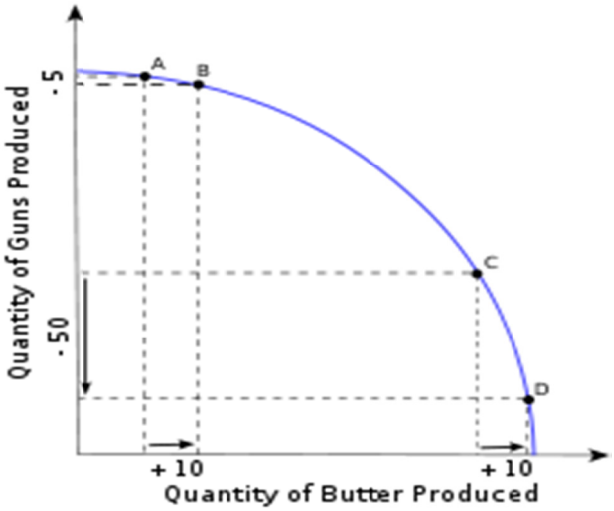
Furthermore, the amount of Indonesian defense spending tends to fluctuate, this is reflected in Indonesia's defense expenditure data released by the World Bank in the period of 1985 to 2016. Figure 1 shows a chart of Indonesia's defense expenditure fluctuations during 1985 to 2016. Fluctuations on the figure shows the amount of Indonesia's defense spending does not increase every year.

National expenditure of a country divided into two kind in military perspective, such as military spending and non-military spending. There is an opportunity cost when government choose their policy to decide the national expenditur, this case could be explained by the guns and butter curve. The guns and butter curve is the implementation production possibility curve concept based of ten principles of economic, people face trade offs (Mankiw, 2011:5), which demonstrates the concept of opportunity cost. Opportunity cost concept mentioned that in the condition with only two goods, a choice must be made between how much of each better to produce or develop. When a country decide to produces more guns (military spending), it must reduce its production of butter (non-military spending), and vice versa. Figure 2 shows that the greater the expenditure of the state / government to build national defense, the fewer resources left for state expenditure in other sectors to improve people's living standards, vice versa (Samuelson, 1973:3).

The difference between budgetary needs and realization is the reality that occurs in the government's efforts to meet the target of Indonesia's basic defense forces. Decisions on spending in fulfilling defense forces are certainly influenced by certain factors so that when

there is an imbalance between budgetary needs and realization, of course there are factors that influence the amount of defense spending.

Figure 2. Production Posibility Curve of "gun vs butter"



Source: Ministry of Defense of Indonesia, 2019

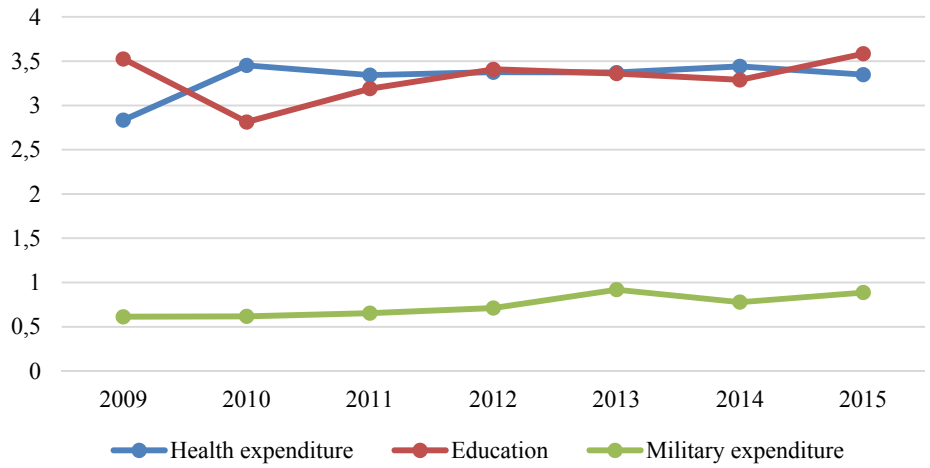
Point A show the combination between the guns and butter in the first position, when the combination moved to point B in the same line, the defense spending reduced by 5 and the another government expenditure will increased by 10. In the another combination, point C is the starting combination of the "butter" oriented decision. When the point moved to point D in the same line, the defense spending reduced by 50 and the another government expenditure will increased by 10. Based on this condition, each country cannot decide to build defenses and another government expenditure in a balanced manner, because the choice between defense and other government expenditures is a trade-off that must be faced as a consequence of opportunity costs in a public policy.

Procurement of Indonesian defense equipment comes from two production locations, foreign and domestic. The procurement of foreign defense equipment is referred to as imports, so those imports will affect the amount of Indonesia's defense expenditure. There is a significance between currency exchange rates and the amount of imports where if the origin of a country's currency decreases due to an increase in the exchange rate, imports from the country of origin will decline due to other countries' price increases (Alotaibi, 2016).

Impact of changes in the value of foreign exchange against a financing is known as exposure. The causes of these fluctuations are transaction exposures, economic exposures, and accounting exposures. Exposures occur due to transaction obligations in foreign currencies that can change the value contained in the procurement contract. Fluctuations in arms imports caused by fluctuations in exchange rates are indicated to have an effect on the amount of defense spending, particularly in Indonesia.

Imports of weapons in the form of demand for weapons of various types are influenced by perceptions of security against internal or external threats and by price and income (Sandle and Hartley, 2007:947). The statement explained implicitly that the ability of defense spending also depends on the amount of revenue obtained by the state to meet the country's needs. Indonesia's defense sources come from tax revenues, non-tax revenues, and grants.

Figure 3. Comparison of National Expenditure in Health, Education, and Military (% of GDP)



Source: World Bank, 2019

Figure 3 shows that the percentage of military expenditure on GDP is lower than expenditure in other sectors such as health and education. fluctuations in the amount of defense expenditures and another government expenditures indicate a tendency to be oriented towards the development of "butter" rather than "guns." Development in the education and health sectors with limited resources impacts on the limited total defense expenditure in Indonesia.

Research by Harris (1986) mentioned that government willingness to increase the defense expenditure, and to justify the consequent reduction in another expenditure, will be influenced by geopolitical factors. In line with Harris, Yildrim and Sezgin (2002) claimed that there is a trade-off between defense and welfare spending while decisions of defense expenditure are made independently of health and education expenditure. Futhermore, there is a competition between education and health expenditure in the budgeting process. This phenomenon is important to study further considering the need for defense expenditure and expenditure in the non-defense sector has a level of urgency that is equally important in realizing a nation sovereignity.

Lotz (1970), and Deger (1986) mentioned that GDP is the determinant of defense expenditure in developing countries. Tiwari and Tiwari (2002) found that defense expenditure and GDP found to be having negative response in one SD structural shock in defense expenditure in the India's case, it will increase openness one the one hand but it has negative impact on GDP on the other hand if defense expenditure increases in India. In the case of Indonesia, Chairil *et. al.* (2013) mentioned that there is a positive relationship between military expenditure and economic growth in Indonesia.

This condition shows that GDP usually tends to have significant effects, but research on this relationship becomes important to study data sets for studies in Indonesia, especially to test whether various variables have been integrated and whether data shows that there are long-term relationships that stable. Therefore, the need for defense spending will continue to increase along with the quality of threats faced by Indonesia, including the need for maintenance and modernization of defense equipment. National defense expenditure at a proportional ratio level will raise the capability of national defense which has deterrent power and affecting the national stability. Determinants that affect Indonesia's defense expenditure are interesting issues to be studied more deeply.

2. METHODOLOGY

This study used secondary data, mostly obtained from World Bank and other publications, which consist of data on defense expenditures, exchange rates, another government expenditures, and GDP in Indonesia for the period 1985 - 2016. Multiple linear regression using the Partial Adjustment Model (PAM) as the analytical method. Partial Adjustment Model is an adaptive adjustment model, the theory that can explain geometric slowness is the Partial Adjustment Model.

The Partial Adjustment Model (PAM) is a dynamic model, which assumes the existence of a long-term equilibrium relationship between two or more economic variables. The PAM model can include more variables in analyzing short-term and long-term economic phenomena and assessing the consistency or absence of empirical models with economic theory (Gujarati, 2012), but what happens in the short term is disequilibrium. With a partial adjustment mechanism, the proportion of disequilibrium in a period is corrected in the next period. Based on this concept, long-term relationships can be estimated through short-term relationships.

To explain what the optimal level of inventory is, here is a simple optimal model of inventory as follows:

$$Y_t = \beta_0 + \beta_1 X1_t + \beta_2 X2_t + \beta_3 X3_t + \varepsilon t \quad (1)$$

Where :

Y_t = Defense Expenditures of the Republic of Indonesia
β_0 = Constant
$\beta_1\beta_2\beta_3\ \beta_4$ = Regression Coefficient
X_1 = Gross Domestic Product (GDP)
X_2 = Exchange Rate
X_3 = Another Government Expenditure
εt = Term Error

The above model explains that optimal inventory is influenced by X_1, X_2 and X_3. The value of optimal inventory Y_t cannot be observed is only predicted. If Y_t is the optimal supply in period t and Y_t is the actual value of inventory, then the PAM model is as follows:

$$Y_t - Y_{t-1} = \delta(Y_t^* - Y_{t-1}) \quad (2)$$

Where :

δ = The adjustment coefficient is $0 < \delta < 1$; - = actual inventory change
$Y_t^* - Y_{t-1}$ = Change of desired inventory

Equation 2 states that the actual change in t-period is δ of the desired inventory in that period. In general, the value of δ will be at the values of 0 and 1 because the adjustment of inventory towards the level of balance is not perfect. Adjustment of equation 2 can be rewritten as the following equation:

$$Y_t = \delta Y_t^* + (1 - \delta)Y_{t-1} \quad (3)$$

Equation 3 explains the actual inventory period t is the weighted average of the actual desired inventory and actual inventory in the previous period where the scales are δ and (δ-1) respectively. To find a solution in equation 1 then we can distribute equation 1 into equation 3. And we will get the following results:

$$Y_t = \beta_0 + \beta_1 X1_t + \beta_2 X2_t + \beta_3 X3_t + \beta_4 Y_{t-1} \quad (4)$$

To obtain equations in the long run, the coefficients of each variable in the above equation are divided by the results of 1- β_4, thus the formulation of the function of the partial adjustment model in the long term is as follows:

$$Y_t = \frac{\beta_0}{\beta_4} + \frac{\beta_1}{\beta_4} X1_t + \frac{\beta_2}{\beta_4} X2_t + \frac{\beta_3}{\beta_4} X3_t \quad (5)$$

3. RESULT AND DISCUSSION

The purpose of this regression is to identify the effect of GDP (X1), exchange rate (X2), and another government expenditure (X3) on Indonesian Defense Expenditure (Y). This study uses a Partial Adjustment Model (PAM). The analytical method used is multiple linear regression using PAM. PAM is a dynamic model, which assumes the existence of a long-term equilibrium relationship between two or more economic variables.

Table 1. Classic Assumption Test

Classic Assumption	**Test**	**Probability**
Heteroskedasticity	White Heteroskedasticity	0,1597
Autocorrelation	Breusch-Godfrey Serial Correlation LM Test	0,1527
Linearity	Ramsey RESET Test	0,1271

Source: Researcher (2019)

Table 1 shows the result of classic assumption test of the model. Model 6 has no heteroscedasticity because the probability value in this model is 0.1597, where the probability value is greater than α 0.05 based on the White Heteroskedasticity test. Model 6 does not show a symptoms of autocorrelation because the probability value of 0.1527 is greater than the value of α 0.05 based on the Breusch-Godfrey Serial Correlation LM Test with a lag of 2. Ramsey RESET Test shows the probability of F-test (0,1271) bigger than the α, so the Model 6 is linear.

Table 2. Result of Regression

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-555111103.1	4.53E+08	-1.224432	0.2318
ANOGOVEX	0.027846	0.011028	2.524959	0.0180
DEFEX(-1)	0.328741	0.092341	3.560084	0.0015
EXCHANGERATE	-187520.0	42682.15	-4.393405	0.0002
GDP	0.005753	0.001822	3.158386	0.0040
R-squared	0.969560	Mean dependent var		3.09E+09
Adjusted R-squared	0.964877	S.D. dependent var		2.20E+09
F-statistic	207.0376	Durbin-Watson stat		2.389570
Prob(F-statistic)	0.000000			

Source: Researcher (2019)

Table 2 shows the results of regression equations using ordinary least square (OLS) in software eviews 8. After regression using eviews8, the results are obtained and we can write in the short term function equation as follows:

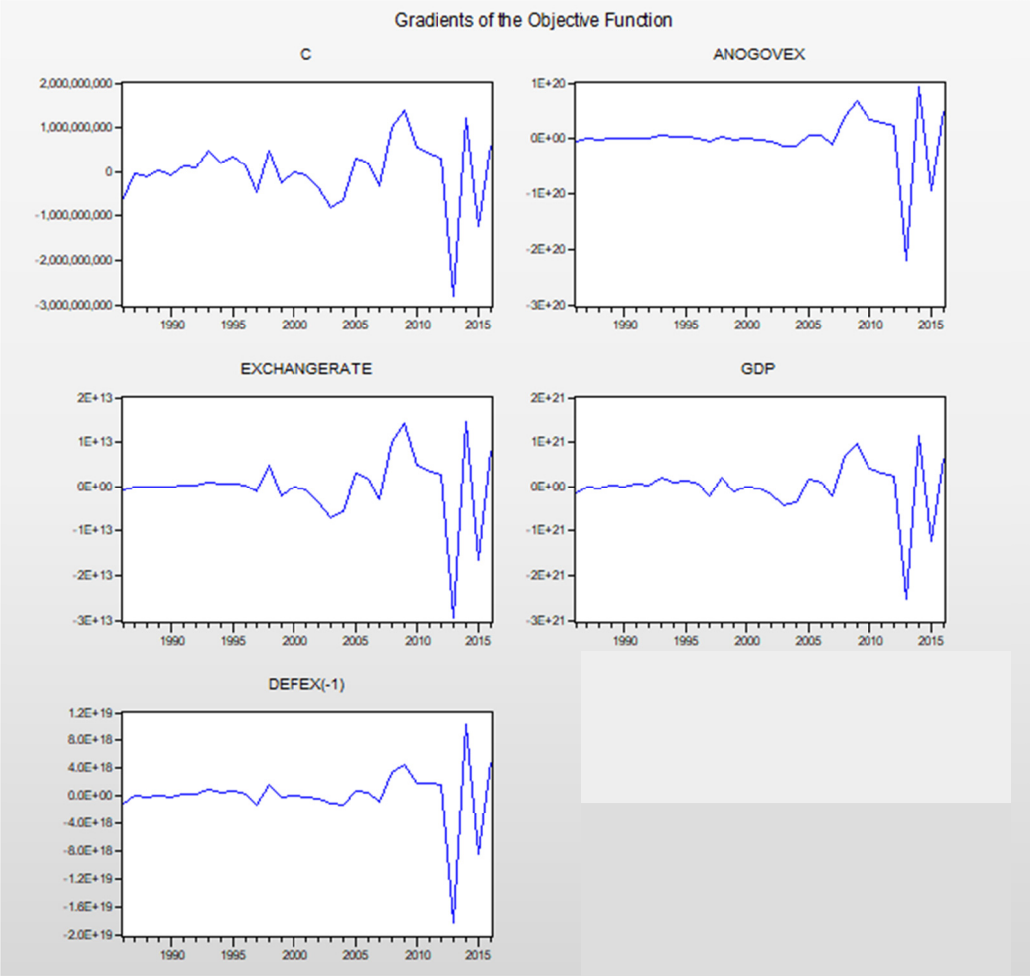
$$DefEx_t = -555.111.103.1 + 0{,}027846\ Anogovex + 0{,}005753\ GDP_t - 187.520\ Exchangerate_t + 0{,}328741\ DefEx_{t-1} \quad (6)$$

The adjustment coefficient in model 5 is $\delta = 1 - 0.328742 = 0.671259$ where the value indicates that the difference is 0. 671259 between the amount of defense expenditure desired and the occurrence adjusted for the annual period. The next step is to divide the coefficients in short-term equations with $\delta = 0.\ 671259$ to find coefficients in long-term equations. The equation for the determinants of defense spending in the long term is as follows:

$$DefEx_t = -826.970.071{,}3 + 0{,}04148\ Anogovex + 0{,}00857\ GDP - 279.355{,}7\ Exchangerate \quad (7)$$

Based on table 2, R_2 value in the regression equation 5 is 0.9737, this value indicates that 97.37% of the defense expenditure variable can be explained by economic growth, exchange rates, and demography. Therefore, the remaining 2.63% is explained by other variables outside the model.

Figure 4. Gradients of the objective function



Source: Researcher, 2019

The partial test (t-test) on each variable shows that the probability value in the exchange rate and demographics is smaller than the α (0.05). Therefore, it can be concluded that the exchange rate, GDP, and demographic variables influence the defense expenditure of the Republic of Indonesia partially. Furthermore, the F test is carried out to test the effect of variables simultaneously. The probability value in the F test is smaller than the value of α (0.05). These results indicate that all of the independent variables have a significant effect simultaneously on the Defense Expenditures of the Republic of Indonesia.

GDP does affect defense spending in the short and long term in Indonesia because economic growth does affect the defense expenditure of the Republic of Indonesia partially. In the short term, the GDP coefficient is at 0,027846. This value means that the GDP compilation rises by 1 million US$, defense spending will increase by 0,027846 million US$ and vice versa. The coefficient value in the long-term equation of 0,00857 refers to the long-term GDP of 1 million US$ which will increase the optimal defense expenditure by 0,00857 million US$, in other words the GDP has a positive effect on defense spending. This condition is in line with the research conducted by Biswas & Ram (1986) that defense expenditure can only have a negative or positive effect on growth at certain times and certain conditions. However, in other countries there is relationship between military spending and economic growth (Chairil, 2013).

In the short term, the exchange rate coefficient is at -187.520. This value means that the exchange rate compilation rises by Rp. 1, defense spending will decrease by 187.520 million US$ and vice versa. The coefficient value in the long-term equation of – 279.355,7 refers to the long-term exchange rate of Rp. 1 which will reduce the optimal defense expenditure by 279.355,7 million US$, in other words the exchange rate has a negative effect on defense spending. Military expenditure for each country must be converted into the same currency value. The use of market exchange rates causes large fluctuations in measured expenditures that are not related to defense activities, so the use of price units and exchange rates in transactions is common (Sandle and Hartley, 1995:79).

Another government expenditure does affect defense spending in the short and long term in Indonesia because economic growth does affect the defense expenditure of the Republic of Indonesia partially. In the short term, the another government expenditure coefficient is at 0,005753. This value means that the another government expenditure compilation rises by 1 million US$, defense spending will increase by 0,005753 million US$ and vice versa. The coefficient value in the long-term equation of 0,04148 refers to the long-term another government expenditure of 1 million US$ which will increase the optimal defense expenditure by 0,04148 million US$, in other words the another government expenditure has a positive effect on defense spending. This finding is in line with Deger & Sun (in Hartley and Sandler, 1986:296) that mentioned defense spending can enhance security which in turn increases aggregate social welfare.

4. CONCLUSIONS

National defense expenditure is intended to meet the basic needs of the country's defense so as to ensure the implementation of strong national defense. GDP, another government expenditure, and exchange rate affecting the Indonesian defense expeniture simultantly and partially. For determining the amount of defense expenditure, in this case the decision making in the state defense expenditure, special attention is needed to the exchange rate factor that affects the price of defense equipment and amount of GDP which is the responsibility of the

government for guaranteed defense and security aspect. Expenditure in the defense sector will spend a budget in this case for spending on salaries of the army, employees of the ministry of defense, etc. with the aim of holding strong and professional defenses. In order to face the trade off between gun and butter, government should counting more the opportunity cost to find the best combination to optimize the gun and butter of Indonesia's national expenditure policy.

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INTEGRATION OF DISTRIBUTED LEDGER TECHNOLOGY INTO FINANCIAL SECTOR OF LATVIJA: SCENARIOS EVALUATION

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ABSTRACT

The paper examines scenarios of integration Distributed ledger technology (DLT) into financial sector in Latvia. Rapid development of innovative technologies, such as DLT provide various benefits for financial companies. Empirical research findings revealed that among factors, which influence on DLT integration process (socioeconomic, financial factor, legal, technological, technical and organizational), the most important are legal and technological factors. Legal factor refers to legislative framework and regulatory environment, while technological describes project-specific characteristics, in terms of knowledge, skills and experience of specialists.

Among three developed scenarios the most preferable appeared to be the one where banks and other financial organizations operating in Latvia initiate the integration of DLT to gain competitive advantage and be able to compete in the market. The other two alternatives describe situation where Central bank of Latvia or European Union initiate and organize integration of DLT into financial sector of Latvia, in order to support development and stability of the country and entire European Union in the international market.

Current research gives insights into the best alternatives to integrate DLT and factors that should be considered, it can be useful for all participants of Latvian financial sector, including financial companies, Central bank and other authorities. Understanding the weights if each factor, may help project managers to draw attention towards factors with highest priority and consider them more carefully.

1. INTRODUCTION

The development of the financial industry has a significant impact on the growth of global economic system. Modern financial sector is characterized by a high rate of innovations, which improve both the quality and the volume of conducted operations every day. It is possible to say that financial and technological innovations are interconnected, since creation of new technologies lead to the positive changes and optimization in financial system, providing opportunity to implement complex processes, mitigate certain risks and meet requirements of clients and partners. While financial innovations can support projects in terms of funding and lead to a rapid leap in the development of new technological solutions (Błach, 2011, p. 17).

At the point where finance and technology merge, such term as Financial technologies (FinTech) appears. 'FinTech' is technologically enabled financial innovation that could result in new business models, applications, processes, products, or services with an associated material effect on financial markets and institutions and the provision of financial services (Schindler, 2016, p. 2). Distributed ledger technology (DLT) that is often associated as a part of FinTech, became one of the most topical technological solution in recent years. DLT is researched and tested by many commercial and governmental financial institutions, since this technology is offering such benefits as transparency and immutability of the records, traceability and auditability of the transactions, as well as security and cost reduction. Transparency are reached due to main characteristics and features of distributed ledgers, where every participant of the system can see history of all transactions performed within a system and trace the link to its origin. Therefore, audit can be implemented faster and easier, this can be valuable benefit for authorities.

Despite the important role of DLT for financial industry, there is lack of analysis on integration of this innovation. Even though, this concept is actively studied by modern researches, this technology is relatively new for many countries including for Latvia. There is little empirical evidence on how the Distributed ledger technology can be integrated into financial sector of Latvia, as well as what are the possible factors that may influence on this process.

Therefore, this study seeks to analyze features and characteristics of possible DLT integration scenarios into Latvian financial sector and evaluate, which scenario can be the most preferable in opinion of experts. Consequently, the following research question is formulated: What are the possible alternatives to introduce Distributed ledger technology into financial sector of Latvia?

Pursuant to the main goal of this research the authors applied the following research methods: scientific literature analysis, content analysis, questionnaire and analytic hierarchy process developed by T. Saaty. Analytic hierarchy process is applied in order to evaluate weights of influencing factors and priorities of scenarios on DLT integration.

Three scenarios are developed based on the analysis of recent official announcements and publications and evaluated by experts:

> *Scenario 1 – "Financial companies":* Banks and other financial companies operating in Latvia initiate integration of DLT in financial sector of Latvia.

Scenario 2 – "Central Bank": Central bank of Latvia initiates integration of DLT in financial sector of Latvia.

Scenario 3 – "European Union": European Union authorities initiate project on integration of DLT in financial sector of Latvia.

2. METHODOLOGY

The Analytic Hierarchy Process (AHP) method is applied to study scenarios of integration of Distributed ledger technology in financial sector of Latvia. This method of qualitative research assists us to understand expert opinion about factors, which may influence the integration process and prioritize possible scenarios.

Analytic Hierarchy Process was developed by Thomas Saaty in 1980, AHP is used to derive ratio scales from both discrete and continuous paired comparisons. This method has found its widest applications in multi-criteria decision making, planning and resource allocation and in conflict resolution (Saaty, 1987, p. 161). AHP is an effective and appropriate method for cases with various factors or criteria that influence on some complex decision. There are three principles of AHP, which make this method appropriate for this research: decomposition, comparative judgments and synthesis of priorities (Saaty, 1987, p. 166). The first means decomposition of decision problem into its smaller parts and building hierarchies of criteria. Therefore, the importance of each element can be understood clearly (Macharis, Springael, Brucker, & Verbeke, 2004). Comparative judgments allow to construct pairwise comparisons of the relative importance of elements and indicate principal eigenvector (Saaty, 1987, p. 161). Synthesis of priorities gives opportunity to gather all criterion priorities to make a general decision.

The analysis included development of questionnaire and further interviews with experts to understand their opinion concerning this topic. The questionnaire was prepared in compliance with AHP method, including 3 parts. The first part represents general introduction to the topic, giving definitions to all necessary terms, such as distributed ledger technology, socioeconomic factor, financial factor, legal framework, technological, technical and organizational factors. The first part also included questions on general information about the experts, for example "Field of professional activity". Experts were offered to participate in the survey anonymously and skip questions about name, company and job title. On practice four experts out of eight preferred to fill in the questionnaire anonymously, indicating only a field of their professional activity. The second part of the questionnaire included pairwise comparison of factors, which influence on DLT integration process and evaluation of their importance according to the following comparison scale (see Table 1).
According to Saaty's fundamental scale the "Equally important" judgment describes situation, when two activities contribute equally to the objective. Values 3 and 5 are explained as experience and judgment strongly favor one activity over another. The judgment "Very strongly more important" describes situation when activity is strongly favored and its dominance demonstrated in practice. The value of 9 "Extremely important" is explained as one activity is favored over another to the heist possible order. Numeric values of 2, 4, 6 and 8 are intermediate values between judgments, and they are used when compromise is needed (Saaty, 1987, p. 163).

Table 1. Saaty's pairwise comparison scale

Verbal judgment	Numeric value
Equally important	1
Moderately more important	2
	3
Strongly more important	4
	5
Very strongly more important	6
	7
Extremely important	8
	9

Source: Mu & Pereyra-Rojas, 2017

In the second part of the questionnaire experts were asked to select one factor, which is more important in a pair and evaluate its importance. The question consisted of 15 rows with pairs of factors and assessment scale from 1 to 9, as it is illustrated below.

The third section of questionnaire was aimed to evaluate three integration scenarios, which were developed based on the analysis made in theoretical part of this paper. The experts were offered three possible scenarios on integration of distributed ledger technology in the financial sector of Latvia. These scenarios were evaluated in respect to the six factors (socioeconomic, financial factor, legal, technological, technical and organizational), therefore question consisted of six separate tables, such as illustrated below. First, the experts were asked to make pairwise comparison, similar to the previous question about factors, they select one scenario out of two, that is more preferable with respect to certain factor, and afterwards evaluate to which extend one scenario is more preferable over another, using the same Saaty's pairwise comparison scale from 1 to 9 (from Equally preferable to Extremely more preferable)
In order to obtain a multilateral opinion about the topic experts from fields of professional activity, which somehow correlates with finance, governance and IT innovations, were invited to participate in the survey.

Having obtained all necessary information, the calculations was conducted using online source 123ahp.com (MyChoiceMyDecision, 2018). The website offers convenient way to apply Analytical Hierarchy Process method, understandable data entry process, detailed view of calculation steps, possibility to save and download results in csv format.
Considering that group of experts includes representatives of several fields it gives an opportunity to look at the question from different points of view and the synthesis of opinions of all experts regarding the integration of distributed ledger technology into financial sector of Latvia provide holistic view of the possible way to reach the goal.

3. THEORETICAL PART

In glossary of European parliamentary research service briefing, it is stated that distributed ledgers constitute databases spread across multiple sites, countries or institutions, which are typically accessible by anyone. Records of transactions are stored one after the other in a continuous ledger, rather than sorted into event-specific or thematic block.
In 2008 Satoshi Nakamoto proposed a system for electronic transactions without relying on trust, an electronic payment system based on cryptographic proof instead of trust (Nakamoto,

2008, pp. 1-2). That is a bitcoin, an entirely new Peer-to-Peer Electronic Cash System, which was built on chain of blocks. Block chain algorithms enable Bitcoin transactions to be aggregated in 'blocks' and these are added to a 'chain' of existing blocks using a cryptographic signature (UK Government Chief Scientific Adviser, 2016, p. 5). Later, Melanie Swan stated that blockchain is decentralized transparent ledger with the transaction records (Swan, 2015, pp. 1-2). Brett Scott described blockchain as widely distributed, and highly visible, public ledger or database (Scott, How Can Cryptocurrency and Blockchain Technology Play a Role in Building Social and Solidarity Finance?, 2016, p. 2). The reason why it is distributed is that identical copies maintained on multiple computer systems (Scott, Loonam, & Kumar, 2017, p. 423), or as it was mentioned by M. Swan shared by all network nodes, updated by miners and monitored by everyone (Swan, 2015, p. 2).
According to Deloitte report on Blockchain & distributed ledgers, distributed ledger technology is a family of technologies that includes blockchain, where a ledger is maintained by a group of peers rather than a single central authority (Chartered Accountants & Deloitte Access Economics , 2017, pp. 8-9). In its turn, blockchain is a type of distributed ledger, which enables records to be stored and sorted into blocks (UK Government Chief Scientific Adviser, 2016).

Blockchain technology provides various opportunities for financial sector worldwide. The most topical now are transaction systems. IT companies, such as Ripple and IBM are developing various blockchain based solutions for their clients. Ripple with ReiseBank settled the world's first live payment between Canada and Germany, it needs 8 seconds to settle an international payment (Ripple, 2016). Paula da Silva, Head of Transaction Services at SEB said "Ripple's solution allows our customers to send real-time transfers between their SEB accounts in Sweden and New York. We plan to expand the solution to all geographies and time zones in which we operate". As it is known, SEB also operates in Latvia (Johnson, 2017). Deutsche Bank, HSBC, KBC, Natixis, Rabobank, Société Générale and UniCredit signed memorandum of understanding, which means they will cooperate in development and commercialization of a new product - Digital Trade Chain (DTC) (Williams-Grut, 2017).

The analysis of recent official announcements and publications from different sources revealed three major groups of entities, which actively study and test DLT in the financial sector. (see Table 2) These groups include financial companies and governmental authorities.

Table 2. Institutions engaged in DLT researches

Financial companies	Deutsche Bank, SEB, ReiseBank, HSBC, CitiBank, KBC, Natixis, Rabobank, Société Générale, UniCredit Nasdaq, VISA, KPMG, Moscow Exchange Group, Ernst & Young Global Limited, SIX Swiss Exchange, Deutsche Börse Group
Central Bank	The Bank of England, US Federal Reserve, Central Bank of Brazil, Hong Kong Monetary Authority, Central bank of Singapore, Bank of Canada, Central Bank of Russian Federation
European Union	The European Commission, The European Parliament, The European Central Bank (ECB)

Source: authors

Since this research focuses on Latvian financial sector, the governmental authorities were divided into two groups: from European union and local authorities. Therefore, Table 2 indicates three major groups of institutions engaged in the researches and development of

DLT and Blockchain in financial sector. Considering certain characteristics and benefits of DLT all involved institutions could benefit from the integration of such innovation. It is safe to say, that financial companies are the most interested parties among three mentioned, since they represent the first beneficiaries. In case of DLT integration, they could save significant amount of funds on every day transactions and increase speed of some operations. The central bank and European Union bodies are regulatory authorities, which could benefit in terms of transparency and auditability from the fact that financial companies use DLT in their operations

4. THE RESULTS AND DISCUSSION

In order to evaluate factors influencing the integration of Distributed ledger technology into financial sector of Latvia and possible development scenarios, the survey among eight experts from financial sector, European Commission and IT field was conducted in compliance with analytic hierarchy process.

To evaluate the overall weight of each factor, experts' judgments are gathered into one matrix and the average value of priority vectors is calculated. The most significant factor in opinion of experts is legal (30%). Legal factor refers to legislative framework and regulatory environment, including laws, norms and rules based on which the innovative project implementation is performed. Scientific articles highlighted certainty of regulatory environment (existing standards and codes) (Russell, Tawiah, & Tawiah, 2006, p. 1528), as well as waves of regulation, deregulation and re-regulation; proliferation of regulations; public policies; regulatory framework (Mention & Torkkeli, 2014, p. 5). Introduction of innovations needs corresponding additions and changes in the current legislation. These changes should clarify application methods and areas, describing how and to which extent new technology can be applied, as well as limiting their level of influence on the existing system. Several experts commented as follows:" Legal system is not equipped; legislative branch is not responding needs; tax system" (see Table 3).

Technological factor has high significance (27%), which is only 3% lower than most important Legal factor. Technological factor refers to project-specific characteristics, in terms of knowledge, skills and experience of specialists, access to necessary information, certain features, challenges and opportunities of the innovative technology. Theorists mentioned inter-/intra-functional technological learning (Ignatius, Leen, Ramayah, Hin, & Jantan, 2012, pp. 453-462), pool of technological opportunities (Laursen & Salter, 2006, p. 146) and internal technological turbulence; technological innovativeness (Candi, Ende, & Gemser, 2013, p. 134). As a part of technological factor cyber-security was highlighted by one of the experts. Organizational factor is rather significant (16%), it is ranked on the third place. It describes structural issues and management of internal processes. Several articles indicated "technical" expertise in area of project management (Goffin & Mitchell, 2017, pp. 16-31), organizational process (Brown & Eisenhardt, 1995, p. 374) and interaction between parties (Fagerberg, 2015, p. 11). As it was commented by one of the experts, one of the barriers that could appear during integration process is organizational model transformation (see Table 3.).

Table 3. Priority vectors of factors assessed by experts

	Priority vector					
	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	**Average value**
Socio-economic factor	0.14	0.07	0.07	0.15	0.05	**0.10**
Financial factor	0.03	0.08	0.07	0.19	0.16	**0.11**
Legal framework	0.21	0.21	0.21	0.35	0.51	**0.30**
Technological factor	0.08	0.51	0.53	0.10	0.15	**0.27**
Technical factor	0.13	0.06	0.06	0.03	0.04	**0.06**
Organizational factor	0.40	0.07	0.07	0.17	0.09	**0.16**
	CR: 0.088	*CR: 0.175*	*CR: 0.139*	*CR: 0.189*	*CR: 0.154*	

Source: authors

Socio-economic factor and financial factor have almost equal significance in opinion of experts 10% and 11% respectively (see Table 3). Socio-economic factors include the level of development and stability in macroeconomic and financial environment, including such indicators as interest and inflation rates, currency exchange rates and market development, labor and customer relations. While financial factors refer to availability of funds and attraction of investments for project implementation, in particular it is investments from external financial sources such as commercial sponsors, governmental and non-governmental organizations, and other stakeholders. The lowest priority level has technical factor (6%), which describes project-specific characteristics, in terms of necessary equipment and machines, as well as processes and maintenance capabilities for innovative project implementation.

The third level of the hierarchy relates to the alternatives, in this research three possible scenarios of DLT integration were offered for experts' evaluation. three scenarios are developed based on the analysis of scientific articles, publications and other official announcements, which revealed three major groups of entities that actively study and test Distributed ledger technologies in the financial sector. These groups include financial companies, Central banks and European Union authorities.

Scenario 1 – "Financial companies": Banks and other financial institutions operating in Latvia initiate the integration of Distributed Ledger Technology into financial sector of Latvia. Being one of the beneficiaries, financial companies are interested in the project of introducing innovative technology. This will allow them to be competitive in the international market. Taking into account the fact that their international colleagues test and perform the first operations using DLT, this is very topical and demanded in a rapidly developing industry. Competition is one of the fundamental factors influencing the development of the market, for instance one company that started using DLT can cause a wave of researches on this technology by other organizations in order to comply with market trends and preserve market share. Mentioned benefits of DLT allow banks and other companies to meet needs of their customers and partners, for example significant increase in speed of operations will not only save time and other resources, but will also give competitive advantage to DLT users.

Scenario 2 – "Central Bank": Central bank of Latvia initiates and organizes integration of Distributed Ledger Technology into financial sector of Latvia. The central bank, as one of the

regulatory authority, constantly monitors the situation in the market. To ensure stability in the financial environment, it needs to make corrections and react on any changes in timely manner. To realize its functions, the central bank needs timely access to information and statistical data, this could be provided by such benefits of DLT as transparency, traceability and auditability. Since the central bank is interested in the development of the entire financial sector of Latvia, the introduction of such technology as DLT can give a push to the development of the entire country. Taking into account that the central banks of other countries are actively involved in the study of this concept, initiating a project on integration of DLT will increase Latvia's competitiveness on the world stage.

Scenario 3 – "European Union": European Union authorities initiate project on integration of Distributed Ledger Technology into financial sector of Latvia. European Union being interested in the development of member states and Eurozone as a whole, actively researches innovative technologies. Since, highly developed EU members ensures stability of the European union in the international market. European authorities have sufficient powers and resources to organize a project of such scale. Taking into account latest researches, reports and briefings dedicated to DLT, with a high degree of probability it is possible to expect integration of DLT into financial sector.

In order to prioritize alternatives, on the final stage of the survey experts were asked to assess scenarios in respect to mentioned factors using Saaty's comparison scale. Based on the priorities in respect to each factor, the total result for scenarios is calculated as a sum. Each expert performed pairwise comparison of three scenarios with respect to every factor, based on their judgments the local priorities are calculated. This gives first insights into their opinion about each scenario. The obtained results of every expert on local priorities and weights of each factor are used to calculate overall priorities of scenarios in terms of described factors (see Table 4).

This stage of the research reveals the best detailed view on experts' opinion about priorities of scenarios. Thus, it is possible to consider which scenario is more preferable in terms of certain factor. Scenario 2 "Central Bank" is prioritized in respect to socio-economic factor by three experts. Experts 2 and 3 who engaged in IT industry assessed 2nd scenario at 0.049 and 0.047 correspondingly, Experts 4 gave significantly higher priority to 2nd scenario - 0.102. That decision could be based on the fact that Central bank has powers to influence on the financial environment, for instance such indicator as interest rate. Two other experts believe that Scenario 1 "Financial companies" is more probable in regards to socio-economic factor (see Table 4).

All experts unanimously gave the highest priority to scenario 1 "Financial companies" in respect to financial factor (see Table 4). Since, the financial factor implies such a criterion as funding and investment it is quite reasonably that financial companies may afford to allocate funds for distributed ledger technology integration, if this could increase their competitiveness and bring higher return in future.

Legal framework being the most important factor in opinion of experts, made some differences in experts' assessments of scenarios. All three scenarios are prioritized to the highest level be some experts. Thus, Expert 1 evaluated scenario 3 "European Union" significantly higher than other scenarios, the priority is calculated as 0.14. Scenario 1 "Financial companies" was prioritized by Expert 5 in respect to legal factor, priority of 0.388 in comparison with weights of 2nd and 3rd alternatives 0.024 and 0.097 correspondingly. Still

the majority of experts gave the highest priority to scenario 2 "Central Bank" in regards to legal framework, Expert 2 assessed it at 0.154, Expert 3 - 0.158 and Expert 4 - 0.254 (see Table 4).

Table 4. Overall priorities of scenarios in respect to influencing factors

		Socio-economic factor	Financial factor	Legal factor	Technological factor	Technical factor	Organizational factor
Expert 1	Scenario 1	0.086	0.018	0.018	0.037	0.060	0.047
	Scenario 2	0.015	0.010	0.056	0.013	0.021	0.097
	Scenario 3	0.041	0.004	0.140	0.027	0.043	0.269
Expert 2	Scenario 1	0.017	0.056	0.015	0.351	0.040	0.017
	Scenario 2	0.049	0.019	0.154	0.120	0.014	0.048
	Scenario 3	0.006	0.007	0.039	0.041	0.005	0.006
Expert 3	Scenario 1	0.016	0.045	0.015	0.338	0.041	0.012
	Scenario 2	0.047	0.016	0.158	0.144	0.014	0.047
	Scenario 3	0.006	0.006	0.036	0.049	0.005	0.006
Expert 4	Scenario 1	0.012	0.130	0.020	0.058	0.024	0.057
	Scenario 2	0.102	0.013	0.254	0.024	0.007	0.057
	Scenario 3	0.041	0.046	0.079	0.015	0.003	0.057
Expert 5	Scenario 1	0.040	0.127	0.388	0.112	0.031	0.070
	Scenario 2	0.003	0.025	0.024	0.009	0.002	0.006
	Scenario 3	0.010	0.010	0.097	0.027	0.007	0.013

Source: authors

Scenario 1 "Financial companies" is the most preferable in respect to both technological and technical factors in solid opinion of all experts. Considering that both factors relate to specific characteristics of the project, whether it is expertise and knowledge of specialists or equipment and machines, these factors deal with sensitive information. Protection of clients' data, history of operations as well as commercial secrets is an important step to ensure normal performance of the systems built on distributed ledgers. Since, in a competitive environment it is very important to protect intellectual property and corporate secrets experts' opinion is reasonable and grounded. Here, experts from IT industry gave the highest priority to scenario 1 among experts, as they are more familiar with certain advantages and risks of such innovative technology as DLT. Expert 2 evaluated priority of the 1st scenario with respect to technological factor at 0.351 and Expert 3 at 0.338 (see Table 4).

The overall priorities of scenarios in terms of organizational factor deviate the most. This is the only question where an expert did not prioritize scenarios, marking all three as equally important. Expert 4 did not highlight any scenario with respect to organizational factor. Expert 1 evaluated "European Union" scenario as extremely more preferable (0.269) compared to other two scenarios. Experts 2 and 3 almost identically weighted priority of 2nd scenario, 0.048 and 0.047 correspondingly. Integration scenario 1 "Financial companies" was prioritized by Expert 5 at the rate of 0.070 (see Table 4).

To summarize the analysis and determine the total priorities for each scenario on integration of distributed ledger technology into financial sector of Latvia, overall priorities are summed up and averaged. Table below describes assessment results of each expert and the values of average priorities for each integration scenario. Despite the fact that experts' opinions differ in some assessments under the influence of their professional experience and knowledge, the Analytic hierarchy process method allows to gather together all the judgments and calculate the overall result considering all evaluations. This step of the research makes it possible to clearly see the overall result of expert analysis on the integration scenarios of DLT, opinion of each one separately and the synthesis of opinions of all experts in terms of average value of the priority vector (see Table 5).

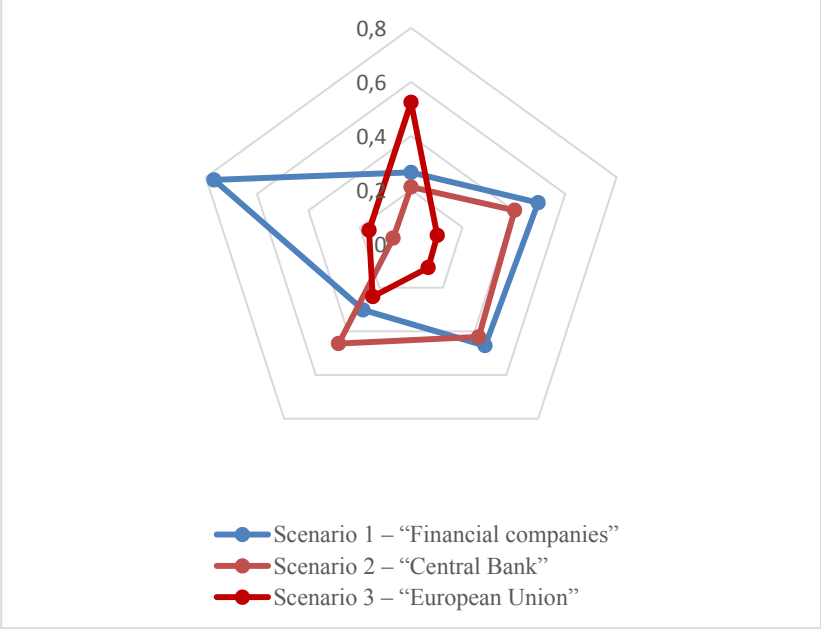
Table 5. Results of experts' evaluation of DLT integration scenarios

	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	**Average priority**
Scenario 1 – "Financial companies"	0.26	0.49	0.47	0.30	0.77	**0.46**
Scenario 2 – "Central Bank"	0.21	0.40	0.43	0.46	0.07	**0.31**
Scenario 3 – "European Union"	0.52	0.10	0.11	0.24	0.16	**0.23**

Source: authors

Figure 1 illustrates the priority values of each interviewed expert. As it can be seen in the graph, Expert 1 who works in the European Commission believes that the most preferable scenario to integrate DLT into financial sector of Latvia is a project initiated by European Union authorities. Expert 1 gave the highest priority value of 0.52 to Scenario 3, which is followed by Scenario 1 (0.26) and Scenario 2 (0.21) (see Figure 1).

Figure 1. Experts' evaluation of DLT integration scenarios



Source: authors

Experts 2 and 3, both are employed in IT industry assessed the Scenario 1 "Financial companies" as the optimal one. Expert 2 has 12 years of experience in the IT field and last

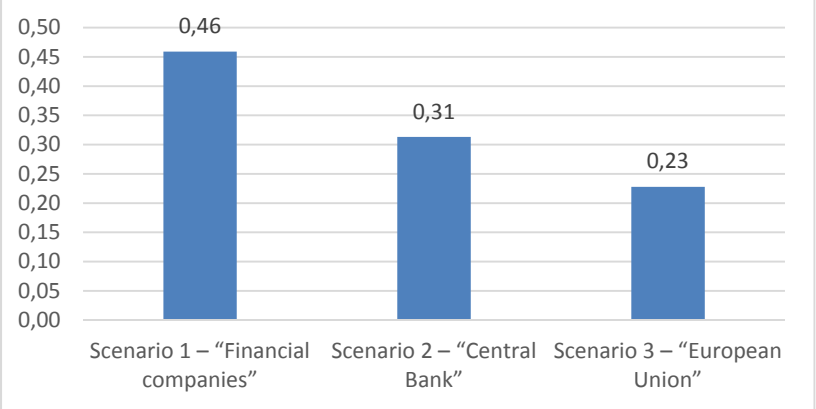
year is engaged in a Blockchain project in Latvia. Expert 3 is an IT expert-developer with a 4 year-experience in Blochchain and other Distributed ledger technologies. The priority vector value of the 1st scenario is 0.49 in opinion of Expert 2 and 0.47 in opinion of Expert 3. In addition, it should be noted that scenario 2 received slightly less weight in opinion of IT experts. Thus, priority vector values of "Central Bank" scenario are 0.40 (Expert 2) and 0.43 (Expert 3). The least preferable scenario in contrast to the opinion of Expert 1 is Scenario 3 "European Union" (see Figure 1).

Experts 4 and 5 are both representatives of financial industry have significantly different opinions about the optimal scenario of DLT integration. Expert 4 gave the highest priority to the 2nd scenario "Central Bank" (0.46), while Expert 5 evaluated the 1st scenario "Financial companies" as the most preferable one (0.77). The lowest priority vector in opinion of Expert 4 is allocated to Scenario 3 "European Union" (0.24), in contrast Expert 5 believes that the least preferable is Scenario 2 "Central Bank" (0.07) (see Figure 1).

Anaclitic hierarchy process revealed that the most preferable scenario of DLT integration into financial sector of Latvia is Scenario 1, where banks and other financial institutions operating in Latvia, start integration of this innovation to preserve competitiveness in the international market and gain competitive advantage and other benefits of distributed ledger technology. Considering recent activities of foreign financial organizations, Latvian companies may follow the trend and in terms of current digital maturity level they have high chance to succeed. In addition, it should be noted that Latvian financial sector is strongly linked with Nordic countries where some banks already officially published first reports and announcements on studies and tests of DLT, for instance SEB bank.

Application area of DLT in finance is rather broad such as money transfers, audit, smart contracts and others, therefore integration of this technology can be performed gradually to mitigate high operational risks. Competition in this case plays the role of the main engine, which can be drive progress to improvements of the available advantages of this technology and the development of ways to overcome the known barriers. The average value of priority vector for Scenario 1 is 0.46, meaning that in opinion of experts it is a best way to integrate DLT (see Figure 2).

Figure 2. Average priority vectors of three DLT integration scenarios



Source: authors

The average priority vector for scenario 2 is evaluated by experts at 0.31. This ranks the alternative, where Central bank initiates the project on DLT integration, at the second place.

Central bank being interested in the development of the entire financial sector of Latvia, can promote the introduction of DLT on different levels, both in private sector and in government agencies, also taking into account certain benefits of DLT it could be valuable for various market participants. Scenario 2 could make integration more organized and structured that allows to avoid some organizational hindrances, also Central bank is able to promote development of local standards and norms to overcome certain legal issues.

The least preferable alternative appeared to be Scenario 3 "European Union", which has lowest priority vector of 0.23. Development scenario, where European Union authorities initiate project on integration of Distributed Ledger Technology in Latvia is rated at the third place (see Figure 2).

Thus, it can be concluded that the best alternative to integrate Distributed ledger technology into financial sector of Latvia in experts' opinion is Scenario 1 "Financial companies". Based on the above analysis, it is possible to state that Hypothesis 3 should be accepted, since financial companies are one of the beneficiaries and most interested entities to integrate this innovation into their operations.

5. CONCLUSIONS

Financial technologies become rather essential in recent years, and distributed ledger technology being a part of FinTech, became one of the most topical technological solutions studied and researched by various companies, institutions and governments.

Literature analysis discovered six groups of factors, which influence on integration of distributed ledger technology in financial sector of Latvia, as follows: socio-economic, financial, legal, technological, technical and organizational factors. Scientific literature highlighted significance of technological and organizational factors. In the course of analysis organizational factors are defined as structural issues and management of internal processes, including procurement, labor relations, support and coordination, arrangement of communication between involved parties, as well as negotiation and cooperation with stakeholders. While technological factors refer to project-specific characteristics, in terms of knowledge, skills and experience of specialists, access to necessary information, certain features, challenges and opportunities of the innovative technology.

Empirical research findings based on Analytic hierarchy process method revealed that the most important factors in experts' opinion are legal and technological factors. Legal factor refers to legislative framework and regulatory environment, including laws, norms and rules based on which the innovative project implementation is performed. Financial and socio-economic factors are almost of the same importance. Innovative project of such scale needs significant investments from external sources or governmental funding. While socio-economic factor refers to the level of development and stability in macroeconomic and financial environment, as well as market development. Technical factor, that describes project-specific characteristics, in terms of necessary equipment and machines, as well as processes and maintenance capabilities for innovative project implementation, has the lowest significance both in terms of literature and in opinion of experts.

Within the research three possible scenarios on integration of distributed ledger technology into financial sector of Latvia were developed and evaluated. According to the empirical results the most preferable scenario on DLT integration is Scenario 1, where banks and other financial institutions operating in Latvia, start integration of this innovation being one of the

beneficiaries, financial companies are interested in the project of introducing innovative technology. This will allow them to preserve competitiveness in the international market and gain competitive advantage and other benefits of DLT. Mentioned benefits of DLT allow banks and other companies to meet needs of their customers and partners, for example significant increase in speed of operations will not only save time and other resources, but will also give competitive advantage to DLT users.

The second place in experts' opinion is allocated for Scenario 2 "Central bank". Central bank being interested in the development of the entire financial sector of Latvia, can promote the introduction of DLT on different levels, both in private sector and in government agencies. Scenario 2 could make integration more organized and structured. Considering that the central banks of other countries also actively study this concept, initiating a project on integration of DLT will increase Latvia's competitiveness on the world stage.

The least preferable alternative appeared to be Scenario 3 "European Union", which has lowest priority vector based on opinion of experts. This development scenario describes situation when European Union authorities initiate project on integration of Distributed Ledger Technology in Latvia.

Therefore, the current research gives useful information for all participants of Latvian financial sector, including financial companies, Central bank and other authorities. Since empirical findings of the thesis provides insights into the best alternatives to integrate distributed ledger technology and factors that should be considered carefully, when developing a project on DLT integration. Understanding the weights if each factor, may help project managers to draw attention towards factors with highest priority and consider them more carefully. This study improves academic knowledge in this area and promote further researches.

Considering, that this study is limited to 8 experts, and among them judgments of only 5 are accepted in accordance with methodology requirements, the further research should involve greater number of experts from different professional fields in order to obtain in order to obtain holistic view on the integration of distributed ledger technology.

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THE IMPACT OF TAX POLICY ON SMES' PERFORMANCE: THE CASE OF SLOVENIA

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Key words: *Taxation, Tax compliance, Administrative barriers, SMEs, Slovenia*
JEL codes: *L26, H83, K23*

ABSTRACT

Small and medium enterprises (SMEs) represent the backbone of the Slovenian economy, providing a solid source of job creation and economic growth. There exist the variety of barriers, which often threaten the business environment. However, most SMEs consider tax-related matters as the most burdensome field that affects them. Accordingly, the main aim of this paper is to examine the direct and indirect effects of tax policy and their implications for SMEs' performance. The paper therefore takes advantages of the unique database of Slovenian SMEs. The empirical results of the multiple linear regression on a sample of 120 SMEs show that taxation and tax related administrative barriers have a negative impact on SMEs' performance, whereby the latter is more harmful for SMEs' business operations than taxes. The findings are beneficial especial for policymakers, which should ensure a stable and predictable tax legislative environment for SMEs and provide simplified methods for taxation.

1. INTRODUCTION

Small and medium enterprises (SMEs) plays a very important role in the European economy, since they provide a solid source of job creation and economic growth. SMEs cover almost the entire European economy, accounting for nearly 67% of employment and over 57% of value added. They are even more important in small economies such as Slovenia since they provide over 72% of employment and some 63% of value added (European Commission, 2018). However, compared to large enterprises, SMEs often have worse performance, which is reflected in lower profitability, higher staff turnover, lower rate of survival etc. (European Parliament, 2016). All three of these presumably result from the barriers SMEs typically encounter in Slovenia. Although economic literature highlights various barriers, most SMEs consider tax-related matters as the most burdensome field that affects them. Namely, SMEs in whatever form, size or sector are required by law to comply with all relevant legislation including taxation (Ravšelj & Aristovnik, 2018).

In general, difficulties regarding tax-related matters comprising taxation on the one hand and tax compliance costs, representing the administrative barriers that arise from tax rules on the other. Generally, administrative barriers represent everything that unjustifiably hampers business operations of enterprises. It covers all costs arising from unnecessary administrative obligations that enterprises must fulfil due to the legislation. Therefore, administrative barriers are not strictly necessary for the achievement of the public interest, not rationally justified and can be removed without any damage to the public interest (Ministry of the Interior, 2013). Administrative barriers in the field of tax compliance and financial reporting, which usually stem from the complexity of the tax policy can be defined as indirect effects of the tax system. In other words, they represent operating costs that are independent from the level of the SMEs' profits (Block, 2016). Tax compliance is defined as the willingness of taxpayers or enterprises to act in accordance with tax legislation without the use of coercive measures (James & Alley, 2002). The fulfilment of these obligations thus includes the true reporting of the tax base, correct computation of tax liabilities, timely filling of tax returns and timely payment of the amount due as tax (Chaltopadhyay & Das-Gupta, 2002; Franzoni, 2000). The aforementioned also requires the proper financial reporting. According to the Doing Business Report issued by the World Bank, Slovenia lags behind some other European Union (EU) member states (e.g. Ireland, Denmark, Finland) in paying taxes (World Bank, 2018). This implies a lot of room for improvement remains in terms of designing tax policy as well as tax and accounting rules in order to address all tax-related challenges faced by SMEs.

Accordingly, the aim of this paper is to determine the impact of taxation and administrative barriers that arise from tax rules on SMEs' performance. The remaining sections of this paper are organized as follows. In the next section, a theoretical considerations and hypotheses development is presented. The following section describes the data and methodology. In the next section, the empirical results are presented. The paper ends with conclusions in which the main findings are summarized.

2. THEORETICAL CONSIDERATIONS AND HYPOTHESES DEVELOPMENT

The business environment is determined predominantly by legislation. It defines the rules under which the enterprises have to operate. However, complexity of legislation creates unnecessary administrative barriers and consequently hinders economic activity. Therefore, clear, transparent and unambiguous legislation plays a vital role in creating friendly business environment in which enterprises operate. This is also confirmed by the literature, which

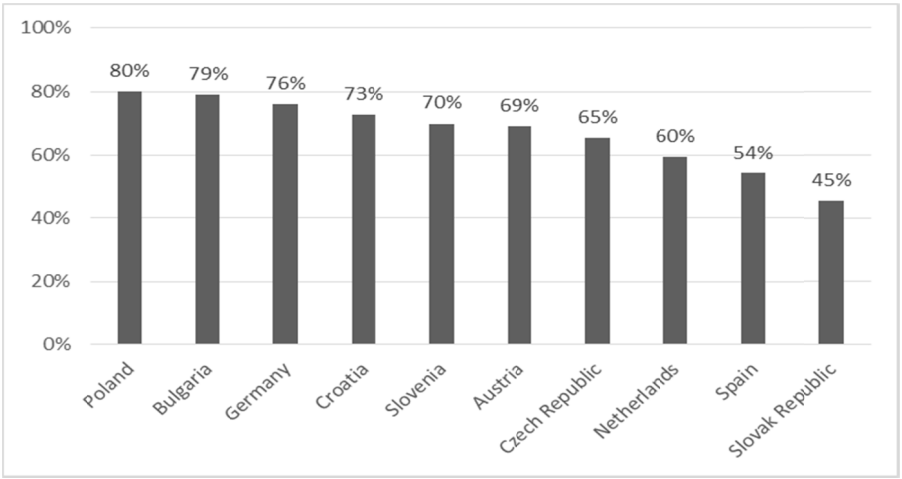
notes that economies with better legislation and regulations grow faster (Djankov et al., 2006). Therefore, lowering administrative barriers is one of the main prerequisites for improving the business environment and consequently the competitiveness of the economy. This is the reason why most of the EU member countries are seeking to reduce bureaucracy (Aristovnik & Obadić, 2015). Compliance with all relevant legislation is becoming increasingly complex. The extensive legislation, regulations and complex administrative procedures adopted in recent years, which is the consequence of Europeanization and Globalization processes are even more burdensome on enterprises. In this context, it is well established in the literature, that administrative barriers stemming from existing legislation and regulations hinder the performance, productivity and growth of the private sector, which relates mainly to SMEs (Bartlett & Bukvić, 2011; Milavec & Klun, 2011; Slabe-Erker & Klun, 2012). Since all contemporary economies are grounded on the compulsory payment of taxes, this applies particularly to tax legislation, which is a major concern of the private sector as taxes also often represent a central parameter defining the business environment.

In general, tax legislation covers all tax-related matters such as taxation, tax compliance and financial reporting as a prerequisite for taxation. There are some studies on a macro level, which examine the impact of taxation and tax compliance on entrepreneurship. In this context, Djankov et al. (2010) note that taxes have a considerable negative impact on entrepreneurial activity. Additionally, it was found in some studies that besides taxes also high complexity of a tax legislation as the main cause of administrative barriers can reduce entrepreneurial activity (Block, 2016; Braunerhjelm & Eklund, 2014). According to these studies, there are two main tax-related matters, which can inhibit entrepreneurship. These are taxation on the one hand and tax administrative barriers on the other. The amount of the tax paid depends on the taxable profit and the tax rates. In other words, taxation varies with business activity and therefore can be considered as a variable cost. In spite of the fact that tax itself can be perceived as burdensome in terms of entrepreneurial activity, administrative barriers can be more problematic. Namely, in relative terms, small enterprises bear disproportionate regulatory barriers. This effect of a disproportionate regulatory barriers can be observed especially in the tax area. There is evidence that tax compliance costs relative to sales are larger for SMEs than for large companies. Namely, European SMEs have a cost to tax revenue ratio (i.e. the ratio between total tax-related compliance costs and paid taxes) of 30.9%, whereby large companies on the other hand have a cost to tax revenue ratio of only 1.9% (European Commission, 2004, 2007). The reasons behind disproportion of administrative barrier on SMEs can be the following. The first reason is that costs related to tax compliance and financial reporting are to some extent fixed, meaning that they do not change much with the size of enterprise. For example, tax accounting and preparing financial reports does not become more expensive just because larger figures have to be entered in the forms. The second reason concerns the lower efficiency of smaller enterprises in dealing with legislation. In other words, larger enterprises are more efficient in dealing with tax compliance. The higher absolute costs justify the employment of specialists and the investment in systems to increase efficiency (European Commission, 2007). In this context, it is established in the literature that tax administrative barriers primarily influences the early stages of entrepreneurship. Namely, when enterprises become more mature, the costs associated with tax compliance and financial reporting abate due to learning. Over time, enterprises develop routines to handle taxes. Since costs related to the tax compliance and financial reporting can largely be considered as a fixed cost, their negative impacts would be particularly prevalent for young and small enterprises (Braunerhjelm et al., 2015).

There are also some studies on a micro level, which emphasize that taxation as well as tax administrative barriers have a negative impact on SMEs' performance. The study from Tee et al. (2016) reveals that tax payment hinders SMEs' performance, while the study from Ameyaw et al. (2016) shows that SMEs' perceive adverse impact of tax policies on SMEs' tax compliance, their perception of tax policies themselves and their growth. This constitutes a reason why many countries strive for different measures, which could potentially encourage tax morale and consequently tax compliance. The most straightforward solution for addressing the tax policy issues can be either lowering tax rates or reducing tax administrative barriers. However, in the vast majority of cases it is about finding a suitable compromise between taxation and the way in which taxes should be paid.

Although it is well established in the literature that taxation and tax administrative barriers have a negative impact on SMEs' performance, the question which of these are more harmful for SMEs' performance remains unexplained. There can be three possible situations, namely: 1) equivalent negative impact of taxation and administrative barriers; 2) prevailing negative impact of taxation; 3) prevailing negative impact of tax administrative barriers. The incidence of a particular situation can be explained by justifiability of tax rate. Namely, if enterprises perceive taxation and tax administrative burdensome to be equally burdensome, it is possible that they have equivalent negative impact on their performance. When enterprises perceive tax rate as unjustifiable, it is more likely that taxes have a greater negative impact on their performance than tax administrative barriers. Contrary, when enterprises perceive tax rate as justifiable, it is more likely that tax administrative barriers have a greater negative impact on their performance than taxes. Accordingly, many countries strive for different measures, which could potentially encourage tax morale and consequently tax compliance. The most straightforward solution for addressing the tax policy issues can be either lowering tax rates or reducing tax administrative barriers. However, in the vast majority of cases it is about finding a suitable compromise between taxation and the way in which taxes should be paid.

Figure 1. Tax morale in selected EU member countries.



Source: EVS, 2018.

Figure 1 presents the tax morale in selected EU member countries. It presents the percentage of individuals, which argue that tax evasion is never justifiable. It is evident that Poland and Bulgaria have the highest tax morale. Contrary, Slovak Republic and Spain are the countries with the lowest tax morale. Slovenia ranks in the middle with Croatia and Austria. Since the compulsory payment of taxes represents the foundation of all contemporary economies, it is

important that individual countries preserve tax morale at high level. This can be achieved through an appropriately designed tax policy providing reasonable or justifiable tax rates and simplified taxation administrative procedures. This is of crucial importance since tax policy is often a major concern of the private sector and represent a central parameter defining the business environment.

The literature review reveals that besides pure financial cost of the tax also administrative barriers that arise from tax rules have a negative impact on SMEs' performance. The latter may be even more problematic for SMEs than the taxation itself, especially due to the disproportion of administrative barriers for reasons regarding fixed-cost nature of regulation and insufficient financial and human resources to manage the obligations of public administration in the most efficient way. Moreover, Slovenia has a relatively high level of tax morale and consequently it can be inferred that individuals and enterprises perceive tax rate as justifiable. Therefore, it can be anticipated that tax administrative barriers have a greater negative impact on their performance than taxes. Accordingly, the following hypotheses are proposed:

- **Hypothesis 1:** Taxes have a negative impact on SMEs' performance.
- **Hypothesis 2:** Tax administrative barriers have a negative impact on SMEs' performance.
- **Hypothesis 3:** Tax administrative barriers have a greater negative impact on SMEs' performance than taxes.

3. DATA AND METHODOLOGY

The unique database for empirical analysis was made by combining survey data and data from the financial statements of SMEs. Database building was therefore carried out in two consecutive steps. The first step refers to the collecting data with a questionnaire. The content of questionnaire was formed by the academia experts in the economic and legal fields together with the recommendations from the practitioners, i.e. representatives of the Chamber of Craft and Small Business of Slovenia as well as entrepreneurs. It contains 39 questions, of which one is of an open type and covers different key fields, where SMEs can face administrative barriers. The respondents could leave certain questions blank if the content was not applicable to them. The questionnaire was distributed via field survey, which resulted in a total of 652 responses. The entire data collection process lasted from the beginning of November 2016 to the end of April 2017. Further, this data was merged with data from the financial statements of SME, which was provided by the Agency of the Republic of Slovenia for Public Legal Records and Related Services. For the purposes of the empirical analysis in this paper, only questions related to the field of tax compliance and financial reporting are considered. Moreover, in order to identify suitable SMEs for the empirical analysis, the sample is reduced for those SMEs, which:

- either cooperate only with one business partner from the beginning of SME foundation or did not respond to this question, since these are so-called fictitious enterprises;
- either use outsourcing for fulfilling obligations to public administration (accounting services or tax advisors) or did not respond to this question;

- either do not use e-portals for communication with administrative authorities or did not respond to this question, since the use of e-portals is obliged for financial reporting;

- have legal form of economic interesting group, as one of the atypical forms of entrepreneurship;

- have negative value of effective tax rate (ETR) and return on equity (ROE); and

- have missing values of the main variables included in the empirical model.

The abovementioned SMEs are excluded from the empirical analysis, since the presented characteristics can distort the empirical results, since they do not have real perception or opinion regarding administrative barriers in the field of tax compliance and financial reporting. Therefore, the final sample of SMEs, which is used in the empirical analysis, includes 120 SMEs.

Dataset, which is used in the empirical analysis, covers data from the questionnaire as well as data from the financial statements of SMEs. Based on the data from the questionnaire, the main independent variable of interest is generated, namely, administrative barriers in the field of tax compliance and financial reporting or tax administrative barriers (TAB). This variable is generated in the following way. SMEs were asked to choose up to three arguments of the seven offered, which represent the biggest administrative barriers for your enterprise in the field of tax compliance as well as in the field of financial reporting. Based on this, the average value of the sum of arguments representing the biggest administrative barriers is used as a proxy variable for tax administrative barriers (TAB). The values of this variable are converted to scale from 1 to 5, whereby a higher value of this variable means that enterprises perceive administrative barriers in the field of tax compliance and financial reporting to a greater extent and more intensively. Other relevant variables were derived from the financial data of SMEs. The second main independent variable of interest is effective tax rate (ETR), which is calculated as the total tax paid divided by the taxable income. Higher value of this indicator means that enterprise pays more taxes in relative terms. There are also some other variables, which are considered in the empirical analysis as control variables. These are total efficiency (EFF), calculated as total revenues to total expenses ratio, financial leverage (LEV), calculated as debt-to asset ratio and SME size (SIZE) calculated as natural logarithm of total assets. All of these variables are assumed to have an impact on SMEs' performance. SMEs' performance is defined by return on equity (ROE), which is calculated as enterprise's net income divided by its average stockholder's equity. Higher value of this indicator means that enterprise have better performance. A summary of all variables used in the empirical analysis is presented in Table 1.

Table 1. Abbreviations and definitions of variables.

Abbreviation	Variable	Definition
ROE	Return on equity	Return on equity is calculated as enterprise's net income divided by its average stockholder's equity.
TAB	Tax administrative barriers	Tax administrative barriers is calculated as average of the sum of arguments representing the biggest administrative barriers in the field of tax compliance and financial reporting.
ETR	Effective tax rate	Effective tax rate is calculated as total tax paid divided by the taxable income.

EFF	Total efficiency	Total efficiency is calculated as total revenues to total expenses ratio.
LEV	Financial leverage	Financial leverage is calculated as debt-to-asset ratio.
SIZE	SME size	SME size is calculated as natural logarithm of total assets.

Source: Agency of the Republic of Slovenia for Public Legal Records and Related services, 2006.

In order to test whether the taxes and tax administrative barriers have a negative impact on SMEs' performance, regression analysis is performed. Regression analysis is a statistical tool for analysing the relationships between variables in order to determine the causal effect of one variable upon another (Sykes, 1993). For hypothesis testing, an ordinary least squares (OLS) multiple regression analysis on a cross-sectional dataset is applied. Therefore, return on equity (ROE) is regressed against the tax administrative barrier (TAB) as well as effective tax rate (ETR) as a separate component in the model to emphasize that taxes will also affect SMEs' performance and must be controlled for when examining the impact of tax administrative barriers (TAB). Additionally, some control variables are added in to the empirical model assuming to have an impact on SMEs' performance. These are total efficiency (EFF), financial leverage (LEV) and SME size (SIZE). Based on this, the following regression model (Equation (1)) is estimated:

$$ROE_i = \beta_0 + \beta_1 TAB_i + \beta_2 ETR_i + \beta_3 EFF_i + \beta_4 LEV_i + \beta_5 SIZE_i + \varepsilon_i \quad (1)$$

4. EMPIRICAL RESULTS

The paper tries to examine the impact of taxation and administrative barriers that arise from tax rules on SMEs' performance. In order to do this, tax administrative barriers (TAB) and effective tax rate (ETR) are considered as a separated components in the model. However, this approach may be problematic. Due to the inclusion of multiple variables that can be assumed to be interrelated may cause multicollinearity. Namely, tax administrative barriers (TAB) may be expected to be positively correlated with effective tax rate (ETR), assuming that a higher tax rate implies a more complex tax policy. However, the Pearson correlations between the main independent variables of interest as well as between other explanatory variables does not indicate any strong linear relationship. This suggests that there is no issue of multicollinearity in the data. The Pearson correlation matrix of variables is reported in Table 2.

Table 2. Pearson correlation matrix of variables.

	ROE	**TAB**	**ETR**	**EFF**	**LEV**	**SIZE**
ROE	1					
TAB	-0.232*	1				
ETR	-0.138	0.024	1			
EFF	0.416***	0.027	-0.086	1		
LEV	0.430***	-0.050	0.069	-0.183*	1	
SIZE	-0.102	0.128	-0.173	0.070	0.019	1

Note: *p<0.05; **p<0.01; ***p<0.001.

Source: Own calculations.

Table 3 shows the regression results of the proposed empirical model, which is assessed in a hierarchical way: (1) inclusion of control variables (total efficiency (EFF), financial leverage (LEV) and SME size (SIZE)) (Model 1); (2) inclusion of effective tax rate (ETR) variable (Model 3); and (3) inclusion of tax administrative barriers (TAB) variable (Model 3). From the Table 3 it is evident that all of standardised beta coefficients are statistically significant

and therefore are all relevant for explaining the model. Moreover, according to the Tolerance (TOL) and Variance Inflation Factor (VIF), multicollinearity is not an issue here, since the first is higher than 0.10 and the second is lower than 10. Table 3 also reveals R^2 and adjusted R^2 for each model. It is evident that R^2 and adjusted R^2 increase with each new variable added into the model. Since Model 3 has the highest R^2 and adjusted R^2 it will be the most appropriate model to predict SMEs' performance.

Table 3. Regression results of the proposed empirical model.

	Model 1			**Model 2**			**Model 3**		
Dependent variable	ROE			ROE			ROE		
	Coefficient	TOL	VIF	Coefficient	TOL	VIF	Coefficient	TOL	VIF
TAB							-0.197**	0.978	1.022
ETR				-0.161*	0.961	1.041	-0.151*	0.958	1.044
EFF	0.523***	0.961	1.040	0.513***	0.957	1.045	0.516***	0.957	1.045
LEV	0.529***	0.966	1.036	0.538***	0.962	1.039	0.528***	0.959	1.042
SIZE	-0.149*	0.994	1.005	-0.177*	0.965	1.036	-0.149*	0.947	1.055
R^2	0.461			0.486			0.524		
Adjusted R^2	0.447			0.468			0.503		
Number of observations	120								

Note: *p<0.05; **p<0.01; ***p<0.001.

Source: Own calculations.

From the empirical results (Model 1, Model 2 and Model 3), it is evident that all control variables (total efficiency (EFF), financial leverage (LEV) and SME size (SIZE)) have an impact on dependent variable defined as return on equity (ROE). The impact of total efficiency (EFF) on return on equity (ROE) is positive. This means that total efficiency of SMEs enhances SMEs' performance. This result is in line with other studies, which found that enterprise efficiency or productivity has a positive impact on enterprise profitability (Salman & Yazdanfar, 2012; Yazdanfar, 2013; Margaretha & Supartika, 2016). Further, the impact of financial leverage (LEV) on return on equity (ROE) is positive, meaning that the increase in financial leverage will result in better SMEs' performance. This result coincides with the findings of Fosu (2013), which suggest that financial leverage has a positive impact on enterprise performance. Finally, the impact of SME size (SIZE) on return on equity (ROE) is negative, which implies that larger SMEs have lower performance. This result is in accordance with other studies, which also found that enterprise size have a negative impact on enterprise profitability (Ramasamy et al., 2005; Salman & Yazdanfar, 2012; Margaretha & Supartika, 2016).

The empirical results from the second (Model 2) and third model (Model 3), where the effective tax rate (ETR) and tax administrative barriers (TAB) variables are included, reveal that the inclusion of main independent variables of interest improved the empirical model, as the value of R^2 and adjusted R^2 increase with each next model. The empirical results reveal that besides other factors of influence also effective tax rate (ETR) has an impact on return on equity (ROE), whereby the impact is negative. This implies that taxes have a negative impact on SMEs' performance, which confirms the Hypothesis 1. Moreover, the results show that in addition to all mentioned variables also tax administrative barriers (TAB) has an impact on return on equity (ROE), whereby the impact is negative. The aforementioned confirms the Hypothesis 2 that tax administrative barriers have a negative impact on SMEs' performance. The presented empirical results indicate that effective tax rate (ETR) as well as tax administrative barriers (TAB) hinder SMEs' performance. Nevertheless, the comparison of

standardised beta coefficients of the main independent variables of interest reveals that tax administrative barriers (TAB) have even greater negative impact on SMEs' performance than effective tax rate (ETR), which confirms the Hypothesis 3 that administrative barriers in the field of tax compliance and financial reporting have a greater negative impact on SMEs' performance than taxes. These results are similar and comparable with the findings on macro and micro level (Braunerhjelm & Eklund, 2014; Ameyaw et al. 2016; Block, 2016; Tee et al., 2016).

5. CONCLUSIONS

Tax policy defines the rules regarding the fulfilling all tax-related obligations. On the one hand, it covers taxation itself while on the other it prescribes the way in which taxes should be paid. In fulfilling all tax-related obligations there usually occur two types of costs. The first one refers to the taxation and covers the amount of the tax paid, which depends on the taxable profit and the tax rates and therefore it can be considered as a variable cost. The second one is related to the administrative barriers that arise from tax rules. This cost is related to tax compliance and financial reporting, which do not change much with the size of enterprise and can be considered as fixed cost. The fixed-cost nature of regulation and simultaneous lower efficiency of smaller enterprises in dealing with legislation cause disproportion of tax administrative barriers. Therefore, the compliance with tax legislation can therefore be challenging especially for SMEs. Moreover, many EU countries are facing the challenges of modern tax legislation, which is often excessive, complex and designed in a way that allows their application to enterprises of all sizes, even for operations that are only carried out by large enterprises. Thus, legislative pressures can be currently even more challenging and burdensome for SME business operations and their performance.

Although there are some studies, which examine the impact of taxation and tax administrative barriers on entrepreneurship and SMEs' performance, there is a lack of studies, which examine this issue at micro level and with real data from the financial statements of SMEs. The paper therefore takes advantages of the unique database. It is focused on the examining the impact of taxation and administrative barriers that arise from tax rules on SMEs' performance. The empirical results reveal that taxes as well as tax administrative barriers hinder SMEs' performance. Further, the empirical analysis also indicates that tax administrative barriers have even greater negative impact on SMEs' performance than taxes. The presented results confirm the main research hypotheses of the paper. Despite the general belief that tax is the main inhibitor of entrepreneurship and SMEs' performance, the results of this paper show that the main problem is mainly in that part of tax policy, which defines the way in which taxes should be paid. In other words, the main problem is in administrative barriers that arise from tax legislation and unjustifiably hampers business operations of SMEs. The findings of the paper are not comparable only to other international studies, but also to the ranking of Slovenia in the World Bank Doing Business Report.

Tax administrative barriers have an adverse impact on SMEs' performance. Reducing those barriers may therefore encourage entrepreneurship. The aforementioned is very important, especially in small economies such as Slovenia where SMEs provide a solid source of job creation and economic growth. Although Slovenia strives to make continuous improvements in simplifying legislation and procedures in the field of tax compliance and financial reporting, there still remains room for improvements in terms of designing tax policy as well as tax and accounting rules in order to address all tax-related challenges faced by SMEs. It is important, that policymakers bear in mind that complexity of tax legislation has a price

resulting in the deterioration of the business environment for SMEs and their performance. Therefore, policymakers should ensure a stable and predictable tax legislative environment for those companies and provide simplified methods for tax accounting and financial reporting. Both of these can be consequently reflected in lower costs related to the tax compliance and financial reporting.

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CITIZENS' ATTITUDES TOWARDS ACTIVE PARTICIPATION IN SMART CITIES

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ABSTRACT

City managers are increasingly more aware of technology advancements and invest more efforts in the development of smart solutions that contribute to solving relevant issues in the cities. To successfully prioritise, design and develop smart city solutions, it is good practice to provide and ensure the possibilities of active participation of those who build the city - its citizens. Although such a concept is still not widely adopted, it is becoming more popular with the proliferation of new technologies and services for smart cities. Numerous cities, from those with a population of millions to those with population of just a few thousand, are becoming polygons for citizen action and engagement through digital platforms with the aim to improve the environment and communities they live in. This paper analyses this specific potential and brings forth international and national examples of successful active citizen participation scenarios. To support the secondary data analysis, a study on a local level was conducted in Split, Croatia, with a view to explore the awareness and the potential for employing active citizen participation methods and tools with over 500 citizens. The results provide valuable insights into needs and preferences in terms of active participation in a city that recently started its transition to becoming a smart city.

1. INTRODUCTION

Cities are faced with major changes and challenges arising from global shifts in the environment, rapid urbanisation, as well as older infrastructure. By increasing the share of the human population in cities, it is becoming increasingly difficult to maintain a standard of living in terms of cleanliness, city-planning, and opportunities for education, employment and mobility (Albino, 2015). It is clear that therein lies a huge challenge for the public sector that would greatly benefit from new business models and solutions that enable transformation based on a user-oriented approach – one that favours design and creation of services in line with what citizens expect (SmartCities, 2013). In that, improvements to city administration and numerous aspects of public life are foreseeable. For the purposes of employing user-oriented approaches, city officials rely on smart communities. Smart communities are the ones where citizens, NGOs, organisations and government holders use the technologies to establish partnerships for innovations that would contribute to strengthening economic and social opportunities (Stratigeau, 2012). Evidently, the availability of digital technology is an enabling factor and an important foundation for the development and competitiveness of cities. This is confirmed by the fact that 72% of the EU-28 population aged 16 to 74 years use internet daily (Eurostat, 2018).

Technology is a focal point not only in designing and creating future services, but it is the backbone of every smart city development and operations. A city can be considered as "smart" if it uses information and communication technologies to meet the needs of its citizens and improve the efficiency of city services. There are numerous examples of integrated solutions for smart cities that improve the lives of its citizens. Those cities that provide digital/smart city services are not just smart cities but serve the citizens in a better way and provide them with an improved and smarter way of living (Neirotti et al., 2014, in Yeh, 2017, p. 556).

In order to achieve this paradigm shift of putting users/citizens in the focus, changes to digital public services (e-Government for example) need to be based on the assessment of usefulness and the overall fit of the new solutions that are to be useful for both citizens and the public administration (Brown et al., 2014). The same principle applies to other smart city services equivalently. Failure to engage citizens in the decision-making process in designing and creating new services may lead to disagreement between the perception and real preferences of citizens for example, regarding the use of public areas. There are cases where smart city initiatives fail to reach their original objectives because citizens were not involved in project development or the impact on their daily life has not been taken into account suitably (Dameri & Rosenthal-Sabroux, 2014, in Simonofski et al., 2017, p. 3). Instead of being considered as just users, consumers or testers – citizens should be involved as producers and providers of creative and innovative ideas as well (Capdevila & Zarlenga, 2015). Since citizens pay taxes and other communal fees and use the public space for life, work and play, there are potential problems if their opinions about – to use the same example – redesigning the public areas, are not respected. Namely, citizens can develop a sense of public space possession and can react negatively if changes in their city take place without thoughtful public debate (Tomitsch, 2017).

However, a recent research study has found that many smart cities use social networks (such as Facebook and Twitter) to publish information about cultural events and city news regularly, but very few of them use them as a means of collaboration and interaction with citizens (López-Quiles & Rodríguez Bolívar, 2018).

Motivated by these particular issues, the focus of the research at hand is on the concept of active citizen participation in a smart city. In the study presented hereinafter, the results of a

survey are presented along with examples and guidelines for active citizen participation. The paper is concluded with the analysis of research limitations and ideas for further research.

2. THEORETICAL BACKGROUND

After defining active citizen participation and its purpose, this section presents several methods and successful examples of active participation implementation in the theoretical part of the study. Case studies of active participation in smart cities from abroad and from Croatia are considered and briefly compared. This comparison was used as a basis for establishing guidelines that could serve in the development of Split as a smart city that will respect and accept the opinions of its citizens when planning future projects. As this is a city that recently started its transition to becoming a smart city, international best practices presented here, in addition to implications of the research presented in Section 3, may provide valuable insight in the formulation of city's active participation policies and projects.

2.1. Active citizen participation definition and purpose

Citizen participation is a process involving members of society, i.e. of those who are not members of the government or who share power with public managers, in decision-making processes relevant to the whole community (Roberts, 2004, in Gil et al., 2018, p. 7). Specifically, active citizen participation is a partnership in which citizens actively contribute in defining the processes and the content of policymaking. In defining the eight steps of the E-Participation Ladder, Krabina (2016) emphasises that in the active participation people take deliberate action such as joining a group in a social network, rating an article, posting a comment, or sharing their views. Moreover, active participation implies an equal role of citizens with the government in setting the agenda, even though the government is responsible for making a final decision (Macintosh, 2004).

As participation is important for democracy itself, it can be equally important for the development of smart cities (Coe et al. 2001, in Berntzen & Johannessen, 2016, p. 5). What is more, collaboration between citizens, associations, organisations and authorities is key to the development of smart communities. Only through participation, a community has the potential to become an innovative community with more active, better informed and interconnected society (Vrabie & Tirziu, 2016).

Different urban environments have different challenges and are facing the problems that need specific solutions, so the use of specific (smart) technologies is an individual scenario for each individual environment. Again, active participation is key as governmental agencies are expected to identify these issues in society easily through active reporting by citizens (Kamal, 2009). Some cities have the problem of pollution and waste disposal, others have traffic problems and parking places, while the third ones face challenges with spatial planning. Regardless of the type of challenge and problem, smart cities should involve their citizens in solving these problems. Consequently, this contributes to achieving several of key (e-)participation targets (Wirtz, Daiser & Binkowska, 2018): (1) increase overall participation, (2) enhance information provision, (3) improve quality of public policies, (4) strengthen public trust, (5) improve and share responsibility for policymaking, and (6) raise public awareness and understanding for policy issues. Specifically, citizens' participation is one of the most important aspects of a smart city because citizens know the city's problems the best. They are individuals who can support a good idea on a volunteer basis and thus contribute to a better environment solving specific problems such as communal or developmental. Such action can be limited to certain city quarters, but even so, active participation will certainly contribute to achieving greater transparency and more relevant decision-making.

It has already been emphasised that for the success in developing smart cities, the participation of citizens is very important. Apart from direct benefits, citizens' involvement in smart city projects has indirect consequences as well. They usually feel proud of their involvement in the community and encouraged to engage in and build a proactive and responsible society (Gelsin, Müller & Gorynski, 2018).

2.2. Active citizen participation methods and tools

Looking at the level of participation, there are two extremes (Callahan, 2007): passive and uninvolved citizens on the one hand, and active and engaged citizens on the other. There are many methods and tools for facilitating the participation of the latter group of citizens, devised for building relationships between different stakeholder groups and stimulating information sharing. In the process of launching initiatives that involve citizens, especially in the context of developing smart city solutions, technology plays an important role. However, it is essential that the choice of technology is aligned with the context of use and the purpose so that the use of new forms of communication would be more successful and effective. Along those lines, several considerations related to more popular methods and tools for active citizen participation are presented hereinafter.

- Social media is a powerful platform for active citizen participation. Instagram, Facebook, Twitter, YouTube, LinkedIn and similar can be used by people who want to share their views and opinions, but also local authorities for providing information, news, official events and citizen consultation on local issues (Vrabie & Tirziu, 2016).
- Online citizen opinion polls (also known as e-Polling) typically include surveys that collect information on citizens' attitudes and suggestions but also may be used to collect citizens' impressions and (dis)satisfaction with the city government (Ergazakis, 2011). These surveys are conducted through a series of questions which are later generalised on the whole population within confidence intervals.
- Online petitions for citizens' initiatives are another successful example of an up-to-date tool. Since 2005, Germany has provided its citizens with an option to facilitate and "sign" online petitions directed to the attention of the German government. It is a simple e-Participation method, and every adult citizen can apply for an e-Form after which he/she is allowed to manage it and use the platform (Varbie & Tirziu, 2016).
- Online public discussions and online forums can be used in a wide range of scenarios and related to a number aspects of city life. Local authorities can present projects, plans and strategies that citizens can comment and leave their impressions and consequently affect their acceptance, modification or rejection. One of the frequently used tools is discussion forums considered as a special manifestation of e-Participation and m-Participation as they are mostly focused on providing access to the central debating forums within the local (e-)government systems (Kamal, 2009).
- Online (and less frequently telephone) consultations provide citizens with information via online chat help services, without having to go to city administration offices, enabling them to get informed in real-time and converse directly with city officials. As these often take place "live", there are several recommendations and issues to be aware of that city officials have to take into account (Clift, 2002).
- Mobile apps make it easy to quickly and easily inform, report problems, or suggest solutions tailored to the needs of specific city service or just a city government. A recent example is Split City Eye (2019). Usually, the apps have the function of geo-positioning, uploading photos or videos, either publicly or anonymously, with timely feedback.
- Interactive screens in public places are usually set up in areas in the city with a large flow of people (Müller et al., 2010). Apart from providing weather information, city transport,

news, and more, they allow citizens to communicate with city administration in the same way as through mobile applications, only to make such screens fixed and accessible to citizens who do not have a mobile application or are not using a smartphone.

- A hybrid approach encompassing both face-to-face communication and use of online tools is manifested in setting up info desks with staff, also set up at frequented places in the city. There, officials would inform citizens about the actualities in the city and would be able to complete online polls using their mobile devices. Apart from the ones presented here, there is an increasing number of methods and tools for citizen engagement in e-Participation in smart cities, some of which are detailed in (Rodríguez Bolívar & Alcaide Muñoz, 2018).

2.3. Examples of active citizen participation solutions

To analyse the context of use of the methods and tools presented in the previous section, several successful examples of active citizen participation are recognised and presented in Table 1. The emphasis was on finding the best-practice solutions that could be successfully implemented, and that could serve as guidelines for a city that is in its nascent phase of becoming a smart city.

Table 1. Global active citizen participation examples.

City/Country	Platform/project and link	Short description
Amsterdam, Netherlands	Monthly Poll (https://amsterdamsmartcity.com/p/monthly-poll)	A website that puts up a questionnaire for citizens every month, with an option to track the results of the polls.
Barcelona, Spain	Civciti (https://io.civiciti.com/en/product/)	A platform that allows citizens to participate in several ways: surveys, online consultations, crowdfunding financing, debates, transparent and public data, data analysis and reporting.
Brussels, Belgium	Brussels Smart City (https://smartcity.brussels/idea)	Provides an opportunity to suggest and track realisation of ideas for smart city solutions which are proposed by residents of Brussels and the surrounding area. It is possible to suggest solutions in the categories of security, mobility, city services, social activities and infrastructure.
London, United Kingdom	FixMyStreet (https://www.fixmystreet.com/)	In a few simple steps, this app provides the ability to report utility problems and track their resolution.
Reykjavik, Iceland	Better Reykjavik (https://reykjavik.is/en/better-reykjavik-0)	Citizens can present their ideas on municipal issues, through open discussion with members of the city council, allowing citizens to suggest, discuss and give preference to ideas for city improvement.
Santander, Spain	Project SmartSantander, Pace of the City (http://www.smartsantander.eu/)	An application used by several European cities but originated in Santander. In addition to tracking atmospheric conditions, traffic conditions, availability of parking and other functions, it is possible to contribute automatically providing information using a smartphone and get involved in many ways.
Singapore	Smart Nation Singapore (https://www.smartnation.sg/initiatives/)	A project that offers a range of transport, health care, administrative tasks, and more but also provides a channel for citizens to comment and review the services.

The listed examples demonstrate active citizen participation and engagement in smart city solutions that are popular and work on a specific location. An interesting viewpoint on what works and what does not in different (international) contexts is by Hoftede et al. (2010, in Zolotov, 2018, p. 24) stating that countries have their own culture and that culture is for humans what software is for the computer. Although culture varies from country to country,

there should be no barriers in interacting and reusing the solutions and practices. For e-Participation initiative to deliver its full potential, the providers first have to carry out the research and define what their e-Participation goals, forms, instruments and target groups are. After that, they also have to take into an account environmental drivers (transparency, stakeholders, technology, and accountability) to set the most efficient e-Participation strategy (Wirtz, Daiser & Binkowska, 2018).

On a national level, there are successful examples of active citizen participation in Croatia (presented in Table 2). These examples are used further in the study, where the survey participants were introduced with this list.

Table 2. Croatian active citizen participation examples.

City	Platform/project and link	Short description
State-level	Citizen go (https://citizengo.org/hr)	Online signing of citizens' petitions throughout Croatia.
State-level	CityHUB (http://cityhub.hr)	Croatia's smart city platform that enables citizens to participate in various aspects of city activities and development (from solving communal problems to proposing initiatives). There are modules: "CityInitiative", "CityVolunteering" and "CitySocial".
State-level	e-counselling (https://savjetovanja.gov.hr)	Open public consultations in the process of adopting laws, regulations and legal acts in Croatia.
Split	Repair the city (http://popravigrad.com)	Reporting on municipal problems by city districts in Split.
Karlovac	DigitalKA (digital Karlovac) (http://karlovac.hr)	Online city service in Karlovac; changed as of recently. The website provides several services such as insights into open data and official documentation, online citizen consultations and more.
Knin	e-Communal policeman (http://knin.hr/e-komunalni-redar)	Online registration of identified environmental and communal problems in the city.
Krk	Patch it (https://grad-krk.hr/zakrpajto)	Online records and reports of municipal problems.
Kutina	Kutina mobile (http://kutina-mobile.appstor.io)	Overview of news, reports of municipal problems of the city with a direct channel for collecting feedback from citizens and communicating with officials in charge.
Omiš	Spiro (Peovica) (https://itunes.apple.com/us/app/peovica/id1326222052?mt=8)	Application for waste disposal with educational content and the possibility of registering municipal problems in the city.

Looking at the examples of active citizen participation in smart cities in the world and in Croatia it can be seen that the ability to implement new technologies in the participation processes of a city might not depend on the size of a city but the level of development of the underlying processes and smart city maturity level. The ability to create and use a platform for active participation certainly favours a planned, developed infrastructure as in the cases presented in Table 1, but it is not a requirement as can be demonstrated by national-level examples in Table 2. If society is ready for proactive action, today's technology offers numerous opportunities to implement citizen-centred socially and ecologically responsible projects.

Apart from the projects initiated by the city government like the ones presented in this section, there are numerous cases where citizens take the matter in their hands and without any push or support by the official authorities, plan and implement solutions in a bottom-up manner to organise and solve relevant city or neighbourhood issues. Such examples were not analysed as a part of the study presented in the following section.

3. STUDY ON ACTIVE CITIZEN PARTICIPATION IN SPLIT

With a purpose to investigate citizens' attitudes and their understanding of smart city concepts and, more particularly, their interest in active participation in the context of smart city solutions, a survey study was conducted. In this section, first the methodological aspects of the study are presented followed by the results.

3.1. Research sample, instrument and procedure

It has already been stated that the study was done for one specific city with a clear rationale behind this. The study was planned and performed within the framework of a project related to the user-oriented process (re)design and information systems modelling in smart cities, and considering that one of the stakeholders invested in the project is City of Split, all the survey respondents are from Split or its urban agglomeration.

As a sample, citizens of Split with a population of about 180.000 were selected. There was no clear differentiation in terms of the categories (for example high school students, students, unemployed persons, employed persons, and retired people). Also, a decision was to include even those users that were not knowledgeable of the concept of smart city because of the intention to collect the opinion of all prospective potential users of smart solutions. Consequently, the sample was chosen based on the principle of availability, representing the non-probability convenience and snowball sampling approaches. Overall, this proved beneficial as there were some different views of active participation in relation to individual categories of respondents in terms of their age and status.

A self-administered questionnaire survey was collated. eSurvey Creator (esurveycreator.com) was used to develop the questionnaire, while hyperlinks were used to invite participants via social networks, such as Facebook and WhatsApp, and by email.

The questionnaire was based on the examples and tools presented in the previous section of the paper. It contained a total of 28 questions that were mostly close-ended with the possibility of selecting only one response, multiple responses, but also provided the possibility of adding own answers or comments if none of the offered statements matched to respondents' views. The rationale behind opting for a closed type of question was to get the unambiguous answers. Three open questions were also included, one of which was mandatory related to the definition of the term smart city. For structured (closed) questions the following scales were used: nominal - enabling classifying respondents by gender, residence, mobile data usage, smartphone operating system, opinion whether Split is a smart city, an interest in deciding issues important for the life of Split citizens, and so on; ordinal - enabling ranking of responses related to the assessment of smart solutions for the city of Split, the importance of some suggestions that would make Split a smarter city, the frequency of use of certain social networks, and so on; interval - enabling quantitative measurements between age variable values. Likert's 5-degree scale was used in assessing the degree of importance, likelihood, quality and frequency (using the statement examples by Brown, 2010).

There was total of 628 attempts to complete the questionnaire. Since not all were fully completed, incomplete submissions were disregarded resulting in 506 complete questionnaire replies that were further processed. The incomplete submissions included answers to about half of the questions, but lacking answers to the last set of questions (general questions about demographical characteristics, a frequency of Internet usage and social networks). When formulating the questions, a funnel rule was used starting from general questions, branching to more detailed and specific questions depending on the answers to the general ones. Consequently, number of replies to particular questions varies due to different navigation patterns through the questionnaire. The first branching was based on whether the respondents

have heard about smart city (197 respondents, i.e. 38.7%) or not (310 respondents, or 61.3%). Those who have heard about the term were redirected to a set of questions about possible definitions including open questions to enter own viewpoints. Then, along with those respondents who were not familiar with the term, they were directed to the part with the appropriate visuals and a definition a smart city by Bakici et al. (2013) emphasising that it is a highly technological and advanced city that connects people, information and city services using new technologies for sustainable development, ecology, more efficient public services and increasing the quality of life. Set of questions about Split as a smart city was followed by listing smart solutions that the respondents wanted officials to implement, and concluding with questions about active participation. Another redirection was implemented differentiating between respondents that were interested in being involved in decision-making about issues important for the life of citizens of Split, and the ones that were not interested. Respondents who wanted to participate in decision-making by circling the polling station and/or voting over the internet were directed to the set of questions regarding active participation and online communication with the city administration.

From the eSurvey Creator data were extracted and imported into the SPSS program where descriptive statistics were prepared as presented in the following section.

Out of the total number of people who completed the survey (506), 73.9% are female and 26.1% are male. The age question was left open and yielded results ranging from the age of 14 years to 69 years. Mode, or the value with the highest frequency, is 24; the majority of respondents are 24 years old. The average number of respondents' age, is 32.43. Majority of respondents, 49.4% of them, are employed persons, 32.2% are students, 9.1% are unemployed, and 5.9% are in high school, while the least of the respondents are retired (17 respondents, i.e. 3.4%). The residency question offered a choice of 4 possible responses, the last of which was an open entry. The vast majority of respondents, 64% of them, reside in Split, then 18.6% of them live in the vicinity of Split, and 11.5% of them are from the Split-Dalmatia County. This is in line with the aim of the study as it was primarily intended for citizens, workers and visitors of the city of Split. Out of the total, 497 respondents use internet every day regardless of the level of education (completed secondary school, bachelor and master degrees).

3.2. Research results

The question about the potential device usage to access smart city applications was a multiple-choice question, so there are more responses received (a total of 753 responses). The question was answered by 499 respondents (out of 506) as seven replied that they would not want to use mobile and web applications branded as smart city, so they were directed to the next appropriate question. Most of the respondents want to access smart city applications using their smartphone (63.7%) and consequently use the applications quickly, easily and on to go.

Below in table 3, preferable ways of active participation (based on the ones presented in the theoretical part of the paper) are listed. In principle, the respondents do not have strong opinions about the way to engage with Split city officials online (estimated on a scale ranging from 1 - definitely not, to 5 - definitely). Responses with the arithmetic mean above 3.5 can be highlighted. Correspondingly, preferable ways of getting involved with Split city officials online are online consultations for citizens with a score of 3.86, online petitions on civic initiatives with 3.80 and online citizen opinion polls with 3.75.

Differences between groups were tested with regards to categories of respondents (employed persons, unemployed persons, students, high school students, and retirees) and ways to engage with city officials presented in Table 5. For that purpose, one-way ANOVA F-test was used: there is a statistically significant difference between the groups only for the

Online public debates [F (4, 422) = 4.07, p = 0.003] as a way of engaging. Correlation coefficients *r* and *ρ*, were also calculated, however, there are no significant correlations between level of education and age on the one side and the preferences regarding the way to engage with Split city officials online on the other side.

Table 3. Statistics regarding the way to engage with Split city officials online

	N	Min	Max	Mean	Std. Deviation
a) Online consultations for citizens	427	1	5	3.86	1.141
b) Online petitions on civic initiatives	427	1	5	3.80	1.108
c) Online citizen opinion polls	427	1	5	3.75	1.149
d) Online forums about certain aspects of life in the city	427	1	5	3.43	1.281
e) Online public debates	427	1	5	3.26	1.374
Valid N (listwise)	427				
Missing	79				
Total	506				

Source: Survey data.

Question about citizens' interest in deciding on issues of vital importance for the citizens of Split offered a choice of 4 answers including voting by rounding up the ballot at the polling station and voting via the internet. Results presented in table 4 show that most respondents (42,7%) are interested in voting exclusively online, while 41,7% of respondents are interested in voting at the polling station and via internet.

Table 4. Responses to question about ways of deciding on issues of vital importance for the life of Split citizens.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a) Yes, by rounding up the polls at the polling station.	38	7.5%	7.5%	7.5%
	b) Yes, by voting over the internet.	216	42.7%	42.7%	50.2%
	c) Yes, by voting at the polling station and via internet.	211	41.7%	41.7%	91.9%
	d) No, I do not want to participate in decision making.	41	8.1%	8.1%	100.0%
	Total	506	100.0%	100.0%	

Source: Survey data.

In terms of recognising the value of smart city solutions and consequently, the eagerness to use them, replies are presented in table 5. The list of the solutions was prepared based on the services provided in the international and national smart city examples in tables 1 and 2 while brief definitions were enclosed as presented in the table. Respondents have rated the importance of all smart city solutions with hight scores demonstrating that they have recognised the value of these projects for the city and them personally. Among all smart solutions, Green buildings (defined in the questionnaire as production and distribution of own electricity, collection and recycling of water and waste) stands out with an arithmetic mean of 4.63, being assessed as the most important one.

To uncover the categories of solutions that the respondents prefer and describe variability among observed, correlated variables, exploratory factor analysis was done. The sample was tested using Keiser-Meyer-Olkin test and Bartlett's test. Adequacy of the sample is appropriate (KMO = 0.831), and Bartlett's test is statistically significant ($\alpha \leq 0.05$). The rotated component matrix (in table 6) demonstrates the three groups representing the types of smart city solutions. The factor extraction method used was Principal Components Analysis. The number of factors was determined using the Kaiser-Guttman's criterion. The three factors account for 51.39% of the total variance. The analysis reveals three factors (F1, F2 and F3) and 13 items. Qualitative analysis and relevant studies that the list of solutions is based upon

leads to interpreting the factors as follows: F1 "e-participation", F2 "green mobility and living" and F3 "advanced city solutions". While the two are self-explanatory, the third one does represent the solutions that are not easily implemented or mentioned yet in the context of Split smart city initiative. Descriptive statistics for each of these concerning the groups are presented in table 7. All participants, regardless of their status, find the second factor – green mobility and living as the most relevant in the context (F2 = 4.44). This is in line with the general perception of the smart city by the respondents, as most of them perceive a smart city as either a city that "…provides mobile applications for the use of public services (e.g. transportation, parking, waste management, and more" (91.8% or 180 of those who have heard about the concept) or a city that "…enables access to public administrative services over the internet" (70.9% or 139 of those who have heard about the concept).

Table 5. Statistics regarding the importance of smart city solutions for Split

	N	Min	Max	Mean	Std. Dev.
Green buildings: buildings that produce and distribute electricity, collect and recycle water and waste.	506	1	5	4.63	0.744
e-Buses: a real-time application that presents bus locations and suggests which buses are the fastest get to the desired location.	506	1	5	4.52	0.847
e-Waste: the use of technology for the management of communal issues and waste (e.g. logging and reporting community problems, synchronising locations with a recycling site, and so on).	506	1	5	4.39	0.852
e-Competitions: an application that publishes job vacancies in real-time in the city and city-managed/-owned companies.	506	1	5	4.35	0.941
e-Parking: an application presenting in real-time free parking spaces and enabling parking fee payment.	506	1	5	4.34	0.935
Road and building sensors: that measure the traffic flow, anticipate crowds and manage traffic lights.	506	1	5	4.31	1.003
e-Communication: the use of technology for communication with city administration and city-managed/-owned companies (e.g. sending queries, complaints, and so on).	506	1	5	4.08	1.056
e-Voting: an application for preparation and approval of new city regulations.	506	1	5	4.02	1.113
e-Procurement: an application with real-time public tenders for the city and city-managed/-owned companies, and through bidding (auction) ensures transparency and selection of the best possible price.	506	1	5	3.87	1.105
e-Polls: an application for sourcing citizens' opinions on certain topics and issues of interest to the lives of citizens.	506	1	5	3.82	1.159
e-City agreements: an application that shows in real-time status and overview of citizens' open agreements and obligations towards city administration and city-managed/-owned companies	506	1	5	3.67	1.209
Intelligent street lighting: street lighting that is activated and automatically adjusts with the motion sensors	506	1	5	3.54	1.263
Autonomous (without drivers) or electric vehicles (automobiles, buses) rented or ordered with smartphones	506	1	5	2.87	1.293

Source: Survey data.

Table 6. Rotated component matrix of smart city solutions for Split

	Factor		
	1	2	3
e-Procurement	**0.752**	0.100	0.092
e-Communication	**0.732**	0.133	0.135
e-Polls	**0.666**	0.213	0.122
e-Voting	**0.665**	0.104	0.104
e-Competitions	**0.655**	0.179	0.018
e-City agreements	**0.618**	0.176	0.153
e-Buses	0.127	**0.799**	-0.057
Green buildings	0.129	**0.643**	0.116
Road and building sensors	0.018	**0.589**	0.367
e-Waste	0.388	**0.579**	0.142
e-Parking	0.268	**0.537**	-0.110
Hired autonomous and/or electric vehicles	0.161	0.077	**0.765**
Intelligent street lighting	0.170	0.040	**0.742**

Table 7. Descriptive statistics for three factors

		F1	F2	F3
High school students	Mean	3.53	4.22	3.00
	N	30	30	30
	Std. Dev.	0.84	0.72	0.94
Students	Mean	3.82	4.48	3.13
	N	163	163	163
	Std. Dev.	0.80	0.59	0.98
Unemployed persons	Mean	4.09	4.48	3.32
	N	46	46	46
	Std. Dev.	0.57	0.60	1.12
Employed persons	Mean	4.09	4.44	3.26
	N	250	250	250
	Std. Dev.	0.75	0.55	1.06
Retirees	Mean	4.02	4.23	3.09
	N	17	17	17
	Std. Dev.	0.91	0.58	1.06
Total	Mean	3.97	4.44	3.20
	N	506	506	506
	Std. Dev.	0.78	0.58	1.03

Source: Survey data.

Differences between groups were tested with regards to categories of respondents (employed persons, unemployed persons, students, high school students, and retirees) and factors presented in Table 6. For that purpose, one-way ANOVA F-test was used: there is a statistically significant difference between the groups only for F1: e-participation [$F(4, 501) = 5.715$, $p < 0.001$]. However, there are no significant correlations between level of education, age and the internet usage frequency on the one side and the types of solutions F1-F3 on the other side. Slight correlations are observed between use of Facebook and F2: green mobility and living ($\rho = 0.123$, $p < 0.005$) and between use of Pinterest and F2: green mobility and living ($\rho = 0.128$, $p < 0.005$).

In table 8, results show how much are citizens of Split aware of Croatian examples of active citizen participation. This question provided the possibility to select more options among the offered ones, the last one being the option 'Other' which yielded answers such as 'Split smart parking' and 'e-Citizen'. The results clearly show that Citizen go, an application for the online signing of citizens' petitions throughout the whole of Croatia, is the most popular one, as 40.5% of respondents have heard for it. On the other side, 35.7% of them did not hear about any of these solutions.

Table 8. Statistics regarding the awareness of Croatian active citizen participation solutions

	Responses		Percent of Cases
	N	Percent	
a) Citizen go	203	27.5%	40.5%
b) CityHUB	45	6.1%	9.0%
c) Digital Karlovac	8	1.1%	1.6%
d) e-Road online	38	5.1%	7.6%
e) e-Communal policeman	32	4.3%	6.4%
f) e-Counselling	108	14.6%	21.6%
g) Kutina mobile	3	0.4%	0.6%
h) Repair the city	84	11.4%	16.8%
i) Spiro (Peovica)	28	3.8%	5.6%
j) Patch it	11	1.5%	2.2%
k) I did not hear about any of these solutions.	179	24.2%	35.7%
Total	739	100.0%	147.5%

Source: Survey data.

4. DISCUSSION AND CONCLUSIONS

One of the specific objectives of the study was to explore the awareness about the concepts of active citizen participation and smart cities and of their importance and favourable effects on the lives of citizens. This manifested in providing clear definitions of the terms and relevant lists of common mechanisms and national examples for over 500 citizens, while at the same time attempting to get an insight into their attitudes and interests to engage with city officials. The objective was derived based on the literature review that clearly emphasises active participation as a key factor in implementing smart city solutions. Involvement of citizens in planning integrated smart city solutions is of crucial importance because in this way not only are projects implemented in line with the specific needs to raise standards and quality of civic life, but also encourage wider usage and public involvement.

Both the primary and secondary data point to a fact that there are a number of ways to facilitate active participation in smart cities differentiating between possible tools to involve citizens in shaping new solutions to smart cities, and relating to citizens' interests to engage in using said tools to achieve positive effects on the development of cities and increase the quality of life of citizens. In that is the contribution of the study; it is reflected in bringing insight into opinions of the citizens of Split about active participation in the city, as well as in defining the preferred forms of communication with the city administration. Although the number of involved citizens is not huge, even studies like this one can help to facilitate the planning processes as well as the realisation of future solutions and innovative projects in Split. Apart from being a university city, due to its location and human capacities, it has tremendously great potential to generate numerous projects branded and as a part of its smart city initiative (turns out preferably under green mobility and living umbrella). Drivers and issues that could hopefully be resolved or managed through smart city solutions (pointed out in a recent interview conducted within the framework of the project with the mayor's advisor Mr. Krešimir Budiša) are closely related to the number of tourist visits growing rapidly as the roads and parking networks cannot keep up with this growth. Other solutions and new innovative ideas are pinpointed and are to be incorporated in the city's strategy that is currently under development. In line with the preferences of the citizens presented here, in developing the strategy and related actions plans - online consultations, polling and voting on vital issues would be essential to incorporate. Given the great benefit of fostering active citizen participation, it is recommended to promote it for the purposes of planning various

future smart city solutions, and in that regard further guidelines and studies would be devised. For example, a mobile application for communal services should not be operated solely on the "smart bins" principle, which automatically sends the signal to the utility company, but should also include citizens in its planning so as to for example agree on the optimal ways to arrange/schedule collection of waste at the citizen's notice, discuss city cleaning issues and similar.

The study demonstrates that many citizens are eager to get involved and that they are ready to do so in terms of technology/device use. It is in line with relevant studies and examples provided in the first part of the paper. Consequently, it should force city authorities to make progress and reconstruct the communication channels and infrastructure at the city level, but also at the state level.

Since the majority of respondents are not fully acquainted with the term smart city and are not aware of the possibilities of new technologies, it is recommended to continue advertising and familiarising the public about the concept and benefits that smart city solutions can provide. Sharing more public information will help citizens to become further involved in their communities and cities as only through greater focus on the needs of people it is possible to implement truly effective smart initiatives that will change our cities to better (Gelsin, Müller & Gorynski, 2018).

There are several important limitations to this research. One of them stems from the specific nature of the research itself. Namely, the objective was to explore the perception of citizens of Split about the possibilities of developing Split as a smart city and the applicability of active citizen participation in developing integrated smart city solutions. As this is a conceptual (exploratory) research, the definition of the sample, as well as the metrics, are not as reliable as in the descriptive research where conclusions can be generalised. Likewise, since respondents are selected primarily according to the criteria of availability through social networks and electronic mail, they make up a non-probability sample that reduces the representativeness of the results and represents another important limitation of the research conducted. Specifically, the people who actively use social media might be the ones that are more inclined towards e-participation anyway. Future research plans include sampling random citizens through other (non-electronic) channels to test this and to make sure that the results could be safely extrapolated to all citizens.

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ANALYSIS OF OVERALL AND PURE TECHNICAL EFFICIENCY OF TOURISM SECTORS IN EUROPE

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ABSTRACT

The aim of this paper was to evaluate the overall and pure technical efficiency of the tourism sector of European countries for 2017 using the output-oriented CCR and BCC DEA methods. The countries are divided into two groups: the EU countries and non-EU counties. For both groups of countries, we identified two input and two output variables.Input variables are identified using the principal component analysis method, starting from 14 pillars that measure the performance of countries in the field of travel and tourism, and whose ratings are published by the World Economic Forum (WEF) in their regular reports.Then, by defining two output variables (the total (direct and indirect) contribution of travel and tourism to GDP, and a direct contribution of tourism to the rate of employment growth), we determined the relative efficiency of decision-making units within the formed homogeneous groups of countries,among which the group of Western Balkans countries was singled out.This analysis enabled us, based on relatively scarce potential, to propose guidelines for the tourism sector development strategy that will encompass the whole region of the Western Balkans.

1. INTRODUCTION

From a global point of view, the tourism sector is today one of the most dynamic and fastest growing economic activities, which, unlike other economic activities is characterized by a constant trend of growth and development, especially dominant in the last two decades. Tourism is recognized primarily as an opportunity for accelerated economic development of a large number of countries, but at the same time it requires the economic policy holder to face a range of challenges and willingness to undertake complex tasks in terms of creating the conditions for establishing cooperation between a large number of business entities, both nationally, as well as internationally.In addition to numerous economic and social opportunities, the development of tourism leads to greater international openness and geographic connectivity of the country, reflected in the prism of increased income of the population and the development of cheap air transport as an accompanying and necessaryelement for the successful development.

With regard to the fact that a strong development of tourism increases employment opportunities and leads to an increase in income and living standards of the population as well as the elimination of a series of financial and institutional barriers, it becomes clear that interest in its development exists and is particularly pronounced in low- and the middle income level countries. Tourism sector meets the requirements of the most realistic development concept, as it is resistant to a large number of internal and external economic shocks, and the input factors necessary for competitive positioning at international level are not insurmountable, as is the case with technologically intensive branches.Tourism, moreover, is a labor intensive branch of the economy with high added value, and its development undoubtedly provides new jobs with the growth of employees' income, confirming that it is a branch that does not build its competitiveness on cheap labor.

If we analyze the tourism offer of a country or region, it should be emphasized that it is most commonly based on natural and cultural-historical components that are most often presented in underdeveloped and passive areas.Today, the competitiveness of such resources is largely determined by innovative ideas and marketing strategies whose core task is to attract more tourists in order to ensure a balanced and unified regional development.From the point of view of demand, prospects and the potential of expanding tourism are relatively unlimited, which opens the possibility even for poorly developed economies to find their potentials for the market with already existing inputs and to achieve positive effects from the tourism sector with minimal investment.

The purpose of this research is to measure and analyze the relevance of the investment efficiency in the tourism sector of European countries, with a particular focus on the Western Balkan countries, in order to propose efficient operational strategies within the tourism sector, which are indispensable for achieving global tourist recognition of the region.Our aim is to point out the problems and sources of inefficiency of the tourism sector of the Western Balkan countries and, accordingly, to propose guidelines for defining a development strategy that will contribute to increasing the impact of the tourism sector in these countries. Proposal guidelines will be based on an empirical study of best practices of various forms of a year-round tourist offer at the global level.In line with the innovative trends in the tourism sector, the proposal of measures for efficiencyimprovement would be based on the development of certain specialized tourism products.

2. LITERATURE REVIEW

Previous studies in this area are mainly focused on the assessment of tourist efficiency of provinces, regions, countries or even groups of countries, and were carried out in order to define tourism development strategies which would provide guidelines for easier and more efficient placement of existing or new tourism services to potential tourists.
Botti, Peypoch, Robinot and Solonandrasana (2009) examined the tourism efficiency of 22 regions in France using the output-oriented DEA method. The analysis was based on the number of tourists as output variable and on 6 input variables: number of hotels, camps, parks, monuments, museums and miles of available beaches. Technical efficiency was achieved in 10 regions whose examples of good practice can serve as a benchmark for increasing efficiency in the rest of the regions.Similar analysis was performed by Barros, Botti, Peypoch, Pobinot, Solonandrasan and Assaf (2011). The analysis also included 22 French regions in the period from 2003 to 2007 and was based on the application of the two-stage DEA method.In the first stage, efficiency coefficients for each region were estimated based on two input variables (accommodation capacities and number of tourist arrivals) and one output variable (number of overnight stays).In the second phase, using regression analysis with the inclusion of variables representing tourist attractions (monuments, museums, parks, beaches, ski resorts and natural parks), the authors came to the conclusion that the efficiency is most dependent on sea exit and coast tidiness. For other regions that do not meet these conditions, a development strategy is proposed to increase the number of thematic parks, monuments, ski resorts and natural parks. The authors believe that the expansion of the tourist offer and the number of tourist attractions contribute to increasing the efficiency of the least developed tourist regions. Encouraged by the importance of tourism for the economy of a country and the growth of tourism market competitiveness due to the transition from mass tourism to the specific needs of tourists, Cracolici, Nijkamp and Rietveld (2008) analyzed the technical efficiency of destinations from 103 regions in Italy in 2001.Competitiveness in terms of technical efficiency was examined by using the parametric SFA method and the nonparametric DEA method. The SFA method showed variability in terms of effectiveness across the region, indicating that regions with artistic and cultural content were better rated than mountain or regions positioned on the coast.Some lower efficiency scores were obtained by using the DEA method, which was characterized as a result of insufficient homogeneity of observed regions.Gucci and Rizzo (2013) applied two-stage DEA method in order to examine the extent to which UNESCO nominations determine the efficiency of tourist destinations and the flow of tourist travels in Italian regions for the period 1995-2010. The results showed that short-term UNESCO nomination had a negative impact on the efficiency of tourist destinations, while in the long run their impact was not statistically significant.This is because tourists value cultural content and natural attractions when choosing a destination, which UNESCO-nominated destinations mostly missing.In order for UNESCO nominations to have a positive impact on efficiency, it is essential that such sites are accessible to tourists, secured with material and immaterial infrastructure and enriched with cultural events.Encouraged by such analyzes, many authors have tried to evaluate the tourism efficiency of the less developed European countries in order to develop a strategy for increasing competitiveness, and thus the exploitation of both natural and cultural-historical components that are often located in underdeveloped areas.One such study was conducted by Tom (2014), who examined the efficiency of 8 regions in Romania in 2012 using the input-oriented DEA method with 4 input and 5 output variables. The analysis pointed to the efficiency of 5 regions,one region was technically inefficient due to the large number of tourist capacity in relation to demand, while 2 were inefficient because the tourist demand for accommodation facilities grew faster than supply.In the market of Asia similar analysis was performed by Bi,

Lou and Liang (2014). The analysis evaluated the efficiency of 31 provinces in China through two stages defined as the capacity building stage and the benefit creating stage. In the first stage there were 19, and in the second 22 efficient provinces, but according to the overall estimate, only 6 provinces had efficiency scores equal to one (Beijing, Inner Mongolia, Shanghai, Henan, Qinghai and Ningxai), while the worst-rated province was Hebei with an efficiency score of 0.3890.

Of the studies that included a group of countries from one or more regions, we will mention only those that were related to the analysis of the efficiency of European countries, given that such analyzes are the closest to the research that will be carried out in this paper.Cvetkoska and Barišić (2014) measured the efficiency of 15 European countries (Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, France, Greece, Italy, Macedonia, Montenegro, Portugal, Serbia, Slovenia and Spain) for the period from 2004 to 2013 using Window-DEA analysis method. By selecting two input and two output variables, with the formation of 6 windows covering 5-year periods, the highest efficiency scores were achieved in 2004, while the lowest were achieved in 2011.According to the results, no country achieved full efficiency in all years and in all windows, but 10 out of 15 countries had an efficiency coefficient of over 0.95.Montenegro has been identified as a country with the lowest efficiency, while the highest scores recorded four countries: Italy, Cyprus, France and Spain.Kosmaczewska (2014) analyzed 27 members of the European Union in the period 2007-2009. The results have shown that richer countries have achieved a higher level of technical efficiency, while developing countries have reached a higher level of scale efficiency. This can be explained, inter alia, by the fact that tourism development is largely determined by investment in which richer countries abound.However, opportunities to improve efficiency in richer countries are less and less, given that the tourist services that these countries offer are already on an extremely high level of development. At the moment, this does not leave much room for investors, so they, in search of increasing their own capital, are increasingly turning to developing countries which they should consider as their chance.Developing countries or groups of developing countries which constitute one region, first of all, should recognize its competitive advantages over other countries and accordingly develop strategies that will attract investors and potential tourists.In a comprehensive list of research results, it is interesting to note the study of the authors Martín, Mendoza and Román (2015), who have created a unique competitiveness index at global level and ranked 139 countries using the DEA method, by analyzing at the same their geographic position and national income. Describing differences in the characteristics of the best and worst-rated countries as well as geographic areas, this paper has made a significant contribution to the mapping of profiles that in the near future can be used by economic policy-makers to form strategies that will maximize their use and increase their tourism potential.

All efforts in the literature so far enable future authors to use the DEA method in their research to a greater extent, which will, in combination with other parametric and nonparametric methods, provide relevant assessments of tourism sector efficiency. This study, as well, will be focused on evaluation of the efficiency of the tourism sector of European countries on the basis of which the Western Balkan countries' positioning in terms of efficiency would be conducted, with the aim of proposing guidelines for a strategy of tourism that would be oriented towards the expansion of tourist offer through innovative forms of tourism and the development of specialized tourist products.

3. METHODOLOGY

3.1. CCR DEA Model

The non-parametric DEA method was proposed by Charnes, Cooper and Rhodes (1978), with the intent to define a relative measure of the efficiency of the decision-making units in situations when a large number of output and input variables are available. The relative measure of efficiency using the DEA method is determined by the ratio of weighted output values and weighted input values for each observation unit individually. The units of observation are compared with each other by the formation of a linear programming model. The efficiency frontier is composed of observation units with best business practice, while the efficiency of all other units is determined on the basis of the distance from the defined efficiency frontier. Units at the frontier are considered relatively efficient, while those out of the frontier are relatively inefficient. A set of efficient units is viewed as a reference point for proposing improvements to relatively inefficient units. (Prorok and Bošnjak, 2018)

Suppose we have n decision-making units (DMUs) and that each of the units DMU_j, $(j=,2,\ldots,n)$ produces s outputs of the same type and of different values, y_{rj} $(r=1,2,\ldots,s)$, using different m input values of the same type, x_{ij} $(i=1,2,\ldots m)$.

The CCR model is designed to solve for each k-the decision-making unit DMU_k $(k=1,2,\ldots,n)$ the optimization task of the relationship between the virtual output and the virtual input, in order to determine the weight coefficients for the output and input variables to which the value of the relationship will be maximized:

$$(\max)\, h_k = \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \tag{3.1}$$

with constraints:

$$\frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \le 1, \quad j=1,2,\ldots,n \tag{3.2}$$

$$u_r \ge 0, \quad r=1,2,\ldots,s \tag{3.3}$$

$$v_i \ge 0, \quad i=1,2,\ldots,m \tag{3.4}$$

where: h_k - the relative efficiency of the k-th decision-making unit; n - the number of decision-making units; m - the number of inputs; s - the number of outputs; v_i - weight coefficients for input i; u_r - weight coefficient for output r; x_{ij} - the amount of input i for the j-th decision-making unit, (DMU_j); y_{rj} - the amount of output r for the j-th decision-making unit, (DMU_j).

The expressions (3.1) - (3.4) present the problem of non-linear nature with the linearly-broken objective function and linearly-broken constraints. With the Charnes-Cooper transformation, the problem can be reduced to the linear programming model. In the input-oriented DEA model, the translation into a linear form is done in such a way that the denominator in the

objective function equals 1 while maximizing the numerator. Otherwise, the output-oriented DEA model is based on minimizing the denominator in the objective function, while equalizing the numerator with 1.

The output-oriented CCR model provides information on how much it is necessary to increase the outputs, so that, at a certain level of input, the observed unit becomes effective.

The primary form of the output-oriented CCR model is obtained by transforming expressions (3.1) - (3.4) into a linear programming model that minimizes the value of the objective function, provided that the numerator is equal to 1:

The input-oriented CCR model aims to provide information on how much it is necessary to decrease the value of the engaged inputs so that, at a certain level of output, the observed unit becomes effective.

The primary output-oriented CCR model is given in the following form:

$$(\min)\, h_k = \sum_{i=1}^{m} v_i x_{ik} \qquad (3.5)$$

With constraints:

$$\sum_{r=1}^{s} u_r y_{rk} = 1 \qquad (3.6)$$

$$\sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} \geq 0 \quad j = 1,2,\ldots n \qquad (3.7)$$

$$u_r \geq \varepsilon, \quad r = 1,2,\ldots,s \qquad (3.8)$$

$$v_i \geq \varepsilon, \quad i = 1,2,\ldots,m \qquad (3.9)$$

On the basis of the primary model, we will form a dual model which, from the analytical point of view, is easier to solve because it contains a much smaller number of variables. The objective function in a dual model reflects the maximum value of the output that the *k*-th unit should produce when engaging its available input level.

The canonical form of the dual output-oriented CCR model is given by the following expression:

$$(\max) Z_k + \varepsilon\left(\sum_{r=1}^{s} s_r^+ + \sum_{i=1}^{m} s_i^-\right) \qquad (3.10)$$

With constraints:

$$\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = x_{ik} \qquad i = 1,2,\ldots,m \qquad (3.11)$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - Z_k y_{rk} - s_r^+ = 0 \qquad r = 1,2,\ldots,s \qquad (3.12)$$

$$\lambda_j, s_r^+, s_i^- \geq 0 \quad j = 1,2,\ldots,n; \quad r = 1,2,\ldots,s; \quad i = 1,2,\ldots,m \qquad (3.13)$$

The variable Z_k is the intensity factor. The information we provide is how much the i-th input should be reduced and the r-th output should be increased so that the decision-making unit becomes effective. Changes in outputs and inputs are represented by dual variables s_r^+

and s_i^-. The variable λ_j is a coefficient indicating the importance assigned to the j-th decision-making unit when defining an input-output combination of a hypothetically formed unit with which the k-th unit is compared. If the variable λ_j for $j = k$ has a positive value, assuming that the other values λ_j for $j \neq k$ are equal to zero, the intensity factor Z_k will be equal to 1, indicating that the *k*-th decision-making unit has produced the maximum value of the output with the engagement of the available inputs. Such a unit will be considered efficient and will represent a frontier point. Otherwise, it will be inefficient.

The lowest possible value of the objective function in the dual output-oriented CCR model is equal to 1. At this value, the decision-making unit has reached the maximum level of output with the given level of input. If the value of the function is greater than one, the observed decision-making unit is relatively inefficient and proportionally to that value it should increase its outputs in order to become efficient. The efficiency measure based on the solution of the dual form of output-oriented CCR model is equal to the reciprocal value of its objective function.

3.2. BCC DEA Model

The presented CCR model assumes that the observation units achieve constant returns to scale, i.e. the increase in the value of the engaged inputs for a certain percentage results in the same or approximately the same percentage increase in the output.For this reason, the efficiency frontier formed on the basis of the CCR model has the shape of a convex cone.

All observation units that are positioned at the frontier of efficiency are considered to have full overall technical efficiency that includes both pure technical efficiency and efficiency of scale.For the purpose of measurement of pure efficiency, Baker, Charnesand Cooper (BCC) proposed the extension of basic CCR DEA model in 1984.

BCC model provides an assessment of pure efficiency, excluding the effect of the business scale. This is achieved in a way that the observed unit is compared only with other units of similar size.

The mathematical formulation of the BCC model, unlike the CCR model represented by the expressions (3.1)-(3.4), includes an additional variable u^*. The decision on whether the additional variable will be included in the numerator or the denominator depends on whether the general form of the BCC model is transformed into a linear programming model with output or input orientation. The purpose of the additional variable introduction is to set up a constraint on returns to scale and to provide that referent set is formed on the basis of a convex combination of decision-making units. (Prorok and Bošnjak, 2018)

The general formulation of the BCC model is given by:

$$(\max)\, h_k = \frac{\sum_{r=1}^{s} u_r y_{rk} - u^*}{\sum_{i=1}^{m} v_i x_{ik}} \tag{3.14}$$

With following constraints:

$$\frac{\sum_{r=1}^{s} u_r y_{rj} - u^*}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1, \quad j = 1,2,\ldots,n \tag{3.15}$$

$$u_r \geq \varepsilon, \quad r = 1,2,\ldots,s \tag{3.16}$$

$$v_i \geq \varepsilon, \quad i = 1,2,\ldots,m \tag{3.17}$$

Given that variable u^* determines the economic concept of returns to scale it can be smaller, greater or equal to zero:

1) The decreasing returns to scale are dominant if and only if $u^* > 0$ for all optimal solutions;
2) The increasing returns to scale are dominant if and only if $u^* < 0$ for all optimal solutions;
3) Constant returns to scale are dominant if and only if $u^* = 0$ for all optimal solutions;

The transformation of the general type of BCC model into the output-oriented BCC model of linear programming is done in a way that minimizes the value of the numerator in the objective function (3.14), provided that the numerator is equal to 1. The primary output-oriented BCC model is given in the following form:

$$(\min)\, h_k = \sum_{i=1}^{m} v_i x_{ik} - u^* \tag{3.18}$$

With constraints:

$$\sum_{r=1}^{s} u_r y_{rk} = 1 \tag{3.19}$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} + u^* \leq 0. \quad j = 1,2,\ldots,n \tag{3.20}$$

$$u_r \geq \varepsilon, \quad r = 1,2,\ldots,s \tag{3.21}$$

$$v_i \geq \varepsilon, \quad i = 1,2,\ldots,m \tag{3.22}$$

On the basis of the primarymodel, we have formed the dual variant of the output-oriented BCC model, whose canonical form is represented by the following expressions:

$$(\max) Z_k + \varepsilon\left(\sum_{r=1}^{s} s_r^+ + \sum_{i=1}^{m} s_i^-\right) \tag{3.23}$$

With constraints:

$$\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = x_{ik} \qquad i = 1,2,\ldots,m \tag{3.24}$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = Z_k y_{rk} \qquad r = 1,2,\ldots,s \tag{3.25}$$

$$\lambda_j, s_r^+, s_i^- \geq 0 \quad j = 1,2,\ldots,n; \quad r = 1,2,\ldots,s; \quad i = 1,2,\ldots,m \tag{3.26}$$

$$\sum_{j=1}^{n} \lambda_j = 1 \tag{3.27}$$

The constraint (3.27) determines the economic concept of returns to scale. If we compare it with the constraints on a variable u^* in the primary model given with (3.14) – (3.17) expressions, we can conclude:

1) In case of the decreasing returns on volume: $u^* > 0$ for all optimal solutions if and only if the condition that $\sum_{j=1}^{n} \lambda_j > 1$ for all optimal solutions is fulfilled;
2) In case of the increasing returns on volume: $u^* < 0$ for all optimal solutions if and only if the condition that $\sum_{j=1}^{n} \lambda_j < 1$ for all optimal solutions is fulfilled; and
3) In case of the constant returns on volume: $u^* = 0$ for all optimal solutions if and only if the condition that $\sum_{j=1}^{n} \lambda_j = 1$ for all optimal solutions is fulfilled.

3.3. Window DEA Analysis

Window DEA analysis is a specific form of the DEA method that allows measuring of changes in the efficiency of the observation units over a given period of time. The method involved defining windows covering multiple time instances, where each observation unit is treated as a separate observation unit at different times. This allows the comparison of the efficiency of not only one unit over time, but also a comparison with other units that are covered by the defined window.

The application of the Window DEA analysis allows to increase the number of observed decision-making units and to include the time dimension of the data by analysis. However, the main disadvantage of this method is that, by moving windows, certain time units are tested several times, while time instances corresponding to the first and last periods are tested only once, because they are only covered by the first and last window, respectively.

In the continuation, we will use the Window DEA analysis to test the overall and pure technical efficiency of insurance companies in the Bosnia and Herzegovina and rank the most efficient decision-making units based on average efficiency estimates, both through windows and time periods. (Prorok and Bošnjak, 2018)

4. IDENTIFICATION OF INPUT AND OUTPUT VARIABLES FOR THE EVALUATION OF THE EFFICIENCY OF TOURISM SECTORS OF EUROPEAN COUNTRIES

4.1. Identification of input variables

Although the DEA method represents a very good optimization technique for assessing the efficiency of the tourism sector, certain limitations still exist. Limitations occur in situations where a large number of input and output variables are available, which is relatively high compared to the number of observation units. As one of the ways to overcome this limitation, it is proposed to introduce in the model only those variables (inputs and outputs) that represent the basic components of the production process. In this way, the outcomes of the DEA method are not affected, but its power is increased.

In evaluating the efficiency of the tourism sector of European countries, we tried to remove the DEA deficiencies by allocating countries to relatively homogeneous groups according to the resemblance of available tourist resources, and adjusting the number of defined input and output variables to the number of observation units. Key input variables were identified using the principal component analysis method, starting with the 14 pillars that measure the performance of countries in the field of travel and tourism, and whose assessments are published by the World Economic Forum (WEF) in its regular reports.

In the 2013 report, the pillars were divided into three categories: T&T regulatory framework T&T business environment and infrastructure, and T&T human cultural, and natural resources. However, since 2015, the pillars are divided into four categories: Enabling Environment, T&T Policy and Enabling Conditions, Infrastructure, and Natural and Cultural Resources. The index of travel and tourism competitiveness is formed on the basis of the aforementioned categories and it measures the performance of countries in the field of travel and tourism.

Given that, above all, the countries, and then the tourist regions, differ according to the degree of tourism competitiveness achieved, it can be assumed that not all factors will have the same impact on the tourist performance of these countries. Therefore, the aim was to identify the main components that contribute to the tourism competitiveness of European countries,viewed in 2017. We divided the countries into two groups: the member countries of the European Union (28 countries) and countries outside the European Union (14 countries).

Within both groups of countries we identified two principal components. For EU countries, we noted that all variables with the highest factor load, which make up the first component, have positive signs, namely: : 1) *Business Environment*, 2) *Human resources and labor market*, 3) *ICT Readiness,* 4) *International openness, 5) Environmental Sustainability,* 6) *Ground and port infrastructure*; while the second component consists of variables: 1) *Prioritization travel and tourism,* 2) *Price competitiveness,* 4) *Air transport infrastructure*, 5) *Tourist service infrastructure*, 6) *Natural resources*, 7) *Cultural resources and business travel*, of which only the *Price competitiveness* variables has negative, while the other variables have a positive factor load. This would mean that if a given country as a tourist destination is rated positively for one attribute within the component that it determines, it will probably be highly rated by other attributes with the same sign within that component. On the other hand, those countries that are highly rated on any of the attributes with a positive sign are likely to be badly rated for some of the attributes with a negative sign. Specifically, in our case, countries from the EU 28, belonging to a group whose tourism is determined by the second component, are likely to have poor ratings in terms of price competitiveness, if they are highly rated by other variables that are mainly related to air transport, tourist infrastructure, and natural and cultural resources.

Similar structure of the components is set out in non-EU countries, so we have the first component, whose structure is made up of the following group of variables1) *Business Environment*, 2) *Safety and security*, 3) *Human resources and labor market*, 4) *ICT Readiness,* 5) *Prioritization travel and tourism,* 6) *International openness*, 7) *Price competitiveness*, 8) *Environmental Sustainability*, 9) *Ground and port infrastructure*; 10) *Tourist service infrastructure;*; while in the structure of the other component there are three variables, namely: 1) *Air transport infrastructure,* 2) *Natural resources*, 3) *Cultural resources and business travel.*

Identified main components were used as input variables in assessing the efficiency of the tourism sectors.

In addition, we conducted a cluster analysis to see how the EU countries and the non-EU countries are grouped according to identified factors. When determining the optimal number of clusters and deploying countries in defined clusters, we used *hierarchical cluster analysis* and *k-means cluster analysis*. For the EU countries there were identified four, while for the non-EU countries were identified three groups of countries. Based on the ANOVA analysis, we confirmed that the clusters thus formed, within both of the observed groups of countries, are statistically significant.

The following table presents the results of the cluster analysis, with the definition of positively and negatively profiled components for each cluster individually.

Table1. Countries grouped by clusters – for EU and non-EU countries

<table>
<tr><th colspan="4">Clusters for EU countries</th><td rowspan="3"></td><th colspan="3">Clusters for non-EU countries</th></tr>
<tr><td>C1</td><td>C2</td><td>C3</td><td>C4</td><td>C1</td><td>C2</td><td>C3</td></tr>
<tr><td>Austria, Germany, United Kingdom, Ireland</td><td>France, Italy, Greece, Portugal, Spain, Cyprus, Malta, Croatia</td><td>Luxembourg, Netherlands, Denmark, Finland, Sweden</td><td>Belgium, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Bulgaria, Romania</td><td>Switzerland, Norway, Iceland</td><td>Turkey, Ukraine, Russia</td><td>Serbia, Bosnia and Herzegovina, Macedonia, Albania, Montenegro, Moldova, Georgia, Armenia</td></tr>
<tr><td>PC1</td><td>PC2 i PC1</td><td>PC2</td><td rowspan="2">Countries where both defined components are negatively profiled and do not currently contribute to the tourism competitiveness of the countries.</td><td>Similar to the profile defined by:</td><td>PC1 i PC2</td><td>PC2</td><td rowspan="2">Countries where both defined components are negatively profiled and do not currently contribute to the tourism competitiveness of the countries.</td></tr>
<tr><td>PC2</td><td></td><td>PC1</td><td>Unlike the profile defined by:</td><td></td><td>PC1</td></tr>
</table>

Source: Prorok et al. (2017)

4.2. Identification of output variables

Development of tourism, as an economic branch, has a strong influence on both economic and non-economic aspects of development.Economic functions of tourism are reflected through direct influence on: social product and national income, development of underdeveloped areas, balance of payments and employment; as well as through indirect influence in a way that it stimulates the development of material production (industry, construction, agriculture) which have the role of supplier in the tourism industry. The non-economic or social aspects of tourism development relate primarily to the following functions: health, entertainment, cultural, social and political.The non-economic or social aspects of tourism development relate primarily to the following functions: health, entertainment, cultural, social and political.These functions stand out as crucial for the development of a country's tourism, and their neglect would lead to the question of the practicality of treating tourism as a development option.

Given that this paper deals with the efficiency of tourism from an economic point of view, our analysis focuses on economically measurable indicators related to the total (direct and indirect) contribution of travel and tourism to GDP and to the contribution of travel and tourism to employment. The two variables mentioned above will be used as output variables when evaluating tourism efficiency using the DEA method.

The World Travel and Tourism Council continually publishes data on total tourism contributions to GDP, which is methodologically consistent with the UNWTO (TSA RMF 2008) recommendation, and which is in line with GDP calculation in national accounts (Đuranović and Radunović, 2011).This aggregate is also an indicator of the shifting of social products from economically developed countries to those with a lower level of economic development. In this way, a more uniform development of the world's power is achieved.

In addition to the contribution to GDP, it is important to look at the impact of tourism on employment, ie generating new jobs. The largest number of jobs is created, both within the hotel and restaurant sector, as well as within other supporting activities. It should also be emphasized that the tourism sector for years has enabled recruiting staff of different degrees of expertise and education.This trend continues, with growing demands for high flexibility staff, which have adequate competencies and capabilities to meet future tourism needs. Also, the World Economic Forum regularly publishes data on tourism's contribution to total employment, reflecting the real state of affairs, but not the real needs of the number of employees in the tourism sector, given that year-on-year needs become more and more.

5. EVALUATION OF EFFICIECY OF TOURISM SECTORS OF EUROPEAN COUNTRIES

The overall and pure technical efficiency of the tourism sector of European countries was assessed by using the output-oriented CCR and BCC model. In the analysis we observed two groups of countries. The first group is made up of 28 member states of the European Union, while the other group consists of 14 countries outside the European Union, including the Western Balkans. For both groups of countries, we determined two input and two output variables when evaluating efficiency. Input variables for both groups of countries are obtained on the basis of rating of 14 pillars defined in the annual report of the tourist competitiveness of countries for 2017, and released by the World Economic Forum (WEF). We reduced the number of input variables by applying the principal component analysis (PCA) method. Thus, for both groups of countries, two input components are formed, based on a linear combination of 14 defined pillars. Given that the linear combinations for the observed groups of countries were different, it was necessary to observe separately evaluation of their efficiency. The structure of the principal components was presented in the previous chapter. For output variables, we used data on the total contribution of travel and tourism to GDP, and data on direct contribution of travel and tourism to the rate of employment growth, where both variables were expressed in percentages. Output variables data referred to 2017 and were downloaded from the World Data Atlas site (https://knoema.com/atlas).

Tables 2a and 2b show the results of the overall and pure technical efficiency of EU countries and non-EU countries using the output-oriented CCR and BCC DEA model. Countries are ranked according to the results of tourism efficiency. For analysis purposes, we used the DEA-Solver-LV software package.

Table 2. a) Evaluation of overall and pure technical efficiency of EU countries in year 2017, using output-oriented CCR and BCC DEA model

Country (DMU)	CCR efficiency score	Rank	BCC efficiency score	Rank
Cyprus	1	1	1	1
Malta	1	1	1	1
Bulgaria	1	1	1	1
Portugal	0.9911	4	1	1
Croatia	0.9225	5	1	1
Greece	0.7269	6	1	1
Estonia	0.6906	7	1	1
Ireland	0.6901	8	1	1
Poland	0.6761	9	1	1
Sweden	0.6116	10	1	1
Spain	0.5804	11	1	1
Romania	0.5493	12	1	1
Slovenia	0.5336	13	1	1
Netherlands	0.507	14	1	1
Italy	0.4797	15	1	1
Latvia	0.4126	16	1	1
Czech Republic	0.389	17	1	1
Finland	0.3722	18	1	1
Hungary	0.3587	19	1	1
Denmark	0.3453	20	1	1
Slovakia	0.3421	21	1	1
Luxembourg	0.2756	22	1	1
Belgium	0.2511	23	1	1
Lithuania	0.2197	24	1	1
Austria	0	25	0.0001	25
France	0	25	0	26
Germany	0	25	0	26
UK	0	25	0	26

Source: Authors' calculations

According to the results presented for EU member states, it is noted that, from the point of view of overall technical efficiency, the best scores were obtained by the following countries: Cyprus, Malta and Bulgaria. The efficiency coefficient value for the three mentioned countries is 1, indicating that these countries have reached total technical efficiency within the observed set of countries and that they represent a reference set on the basis of which the relative efficiency of other countries is assessed. Slightly lower efficiency scores are achieved by Portugal (0.9911) and Croatia (0.9225), followed by Greece (0.7269), Estonia (0.6906), Ireland (0.6901), etc. It should be noted that, at defined output and input variables, countries such as Austria, France, Germany and the UK have proven to be completely ineffecient compared to the reference units.

Table 2. b) Evaluation of overall and pure technical efficiency of non-EU countries in year 2017, using output-oriented CCR and BCC DEA model

Country (DMU)	CCR efficiency score	Rank	BCC efficiency score	Rank
Turkey	1	1	1	1
Albania	1	1	1	1
Montenegro	1	1	1	1
Georgia	1	1	1	1
Ukraine	1	1	1	1
Armenia	1	1	1	1
Moldavia	0.8913	7	1	1
Macedonia	0.7826	8	1	1
Bosnia and Herzegovina	0.6115	9	1	1
Serbia	0.4268	10	1	1
Russia	0.3057	11	1	1
Iceland	0.004	12	0.9999	12
Switzerland	0	13	0.0001	13
Norway	0	13	0	14

Source: Authors' calculations

When it comes to the non-EU countries, the most efficient units, with the efficiency coefficient equal to 1, were the following countries: Turkey, Albania, Montenegro, Georgia, Ukraine and Armenia; while relatively inefficient countries were: Moldova (0.8913), Macedonia (0.7826), Bosnia and Herzegovina (0.6115), Serbia (0.4268), etc.

From the Western Balkan countries, which according to defined input variables belong to cluster 3, Albania and Montenegro achieved the best efficiency scores, while Macedonia, Bosnia and Herzegovina and Serbia achieved relatively poor scores of overall technical efficiency.

It should be noted that the implementation of the input-oriented CCR model would give the same results of the efficiency scores, with the orientation being different.

The results of the assessment of pure technical efficiency for EU member states show that most countries achieved full efficiency. Countries that did not achieve pure technical efficiency are France, Austria, Germany and Great Britain. The pure technical efficiency coefficient for these four countries is equal to zero. However, if we take into account that the coefficient of their overall technical efficiency is equal to zero, and that, according to a large number of tourism indicators (revenues from tourism, number of employees in tourism, etc.) they occupy relatively good positions, we can conclude that these countries achieve their tourism development through the efficiency of scale.

Also, from the non-EU countries, almost all countries achieved pure technical efficiency, while only Switzerland and Norway had a coefficient of efficiency equal to zero. It should also be noted that all countries of the Western Balkans had a pure technical efficiency coefficient equal to 1. Albania and Montenegro, in addition to achieving pure technical efficiency, also achieved the efficiency of scale, because their coefficient of overall technical efficiency is equal to 1. Countries that had a lower coefficient of overall technical efficiency,

with a high value of coefficient of pure technical efficiency, did not achieve the efficiency in terms of scale. This is the case with countries such as Macedonia, Bosnia and Herzegovina, and Serbia. In other words, a lower CCR coefficient value, with a high BCC value, would mean that these countries are locally but not globally efficient, which is again a consequence of inefficiency of scale. Inefficiency of scale may be the result of inefficient operational activities and / or unfavorable conditions for the development of tourism.

For this research, it is particularly interesting to note the position of the Western Balkan countries in relation to other countries, primarily those that are not part of the EU. Using the principal component analysis method and then the cluster method, we grouped the countries of the Western Balkans into one cluster (C3) and showed that none of the two defined components currently contributes positively to the overall tourist competitiveness of these countries. This resulted in lower scores of total technical efficiency, and consequently, of efficiency of scale. For economic policy makers, this should be an indication of the necessity of designing strategies and operational measures in the field of tourism.

In order to achieve their global efficiency, it is necessary to devise a tourism development strategy that would encompass the entire region. The strategy should be based on innovative trends in tourism, for which there are enormous potentials in the Balkans.

6. CONCLUSION AND DISCUSSION

In this paper we evaluated the overall and pure technical efficiency of the tourism sector of European countries using CCR and BCC DEA methods. We divided the countries into two groups: the EU countries and non-EU countries. For both groups of countries we defined two input and two output variables. Input variables are presented by linear combinations of 14 pillars on the basis of which The Travel and Tourism Competitiveness Index (TTCI) is formed.On the basis of defined input variables, we carried out a clustering of countries using a cluster method in order to allocate relatively homogeneous decision-making units that have similar or identical tourism potentials, from the point of view of natural resources, cultural and historical heritage, geographical location, infrastructure, etc.In that sense, cluster C3, where Western Balkan countries belong, was distinguished as a special cluster within non-EU countries. The aforementioned cluster is characterized by the negative profile of both principal components.In addition, by defining output variables, we estimated the relative efficiency of all observed units.The result of the analysis has enabled us to identify the advantages and disadvantages of post-transition countries in terms of their tourism competitiveness.

From the Western Balkans countries, Albania and Montenegro have been most effective in achieving full and pure technical efficiency compared to other observation units from the group of non-EU countries.Bosnia and Herzegovina, Serbia and Macedonia have achieved lower coefficient of total technical efficiency, while their coefficient of pure technical efficiency was equal to one.These results indicate that the three mentioned post-transition countries are ineffective in terms of scale, which may be the result of non-existence or inefficient implementation of operational activities in the field of tourism, as well as of unfavorable conditions for its development.For this reason, in order to improve tourism competitiveness, these countries should seek their chance in a tourist offer based on relatively inexpensive and already existing resources that do not require significant investments.This can be achieved through the development of specialized tourism products based on innovative

trends in tourism, for which the countries of the Western Balkans have enormous potentials.Such forms of tourist offer could include various subtypes of health tourism, dark tourism, cultural tourism, educational tourism, etc.Such a tourism development strategy, which would encompass the whole region of the Western Balkans, would represent the opportunity for these countries to be recognizable on a global level, thus achieving a significantly higher level of tourism competitiveness.

The methodology presented in the paper is practical for comparing the contribution of the tourism economy to the gross domestic product in different countries. The actual repercussions of the tourist sector's revenue on the economic development of the receptive country also depend on some other parameters. Particularly in small post-transition countries it is appropriate to take into account the total number of inhabitants, the share of tourist income per capita, the establishment of the national tourist offer on existing and available resources. In addition, it is necessary to take into account the following facts: the orientation of the tourism economy (seasonal or year-around), whether national resources are sufficient to meet the tourism industry's needs in the main tourist season, what is the ownership structure of receptive tourism capacity (locals and domestic companies / foreign companies) and so on.The number of population of the tourist country has repercussions on the quality of life and the level of all social services (health, education, etc.). This thesis is confirmed by the differences in the quality of services achieved between EU countries of similar degree of development, different levels of tourist income and different population numbers. A similar level of realized national tourist income will have different repercussions on raising the quality of life of the local population. Thus, the tourism economy can be transformed into a social policy instrument through a redistributive tax policy. Due to this aspect of the tourism economy's contribution to quality of life in the receptive country, the importance of the tourism economy in the context of national GDP has to be distinguished. National income from tourism per capita is a parameter that makes it possible to assess the potential contribution of the tourism economy to the receptive country. The foundation of national tourist offer on available resources is a prerequisite for lower costs of maintaining and raising the quality of tourist facilities. Foundation of the national tourist offer on amenities such the trend, but only to a certain extent based on the available resources, in practice results in a lower rate of efficiency of the national tourism economy. Countries that do not have adequate tourist resources needed for the development of specialized tourist offer do not have much choice. In these countries a strategic reliance of the national economy on tourism represents a significantly higher risk.The seasonal tourist sector in considerably more exposed to security, hydro meteorological and other risks. The year-round tourist offer is much less exposed to the same risks. The inadequacy of national resource for the needs of a growing tourism economy can be a problem in the context of the autochthonous tourism offer. Competitiveness of various forms of specialized tourist offer depends to a large extent on the experience of autochthonous. Many recent studies have shown that employees who provide tourist services are an important component of the perception of the autochthonous offer.The lack of local tourist workers would, instead of providing additional quota of foreign workers who will be employed in the tourism industry, be resolved by restructuring the content and quality of the national tourism. Thus, instead of remedying the consequences of the growth of tourist visits (especially seasonal type), the national tourism economy would adjust the contents, capacities and prices to the responsible and sustainable development standards. Recent research has shown that adapting national tourist offers to these standards contribute to the competitiveness and profitability of the national tourism economy. Finally, good practice argues that the structure of receptive tourist capacities at the national level should also be tailored to all these parameters. The prevailing dispersion of ownership of receptive capacities to the local

population is a rational platform for the development of year-around tourist offer in areas where it is in the interest of local stakeholders. Countries in which the receptive capacity structure is dominated by large resources are difficult to implement standards of responsible and sustainable tourism. Due to the large investments in receptive capacities, often of foreign owners, the primary focus is on the dynamics of return. There is not too much concern about the indigenous nature of the national tourist offer, and active capacities are filling up by importing cheap labor.Business is often seasonal, and the focus is on mass tourism offer developed on the basis of available destination resources. Without systematic management with uncontrolled growth of tourist visits, the available resources are exposed to uncontrolled commercialization (often devastation), and rarely on them are created tourism attractions that are the only sustainable foundation of the year-round tourist visit. Given the structure of the ownership of the resources, a large part of their income is inflated abroad. When added to the fact that the importing workforce transfers the earned funds to the resident countries, their income has minimal repercussions on consumption in the receptive tourist country. Along with these facts, there is a need for different qualifications of the importance of the tourism economy within the national economy. Due to all of these facts, the strategy of tourism development, especially of the small post-transition countries that have relevant resources for the development of autochthonous specialized offers, should have much greater relevance. Decisions in the sphere of tourism development in such countries should be made at a parliamentary democratic level, instead of political preferences of large-scale foreign investment in the tourism industry, which changes the structure of ownership of receptive capacities, and lead to the growth of tourism income transfers to abroad.

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IMPLEMENTING REGIONAL SMART SPECIALIZATIONS FOR MORE INNOVATIVE AGRI-FOOD SECTOR

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ABSTRACT

The objective of the paper was, firstly, to examine the impact of regional smart specialisations on the development of outermost regions, with particular consideration given to the agri-food sector and, secondly, to identify potential prospects, which can be conducive to increasing innovation of this sector in the future. The paper was conducted on the basis of legislation and strategic documents as well as literature, using the method of the review and critical analysis of source materials. As a case study, the Polish regional innovation strategies and smart specialisations selected in the individual regions were taken into consideration.

In conclusion, one of the reasons for the ineffectiveness of implemented policies based on smart specialisations is the use of solutions identical for all regions (*one-size-fits-all* approach), without taking their specificities into account. In the case of Poland, most voivodeships indicated among smart specialisations areas directly or indirectly related to the agri-food sector, while not defining which fields they actually want to develop. The selection of smart specialisations should not identify the most fashionable trends, but areas where new research and development activities will complete other production resources, so as to create future local values and comparative advantages of the region.

1. INTRODUCTION

Current food-related expectations make the agri-food sector comply with new requirements and standards, which in turn generates a need to implement innovations reducing costs and increasing food security and quality. Moreover, the implementation of new solutions increases the opportunity to participate in global value chains and the export of agri-food sector products. Competing with the low price is no longer sufficient in the future. The dynamic robotisation and digitisation of production processes will reduce costs in those companies that apply it, hence the current cost-price advantages of such countries as Poland will rapidly decrease. A new approach is thus needed to further develop the agri-food sector in the era of globalisation and digitisation.

However, the development potential of the agri-food sector depends, to a large extent, on the region in which it functions. There is a positive relationship between the region's innovative activities and its competitiveness. The outermost regions, where the agri-food sector is usually located, are often perceived as the areas characterised by the poor quality of local information technology infrastructure and the lack of or low access to local, national and global institutional structures or networks (Copus, 2001). The current concepts of regional development indicate that the distance should not be understood literally, as the outermost regions may be linked in organisational, cognitive and technological terms with the key regions and thus develop their innovative activities. The concept of global pipelines complementing indicates that in some cases they replace local pipelines assuming that more and more knowledge sources are present on a global scale (Bathelt et al, 2004). In turn, other concepts emphasise the role of the neighbourhood in sharing knowledge, especially in the case of knowledge diffusion, including the so-called tacit knowledge, which is transferred only during trust-based contacts. These approaches are linked by the knowledge spillover approach that highlights the importance of combining local links into wider, global links. This network of links provides opportunities to use both the local and external knowledge (Sleuwaegen and Boiardi, 2014).

The outermost regions need their own policy to increase the innovation activity preventing social and economic polarisation. Therefore, even the best innovation policy for the whole country will not be effective if it does not take into account the specific nature of creation and diffusion of innovations in the regions. Innovation is, in fact, determined by the region. We should see in this the reason of failures of existing support for the agri-food sector.

The adoption of an appropriate approach is of particular importance in the case of the poorer regions, often subject to an "innovative paradox", when the economically weaker regions that actually need to strengthen innovation are also weaker in the use of funds as are not able to transform them into effective innovative activities. This weakness results from the low institutional capacity and management (Muscio et al., 2015). So, what is needed are such policies that would allow to overcome this paradox. According to McCann and Ortega-Argiles (2016), smart specialisations can be a good solution. They offer a framework for the policy of shaping priorities in line with the logic of resource allocation and making of appropriate choices with regard to budgetary challenges.

The objective of the paper is a) to examine the impact of regional smart specialisations on the innovation development of regions, with particular consideration given to the agri-food sector, and b) to identify potential directions which can be conducive to increasing innovation of the agri-food sector in the future. The method of the review and critical analysis of source

materials were used based on primary and secondary sources of information. Primary sources were the documents of the EU institutions on the subject concerned, strategy papers related to regional and innovation policies prepared for the Polish government and regional innovation strategies developed for the regional authorities in Poland, while secondary sources was the national and foreign scientific literature.

2. EXPERINECES RESULTING FROM THE USE OF THE SMART SPECIALISATION CONCEPT IN REGIONS

Few studies are focused on territorial innovation factors in rural areas (e.g. Garcia Alvarez-Coque et al., 2013). For decades, these areas, particularly in the OECD countries, have been subject to a profound economic and social transformation, experiencing the depopulation and the rapid aging of the rural community, with limited access to public services, when compared to urbanised areas. Enterprises in the agri-food sector play an important role in this transformation, demonstrating greater resistance to deteriorating management conditions than other sectors. The studies by Avermaete et al. (2003) show that small food businesses located in Belgian regions can be innovative, introducing new products and processes, making changes in their organisational structure and exploring new markets. However, the authors conclude that a lot depends on the economic development of the given region.

Companies located in rural areas do not have such competitive advantages as those located in urban areas. This raises the question about the impact of "rurality" on innovation of companies. Some medium-advanced rural areas, including those located near cities, have advantages through local resources and/or access to urban markets. The outermost rural areas are difficult for the functioning of companies that would like to base on the economies of scale. The example of Spain (Garcia Alvarez-Coque et al., 2013) shows that there are also differences between the rural regions themselves. Companies in the agri-food sector can use local resources based on natural and labour-related conditions, while addressing the challenge related to their size, location and access to new technologies. The specialisation of these companies, such as the production or processing of products obtained in the area where they are located, can be a source of competitive advantage. They solve the problem of depopulation and the lack of labour force by employing migrants, mainly foreigners, thus incurring low labour costs.

The outermost regions in Poland are not much homogeneous in terms of the production structure, which is dominated by the traditional industry, including food processing. Their characteristic feature is generally a low level of innovation, which does not mean that there are no innovations at all. However, they are mostly imitative by nature. They are mostly not oriented towards so-called technology-push, which are primarily associated with basic or applied studies (Wijnands et al., 2007). The innovation activity usually refers to the improvement in the functional and utility features of existing solutions, which, in practice, is associated with implementing marketing innovations (in the years 2008-2010, they were implemented by 14% food companies in the country) and, to a lower extent, product and process innovations (less than 9%) (GUS, 2012). This does not require such intensive and high-volume research and development work as, e.g. in the case of the electronic industry.

Food processing of the outermost regions is closely linked to the raw material base and natural conditions. The studies by Zakrzewska (2011) conducted in the selected voivodeships of Eastern Poland in the years 2009-2011 showed that the leader in the sale of new and significantly improved products was the Podlaskie Voivodeship, dominated by the food

sector. The next place was occupied by companies from the Lubelskie Voivodeship. On the other hand, the Podkarpackie and Warmińsko-Mazurskie Voivodeships were the worst against a background of the analysed regions.

The example of the Polish regions clearly shows how the process of implementing innovations relates largely to the specificity of the "place" and resources it has. The concepts related to the specificity of the "place" indicate a need to seek such actions that can be considered as their specialisation. This comes down to the operationalisation of the smart specialisation concept and the preparation of a methodology allowing to identify activities on which the strategy for further development can be based. The introduction of innovations should therefore be closely linked to specialisations so as to build territorial competitive advantages (Wójcik 2018).

The smart specialisation concept, proposed by the *Knowledge for Growth* expert group in 2008, quickly became popular among politicians, especially in Europe, and a key element of the Europe 2020 Strategy. The conclusions of the aforementioned group pointed to a need for structural changes in the European Union, *inter alia*, by supporting new activities in the regions, based on their potential and specific nature. The concept gained particular importance during the financial and economic crisis since 2008, when it turned out that many regions were unable to "renew" economically, the used innovation systems failed and the disparities among the regions and countries deepened. Thus, smart specialisation became a mandatory part of the regional development strategy, as it was considered that, firstly, regions could not be active in all areas of science, technology and innovation, and secondly, they should promote what makes them unique and extraordinary.

The concept is not completely new, but is based on the principles assigned to Regional Innovation Strategies[1]. Thus, it does not replace existing regional development policies, but extends them by new areas. A key component of smart specialisations is the entrepreneurial discovery process, during which specialisations most promising for the region's development are selected. This is done through a bottom-up approach, namely, the inclusion of key stakeholders in the region, as opposed to a more traditional top-down approach when policy-makers make strategic choices for the region (Foray et al., 2009).

The comprehensiveness of the functioning of smart specialisations requires the selection of proper areas for future specialisation and determination of coordination of possible disturbances, so that the selected specialisations become the key drivers of the region's development. How difficult is this choice, we can see, for example, by comparing the specialisations promoted by the regions in the EU: some information and communication technologies (ICT), some nano, some bio – which points to the lack of imagination, creativity and strategic vision. According to Foray et al. (2011), the process of selecting smart specialisations should identify not necessarily the most fashionable trends in nanotechnology and biotechnology, but rather areas where new research and development activities will complement other production resources so as to create future local values and interregional comparative advantages. In order to be effective, this process should function in both directions at the same time, i.e. bottom-up and top-down. Then, it enables the active role of entrepreneurs in the innovation process, but does not minimise the importance of public policy interventions in certain phases of the innovation process, such as identification, evaluation or targeted support for priority regional specialisations.

[1] Smart specialisations are alternately defined as RIS3 (*Research and Innovation Strategy for Smart Specialisation*) and S3 (*smart specialisation strategy).*

The studies by Veugelers (2015) carried out in the EU Member States show a large homogeneity of the priorities and tools used in innovation development programmes, which often do not correspond to the actual needs of the given country. This is due to the pressure of various factors, among which the region's development is not always decisive. In addition, fashion and professing the *one-size-fits-all* principle are still common. Therefore, the use of proper indicators for the ex-ante evaluation and the better ex-post evaluation play such an important role in selecting and implementing smart specialisations. Table 1 shows smart specialisations implemented in the 11 new EU Member States during the period 2014-2020. Preferences for the agri-food sector, which are present in the case of 7 countries, are clearly visible.

Table 1. Smart specialization areas in selected new Member States in the period 2014-2020

Specialization	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	Hungary	Lithuania	Malta	Romania	Slovakia	Slovenia
Food, Agriculture and fisheries	X	X	P	X	P	X		X			
Biotechnology	X	P		X	P		P			X	X
Health		P	P		P	X	P	X			
ICT	X		P		P		P	X			X
Nanosciences and nanotechnology				X					X		X
Materials					P		P		X	X	X
New production technologies		P	P	X	P	X	P	X	X	X	X
Integration of nanotechnologies for individual application				X			P	X	X	X	X
Energy		P	P				P			X	
Environment		P		X			P		X	X	X
Aeronautics	X			X				X	X		X
Space				X				X			
Automotive			P								
Rail				X			P				
Waterborne		P	P					X	X		
Urban transport and intermodalities	X	P	P	X		X	P	X	X	X	X
Socio-economic sciences and humanities				X		X		X	X	X	X
Security		X			P				X	X	

X – area covered in priorities of smart specialization strategy; P – area partly covered in priorities of smart specialization strategy

Source: Stairway to Excellence project, based on McCann i Ortega-Argiles, 2016

Table 2. Selected smart specialisations in the regions related to the agri-food sector and rural areas in Poland

Voivodeship	Specialisation
Dolnośląskie	Among emerging sectors: **production of healthy food**. Among scientific and technological specialisations: biotechnology and genetic, biochemistry, environmental protection engineering.
Kujawsko-pomorskie	- **best safe food – processing**, fertilisers and packaging; - health-related tourism; - biosmart specialisation – natural potential, environment, energy industry
Lubelskie	Key specialisation: bioeconomy (**primary production, processing of bioresources, food production – agri-food sector,** chemical, paper, pharmaceutical, energy sectors). Complementary specialisation: medical and health-related services – nutrition and dietetics, functional food, **food production chain**, production of pharmaceutics and probiotics. Emerging specialisation: low-carbon energy industry – energy from renewable energy sources.
Lubuskie	Specialisations based on the sectoral approach: - environmental technologies and services; - technologies and services for human health. Specialisations based on the intersectoral approach: - **green economy**; - health and quality of life.
Łódzkie	Key specialisations: **- innovative agriculture and agri-food processing;** - energy industry, including renewable energy sources, Key areas of technology: - biotechnology; - nanotechnology and functional materials.
Małopolskie	Sustainable energy
Mazowieckie	- **Safe food**; - High quality of life.
Opolskie	Specialisations: **agri-food technologies** Potential specialisations: Processes and products of health and environment protection
Podkarpackie	- Sustainable tourism; - Health, **food, nutrition**.
Podlaskie	- Green technologies – **agri-food processing,** life science, renewable energy industry, eco-innovations
Pomorskie	- Renewable energy sources. - Lifestyle and aging-related diseases (technologies, therapies, quality of life).
Śląskie	- Environmental protection technologies; - Energy industry.
Świętokrzyskie	- **Modern agriculture and food processing;** - Health and health-oriented tourism.
Warmińsko-mazurskie	- **High quality food**; - Water economics.
Wielkopolskie	Initial specialisations**:** **Food production** – agricultural production, food processing, biotechnology, agricultural sciences. Specialisations to be consulted: Quality of life – modern medical and environmental technologies.
Zachodnio-pomorskie	- **Bioeconomy**; - Tourism and health.

Source: Own elaboration based on 16 Regional Innovation Strategies in Poland

In the case of Poland, the share of smart specialisations related to the agricultural sector is 14% (Mazurek, 2017). This sector is most often represented from among all sectors in the Regional Innovation Strategies (RIS) documents. Own studies show that almost all voivodeships, except Małopolskie, Pomorskie and Śląskie, mention, among smart specialisations, areas directly or indirectly related to the agri-food sector (Table 2). The broadest concept of the "bioeconomy/green economy" occurs in three voivodeships: Lubelskie, Lubuskie and Zachodniopomorskie. Other voivodeships (except the three above-mentioned) refer, to a varying extent, to the agricultural production and processing of agricultural products.

It can be concluded that the selection of smart specialisations related to the agri-food sector usually corresponds to the opportunities for their development in the region. However, in addition to very general specialisations, such as the quality of life, very narrow specialisations are often selected, for example, the food production. Many of them are repeated in different regions, so there is no attempt to seek specialisations, which would correspond to the specific conditions of the region and reflect its actual endogenous potential. Several specialisations are often provided, which, finally, can lead to the dispersion of actions and finances. Similarly, Nazarko (2018) considers that the selection of smart specialisations in Polish regions has not always been substantively justified. He also states that smart specialisations are not always distinguished from the development priorities defined in the strategy papers and from areas recognised as strengths of the region concerned.

An interesting research area is not only the process and relevance of selecting smart specialisations for the needs and development potential of the regions, but also their impact on the development of the agri-food sector in the regions. Smart specialisations are to foster the implementation of new technologies improving the competitiveness. They are an opportunity for agriculture, which through new investment activities can improve traditional and develop new forms of production.

In this context, it is worth mentioning the studies by Ślusarz (2015) on the effectiveness of the "Development strategy for the Podkarpackie Voivodeship for the years 2000-2006", which indicate the lack of clear progress in the field of structural transformations of agriculture and rural areas of the region, despite the adopted priorities regarding rural development and agriculture. The updated "Development strategy for the Podkarpackie Voivodeship 2020" reiterates the references to the agri-food sector. The above-mentioned author concludes that, although the strategy papers contain priorities to promote the development of innovation in the agri-food sector, their implementation is ineffective. This raises concerns with regard to smart specialisations selected for the region, the more that no separate specialisation has been adopted for the rural areas and agriculture.

Nazarko (2018) sees the ineffectiveness of the adopted S3 strategy in the absence of a prospective view on the development of the given region. On the example of the Podlaskie Voivodeship and its "Plan for the development of enterprise based on smart specialisations for the years 2015-2020+ (RIS3)" he shows that no analyses were carried out what are the chances of development of the region after 2020 years and no emerging specialisations, which would promote this development in the long term, were identified.

The lack of positive effects of undertaken actions regarding smart specialisations can be explained by the introduction to the practice a concept which has not been refined theoretically yet. Thus, there was a gap between the conceptual development of the expert

group's idea and the possibilities of its implementation. This promotes the creation of various approaches, thus making it difficult to operationalise the concept in practice. Rather than specifying its content over time, it grows more and more, aspiring to the panacea for all problems of the socio-economic development in Europe. By replacing the slightly politically worn-out slogan of sustainable development, it raises again a discussion both in the development policy, the innovation policy and the environmental protection.

The obligation to identify and implement national and regional smart specialisations is an interesting experiment on a Union scale, as there are about 120 of them. This was primarily a reaction of the Member States to the possibility of blocking funds from the European Regional Development Fund (ERDF) allocated for supporting research, technological progress, innovation and improvement of access to information and communication services. The estimates by Radosevic (2017) indicate that for all activities related to smart specialisations about EUR 120 billion will be allocated across the EU in the years 2014-2020, including ERDF funds directly linked to the implementation of smart specialisations, in the amount of EUR 40 billion, and funds indirectly supporting industrial modernisation, in the amount of EUR 83 billion.

The indication of smart specialisations therefore meets the requirements of the application for EU funds, but does not guarantee the actual development of the region. This is mainly due to the lack of openness to all interested parties. Instead of the bottom-up process of developing by stakeholders of a new vision for the development of the region, S3 preparation is usually outsourced to consulting companies, which, using commonly used methodologies, provide a document upon request. Using proven methods of monitoring and evaluation, these companies provide policy makers with the apparent implementation of the strategy, regardless of actual progress in the region. According to Nazarko (2018), the obstacle to the authentic implementation of smart specialisation strategies is often deeply rooted in public administration habits, fossilised governmental and self-governmental structures, specific culture of formulating policies, policy makers' habits. Miller et al. (2014) come to similar conclusions and show in their analysis that the Polish RIS are based on sectoral thinking, promoting traditional sectors and only to a limited extent are focused on the development of a new culture of information and cooperation flow. The disbursed national and EU funds do not translate into the creation of added value. In this context, they ask the question of to what extent smart specialisations are actually smart.

Worrying is the fact that the areas of relatively low productivity are often considered as smart specialisations, which can be a development trap for the region. Smart specialisations in the highly developed regions are usually based on the innovative sectors, from the so-called high technology group, while in the less wealthy regions they are based on traditional sectors, from the so-called low technology group. Thus, the differences between the regions can be deepened. The regions can imitate the development profile of other regions without seeking their own comparative advantages, or the other way round, they can focus on supporting traditional sectors and established interest groups without thinking about the long-term development. Smart specialisations are to help regions achieve a leading position in certain areas, but this is particularly difficult for the regions with a low level of innovation.

Regional policy makers are usually based on "good practices" by trying to imitate them and to achieve success through this. However, not all regions are able to create high-tech industries. This is due to the large differences among the regions in terms of the starting position, economic and institutional structure. Not all regions have the "absorption capacity" for new

technologies. It takes a lot of time and costs to create new clusters in their area totally from the scratch, and it does not always succeed. Another reason for the fact that decision makers prefer traditional sectors is a significant number of workers, making it difficult to make bold decisions. New technology industries usually employ fewer workers with higher professional qualifications (Gobbens, 2017).

3. POTENTIAL PROSPECTS PROMOTING THE INNOVATION OF THE AGRI-FOOD SECTOR IN THE FUTURE

The process of innovation development is becoming more and more comprehensive, requiring the creation of new business models and new management and organisation capacities to take full advantage of the benefits of this. Demographic and climatic changes, increased globalisation and the emergence of new digital technologies have drastically changed the nature and impact of innovation, as well as the way it is created and transferred. Companies like Uber, Facebook, Amazon and Alibaba have redefined the concept of market creation, providing the supply and demand "at one click".

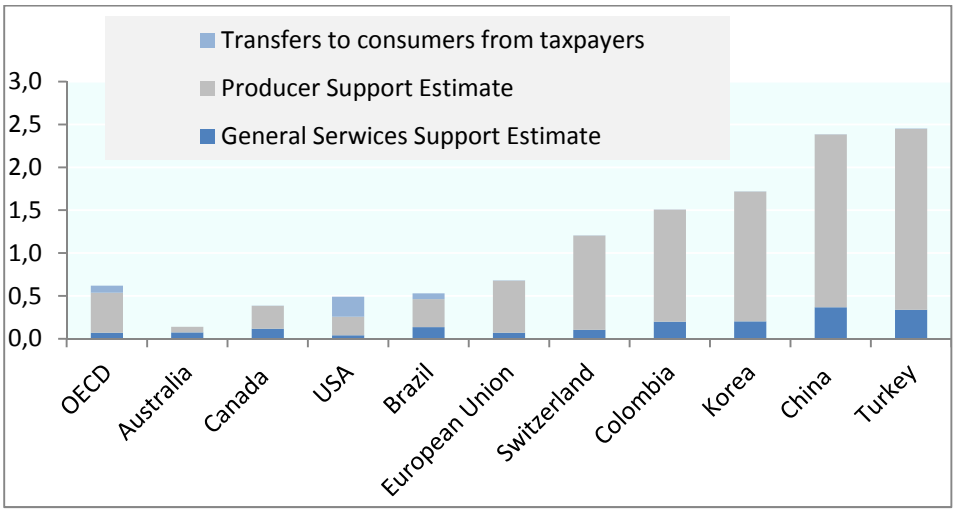
Also, the emergence of strong network effects when a product or service gain additional value when more people use them, in combination with the growing comprehensiveness, leads to the concentration of the benefits of innovation in the groups of the largest companies. This has its implications for increasing the productivity and deepening the inequalities. When leaders continue to grow, most companies in the economy are characterised by the slow growth.

In the case of external effects taking place in the economic and innovation activities and with which the market cannot cope, there is a justification for public intervention, e.g. through technological marketing (Markowski 2007). This intervention may be direct (when it is addressed to technology brokers, technology creators or universities training engineers to counteract the side effects, e.g. environmental, in technology design) or indirect (e.g. when addressed to social groups or whole territorial units). However, the selective technology policy does not always works. When the country's development distance in relation to the best is small, there is the greatest political risk of irrelevant support, because the strategy is not to catch up, but to maintain advantage and overtake others. In turn, the countries chasing the more developed countries have a greater chance that their selective technology policy is more effective if combined with the innovative horizontal policy. These policies are not interchangeable and even complementary, since they create opportunities for the emergence of radical innovations (Markowski 2013).

Therefore, we should believe that the well-defined innovation policy is essential to stimulate the development of innovation in the outermost regions. However, the *one-size-fits-all* approach is used too often, thus, inhibiting the development of regional specificities and resulting in the inefficiency of the implemented policy. Despite the different level of economic development, the countries apply the same innovation policy instruments. The introduction of smart specialisations has not changed this imitation, and even deepened the similarities in innovation policies among the countries/regions. According to Veugelers (2015), this situation leads to a selection of inappropriate priorities. She believes that in the case of economically weaker countries, it would be better to absorb and adapt the existing leading technologies rather than act for their creation.

In the context of the agri-food sector, it is worth mentioning a similar, significant homogeneity of applied instruments in OECD countries' agricultural policies, including the EU (Figure 1). Although since the 80s of the 20th century, there has been a reduction in aid granted to agriculture from public funds, expressed as the producer support estimate (PSE), the majority of the funds are directly addressed to farmers. According to OECD estimates (2018), approximately 70% of total support estimate (TSE[2]) resources are allocated for PSE. Direct payments are still considered to be the simplest form of support for agricultural income, determining the competitiveness of the agricultural sector. These funds only to a small extent are translated into the increase in innovation of farms.

Figure 1. Total Support Estimate (TSE) as a % of GDP in 2014-2016



Source: OECD, 2018

The transfer of public funds to the agricultural sector also takes place through the financing of services in a form of research and development activities, training, inspections, marketing, promotion and public stocks. In order to estimate the amount of this aid, the general services support estimate (GSSE) is used. The increase in the funds for agricultural services is usually accompanied by the decrease in support for farmers. This should explain the low level of GSSE in overall support of agriculture.

The ongoing negotiations on the next multi-annual EU budget for the years 2021-2027 again gave rise to a discussion on the effectiveness of the Common Agricultural Policy and the EU funds disbursed within it. It is therefore worth wondering whether or not to redirect funds from direct support to support for agricultural services, which are focused on human, animal and plant health protection systems, agricultural sciences enhancing broadly understood biosecurity and innovation in the agri-food sector.

These activities seem to be particularly needed in areas where agricultural companies/farms are predominant, by nature less innovative than processing companies. As we have already pointed out, the innovative behaviour of companies, however, depends not only on its structure, but also on the territory where it functions. According to Garcia Alvarez-Coque et

[2] *Total Support Estimate* (TSE) – estimate index determining the total amount of support for agriculture. This is a total of transfers to individual farmers (PSE), to groups of farmers (GSSE) and through budget support on the part of customers (support for market prices). The TSE value is closely dependent on the size of the country, thus it is expressed in relation to GDP.

al. (2013), who compared the data of food and non-food companies in the Valencian region of Spain, rural areas do not have to be a handicap for innovation, an important role in this regard is played by access to training services and scientific and technological institutions. Therefore, the major task of the innovation policy should be to improve the channels of access to knowledge. Some solutions can be found in the EU Common Agricultural Policy, such as the functioning of producer organisations. Unfortunately, this instrument is often treated as a source of EU funds rather than a potential stimulus for the increase in knowledge, cooperation and innovation.

We may ask a question important for shaping innovative policies, namely, how to influence the flow of knowledge in the regional dimension? Poland belongs to countries characterised by a fragmented structure of science and innovation, a strong separation between science and business, the lack of global links and a low level of critical mass in the leading sectors of the economy. It has approximately 96% of small and medium-sized enterprises producing approximately 30% of GDP (European Commission, 2014). However, the developed Regional Innovation Strategies are not much effective and, despite the significant resources currently allocated on a national scale for the development of innovation, do not translate into actual economic benefits. As an example, Miller et al. (2014) provide spin-off and spin-out companies, which were established as part of the Innovative Economy Operational Programme – Measure 3.1, managed by the Polish Agency for Enterprise Development. These companies make significant investments in the R&D activities and have strong links with universities. However, it is difficult to talk about the translation of the effects of their operation into the Polish economy in terms of its productivity and competitiveness. The selection of appropriate priorities becomes the key to the innovation development strategies.

In this context, another question arises whether the sectoral innovation policy, intended only for the agri-food sector, will effectively pursue the objectives set for it. Too many external factors are currently influencing the development opportunities of this sector, e.g. the level of socio-economic development of the region. Moreover, agriculture plays the smaller and smaller role in the economy. The share of this sector in producing GDP is 2.4% in Poland and less than 10% of the rural population live on agriculture (Polska Wieś, 2018). Thus, a more holistic approach is needed, covering not only the above-mentioned sector but also rural areas.

Therefore, it is not surprising that the smart rural development concept, coming from the smart development concept as a basis for the creation of the innovative policy (Foray et al., 2009; Foray et al., 2011), becomes more and more popular. Each of the modern territorial development concepts emphasises a need to take account of the regional or local specificities, which is also stressed in the place-based policy and knowledge-based policy. According to Wójcik (2018), the adaptation and implementation of the smart development concept in the case of the countryside should additionally take into account not only economic but also cultural differences, highlighting the factors which are linked to local forms of knowledge.

However, it is not known how the smart development policy should translate into practical actions in order to meet the expectations of very diverse rural areas. That is why, it is often linked with the concept of regional smart specialisation which take into account the evolutionary nature of the economy in the given region and can foster the proper shaping of the region's policy. They are also encouraging to carry out an analysis of the regional resources of knowledge, skills and competences and key players among which the knowledge is transferred.

According to the studies conducted by Muscio et al. (2015), the innovative systems of the Central and Eastern European countries have already reached the upper limit of the possibility of absorbing EU funds for R&D activities, *inter alia*, due to the constraints of human and financial capital of small firms that are predominant in this region. The next funds will be probably used, but they will not lead to an expected return with regard to the innovation growth. This should also explain, according to the authors, the failure to implement smart specialisations, limited by the shortage in the institutional development and management at the strategic level and implementation. Similar conclusions were made by McCann and Ortega-Argiles (2016), who analysed the effectiveness of using smart specialisations for regions different in terms of the economic development. These authors have found the smaller usefulness of smart specialisations for large urban centres and leading knowledge regions, which already have sufficiently diversified forms of activities. According to Naldi et al. (2015), smart specialisations are the best alternative to intermediate urban and rural regions if they have a sufficiently large population. These regions have many opportunities for development, as they can benefit from the proximity of large urban centres. The innovation policy, in particular for intermediate rural regions, should consist in attracting investors from urban areas. These external actors of the innovation process have the necessary competences and networks providing access to markets and technology. In addition, knowledge and competences coming from outside are stimulating the internal learning process.

In the case of the outermost regions, smart specialisations offer limited opportunities, as the lack of economies of scale reduces the effectiveness of this concept in the policy. According to the above-mentioned authors, such forms of activity as, for example, tourism, forestry are not a sufficient basis for settling and building the future in the countryside. However, it should be stressed that the outermost regions have different potentials with regard to access to resources and social infrastructure, so they can increase their potential through local solutions, the development of creative economies or other resources. Therefore, the essence of smart specialisations for such regions should be to build strong, specialised links with urban regions, and the innovation policy should foster the creation of intra- and inter-regional cooperation mechanisms. These activities can be manifested in regional innovation systems, specialised clusters or in local/regional public-private partnerships focusing on various sectors and niches. In terms of a networks, it is important to build new internal links between old and new actors in the region. On the other hand, a certain group of mechanisms should support the development of external networks, which provide, on the one hand, knowledge, innovation, capital and, on the other hand, consumers of specialised products and services from the outermost regions.

The above considerations indicate the possible risk of the lack of positive effects in applying smart specialisations in rural areas. The smart specialisation concept puts a great emphasis on the involvement of local stakeholders and regional/local institutions in the implementation of the innovation policy. However, there is a threat of the significant involvement of private actors in the process of shaping and implementing this policy, as a result of which there can be a "pursuit of rent", corruption and the emergence of a network of private-public links to inhibit access to information, create barriers to new entrants or new ideas and initiatives. This is particularly possible in the outermost regions, where there are only a few significant players, and there are close links among private and public actors. In this situation, the informal governance structure and local groups of interest inhibit the bottom-up entrepreneurial discovery process (Boschma, 2013). According to McCann and Ortega-Argiles (2016), important is the transparency of the pursued policy and openness to as many

local players as possible. In addition, as part of the policy it is required to closely define the conditions for participation with specific indicators of the results obtained. Smart specialisations should not support local groups of interest, but encourage new players and non-local actors to act actively in the regional innovation process.

According to some experts (e.g. Camagni and Capello, 2012), the use of smart specialisations in the development of regions has its limitations. The first one stems from a belief that only formal knowledge is a source of innovation, so it does not take into account other informal sources of knowledge present in local economies. The second one is said to be ignoring the diversity of the regions in reaching own innovation. In this context, we can identify three conceptual models as part of which knowledge and innovation are created in the regions. Each of these models represents a different way of reaching innovation and requires a different innovation policy. For the first type, the most effective seems to be support for the research and development activities. For the second – appropriate incentives to change as a response to external stimuli, e.g. introducing a new technology or a support in modernising existing specialisations or moving from old to new one. For the third model, the most effective policy may be support for the maximum return on the adaptation of imitations, i.e. implementation of existing innovations in order to reach specific market niches or geographic areas.

The empirical studies indicate that there is a significantly larger number of models than those mentioned above (ESPON, 2012). The existence of different models of reaching innovation explains the fundamental reason for the failure of the existing innovation policy, which is to profess the *one-size-fits-all* principle. An example could be incentives which are to support R&D, the same for different regions. In some cases, support for R&D can be very helpful, especially where there is a critical mass for the research activities. However, it will not be useful in the region where there is no base for formal internal knowledge. Therefore, the implementation of the "smart" innovation policy gives an opportunity to increase the innovation of the region by identifying the specific path of reaching innovation, and then supporting it by means of "tailored" objectives and instruments. Such an approach also guarantees support for all regions in the EU, without the risk of concentration of resources only in selected regions, where the expected return on the research and development activities seems to be the greatest.

4. CONCLUSIONS

The ineffectiveness of existing public practices in relation to the development of innovation of the agri-food sector makes us wonder on the direction of changes. The smart specialisation concept has been based on the sectoral approach to the development of innovation, moreover, it has not been refined in theoretical terms. Therefore, this is a concept which is difficult to be put into practice, particularly in the context of regional development. Admittedly, most stakeholders support the introduction of smart specialisation into regional innovation strategies, but ideas how to implement them are very different. Current smart specialisations are treated mainly as a distribution mechanism for the European Regional Development Fund resources. In the literature of the subject there are studies which point to limited possibilities of using smart specialisations in the outermost regions.

One of the reasons for the ineffectiveness of implemented policies based on smart specialisations is the use of solutions identical for all regions (*one-size-fits-all* approach), without taking their specificities into account. In the case of Poland, most voivodeships

indicated among smart specialisations areas directly or indirectly related to the agri-food sector, while not defining which fields they actually want to develop. The selection of smart specialisations should not identify the most fashionable trends, but areas where new research and development activities will complete other production resources, so as to create future local values and comparative advantages of the region.

Taking the above into account, it seems reasonable to recommend another approach to the development of the agri-food sector. This, however, requires a significant change in the paradigm of support for this sector under the Common Agricultural Policy in order to transfer funds from direct aid to agricultural services, focused on human, animal and plant health protection systems, agricultural sciences improving broadly understood biosecurity and innovation of the agri-food sector. Nevertheless, the current political and economic situation in the EU and all over the world does not foster changes but rather maintaining, during subsequent negotiations on the EU multi-annual financial framework, the *status quo* and the *juste retour* principle. This will have negative implications for the above-mentioned sector in the future, as it loses its importance in creating GDP and providing jobs, while innovative methods of food acquisition (e.g. hydroponic crops) will be increasingly reducing the importance of the land factor in the agricultural production.

Therefore, the innovation development policy of the agri-food sector should be strictly related to the rural development in the given region. In this context, the place-based policy and knowledge-based policy seems to be most promising. Knowledge and diversified approach to innovation may be a key to developing a smart development and transformation strategy for rural areas.

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THE EFFECT OF TECHNOLOGY AND MARKET ORIENTATION ON SERVICE INNOVATION CAPABILITY IN THE CONTEXT OF SOCIAL AND HEALTH CARE SMEs

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ABSTRACT

Developing new services is vital for a service-based company to succeed in the long run. This requires both innovation capability and understanding customer needs. Previous research has shown that if a firm wishes to develop an innovation superior to the competition, it must have both a strong technology orientation and a strong market orientation. The objective of this study was to examine the effect of market orientation and technology orientation on service innovation capability in SMEs operating in the field of social and health care. In addition, this study examined the obstacles to using digitalization and new technologies in service innovations. Mixed methods design was applied so both quantitative and qualitative data was used. The results from the quantitative part of this study show that both technology orientation and market orientation have a positive and statistically significant effect on service innovation capability in SMEs operating in the field of social and health care. Furthermore, market orientation is the most important variable in the model. The results from the qualitative element again show that some of the hindering factors of using digitalization and new technologies arise from practices and attitudes of social and health care actors but others arise from the digitalization and new technologies themselves.

1. INTRODUCTION

Developing new products and services is vital for any company to succeed in the long run. This requires innovation capability and understanding customer needs. Innovation capability is a manifold construct, and it is thus hard to specify directly (Saunila & Ukko, 2014). Lawson and Samson (2001) define innovation capability as a theoretical framework aimed at describing the actions that can be taken to improve the success of innovation activities. There are only a small number of studies which have examined differences in innovation development within the manufacturing and service sectors, and within service enterprises, the focus has been on the knowledge intensity of sectors (Forsman, 2011). According to previous studies (see Evangelista, 2000; Forsman, 2011) service and manufacturing sectors show more similarities than differences with respect to the basic dimensions of innovation development. However Jansen et al., (2016) argue that service innovation follows a different logic to product innovation and because of the limited understanding of how service innovation comes about, more detailed research into the organizational antecedents of service innovation is needed (Den Hertog et al., 2010; D'Alvano & Hidalgo, 2011).

Previous research has shown that if a firm wishes to develop an innovation superior to the competition, it must have a strong technology orientation (Gatignon & Xuereb, 1997). Technology orientation is becoming even more important in the digital era. Digitalization is transforming entrepreneurship in two ways (Autio, 2017). The first transformation is the shifting locus of entrepreneurial opportunities in the economy and the second is the transformation of entrepreneurial practices. The current wave of digitalization is considered as a third or fourth industrial revolution, or a second machine age (Valenduc & Vendramin, 2017). Autio (2017) uses the term "digital disruption" in describing the transformative impact produced by digital technologies and infrastructures on how business, economy, and the society operate. This creates opportunities for many SMEs, but requires technology orientation from the company. The second important factor in innovation capability is market orientation. Market orientation has a link to service innovation, which in turn affects new product/service performance (Cheng & Krumwiede, 2012). In addition, market orientation has a positive impact on new product performance and innovation speed (Baker & Sinkula 2005; Kirca et al., 2005; Carbonell & Rodriguez, 2010). It is important to notice that market orientation and technology orientation are both strategic orientations of the company. As Leng, Liu & Tan (2015) suggest, research should pay attention to both of these concepts when examining their effects.

Digital services are also increasingly required in the field of social and health care (Reddy & Sharma, 2016). In the Finnish social and health care sector, administrative processes are largely becoming digital. Service providers are obligated to use certain programmes if they want to offer public services. At the same time, customers have adopted digital services in many parts of their lives. However, along with digital services, face to face services are also needed (Zechner & Kulmala, 2015). According to Raunio et al. (2015) customers want welfare services that are easy to use, personalized, flexible and that have good general guidance. In addition, the technology needs to work well, without interruptions. Apart from digital transformation, the social and health care sectors in Finland are also facing structural changes; this appears in particular as privatization of services. Health care organizations have not traditionally been very customer-focused (McColl-Kennedy et al., 2012) but they are now gradually realizing the importance of a customer-oriented business approach (Thakur et al., 2012). However, according to Sharma et al., (2014) they often lack an understanding of how best to coordinate their resources and utilize their capabilities to address this challenge.

Rethmeier (2010) states that due to constant health care reform, global economic fluctuations, and employee resistance, health care organizations face critical challenges, and it is hard to drive innovation in the organization.

The objective of this study is to examine the effect of market orientation and technology orientation on service innovation capability in SMEs operating in the field of social and health care. In addition, this study examines the obstacles to using digitalization in service innovations.

This study uses a mixed methods design applying both quantitative and qualitative data. The purpose is to understand more deeply the phenomena of service innovation in social and health care companies. Based on previous research, the following questions are proposed:

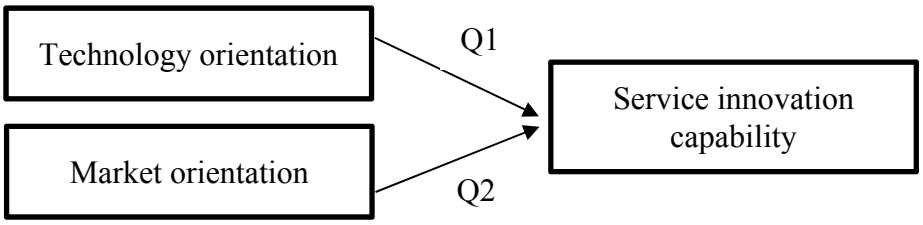
Q1: Does technology orientation have an effect on service innovation capability in social and health care SMEs?

Q2: Does market orientation have an effect on service innovation capability in social and health care SMEs?

Q3: Which factors hinder the use of digitalization and new technologies in service innovations in social and health care SMEs?

To answer questions 1 and 2, we used linear regression analysis and tested the following model:

Figure 1. Conceptual model of the study.



To answer the third question, we used qualitative data from focus group interviews.

2. THEORETICAL FRAMEWORK

2.1. Technology orientation and digitalization in social and health care

Deshpande et al., (2016) define technology orientation "as one where firms have an R&D focus and emphasize on acquiring and incorporating new technologies in product development". Technology orientation is one of the strategic orientations of the firm, and it is assumed that applying new technology solutions, products and services will create long-term success for the company (Gatignon & Xuereb, 1997; Hult et al., 2004). Technologically oriented firms have the ability and the will to acquire a substantial technological background and use it in the development of new products (Gatignon & Xuereb, 1997). Previous research

has shown that technology orientation is positively related to organizational performance (Masa'deh et al., 2018).

Technology orientation can create leadership (Hamel & Prahalad, 1994), and in the era of digitalization, it is even more important to develop and adapt new technologies. Digitalization can be examined at the level of individual firms, at the level of industry and markets or at the level of society as a whole. Digitalization is not just digitizing things and processes or utilizing new technology, but it also contains changes to human behaviour, markets and core activities (Ilmarinen & Koskela, 2017).

At the moment, there are large expectations for digitalization and technology in Finnish social and health care organizations. Many solutions exist, but commercial breakthroughs are still rare. (Raunio et al., 2015.) Digitalization, the use of the internet and the amount of available data offers possibilities for radical changes. Utilization of data offers possibilities of renewing the way of working and doing business (Kiiski-Kataja, 2016) in the social and health care sector. One field of active development in technology focuses on the needs of ageing society, the prevention of illnesses, and using e-services with the goal of reducing the rising costs of social and health services (Hori, Ohashi & Suzuki, 2006). The use of big data enables the gathering and use of data from personal devices, information and research on large populations (Gellerstedt, 2016) and the use of artificial intelligence as a help in diagnostics.

Big companies have an advantage in adopting new technologies. Small companies usually do not have as much money to invest in the development process. The adoption of new technology requires planning and management, as it is a process that changes the way of working (Jauhiainen & Sihvo, 2015). Changes in work also mean resistance to change, which may be amplified by work pressure (Ervelius, 2017). Digitalization may also require changes and renewal of the business model (Zott & Amit, 2017). Svejgaard Pros (2014) argues that e-services change the possession of the professionals. The line between professionalism and personal capabilities becomes less clear. The role of the professional becomes more supportive and the hierarchy between the service user and the professional becomes lower and more informal (Svejgaard Pros, 2014; Karinsalmi et al., 2018). According to Wälivaara et al. (2011) technology may serve as one channel of contact and as an additional contact, but it should not displace human contact, especially when psychological support, giving comfort or convincing are needed.

2.2. Market orientation in social and health care

Market orientation can be viewed from a cultural perspective as a part of organizational culture (Narver & Slater, 1990) or from a behavioural perspective as market-driven behaviours (Jaworski & Kohli, 1993). Market orientation has three different elements: organization-wide generation of market intelligence, dissemination of market intelligence, and organization-wide responsiveness to market intelligence (Kohli & Jaworski, 1990). Previous research has shown that market orientation has a direct or indirect effect on firm performance (e.g. Kirca, Jayachandran & Bearden, 2005), although this relationship can be moderated or mediated by different factors (González-Benito et al., 2014; Kirca et al., 2005; Liao et al., 2011).

Wood, Bhuian and Kiecker (2000) explored market orientation in the not-for-profit hospital setting and found a positive and strong association between market orientation and hospital performance. Hence, it is vital that social and health care companies develop their market

intelligence generation, dissemination and responsiveness. Roselund and Kinnunen (2018) emphasize that market orientation in social and health care technological services should have already begun in the planning stage. The views and information of the special needs of various user groups are vital, because these services are often used by people with some disabilities.

Atilla et al. (2015) suggest that health care organizations benefit especially from market orientation behaviours in emerging markets, as a market-oriented strategy enables these organizations to understand and respond to their health care customers more effectively. They also showed that market-oriented strategies and operations improve hospital performance. Viswanathan et al. (2009) emphasize that understanding customer needs and welfare helps organizations to design products that improve life and enhance welfare. Thus, a market-oriented strategy allows organizations to incorporate the voice of the citizens into the product/service development process (Atilla et al., 2015). Previous research has shown that market orientation has a positive impact on service innovation (Cheng & Krumwiede, 2012). In addition, Masa'deh et al. (2018) found that market orientation contributed the most to the enhancement of organizational development followed by technology orientation.

Several measurement instruments have been developed to examine market orientation in different contexts, e.g. the MARKOR scale (Kohli et. al, 1993) and MKTOR (Narver & Slater, 1990). However, Wood et. al (2000) criticize these scales for being tested in for-profit business corporations and not being validated in other contexts. Based on previous scales, Wood et al. (2000) developed their own market orientation scale to be used in social and health care. Their research was the first step in validating the relationship between market orientation and hospital performance. The domain and key elements of market orientation in the scale developed by Wood et al. (2000) are market intelligence generation, market intelligence dissemination and market intelligence responsiveness. Market intelligence generation refers to a) gathering, monitoring and analysing information concerning clients/customers and environmental factors and b) gathering information using formal and informal means. Market intelligence dissemination refers to a) sharing of information concerning clients/customers and environmental factors and b) ensuring horizontal and vertical information flows, participation of all departments and personnel and other marketing tools. Market intelligence responsiveness refers to a) developing, designing, implementing and altering programmes, goods/services, and systems to promote, price and distribute programmes, goods/services and b) utilizing segmentation and goods/services differentiation.

2.3. Service innovation capability

Den Hertog et al. (2010) have developed a conceptual framework of dynamic service innovation capabilities for strategically managing service innovation. The basis of their framework is a model of six dimensions of service innovation. Those dimensions are: 1) Service concept, which describes the value that is created by the service provider in collaboration with the customer. This kind of innovation could be, for example, a new idea of how to organize a solution to a customer's problem. 2) New customer interaction, where the interaction process between the provider and the client is an important source of innovation. 3) A new value system or set of new business partners, which are increasingly materialized through combinations of service functions provided by a coalition of providers. 4) A new revenue model: those firms with new service concepts have to find new models to distribute costs and revenues in appropriate ways. 5) A new delivery system: personnel, organization, culture, which refers to the organizational structure of the service company itself (the

company may need to develop e.g. new organizational structures; (inter)personal capabilities or team skills). 6) A new service delivery system: technological, which shows the observation that those ICTs have recently enabled numerous service innovations. Den Hertog et al. (2010) remarks that a service company can innovate in either every single dimension, or in a combination of several dimensions.

After outlining six dimensions of service innovations, they integrate those dimensions with the idea of dynamic capabilities. According to Teece (2007) dynamic capabilities embody difficult-to-replicate capabilities required to adapt to changing customer and technological opportunities. Dynamic capabilities theory aims to explain an organization's ability to modify their internal resources to match the external environment. Hence, the dynamic capabilities approach emphasizes the dynamic and temporal approach to the reconfiguration of resources (Helfat and Peteraf, 2009; Siren, 2014). According to Augier and Teece (2009), it is critical for business enterprises to figure out where to put their resources, realizing those opportunities, and then defending and/or moving on when competition inevitably appears. Augier and Teece (2009) divides dynamic capabilities into three classes: the capability to sense opportunities, the capacity to seize opportunities, and the capacity to manage threats through the combination, recombination, and reconfiguring of assets inside and outside the firm's boundaries. In short, dynamic capabilities relate to the ability to sense, seize, and reconfigure (Teece, 2007).

The outcome of this integration (six dimensions of the service innovation model and the dynamic capabilities approach) is a framework of six dynamic service innovation capabilities. Those six dynamic service innovation capabilities are: 1) *Signalling*, which is looking for and interpreting signals from the real world: it is thus the capability to see dominant trends, unexploited needs and promising technological options for new service configurations. 2) *Conceptualizing* intangible new service ideas between the service provider and the client is a specific capability. 3) *(Un-)bundling,* which means the capability to (un)bundle, enrich or blend the existing elements in a new way or in a new context. 4) *Coproducing and orchestrating*, which requires that the core service provider has to co-design and co-produce a service innovation with other suppliers and manage the accompanying alliance. 5) *Scaling and stretching* means both the capability to diffuse the service concept and capability building a valuable service brand. 6) *Learning and adapting capability* implies reflecting one's own performance by keeping track of failed and successful service innovation efforts.

Jansen et al. (2016) provides the operationalization for this framework of dynamic service innovation capabilities that Den Hertog et al. (2010) have developed. They used two sub-samples of a multi-industry survey for purifying and validating an actual measurement scale. Their measurement scale captures to what extent firms have dynamic service innovation capabilities that are relevant for different processes concerning the creation and implementation of new services. However, since learning and adapting is explicitly defined as a meta-capability that helps an organization to reflect upon the other capabilities (Hertog et al., 2010) it is not seen as separate dimension. Similarly, (un-)bundling capability was discarded since it does not reflect a dynamic capability that can be related to observable activities. But then Jensen et al., (ibid.) divided the capability of sensing (signalling in the 2010 framework of Hertog et al.) into two parts: sensing user needs and sensing (technological) options. Eventually, the measurement scale of Janssen et al. (2016) contains five capabilities, which are: sensing user needs, sensing technological options, conceptualizing, coproducing and orchestrating, and scaling and stretching. With their measurement scale, Janssen et al. (2016) found that the presence of several capabilities has a

positive correlation with gaining turnover from improved rather than existing products. In addition, coproducing and orchestrating correlated with having a rapid growth in market share, whereas scaling and stretching was now related to none of the outcome variables. Overall, it seems that firms who have stronger dynamic service innovation capabilities also tend to perform better.

3. METHODOLOGY

3.1. Mixed methods approach

We used a mixed-method design to collect information. In this study, as usual, mixed-method research involves both quantitative and qualitative methods and data. Hence, methodological pluralism is a key feature in our study as it is generally in mixed methods research (Burke & Onwuegbuzie, 2004). The empirical data used was collected from survey and focus group interviews. The survey data is a core component of our research, while the focus group interview is a supplementary component (Morse & Niehaus, 2009, 14). In other words, we conducted a quantitative mini-study and a qualitative mini-study in one overall research study. Nonetheless, as Burke and Onwuegbuzie (2004) have stated, to be considered a mixed-method design, the findings must be mixed or integrated at some point. We expect that the focus group interviews provide a deeper understanding of the obstacles of adopting digitalization and new technologies in service innovations in social and health care SME than the survey could produce. Hence, by mixing results gained from both mini-studies we are aiming to gain a comprehensive understanding of the service innovation capability of SMEs in social and health care.

3.2. Quantitative data gathering and measurement constructs

A list of social and/or health care firms was ordered from the Business Register of Statistics Finland. From that list, the survey was sent to 433 postal addresses. To increase the number of responses, the survey was re-sent to entrepreneurs by e-mail addresses. It was possible to find only 188 emails for those 433 enterprises. In addition, 45 phone calls were made and surveys was passed on to entrepreneurs on two different occasions. Finally, 46 enterprises answered the survey. 72 % of respondents were women. Half the enterprises had a turnover of over 250 000 euros, while the other half had a turnover under 250 000 euros. Even though the response rate was low, the respondents represented a wide spectrum of SMEs in social and health care. 61 % were health care entrepreneurs from various fields and the rest of the respondents were entrepreneurs from the social work sector such as child welfare.

We measured technology orientation with a scale from Gatignon and Xuereb (1997). It had seven items (5-point Likert scale) with Cronbach's alpha 0.96. Market orientation was measured with a scale specifically developed for health care companies by Wood et al. (2000). They base their scale on previous scale development by Kohli, Jaworski, and Kumar (1993). The resulting scale of market orientation consisted of 11 items. Four items were used to measure intelligence generation (MO1–MO4), three items were used to measure intelligence dissemination (MO5–MO7), and four items were used to measure intelligence responsiveness (MO8–MO11). The 5-point Likert scale was used in these items. Cronbach's alpha demonstrated high reliability for the scale (0.88).

Service innovation capability was measured using a scale from Janssen et al. (2015). We shortened the scale by measuring the four subconstructs as follows: sensing user needs and technological options (four items, Cronbach's alpha 0.87), conceptualizing (four items, Cronbach's alpha 0.91), coproducing and orchestrating (two items, Cronbach's alpha 0.80), and scaling and stretching (three items, Cronbach's alpha 0.89). In the model we united all subconstructs to a one scale service innovation capability, which had high reliability (Cronbach's alpha 0.96). Table 1 presents the correlations, Cronbach's alphas, range, means and standard deviations for the scales.

Table 1. Correlations, Cronbach´s alphas, range, means and standard deviations for the scales.

	Technology orientation	**Market orientation**	**Service innovation capability**
Technological orientation	1		
Market orientation	.41**	1	
Service innovation capability	.67***	.88***	1
Cronbach´s alpha	.96	.76	.96
Range	1.0-5.0	1.55-5.0	1.1-5.0
Mean	2.4	3.4	3.3
Sd	1.1	.8	.9

,* indicate significance at the 90 %, and 99 % level respectively.

Common method variance can cause problems in a study, if a single factor emerges from a factor analysis or if one general factor accounts for most of the covariances in the independent and dependent variables (Podsakoff & Organ, 1986). We tested the possible effects of common method variance for the variables collected using Harman's one factor test (Harman, 1976). All the items in the study (a total of 31 items) were factor analysed using principal axis factoring where the unrotated factor solution was examined, as recommended by Podsakoff et al. (2003). Kaiser's criterion for retention of factors was followed. The sample size seemed to be large enough for the factor analysis, based on the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.74) and Bartlett's test of sphericity (sig. 0.000).

The factor analytic results indicated the existence of five factors with eigenvalues greater than 1.0. These factors explained 73 % of the variance among the 31 items, and the first factor accounted for 49 % of the variance. Since several factors, as opposed to one single factor, were identified and since the first factor did not account for the majority of the variance, a substantial amount of common method variance does not appear to be present. However, this procedure does nothing to statistically control for the common method effect: it is just a diagnostic technique (Podsakoff et al. 2003). Hence, the possibility of common method issues cannot be fully discarded.

We used standard linear regression analysis to test the hypothesized model. Tolerance and VIF-values were analysed to see that there was not a threat of multicollinearity between independent variables.

3.3. Qualitative data gathering

We applied the focus group method for the qualitative data gathering part. Focus groups have become increasingly popular in applied social research, especially in the field of health (Puchta & Potter, 2004). The focus group also functions as an adjunct to other research methods such as individual interviewing, participant observation, surveys or experiments

(Wilkinson, 1998). The focus group provides a deeper understanding of the phenomena being studied. The group may encourage participants to make connections to various concepts and ideas through discussions that may not occur during individual interviews (Nagle & Williams, 2013). At the same time, the focus group offers an opportunity for the researcher to listen to local voices (Liamputtong, 2011, 4). Above all, focus groups are collective in their nature – giving participants opportunities to define what is relevant and important according to their experience (Liamputtong, 2011). In our project, we used focus group interviews for two reasons: first to deepen the findings gathered in the survey, and secondly to create networks for possible future collaborations between the social and health care entrepreneurs.

We conducted the focus group in a way that would meet the criteria of focus group interviews by Puchta and Potter (2004). According to Puchta and Potter (2004) focus group moderation is a task-oriented activity: both moderators and participants aim for producing opinions about the chosen theme or issue. However, the interaction in a focus group is a flexible, open-ended thing, and is not mechanistic or deterministic. Puchta and Potter (2004) note that we should look at focus groups from a discursive perspective, and consider attitudes not as preformed but as performed. Then there is no need to be concerned whether individuals are precisely reporting their unique, private, inner attitude rather the opinions produced with this particular group of people in that given social context. According to Wilkinson (1999) the focus group is itself a social context. From a discursive perspective, a focus group provides a setting for considering interaction of people in a way that appears in everyday life: in conversation with others, in arguments, included in suggestions (Puchta & Potter, 2004).

Moderating a focus group is a complex set of formality and informality. Puchta and Potter (2004) outline a few important guidelines for the moderator(s) of a focus group. The moderator should generate a situation that is relaxed and informal while still managing the interaction. On the one hand, the moderator needs to lead the focus group participants to the correct answer or at least a useful one, while simultaneously presenting it as something arrived at by the members themselves. The moderator should also beware of over-preparation and over-scripting the focus group action, rather using simply a checklist of questions. The moderator should encourage participants to POBA talk, which means talking of perceptions, opinions, beliefs, and attitudes instead of talking about knowledge, facts or truth. It is important to make it clear that the aim is not to find out how much participants actually know about the theme or issue, but rather their opinions, ideas and attitudes to it. It is also important to stress that a variety of opinions are desired and encouraged. (Puchta & Potter, 2004) Hence, the objective of the focus group is not to achieve a consensus on the issues discussed (Puchta & Potter, 2004; Liamputtong, 2011). However, it is important that the moderator obtains good and accurate information from the focus group (Liamputtong, 2011, 5).

Two members of the project team conducted the focus group interview. The focus group interview was organized during the digitalization workshop organized for social and health care entrepreneurs. Those entrepreneurs and experts invited formed the focus group (see Table 2 for the participants). There were 10 participants in total, plus two moderators in an arranged focus group. Typically, focus groups do not use random samples, but rather utilize convenience sampling (Nagle & Williams, 2013). Our participants were chosen to help the research gain a greater understanding the obstacles of using of new technology and digitalization in service innovations in social and health care SMEs. According to Nagle and Williams (2013), an optimal focus group has approximately five questions, which are open-ended because the intent of the focus group is to promote discussion. Our focus group interview was structured around the theme of digitalization and new technologies in social

and health care enterprises. We had four questions in total, but for this study, we only analysed the focus group discussions that concerned the obstacles experienced in using digitalization and new technologies in service innovations.

Table 2. Focus group participants

Focus group participants	
Entrepreneurs in social or health care	7
Experts in social or health care	2
Experts in digitalization	1
Moderators	2
Total	12

4. RESULTS

4.1. Quantitative part

Standard linear regression analysis was used to test a model in which technology orientation and market orientation explain service innovation capability in SMEs. The results show (Table 1) that both technology orientation and market orientation have a positive and statistically significant effect on service innovation capability. Market orientation is the most important variable in the model (β .633). The whole model explains 78 % of the variance in service innovation capability.

Table 3. Regression results (standard deviations from the mean and β).

Dependent variable: service innovation capability	
Constant	-.242 (.311)
Technology orientation	.348*** (.065) β .412
Market orientation	.791*** (.097) β .633
R-squared	.786
Adjusted R-squared	.776
F statistics	79.170***

Standard errors are reported in parentheses.
*** indicates significance at the 99 % level respectively.

The results indicate that in SMEs operating in social and health care, it is important to develop both technology and market orientation in order to improve the service innovation capability.

4.2. Qualitative part

We used qualitative content analysis to categorize and analyse the focus group data to create comprehensive interpretation of the topic (Krippendorff, 2013). At first, we coded all the material from the focus group related to obstacles to using new technology and digitalization in service innovations in social and health care SMEs. Then we categorized those themes that focus group participants brought forth around the topic. At this stage, we held several rounds of discussion in our research group. Finally, we came up with the four key factors that hindered the development of new technology and digitalization in service innovations in social and health care SMEs. First we identified a hindering factor is *lack of resources*. Focus group participants felt that it is difficult to adopt new technologies because of a lack of resources. Firstly they said that they do not have time to search and test new devices, software etc., and secondly they had doubts about the possible costs of introducing new technologies. As here, one entrepreneur says that she lacks both resources:

> *For me it is the time management. I do not have time to find out what possibilities are there and then learn to use these new things. … I have to say also that those costs. It is [an] issue for small enterprise. (Entrepreneur1)*

The second hindering factor is a *lack of mutual language* between the social and health care providers and technology developers. According to focus group participants, technology developers are using a jargon that is not commonly intelligible for social and health care actors and in addition developers do not have a very good understanding of the actual needs of the social and health care sector. As one of the entrepreneurs said:

> *In particular the fields are so separate at the moment. So technology people are very good creating these tools but then they don't understand the end-user. And then the opposite way the health care experts do not necessarily have the knowledge or the skills or the understand how to create these technology. (Entrepreneur2)*

The third hindering factor identified is the *old-world attitudes* of entrepreneurs, employees and customers. A focus group participant said that in social and health care sector there appears a rigid attitude towards adopting or developing new technologies and digitalization. Both entrepreneurs, and employees and customers, are rather suspicious of new technologies and digitalization. Especially among older employees, there is not a high interest in adapting to new technologies, as one entrepreneur describes:

> *It is more about the own willingness… If I am not interested (technology), why should I adopt it? (Entrepreneur3)*

The fourth and last hindering factor identified is *impractical technology*. Focus group participants brought up that the existing technologies are still quite crude and inoperative.

They felt that available technological solutions for social and health care are still in an early phase. Both social and health care entrepreneurs and experts wish that those new technological innovations and devices were more user-friendly and more functional. Current technological solutions are, on the other hand, so generic that they are thus unworkable for the use of small enterprises, and secondly some devices designed for customers are very uncomfortable to use.

Then these devices, which are available now, are clumsy and there are too much alternatives. (Entrepreneur4)

5. DISCUSSION AND CONCLUSIONS

The first objective of this study was to examine the effect of technology and market orientation on service innovation capability. The results show that market orientation is positively related to service innovation capability. The effect of market orientation is even more important than technology orientation, which is also positively related to service innovation capability. This confirms the findings of Cheng and Krumwiede (2012). Huhtala et al. (2014) also found that market orientation and innovation capability are linked: in their study innovation capability mediated the effect of market orientation on business performance. The results of this study show that market orientation is an important factor in social and health care. High market orientation improves the understanding of customer needs and competition environment, which in turn enhances the capability to innovate new services. It is interesting that market orientation was a more important factor affecting the service innovation capability than technology orientation. This may indicate that with social and health care, service innovations may be more customer-driven than technology-driven. However, technology orientation was also positively related to service innovation capability. Social and health care firms with high technology orientation have a higher capability to innovate new services. Digitalization is transforming the sector rapidly, and therefore it is important to have access to networks developing new technology in the field. Firms need both market and technology orientations. Tsou, Chen & Liao (2014) also found that proactive market orientation and technology orientation affect innovative competences. They argue that managers need to understand the market trends and technology available, and need to be able to customize corresponding services. This study also confirms this in social and health care.

The second objective of this study was to examine the obstacles to using digitalization and new technologies in service innovations. The results show that some of the hindering factors arise from practices and attitudes of social and health care actors but others from the new technologies and their developers. Entrepreneurs related that those technological devices or applications that they have in use or that they have tested are quite ineffective and that this diminishes the use and adoption of new technologies. It seems that developers of technological devices and applications for the social and health care sectors do not yet understand the end-user well enough. However, Pajarinen and Rouvinen (2018) note that technological development is always cumulative: fundamental ideas need many complementary ideas around to be advantageous. Besides ineffective technologies, a lack of mutual language between the social and health care providers and technology developers hinders the adoption of new technologies in social and health care SMEs. It seems that activities and operation logics, along with jargon, are so different in the social and health care sector than in the technological or digitalization sectors that collaboration appears very difficult, at least for social and health care entrepreneurs.

At the same time, according to our results preferring old-time practices rather than adopting new digitalized practices characterizes many of the actors in social and health care SMEs. Sometimes implementation of new technologies might be rapid, but for the people and organization the integration and adaption of new technological possibilities might even take decades (Pajarinen & Rouvinen, 2018). Furthermore, the social and health care entrepreneurs interviewed felt that they do have neither time nor financial resources to develop or adopt new technologies into their services. This might result from the fact that in those social and health care SMEs most of the employees, and also the entrepreneurs themselves, have an education and work experience mainly from the social and health care sector. Hence, they do not have any inner expertise for introducing digitalization or new technologies, and they would need to find a completely new person with digitalization skills who could explore and introduce suitable technologies for their services. Hiring new employees is a high expense for SMEs. Altogether, it seems that social and health care SMEs lack competence in combining technological and social and health care knowledge. Hence, our results are congruent with Sharma et al. (2014), who claim that health care organizations often lack an understanding of how to best coordinate their resources and utilize their capabilities to address new challenges. However, with social and health care SMEs, it should also be taken into account that the available resources are often limited.

In the social and health care sector in Finland, big companies are buying small ones in the market. For SMEs operating in this field, it is important to develop market and technology orientations in order to succeed and survive in the sector. High market and technology orientation improves the capability to deliver new services in the market and enables firms to become technological pioneers in the field. One practical strategy for social and health care SMEs with limited resources could be recruiting professionals with broad competencies – from technology, marketing and social and health care. Another strategy is open innovation and user innovation (Vuorela et al., 2013). The idea of open innovation comes from the notion that valuable ideas come from both inside and outside organizations (Chesbrough, 2006). The advantage of small businesses is their close activity with their customers – the end-users. Hence, SMEs could and should involve their customers more in their service innovation processes (Vuorela et al., 2013). Co-creation is one suggested and employed concept/tool for open innovation and user innovation activity in SMEs (Vuorela et al., 2013) but more research is needed, particularly from social and health care SMEs.

There are some limitations to this study. First, the data was collected from one country and one region. Hence, the results cannot be generalized in all contexts. Second, the data for the quantitative part is quite small. However, the qualitative part adds knowledge for this phenomenon. By using mixed-method, we managed to grasp this complex phenomenon at least slightly more profoundly than by using one research method alone.

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PERSONAL VALUES AND ENTREPRENEURIAL ETHICS: AN EMPIRICAL STUDY OF CROATIAN AND SLOVENIAN STUDENTS[1]

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ABSTRACT

In this paper, authors examine the existence of a potential empirical relationship among the Croatian and Slovenian students' personal values and the measures of their perceived behavioural entrepreneurial ethics. Although empirical results formally support such a hypothesis, based on the negative influence of the value of power to entrepreneurial ethics, its effect is rather marginal. When placed in the context of previous research, as well as the analysis of the sociological and educational environments, it is argued that a potential attitude-behaviour gap makes it difficult for Croatian and Slovenian institutions of HE to translate students' personal values into the relevant behaviours in different social frameworks. The negative causal association of power to entrepreneurial ethics could be, thus, explained by the perception of social power as a 'given reality', which lowers the ethical behaviour in many social contexts, including entrepreneurship. Findings of this study, as well as their tentative positioning within wider the sociological and educational backgrounds, could be useful to business school and other HE institutions' administrators. It should be, also, interpreted as a call for further research and policy action in the field of higher education and/or youth-related public policies, in general.

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1. PERSONAL VALUES AND ETHICAL DECISION-MAKING

1.1. Research question and the expected contribution

This study contributes to *understanding if personal values influence the students' ethical decision-making, including identification of control variables, relevant for the student population.* Such a line of research can be classified into the field of *behavioural ethics,* in which, a limited amount of empirical studies have been done in studying effects of personal factors to ethical behaviour. Those studies, described by the rest of this chapter, still leave ample space for additional scientific contribution. Authors especially wish to contribute to the understanding of the entrepreneurial ethics from the behavioural point of view. In this paper, *personal factors are used as predictors of entrepreneurial ethical decision-making*, which is in line with the traits approach to entrepreneurship, as well as with the literature on the *ethical attitudes-behaviours link (or the gap thereof).*

The study is conducted on the student population, which is further described in the methods section. From the applicative point of view, addressing this research question, by using the student population is important for business schools, in terms of decisions, related to curricula and teaching ethics/social responsibility.

1.2. An overview of literature on personal values in behavioural ethics

There are two fundamental approaches to studying (business) ethics: a normative one, focusing on what *should* be done in ethically sensitive situations, and the behavioural (descriptive) one. The latter, also referred to as the *behavioural ethics*, analyses how the ethical decision-making is *actually* conducted, instead of theorizing and prescribing the drivers of moral behaviour (Bazerman & Gino, 2012). This line of research addresses ethical intuition and other, non-rational drivers of human behaviour, which motivate even 'good' people to commit immoral acts (De Cremer & Vandekerckhove, 2017). It takes into account cognitive, social and situational factors of ethical decision-making (Robbenholt, 2015), emphasizes moral perception to moral action mechanisms, as well as the role of intuition and emotions in moral behaviour (Ellertson, Ingerson & Williams, 2016). Psychological characteristics and processes are examined, as to contribute to the understanding of (i)mmoral choices (De Cremer et al, 2011).

Previous research in the field has been identified, based reviews of ethical decision-making literature (Loe, Ferrell & Mansfield, 2000; O'Fallon & Butterfield, 2005), for the pre-2003 studies and a more contemporary review (Craft, 2013), as well as the personal literature search, for the newer studies. There is a range of studies, discussing partial links of the personal values to different aspects of ethical decision-making, including different moderators. Morris et al (1996) found that the turbulent organizational environment can lead to strengthening of personal values and the weakening of behavioural intentions. Glover et al (1997) describe their previous research, reporting that the potential relationships among personal values and ethical decisions are heavily moderated by both demographic and environmental variables. Personal values have also been linked to ethical tolerance (Ashkanasy et al, 2000) and inclination to make unethical decisions (Nonis & Swift, 2001), which applies to a certain value profile, with a low score for each of the values, analysed in the latter study. Bartlett (2003) identifies an archetypal issue of individual (psychological) value constellations, versus socialization and organizational cultures, in terms of influence to the decision-making process, which has been raised by Conrad (1993). According to the same

study, several models have been formulated, in order to address the duality of potential influences. The most accepted model seems to be the one, proposed by Trevino (1986), who sees both individual characteristics (including values), as well as organizational variables, as moderators of the cognitive variables and the ethical behaviour of a decision-making actor.

Based on the discussed research results, potential influence of *personal values* to the realities of ethical decision-making is one of the gaps in the behavioural ethics literature. Namely, the older studies did not clearly indicate: (a) if there is solid empirical evidence for the values – ethical decision-making relationship and (b) in case of its existence, what would be the relevant value profile.

More recent research has been more helpful in answering the research question, with Frische and Oz (2007) linking ethical decisions to self-improvement and the value of altruism, while Brown et al (2010) added empathic and narcissistic orientation to the list of relevant personal values. The most important contribution seems to have been done by Watson & Berkley (2008), who reported on the influence of *traditionalism, conformity, and stimulation* to ethical judgment, with combined moderating effects, including several contingency variables (such as moral complicity and performance rewards). In the follow-up study, Watson, Berkley & Papamarcos (2009) found *benevolence and universalism* (representing the potential 'immoral' influences), as well as *hedonism and power* (selected as predictors of 'moral' influences) to be predictors of ethical decision-making. They also demonstrated the moderating effects of the discussed value pairs to the relationship between contingency variables and the ethical decision-making.

This study will seek to follow up on the *analysis of the potential direct relationship between the value profiles* (as described by a selected value research methodology) and the *ethical decision-making*. The additional influence of situational variables and the moderating/mediating effects will be explored in forthcoming research.

1.3. Entrepreneurial ethical decision-making

Entrepreneurship is a vital source of innovation, new job and wealth creation, which were commonly linked to 'entrepreneurial personalities', who are self-confident, not afraid to challenge stereotypes, break rules and accept a moderate level of risk (Brockhaus & Horwitz, 1986). They are more oriented internally, seeking personal satisfaction and power, rather than satisfaction with interpersonal relationships (de Vries, 1977). This line of theorizing was extremely popular in the early era of entrepreneurial research, but has been increasingly neglected in contemporary studies. Nevertheless, it has been 'resurrected' in the 2000s by Rauch & Friese (2007), who matched the entrepreneurs' personality traits to stages of the entrepreneurial process and their performance.

There is limited empirical evidence on the topic of how personal characteristics contribute to the ethical entrepreneurship. When examining this issue, some authors argue that, sometimes, even the disregard of moral and social rules can be productive in securing innovation and creation of new entrepreneurial opportunities (Brenkert, 2009). At the other hand, Buchholz & Rosenthal (2005) link the 'entrepreneurial' values (such as creativity, sensitivity...) to moral sensitivity and imagination. Regardless of the theoretical explanations, our search for the previous empirical research on the influence of personal factors/traits to entrepreneurial decision-making, especially as relates to its ethical dimension, has not been especially fruitful. Importance of personal values for entrepreneurial decision-making was emphasized by

Holland & Shepherd (2011), who confirmed the influence of personal values, following Schwartz's (1992) formulation, relate to entrepreneurs' decision to persevere with their venture. The overall influence of personal values on entrepreneurial ethics proved to be much higher than in the case of managerial ethics (Bucar & Hisrich, 2001), while ethical values of founders seem to be associated with strong entrepreneurial cultures, oriented toward social responsibility (Joyner, Payne & Raiborn, 2002).

Authors have identified only one empirical study, conducted on a student sample, by Clarke and Aram (1997). In addition to being more than 20 years old (at the time of data collection for this paper), the Clarke and Aram's study has been focused on establishing the cultural differences between Spain and the US students. Nevertheless, it still provides empirically tested items for measurement of the entrepreneurial ethics from the behavioural perspective. Those will be discussed in the following section of the paper.

2. METHODS

2.1. Research context and objectives

This study is a part of the more comprehensive empirical research project, which has been conducted by the same authors, on the topic of students' values influence to educational processes in business schools and their wider institutional context. In previous research, Alfirević, Nedelko & Potočan (2018) tested if business school students in Croatia accept the officially proclaimed values of the education system and identified the empirical value dimensions of the Croatian Higher Education (HE) system. Results of the study indicate correlations between the personal and the institutional value systems, as well as employed control variables. In their paper, Popović & Nedelko (2018) examine the linkages among the social responsibility of the business schools in Croatia and B&H and the strategic orientation of the HE systems in these countries. The study introduced measures for the strategic orientation of the HE system and indicated that those can be empirically linked to the three dimensions of the social responsibility, i.e. concerns for social and natural environment, as well as economic results (Furrer et al, 2010; Ralston et al, 2014) of HE organizations. The same set of controls (including sex, age, level of study – undergraduate vs. graduate, source of study funding, country...) have been used in both papers. In this context, the current paper analyses the link between the students' value systems and their potential behaviours, which is in line with the attitudes-behaviour studies (see, e.g. Hemingway, 2005).

In line with the research question, posed in the previous section of the paper, the fundamental objective of this study is to *establish how personal values contribute to students' entrepreneurial ethics*, i.e. to *examine the attitudes-behaviour linkage, from the viewpoint of behavioural ethics in entrepreneurship.* This also leads to the need to *test and validate the measures for ethical entrepreneurial decision-making,* proposed by Clarke and Aram (op. cit.), in a different research context. Specifically, their main concern was related to establishing differences between Spanish and the US students, regarding the items, describing entrepreneurial ethics. At the other hand, this study wishes to describe the potential attitudes-behaviour link (or the gap thereof).

2.2. Constructs, measures and the research instrument

Personal values were operationalised and measured, by using a well-known approach, constructed by Schwarz (1994), who believes that attitudes, related to the most important life

goals/standards, represented by values, guide a person's behaviour. Schwarz's empirical strategy, usually referred to as the SVS (Schwarz's Value Survey) is based on a proposition of 56 individual values (Schwartz, 1992), which are easily categorized into ten generic constructs and four universal value dimensions, valid across different cultures (see, e.g. Schwartz & Boehnke, 2004). For empirical analysis, conducted in this study, authors used the original SVS approach, with the personal values-related items, being translated into Croatian and Slovenian languages. Personal values were measured on a nine-point scale, used and empirically validated by the original SVS research instrument.

Entrepreneurial ethical decision-making items were taken from Clarke and Aram (op. cit.), who reported their formulation in their paper. Nevertheless, since operationalization of the construct is based on a single study, authors report on their reliability in the following section. Those items were also translated into Croatian and Slovenian, while the classical five-point Likert scale has been used for measurement, in analogy with the original authors' approach.

The resulting questionnaire included additional items, describing a range of control variables, which were used in previous studies and proved to be meaningful in the context of the authors' empirical approach (as described in the previous section). Questionnaire has been administered to students by using a commercially available on-line platform, which did not capture any personal details (such as name and surname, ID numbers, IP addresses, etc.). Participation was voluntary and anonymous, with disclosure of research objectives and procedures being provided.

2.3. Hypothesis

Based on the previous discussion, a single research hypothesis will be examined in this study. It is formulated as follows: *Personal values influence students' perception of ethical decision-making in entrepreneurship.*

2.4. Research sample

This study should be regarded as being of exploratory nature, which is justified by limited theoretical, as well as empirical papers on the topic of attitude-behaviour link in entrepreneurial ethics. This resulted by choosing a non-probabilistic approach to sampling, which somewhat limits the generalizability of obtained empirical results, but reflects the sample and partial comparability with the results of a previous study on personal values of Croatian students (Alfirević and Kuljiš Brčić, 2016).

Although there is almost a complete lack of such studies in Europe (as far as the authors are informed), the potential influence of cultural factors should be acknowledged, based on previous studies (Alas, 2006). The choice of student populations from two South-East European (SEE) countries – Croatia and Slovenia, guarantees that the absence of cultural bias, since both countries can be classified as 'new European nations', with the shared historical and cultural context. Nevertheless, the choice of two comparable and neighbouring countries generates some research limitations, which are discussed in the concluding part of the paper.

The research sample consists of 376 students, with 206 studying at the University of Split - Faculty of Economics, Business and Tourism (EFST - Croatia) and 170 at the University of Maribor – Faculty of Economics and Business (EPF - Slovenia). The relative number of

respondents is, approximately, comparable to the overall number students at the two institutions, to which the authors are affiliated.

3. EMPIRICAL RESULTS

3.1. Statistical description of the research sample and the key constructs

Out of 376 respondents, 346 students (93.5%) were studying at undergraduate level, 10 (2.7%) were graduates and 14 (3.7%) were enrolled into a postgraduate (PhD) program. The total of 129 (34.7%) respondents were male and the remaining 243 (65.3%) female. Out of the respondents, majority were studying full time. Out of those, 76% were financed by the state budget, while 21.6% were financing their studies individually. The remaining 2.5% were employed and studying part-time. Out of all the responding students, 30.6% were receiving (any form of) scholarship, or a financial aid for their HE studies.

As regarding the social status perception, students' self-assessment was as follows: 5.9% perceive themselves as belonging to a higher social class, 81.5% to the middle class and 5.3% to the lower class (with the remaining respondents not declaring their perception). These results are comparable to a related empirical research of social inequalities in higher education (HE) in Croatia (Alfirević, Popović & Mihanović, 2017), where, out of 251 students surveyed, the comparable perception of social class belonging equalled: 6.5% (higher), 86% (middle) and 7.5% (lower).

As measured on a dichotomous (true/false) scale, the most significant motive for pursuing the study in the field of business and economics has been a general intention to enrol into a HE institution, as indicated by 59.7% of responding students. For 35.2% respondents, who studied at a vocational secondary school, enrolment represented a continuity of their existing education. As much as 21.3% of students indicated that the business and economics were not their first choice, when enrolling, but found studying to be a satisfactory experience, as opposed to 11.6%, who did not find business and economics studies either to be their study of choice, or a study they are satisfied with. Around one fifth of respondents (19.4%) express their choice of a profession in the field of business and economics as a study motive. Additional 12.7% chose these studies, as they already have a job prospect, after finishing them, while 15.8% chose the business and economics HE studies, due to a general perception of a high level of employability. Social influence seems to be marginal, since only 0.6% were influenced by their teachers, 3.6% by friends and 6.4% by family, as to enrol into a business and economics program.

Work and other forms of 'real-world' experiences (including those of being an entrepreneur, or belonging to an entrepreneurial family), are often included into empirical studies, performed in the SEE educational context (see, e.g. Alfirević, Umihanić & Rendulić, 2015; Juračak & Tica, 2016; Alfirević, Popović & Mihanović, 2017). Results of this study show that, in a sample of Croatian and Slovenian business and economics students, 60.6% had (any form of) work experience, only 13.4% had an entrepreneurial experience, as well, while 39.1% were coming from entrepreneurial families. This could be compared to a study of Croatian students of business/economics and social sciences/humanities (Alfirević, Popović & Mihanović, 2017), where the relative amounts equalled 58.3% (for work experience) and 18.8% (entrepreneurial experience), or the study of Croatia students of agriculture (Juračak & Tica 2016), who report as much as 21.8% of students holding a regular job, while 74.2% had (any) form of work experience.

Table 1 illustrates personal values of Croatian and Slovenian students (measured on the scale of one to nine). Benevolence, self-direction and conformity are the most important SVS values for Croatian students, while hedonism, benevolence and conformity (followed closely by security) are Slovenian students' top values. Slovenian students significantly differ from their Croatian counterparts, as related to higher levels of hedonism, self-direction, universalism, benevolence, conformity and security (as tested by nonparametric methods, due to the departure from the normality assumption). At the other hand, Croatian students are significantly more traditional than the Slovenians.

Table 1 Personal values of Croatian and Slovenian students (SVS)

Personal values (Schwartz Value Survey)	**Croatia – EFST (N=206)**		**Slovenia- EPF (N=170)**	
	Mean	**St. Dev.**	**Mean**	**St. Dev.**
Power	5.3561	1.45037	5.5778	1.41179
Achievement	6.9657	1.21695	7.1443	1.00690
Hedonism	6.8971	1.48197	7.8705**	1.21970
Stimulation	6.5165	1.41617	6.7088	1.31716
Self-Direction	7.1569	1.09026	7.5662**	.94801
Universalism	6.7537	1.12434	7.0727**	.95348
Benevolence	7.1951	1.12095	7.6438**	.97308
Conformity	7.0274	1.19969	7.4865**	.90316
Tradition	6.1813	1.27483	5.6675**	1.20515
Security	6.9441	1.20402	7.4315**	.94377

Source: Empirical research results

** $p < 0.01$ (comparisons between Croatia and Slovenia; Mann-Whitney U)

Power is least important of all SVS values, which is not expected from students of economics and business, which is followed by a high level of benevolence. This could be attributed to a predominantly female sample, as previously argued by Schwartz and Rubel (2005).

When considering the classical value dimensions (Calogero, Bardi & Sutton, 2009), as presented by Table 2, some value trends can be identified. While both national samples are low on stimulation and tradition, self-direction and hedonism are much more emphasized in the Slovenian sample. This would hint on a higher level of *openness to change in Slovenia,* although Croatian students *cannot be considered as having a clear conservative value profile.* Considering the second value dimension, Croatian students seem to be relatively low on self-enhancement, while not being clearly self-transcendent, either. The same can be concluded for the Slovenians, although *both groups seem to be more accepting of self-transcendent values,* due to high levels of benevolence.

Table 2 Opposing SVS value dimensions

Opposing SVS value dimensions			
Conservation	Tradition	*Openness to change*	Self-direction
	Conformity		Stimulation
	Security		Hedonism
Self-enhancement	Power	*Self-transcendence*	Benevolence
	Achievement		Universalism
	Hedonism		

Source: Calogero, Bardi & Sutton (2009, 155)

Entrepreneurial decision-making ethical dilemmas were taken verbatim from the study, authored by Clarke and Aram (1997), who were interested in establishing the existence of

significant differences among samples of Spanish and US students. They proposed eleven items and mixed positively, with negatively worded item descriptions, by relying to the broad theoretical categories, originally proposed by Dees & Starr (1992). The items were grouped into three constructs: *the promoter dilemma* (related to promoting investment into a new venture and its innovations, required for social and economic change), *the relationship dilemma* (contrasting the economic and social responsibility of an entrepreneur) and *the innovator dilemma* (describing the reliance on market forces by innovative entrepreneurs).

In this study, the empirical analysis started by recoding the negatively worded items and considering the internal validity of the three constructs, used by Clarke and Aram (op. cit.). Unfortunately, the initial conceptual framework, aimed toward a different research design, could not be used for this study, due to the low internal consistency of the originally proposed constructs (with respective values of the Cronbach alpha indicator being equal to 0.406; 0.69; 0.123). When analysing inter-item correlations, one promoter dilemma item (item 3 - disclosure of innovation risks and uncertainties), as well as two innovator dilemma items (item 1 – negative influence of innovation to society and item 4 - ethic of social change vs. ethic of social stability), proved to be negatively correlated with the majority of other items. There is no clear theoretical explanation why the disclosure of entrepreneurial/innovation risks seemed to represent a source of internal inconsistency. At the other hand, two inconsistent innovator dilemma items could be attributed to the unclear wording of item 1, which could be interpreted as supporting, but also as criticising the negative social influence of entrepreneurial innovations. Item 4 seemed to be somewhat overly general and might have been emphasized by the original study, since the first three items did not produce significant statistical differences between the students groups.

When considering the remaining eight items, as a part of a single construct, the Cronbach alpha equals 0.762, which can be accepted as relatively adequate for an exploratory study. After the inter-item correlation matrix has been examined, no negative correlations were identified, which demonstrates internal consistency, as well. Authors acknowledge that the approach used in this study does not meet all the strict methodological criteria of scale development. Nevertheless, an effort will be made to make additional efforts in exploring and reporting alternative approaches to scale development, followed by the strict methodological examination of the appropriate construct and the measurement approach for ethical entrepreneurial decision-making in future research.

Table 3 presents the empirical values for the retained entrepreneurial ethical decision-making items. Majority of empirical item values are positioned around the neutral point of the Likert scale, except for promoter dilemma 2 (ethics vs. economic/innovation performance) and relationship dilemma 2 (economic vs. social responsibility), which are slightly negative. At the other hand, student attitudes toward the promoter dilemma 4 (ethical integrity) are positive in both countries. National differences are established by using the nonparametric methods (once again, due to the departure from the normality assumption). There is a significant difference ($p<5\%$) for the venture financing (mis)representation dilemma, showing a somewhat more ethical orientation of Croatian students. Nevertheless, Slovenian students seem to be significantly more ethical ($p<1\%$), when it comes to ethical integrity, use of 'selective honesty', treatment of stakeholders and the perception of ethics' relevance in business.

Table 3 Entrepreneurial decision-making ethical dilemmas: Indicator results in Croatia and Slovenia

Entrepreneurial decision-making ethical dilemma	Croatia – EFST (N=206)		Slovenia- EPF (N=170)	
	Mean	St. Dev.	Mean	St. Dev.
Promoter dilemma 1 (venture financing)	3.11	.984	2.91*	.862
Promoter dilemma 2 (contribution of ethics to performance and innovation)	2.78	.883	2.68	.847
Promoter dilemma 4 (entrepreneur's/innovator's ethical integrity)	3.82	.903	4.33**	.744
Relationship dilemma 1 (entrepreneurs' and innovators' 'selective honesty')	2.92	1.011	3.40**	1.031
Relationship dilemma 2 (entrepreneurial responsibility toward venture and social environment)	2.74	.859	2.88	1.023
Relationship dilemma 3 (innovators' treatment of venture/innovation stakeholders)	3.14	1.075	3.59**	1.001
Innovator dilemma 2 (relevance of ethics in a market society)	2.91	.951	2.92	.803
Innovator dilemma 3 (relevance of social values/ethics for business)	3.03	1.050	3.46**	1.033

Source: Empirical research results

* $p < 0.05$ (comparisons between Croatia and Slovenia; Mann-Whitney U)

** $p < 0.01$ (comparisons between Croatia and Slovenia; Mann-Whitney U)

3.2. Relationships among key constructs

Non-parametric analysis demonstrated that the ethical entrepreneurial decision-making indicator is *negatively correlated* with the personal values of *power* (-0.169; $p < 0.01$) and *tradition* (-0.131; $p < 0.05$) only. Although the being of very low strength, both personal values proved to be potentially significant predictors of behavioural ethics in entrepreneurship. Detailed nonparametric correlations of personal values of power and tradition with all the entrepreneurial ethical decision-making items are presented by Table 4.

Table 4 Correlations: personal values of power/tradition and entrepreneurial decision-making ethical dilemmas

	Power	Tradition	Promoter dilemma 1	Promoter dilemma 2	Promoter dilemma 4	Relationship dilemma 1	Relationship dilemma 2	Relationship dilemma 3	Innovator dilemma 2	Innovator dilemma 3
Power	1.000	.216**	-.190**	-.046	-.020	-.079	-.086	-.124*	-.176**	-.110*
Tradition		1.000	-.122*	.019	.043	-.113*	-.060	-.094	-.118*	-.115*
Promoter dilemma 1			1.000	.347**	.044	.241**	.244**	.267**	.263**	.211**
Promoter dilemma 2				1.000	.015	.320**	.328**	.233**	.185**	.208**
Promoter dilemma 4					1.000	.189**	.056	.287**	.100	.190**
Relationship dilemma 1						1.000	.382**	.524**	.368**	.488**
Relationship dilemma 2							1.000	.307**	.294**	.275**
Relationship dilemma 3								1.000	.404**	.441**
Innovator dilemma 2									1.000	.404**
Innovator dilemma 3										1.000

Source: Empirical research results

* $p < 0.05$ ** $p < 0.01$ (Spearman R)

Significant negative correlations, although of weak to moderate strength, are observed between both values and items for promoter dilemma 1, as well as innovator dilemmas 2 and 3. Power is negatively and significantly associated with relationship dilemma 3 and tradition with relationship dilemma 1. Correlation analysis justifies the causal analysis of the power and traditional values as predictors of entrepreneurial behavioural ethics, with the control variables, used in previous studies (Alfirević, Nedelko & Potočan, 2018; Popović & Nedelko, 2018). Two multiple linear regression models are used, with analysis of coefficients provided by Table 5.

Table 5 Linear regression of behavioural ethical decision-making, using personal values as predictors

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.800	.353		5.098	.000
	Sex	.155	.069	.125	2.259	**.025**
	Country	.466	.086	.396	5.390	**.000**
	Level of study	.145	.053	.159	2.754	**.006**
	Study motive: not the study of choice and not satisfied	-.051	.103	-.029	-.498	.619
	Study motive: not the study of choice and satisfied	.160	.083	.114	1.933	.054
	Study motive: general intention to enroll into HE	-.042	.070	-.036	-.606	.545
	Study motive: continuity of secondary education	-.046	.065	-.042	-.707	.480
	Study motive: choice of a profession	.164	.086	.113	1.904	.058
	Study motive: peer influence	.237	.180	.072	1.312	.191
	Study motive: family influence	-.003	.139	-.001	-.020	.984
	Study motive: teacher influence	.432	.409	.060	1.058	.291
	Study motive: perceived employability	-.044	.091	-.028	-.487	.626
	Study motive: job prospect	.160	.095	.097	1.680	.094
	Student fee financing	.231	.074	.202	3.103	**.002**
	Scholarship-holder	-.002	.074	-.002	-.032	.975
	Social class	-.043	.053	-.046	-.824	.411
	Work experience	.016	.070	.014	.235	.815
	Entrepreneurial experience	-.016	.099	-.009	-.158	.874
	Family entrepreneurial experience	.028	.067	.023	.412	.681
2	(Constant)	2.406	.416		5.790	.000
	Sex	.134	.069	.109	1.955	.052
	Country	.438	.089	.374	4.909	**.000**
	Level of study	.134	.052	.148	2.560	**.011**
	Study motive: not the study of choice and not satisfied	-.038	.103	-.021	-.365	.716
	Study motive: not the study of choice and satisfied	.149	.082	.107	1.829	.068
	Study motive: general intention to enroll into HE	-.038	.070	-.032	-.538	.591
	Study motive: continuity of secondary education	-.035	.065	-.032	-.538	.591
	Study motive: choice of a profession	.180	.086	.125	2.099	**.037**
	Study motive: peer influence	.230	.178	.071	1.292	.197
	Study motive: family influence	-.011	.137	-.004	-.079	.937
	Study motive: teacher influence	.404	.403	.057	1.003	.317
	Study motive: perceived employability	-.045	.090	-.029	-.499	.618
	Study motive: job prospect	.171	.094	.104	1.812	.071
	Student fee financing	.204	.074	.180	2.754	**.006**
	Scholarship-holder	-.017	.073	-.014	-.233	.816
	Social class	-.043	.052	-.046	-.825	.410
	Work experience	.022	.069	.018	.314	.754
	Entrepreneurial experience	-.024	.098	-.015	-.248	.804
	Family entrepreneurial experience	.036	.067	.030	.535	.593
	Power	-.046	.023	-.116	-2.023	**.044**
	Tradition	-.036	.027	-.078	-1.320	.188

Source: Empirical research results

The initial regression model includes control variables only. This model is statistically significant (F statistic = 2.967, $p < 0.01$), with satisfactory independence of residuals (Durbin-Watson/DW statistic = 1.984, i.e. within the 1.5 and 2.5 critical interval). Variance inflation factor (VIF), indicating collinearity among predictors, has been checked and confirmed to be lower than the traditionally accepted cut-off value of 5 for all control variables. Sex, country, level of study and the source of student fee proved to be significant control variables (as demonstrated by Table 5).

Second regression model includes the personal values of power and tradition, as potential predictors of entrepreneurial behavioural ethics. Its statistical significant is confirmed (F statistic = 3.086, $p < 0.01$). Independence of residuals is satisfactory (DW statistic = 1.993), while multi-collinearity among predictors has been checked by all predictor VIF values being lower than five. Predictive strength of the control-only model is moderate ($R^2 = 0.166$), with the low contribution of personal values as predictors, with $\Delta R^2 = 0.023$. The personal value of *power is a significant predictor of the entrepreneurial ethical decision-making* ($p = 0.044$), while *tradition is not statistically significant.*

3.3. Analysis of the hypothesis

Empirical results support the hypothesis, since one of the analysed personal values is a significant, but very week predictor of entrepreneurial ethics. However, when comparing the predictive strength of the control variables vs. a single value predictor, *it is demonstrated that, in a non-probabilistic sample in two countries, values only marginally influence the perceptions of students' ethical behaviour in the entrepreneurial context.*

4. DISCUSSION AND CONCLUSION

Unfortunately, this study has not produced convincing empirical results, regarding contribution of personal values to behavioural ethics of entrepreneurship, except for *a marginal negative effect of power.* Considering that power is the least important value in both analysed countries, further discussion focuses on the potential reasons for the lack of a substantial empirical result.

Alfirević, Nedelko & Potočan (2018) indicate, based on a Croatian student sample, that the idealized knowledge outcomes of HE are causally associated with the personal values of hedonism and security. Hedonism is, also, predictor of the HE adaptability and the student culture dimensions of the HE system. In addition, self-direction serves as a predictor of the institutional cultural dimension of the HE system. The social outcomes of HE cannot be linked to the personal values. When the described results are considered in the context of this study, it could be argued that *hedonism and security drive the attitudes, oriented toward learning and determining the student culture.* However, *those values do not influence the perception of actions, which might be taken by students in a future entrepreneurial context. Self-direction* is important for the institutional value context, but *does not translate to the students' perceived future entrepreneurial behaviour.* Therefore, it could be suggested that **an attitude-behaviour gap makes it difficult for Croatian and Slovenian institutions of HE to translate students' personal values into the relevant behaviours in different social frameworks.**

This study has only touched the potential entrepreneurial behaviour outcomes and their marginal relationship to personal values. *Only the least important personal value for the*

analysed Croatian and Slovenian students, i.e. power, negatively influences the perceived future entrepreneurial ethical behaviour. This finding could be linked to the results of empirical research, concerning sociology of the youth in the SEE region. Regarding the attitudes on democratization, both Croatian and Slovenian youth share a low trust toward political and public institutions (Taleski, Reimbold, Hurrelmann, 2015). They seem to place their trust with family and friends, while being dissatisfied with democracy, as well as alienated from the electoral process and political representation. They seem to be disillusioned by social developments in their countries, which reduce their motivation for education. This motivation is firmly associated with the more traditional and conservative social relationships/environments, typically found in poorer SEE countries, located in the east and south-east of the region (Lavrič, 2015). Students in those countries combine a high level of motivation with the longer hours of study, which could be attributed to the perceived lower quality of the education system and higher levels of corruption (Lavrič, op. cit.), or, at least, to the lack of resources in the education systems.

Our attitude-behaviour gap proposition fits well the overall context of sociological and educational empirical research, as institutions of HE are not trusted enough by young people in Croatia and Slovenia, who might be, simultaneously, losing motivation and imperative to pursue education, representing a readily available driver of social success (as it could be perceived in poorer SEE countries). *Disillusionment could be associated with the perception of social power as a 'given reality', which lowers the ethical behaviour in many social contexts, including entrepreneurship.*

Such a notion of 'tough realities' could be associated to the specific perceptions of Croatian youth, who do recognize a significant role of HE in securing an adequate socio-economic status. Indeed, HE enrolment becomes a *'normative expectation'* in the Croatian society, although high school students do not recognise knowledge/educational attainment as a single source of success for access to HE. On a representative national sample of 13,301 high school students, the same study reports on the positive perception of own future (with 86.5% of respondents, reporting two positive levels of agreement on a five-point Likert scale). Unfortunately, the outlook toward the national socio-economic environment is rather gloomy, with 43.9% students, reporting one of two negative levels on agreement. This is why 35.3% of today's high school students see themselves, in the next 20 years, as migrating to another EU country and additional 12.2% to a country outside of the EU. This is followed by a perception of another EU country (39.3%), or a country outside the EU (13.7%) as an optimal environment for future life and career (Jokić, Ristić Dedić et al, 2018).

This study can be only hypothetically placed in the suggested notional context, since the solid empirical evidence needs to be provided by future research. Nevertheless, there are *specific questions raised for HE administrators in Croatia and Slovenia, especially those of business schools, who might want to examine the perceived socio-economic relevance of their institutions and adapt their strategic and marketing orientation* (cf. Alfirević, Pavičić & Mihanović, 2009), as well as *their involvement into all forms of social responsibility* (cf. Jongbloed, Enders & Salerno, 2008).

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DEVELOPMENT OF CROATIAN LOGISTIC POTENTIAL FOR THE EUROPEAN MARKET

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ABSTRACT

Country that applies the adaptable concept of logistic platform has the ability for new possibilities on the EU market. That means using of advanced analytical techniques of simulation and visualization of logistic applications. The purpose of the paper is to examine asses the existing logistic strategies in Croatian companies as a prerequisite for growing commerce on the EU market.

Increasing the logistic performance of company supported by logistics infrastructure may be beneficial for the economic development. That can increase participation in European supply chains and decrease company logistical costs. In a process of building trust and increase attractiveness of the business, it is a prerequisite to secure a high level of logistic services.

Preliminary research was conducted by LPI analysis, literature and data mining. Variables examined in the primary research of Croatian companies practice were categorized through business intelligence, supply chain management, information visibility and integration of logistic function. Factor analysis was used for the connection of these variables, i.e. reduction of number of variables. Authors have tested the correlation between variables. There was a significant statistical correlation between business intelligence, supply chain management, information visibility and integration as a prerequisite for concurrent logistic strategy of the company.

1. INTRODUCTION, PURPOSE & METHODOLOGY

Modern market requirements focus on fast and cost-effective delivery of product and services. Competitiveness between supply chains is becoming one of the most important paradigms of modern business. The business excellence of supply chains is directly correlated with the increase in value for shareholders (Slone et al., 2010.). Time is a critical factor in the process of serving modern customer who appreciates the effort in providing reliable delivery and other additional services. Information management and the ability to exchange them represent a strategy for achieving the cohesion of all functions among parties in the flow of materials and services. (Luetić, 2017.). Business logistic services are important factor of creating strategic advantage over traditional distribution (Min, Mentzer, 2004). The innovative web-based approach to the process of serving the customer increases the requirements from the logistic services of the company or its supply chain. Since the accession in 2013 Croatia become a valuable partner for business development in the European single market. Its location and availability to transship cargo, thanks to the access to Adriatic Sea, opens new possibilities in term of logistic services and business opportunities. Connecting western and central Europe, the Black Sea region with south-eastern Europe and Baltic regions passing central Europe with Pannonia and Mediterranean region decide on multidirectional character of this country. Moreover, access to the Adriatic see create the shortest and cost-effective route between Europe and Africa and Asia via Suez Canal (Abramovic et all, 2015, p. 501). Especially location of the port Rijeka provides opportunities for transshipment to rail, road and inland waterway which may by important due to the development of Central European Boomerang region of intensive logistic and manufacturing activities (Bentyn, 2016).

Figure 1: European Traffic Corridors in Croatia

Source: Steiner, S. (2007), *Valorizacija Prometnog Sustava Hrvatske*, Research report, Hrvatska akademija znanosti i umjetnosti

The area spans from Gdansk through Prague reaching Budapest and reflect the development of similar structure in Western Europe called *Blue Banana* (Gorzelak, 2012, p.127). Local advantages open new perspective in front of the businesses for accessing the European supply chain. The trend to improve logistic performance is a clear indicator of business activities which begun in the region after series of accessions to European Union in years: 2004, 2007 and 2013. The opportunity that creates allows the Croatian companies to participate in the European supply chain. Thanks to the improvements in the logistic performance it is possible to take an advantage in the location of the country and provide services on the European level.

The investment in the logistic infrastructure both private and through European funds influence in positive way basic logistic activities thus fulfill the requirements of modern customer. The EU business creates unique opportunity by eliminating physical barriers between merchandise and the customer. Transferring the basic commercial operations to the virtual world opens new possibilities for the customer in form of:

- Searching for the products and services;
- Comparing them in multicriterial way;
- Assessing the availability of required value.

The relative ease of acquiring goods and services in commerce draws attention of growing numbers of customers. Since accession of Croatia to the EU in 2013 commerce started to grow. It took five year to reach the current level. Data gathered in 2017 describing this market, build promising perspective (export.gov, 2018):

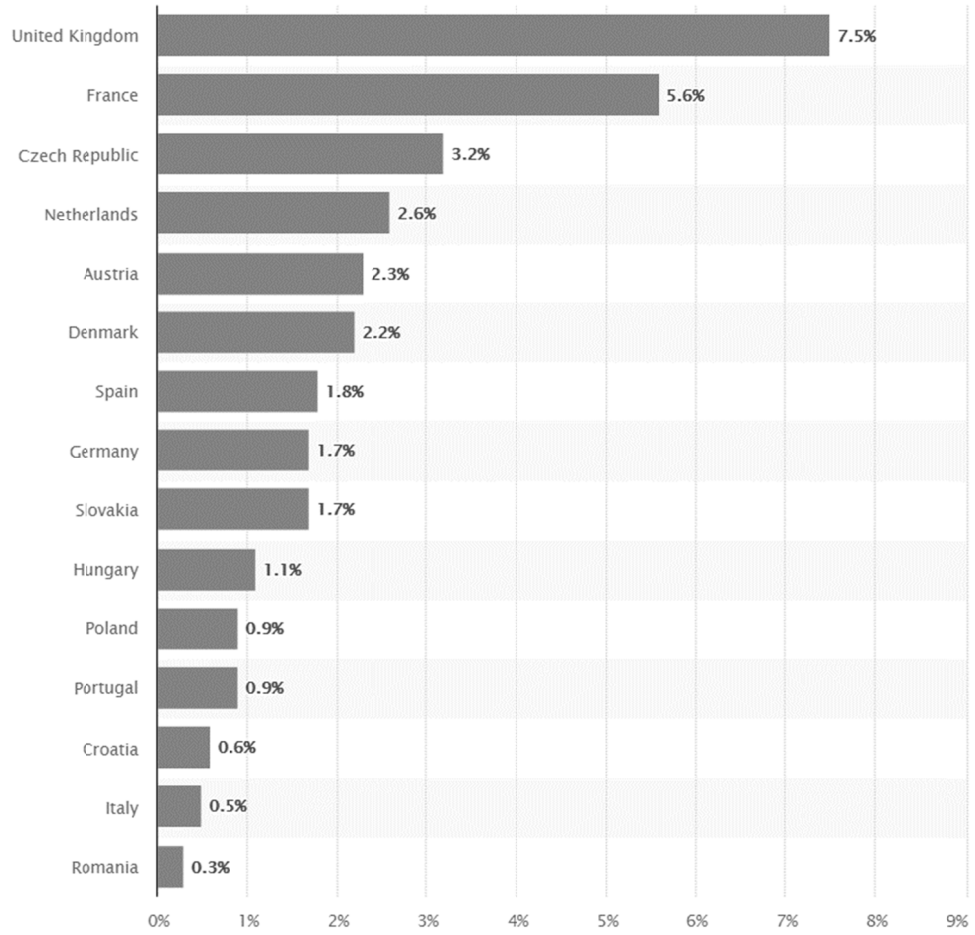
- The number of online buyers in Croatia is 1,75 mil;
- The growth rate in 2017. is 18%;
- 60% of all internet users are e-customers;
- 6-10% of those e-customers buy at least once a month;
- The value of the e-commerce market in Croatia is estimated on $446 million;
- Online transactions generate approximately $30 million in revenue yearly.

Toward these information conservative logistic strategy in Croatian companies need to be changed. The changes noted in the year 2017 assure the increase in the trends. Observed 9% increase in the number of regular e-customers visualizes the tempo of growth in this market. Still the comparison of a Croatian market to the other European countries gives the perspective to the size and potential ahead.

Changes in business philosophy of companies which are the result of the global impact of a highly competitive external environment and the internal characteristics and factors of the micro environment are strongly reflected in the functioning and supply chain management (Luetić, 2017.). The steady growing interest of the customers implicates the need for reliable logistic services (Lee, Hau, 2004). The performance in delivering the expected value is a precondition for the development in this area of business. All physical activities including

transport, warehousing and additional value adding logistic services are a critical for delivering the customer satisfaction. The superiority of e-distribution base on expected convenience and price attractiveness. As expected prices is the most appreciated advance of the e-commerce. E-customers expect lower prices in comparison to the physical store. Moreover, the added cost of delivery should be minimized as much as possible concerning the fact that 28% of e-customers expect free shipping (Enterprise Europe Network EC, 2018). Additionally, the e-channel of distribution should provide detailed information about the product, customer reviews and feedback maintaining the exchange of information securing the transfer of the value. Characteristic feature of e-distribution is ability to return the product. National and European law secure the rights of the customers in this matter and build the trust to this new wave of distribution. On the other hand, it increases the requirements on the logistic services designed for e-commerce. Return policy of a e-business should be clearly stated on their website because e-customers pay additional attention to this fact. Unreliability in the process of return of the products is the most criticized behavior by the e-shoppers in Croatia. Part of this depends on logistic performance in the region.

Figure 2: Share of global online grocery sales based on value in leading European Union (EU) countries in 2017.



Source: The Statistic Portal, https://www.statista.com/statistics/614717/online-grocery-shopping-in-the-european-union-eu/ (18.9.2018.)

The modern distribution centers are crucial part of the logistic systems. Thanks to the available space and functional opportunities it is possible to process many orders in right way, saving time by the way and gaining competitive advantage over a physical, traditional way of distribution. The existing infrastructure, both logistical and informational determines the time and cost of logistic operations. Therefore, the era of e-customers relies heavily on readiness of logistic services. The advantage of geographical location of Croatia may be critical for the future development of e-business. Already an estimated 40% of Croatian e-customers order from e-shops outside of Croatia: China, EU-countries. Online retailers from Croatia services divide on: 40% for local customers, 40% for global markets. The already globalized trade relations may become even more pronounced thanks to the abolishing geo blocking. In February 2018 The European Parliament set the regulation forbidding of geo-blocking and other forms of discrimination based on customer nationality, place of residence or place of establishment (PE, 2018). This may unlock the potential to grow E-commerce in Europe and Croatia may benefit thanks to its location. The idea of maintaining cohesion inside the Single European Market may decrease the barriers and produce the impulse for further development in trade relations.

For the purpose of this paper the most interesting empirical statistical research involve survey sampling. The questionnaire was verified by general managers of Croatian companies that have experience in export business. Before the final definition of the survey, preliminary research was conducted to test questions for the primary research. The purpose of the preliminary research was confirmation of the research instrument. In addition to the implementation, the purpose was to determine its clarity and appropriateness for the research. 321 companies responded to the questionnaire. The main instrument for the implementation of this study was a questionnaire consisting of closed questions with multiple choice answers that involve using a Likert scale with five degrees of intensity. Likert scale attitude is based on the assumption that every statement/particles on the scale has equal importance and weight in terms of how much reflects the attitude toward a particular issue or problem. The survey participants have to choose the answer from 1 = strongly disagree to 5 = strongly agree. For the purposes of this research, a measurement of the perception of respondents was employed.

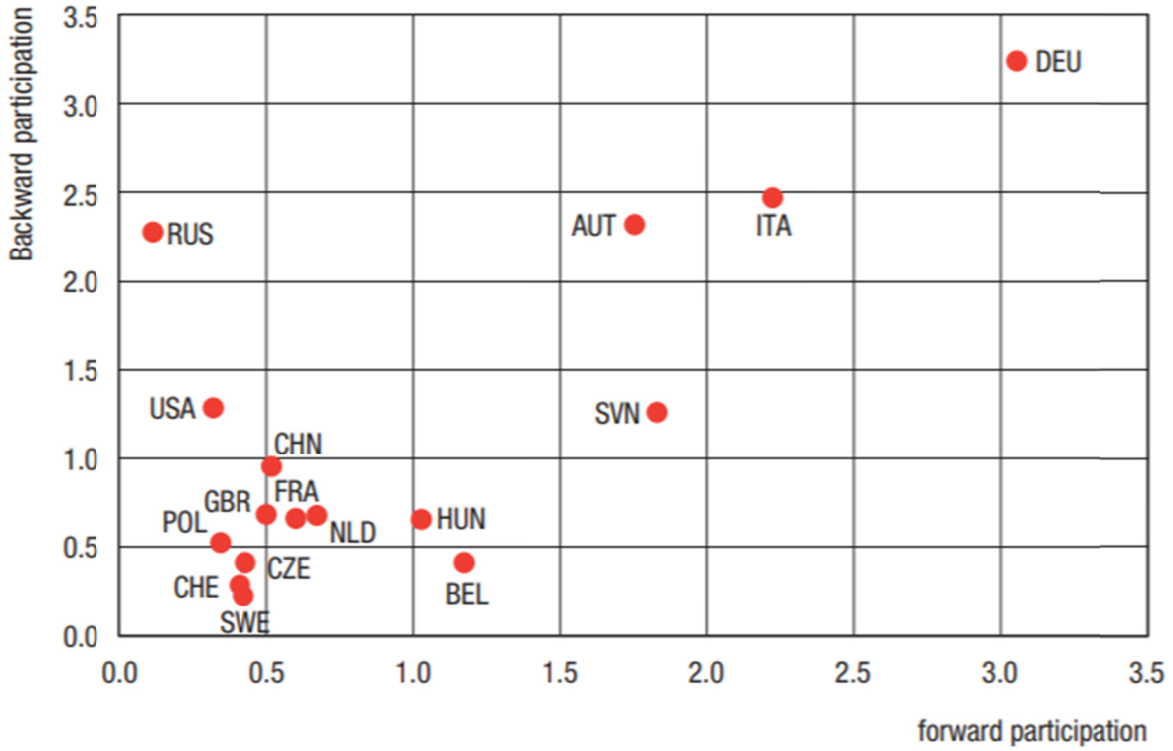
2. THE PRELIMINARY RESEARCH

2.1. Participation of Croatian businesses in European supply chain

Evaluation of the importance of Croatian logistics performance could be seen through its participation in the European supply chains. Direction of cooperation and locations of the countries as a critical partner for Croatia support the effort to improve its logistic potential. In the report presented by Croatian National Bank there are most important partners mentioned (Fig.3). Germany represents the most balanced partnership in term of equilibrium between forward and backward participation. Similar in this position but on a smaller scale report locate Italy. Those two countries thanks to the equal back and forward participation create movement of cargo in both directions. Those increase the importance of transport corridors between them and Croatia and logistics infrastructure along. Austria and Slovenia are slightly away from previous balanced positions but are also important for Croatia because of scale of participation. Location of those countries covers the directions designated for Germany and Italy which is helpful in assessing importance of those corridors of transport. For example Russia, USA and China are representing week forward participation. It translates to the much bigger imports (several times) of intermediaries from these countries. Location of these

countries implies necessity of developing marine ports and additional logistics infrastructure in case the reported imbalance would change for greater participation of export from Croatia. The scale of trade in this case proves of international role of Croatia in the global supply chains and is a promising for the development of another trade exchange partnerships.

Figure 3: Main GVC partner countries for Croatia in 2014 in %



Source: Vidaković-Peruško I., Kovač K., Jošić M., (2018), *Croatia in Global Value Chains*, Croatian National Bank, Zagreb, 02. p.10

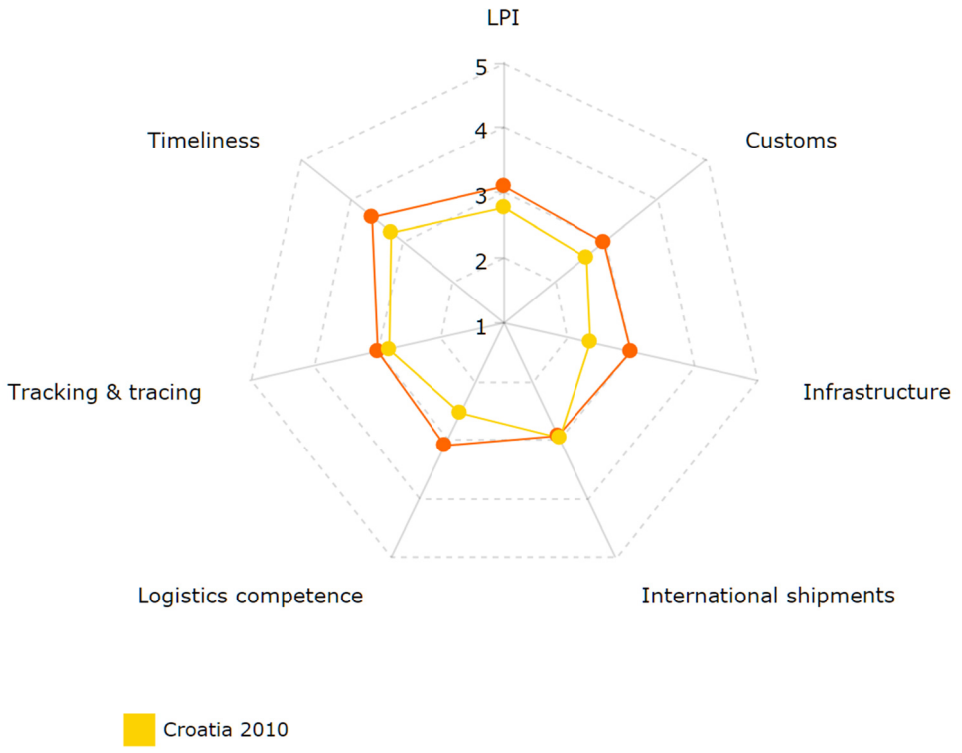
After Slovenia there are other countries noticeable as partners in global value chain from the CEE part of the Europe (Hungary, Belarus, Poland and Czech Republic). The developing partnerships in supply chains among those countries support the concept of CEE boomerang located between Gdansk, Poznan, Prague, Brno, Bratislava, Vienna and Budapest. Central European Boomerang described in 2012. was divided into a more attractive and developed southern part near Budapest and Prague and less developed infrastructural part of the northern part starting in Gdansk and including Poznan and Wroclaw (Gorzelak, 2012, p.127). Gorzelak pointed out the directions of transport from the industrial part of the CEB zone. It should connect area between Bratislava and Budapest towards Zagreb and the ports of Rijeka and Trieste on the Adriatic Sea (Bentyn, 2016). The development of this area of logistic and manufacturing cooperation would create an axis starting from the port of Gdansk, passing corridor No.6 along important distribution hubs: Poznan, Lodz, Wroclaw, Tychy, Brno, Bratislava, Budapest and Zagreb. At the other end axis would finish in Rijeka port in Croatia and condition the development of the international logistics hub located there. The Croatia offer a greater share of domestic value added in the production of food, beverages, tobacco industry, pharmaceutical products, and computers and electronics. Being a part of global supply chains nowadays means to cope with requirements of modern markets and at the same time optimizing costs of logistic services. These demands become more important in the FMCG (Fast-Moving Consumer Goods) markets which reveal the tendency to search for

time-based competitiveness (Šerić, Rozga, Luetić, 2014). Therefore goods may be distributed in e-commerce channels and thanks to mentioned linkage between partnering countries benefit greatly to the Croatian economy. For this reason conservative logistic strategy needs to be changed (Copacino, 2008; Sahay, Ranjan, 2008).

2.2. Current logistics performance index (LPI) 2018 and future perspective

In the global ranking of Logistic Performance Index based on research carried out by The World Bank, Croatia improves its location, from 51th in 2016. to 49th in 2018. Although the overall LPI score decreases from 3.16 to 3.10, the comparative location in the ranking is dependent also on the outcome of other countries. Since 2010. when most neighboring countries were EU members, Croatia noted the bigger improvement in logistic performance. Joining the European supply chain on the condition of EU member was possible from 01.07.2013. Creating greater cohesion among the CEE countries with access to developed western part of the Europe was an important stimulus to increase foreign investment and adequately manufacturing and logistics operations.

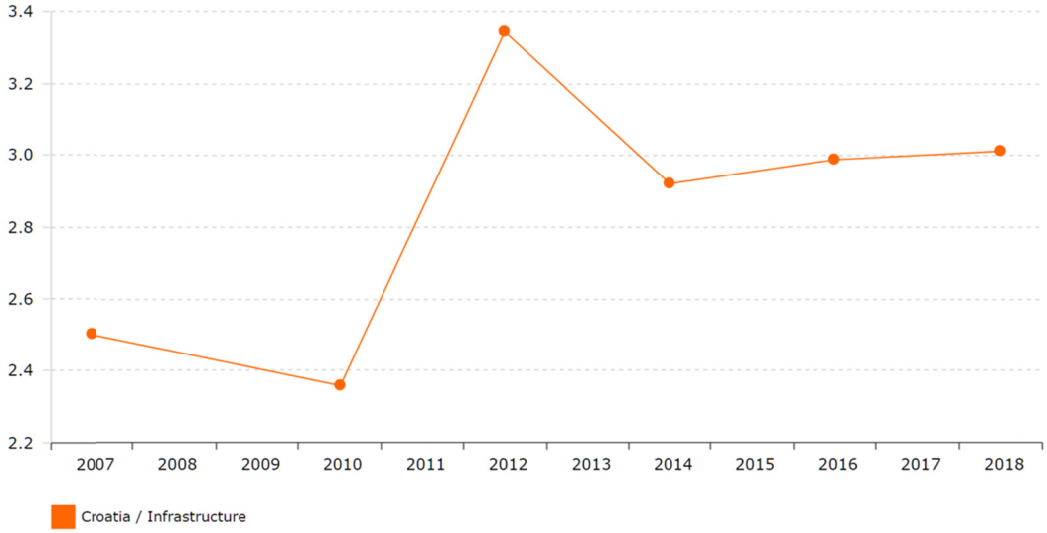
Figure 4: Croatia overall LPI index 2010. - 2018.



Source: own, based on lpi.worldbank.org. 2018.

The critical for the logistic performance of a country is development of logistic infrastructure. Moreover modern distribution requires quick reaction and reliable time of performed logistic operations what is an additional argument for the further infrastructural development. On a fig. 5 representing consecutive research in infrastructural sub factor of logistic performance index, the year 2012 was significant for the logistic infrastructure. Another three measurements after that year represent steadily growing trend. Those translate for a more balanced increase rather than a radical change visible in the years around accession to EU.

Figure 5: Infrastructure development in Croatia 2010-2018.



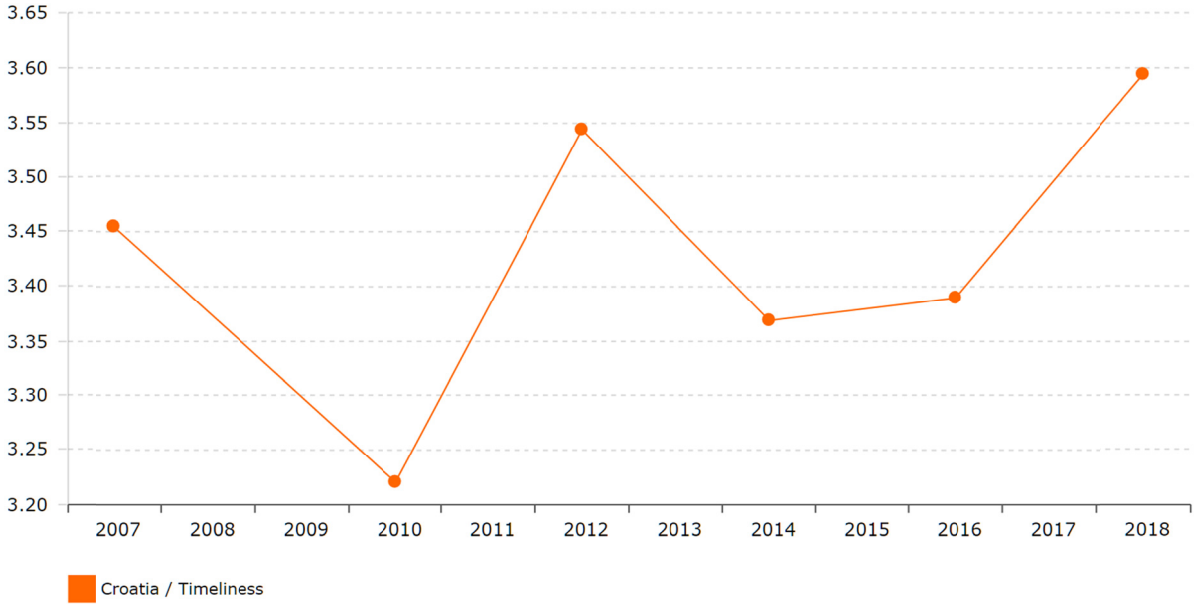
Source: own, based on lpi.worldbank.org. 2018.

The undertaken infrastructural projects like: Rijeka Gateway Project, Zagreb Pier Deep Sea Container Terminal (ZCT), Waterdrome Network and Air Carrier, Port of Ploče and construction and upgrading of infrastructure in the port of Slavonski Brod may make a difference in next researched periods. Some specific objectives written in the Transport Development Strategy of the Republic of Croatia (2017 – 2030) include development of following main logistic centers:

- Rijeka maritime port,
- Ploče maritime port,
- Split maritime port,
- Vukovar inland port,
- Osijek inland port,
- Zagreb hub.

Another objective is even more promising for the development of international logistic hub. It declares focus on strengthening of Croatia as a logistic hub for the wider region with focus on Zagreb. That statement leads to the logical implication in aiming on harmonization of the transport operations with neighboring countries: Bosnia and Herzegovina, Slovenia, Serbia, Italy, Montenegro and Hungary (Croatian Ministry of the Sea, Transport and Infrastructure, 2017).

Figure 6: Timeliness sub factor of LPI index in Croatia 2010-20118.



Source: own, based on lpi.worldbank.org. 2018.

The important from the perspective of ecommerce factor is timeliness. This sub factor improves significantly in two recent measurements (Fig 6). The reliability of cargo flow is in reality, an effect of all sub factors of logistic performance combined. The time-based competitiveness is a condition forcing cooperating enterprises to create synchronized supply chains. The customers compare and choose the better offer also in term of delivery and standard of logistics services. The effort in this area is visible in Croatia and may be an important factor for future development of modern distribution centers ready for serving the most valuable branches of Croatian industry.

3. THE PRIMARY RESEARCH

3.1. Findings

The primary research was a part of one other author's research (Šerić, Rozga, Luetić, 2014), but this part was conducted on the sample of export Croatian companies. Claims related to logistic potential are grouped into five groups. Internal consistency was examined using Cronbach's alpha.

The first group includes claims related to the sources and reliability of data and information. There is at the beginning of a total of eight variables. Cronbach's alpha was calculated to examine internal consistency and it was concluded that one variable should be dropped. Thereafter obtained a satisfactory size Cronbach's alpha (0.715). The second group includes claims related to access to data and information. There were four claims. Cronbach's alpha was 0.77. The third group of variables is made of claims relating to advanced analytics. There were also four claims. Cronbach's alpha was 0.778. The fourth group includes claims related to intuition and time and consists of five claims. Cronbach's alpha was 0.765. The fifth group consists of claims related to the organization of business intelligence and consists of five

claims of which one is expelled because of internal inconsistencies. Cronbach's alpha was 0.64.

After testing the internal consistency, factor analysis was performed in order to create five latent variables to facilitate handling in the later stage of analysis. All the results were satisfactory in accordance with the requirements of factor analysis. Main indicators considered about the validity of factor analysis were: Kaiser-Meyer-Olkin measure of sampling adequacy, Bartlett's test of sphericity, Kaiser's criterion on the size of eigenvalues and the percentage of variance explained. Factor loadings were all greater than 0.5, which is very satisfactory.

Claims relating to the management of the supply chain are grouped into five dimensions. The first dimension is related to agility and had four claims. Cronbach's alpha was 0.894. The second dimension was related to the adaptability and had three claims. Cronbach's alpha was 0.817. The third dimension is related to the alignment and had three claims. Cronbach's alpha was 0.732. The fourth dimension is related to the proactivity and consisted of four variables. Cronbach's alpha was 0.900. The fifth dimension was related to the performance and consisted of six statements. Cronbach's alpha was 0.896. After testing the internal consistency, the factor analysis was performed in order to create five latent variables in order to facilitate handling in the later stage of analysis. All the results were satisfactory in accordance with the requirements of factor analysis.

3.2. Conclusions of the primary research

Creating logistic strategy represents a crucial phase in management. The research has shown that different strategies are used in Croatian business practice (Šerić, Luetić, 2016). According to the findings of the primary research, the most complex phase in creating concurrent logistic strategy is linked to possibilities of their implementation. A prerequisite of the effective logistic strategy considers different criteria – accuracy, measurability and applicability of information. The important aspect is the suitability of information which is used in existing marketing information system of a company also. Companies that satisfy those criteria make promptly decisions to eliminate business risks.

Business intelligence and supply chain management contributes to the concurrency of the logistic strategy. Such concurrency assumes constant collection of information of competitors' supply. Making successful logistic strategy based on the application of business intelligence in the management of SCM is more efficient and responsible. All logistic tools need to be adapted in accordance with strategy.

The research has shown that creating concurrent logistic strategy based on business intelligence is generally conducted through four phases. The first phase considers company's environmental analysis. The second phase includes defining frames of the final marketing decision. In the third phase correction decisions are made according to the feedback. In the fourth phase, consequences of the final marketing decision are estimated.
Logistic strategy should perform the function of maximizing the perception of the value of the company. The efficiency of data collection and analysis of competition in this sense are the imperative.

Positive experiences from the several companies in the research sample indicate a convenience of business intelligence analysis for creating of the logistic strategy through five levels: early warning intelligence, intelligence as a support for creating of logistic strategy, intelligence as a support in tactical logistic operations on the market, evaluation of competitors, intelligence as a support in planning and creating of the logistic strategy.

Although, Herring (1999) was the first one who, according to the results of the conducted research, had formed important intelligence application areas for logistic decisions, in this approach access stratification through multiple platforms is evident. The research conducted for the purpose of this study confirmed that relevant information about consumers, competitors, potential partners, suppliers and other influential groups is the first and the last line in defending market position. As a result here is a suggested protocol for creating the logistic strategy (table 1):

Table 1: Recommended protocol for creating the logistic strategy

1.	Estimation of tactical and strategic competitor's logistic activities.
2.	Estimation of competitor's SCM praxis.
3.	Guidelines for improving own SCM praxis.
4.	Decisions related to the business development.
5.	Guidelines for improving company image on the market.
6.	Guidelines for shaping competitive logistic strategy.
7.	Simulations and evaluation of the implementation for logistic decisions.

Source: own, based on conducted research

After reducing the number of variables in the business intelligence and supply chain management investigated the association between latent variables related to business intelligence and supply chain management. The following matrix of Pearson's correlation coefficients was obtained in the table 2:

Table 2: Correlation between business intelligence and supply chain management for creating the logistic strategy

		SCM Agility	SCM Adaptability	SCM Alignment	SCM Proactivity	SCM Performance
BI Reliability of data and information	Pearson Correlation	0.400**	0.465**	0.321**	0.287**	0.429**
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000
	N	270	275	270	273	270

BI Access to data and information	Pearson Correlation	0.330**	0.330**	0.211**	0.201**	0.252**
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000
	N	283	289	283	285	280
BI Advanced analytics	Pearson Correlation	0.247**	0.380**	0.162**	0.397**	0.295**
	Sig. (1-tailed)	0.000	0.000	0.004	0.000	0.000
	N	274	280	274	278	273
BI Intuition and time	Pearson Correlation	0.420**	0.473**	0.313**	0.296**	0.402**
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000
	N	282	288	282	285	280
Organization of BI	Pearson Correlation	0.308**	0.333**	0.235**	0.242**	0.265**
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000
	N	276	282	275	280	275
**. Correlation is significant at the 0.01 level (1-tailed).						

Source: own, based on conducted research

As can be discerned from the table above, in all cases there is a statistically significant correlation between variables that are related to business intelligence and variables related to supply chain management ($p < 0.001$). It may also be noted that the correlation coefficients are not very large. It has been investigated the difference in the arithmetic means of business intelligence through one-way analysis of variance in relation to the sort of business of the company, number of employees, and legal form. Statistically significant differences in mean of business intelligence were obtained only when analyzing the activity of the company shown in the table 3:

Table 3: Analysis of variance of business intelligence with respect to the activity of the company for creating the logistic strategy

Variable	Significance
Source and reliability of data and information	0.013
Access to data and information	0.080
Advanced analytics	0.061
Intuition and time	0.927
Organization of business intelligence	0.967

Source: own, based on conducted research

The differences among companies that have significantly more developed business intelligence were found in the first three groups of questions related to business intelligence

and were statistically significant. As regards the number of employees and legal form of companies, there was no statistically significant difference regarding the application of the concept of business intelligence, and thus these results are not displayed.

On the table 4 all variables were statistically significant difference except pro activeness. As with business intelligence better results were achieved in services companies. As with business intelligence, there was no statistically significant difference considering number of employees and legal form of enterprise, and thus these results are not displayed.

Table 4: Analysis of variance of supply chain management regarding the activity of the company for creating the logistic strategy

Variable	Significance
Agility	0.007
Adaptability	0.062
Alignment	0.001
Pro activeness	0.394
Performance	0.002

Source: own, based on conducted research

4. CONCLUSION

Traditional supply chains increasingly become supply networks, which is best characterized by their complexity. The added complexity of the relationship is noted when analyzing the levels of established relationships and relationships within the enterprise and between the company and its partners in the chain itself. The results should be respected considering the fact that the survey was conducted at a time when the Republic of Croatia was in recession, which certainly left consequences for the success of the business. The goal of this research was to show exact Croatian company experience for creating of concurrent logistic strategy for the EU market. The research has shown reasons why Croatian economy has bad position on the EU market. There aren't enough experiences of creation logistic strategy on the platform of the main variables (such as business intelligence ecc.). in Croatian business practice. In many approaches analyzed through the research the most complex phase is where business decisions are made for logistic strategy implementation.

It is necessary to ensure accuracy, measurability and applicability of information based on which logistic decisions are made. Companies that are included in the sample and which accomplish these criteria take prompt measures to eliminate different market risks. The research has shown that business decisions in logistics based on business intelligence implementation in SCM management is efficient and responsible. Creating of the logistic strategy for the EU market has to be in the function of maximizing perception of the company's value supply.

Aggregate correlation coefficients show statistically significant correlation between the actual two sets of variables. Correlations dimensions that constitute the observed variables indicate some interesting elements also:

- Quality of sources and reliability of data and information is effectively connected with better agility, adaptability and better performance of the company;

- Use of intuition and time improvements based on the use of business intelligence is effectively connected with better agility, adaptability and better performance of the company;

- Widespread use of advanced analytics is actually associated with better adaptability and greater supply chain pro activeness of the company.

With the exception of the correlation between advanced analytics and compliance which is defined as low, all other mutual correlations are strong and statistically significant. It can be conclude that there is a positive correlation between the use of business intelligence and efficient supply chain management. Croatian companies do not have enough time to adapt and their efforts need to go in several directions: towards the development of integration (vertical and horizontal), to achieve greater visibility between the involved process participants, to achieve greater flexibility, better matching and adaptability to the conditions in which they operate.
The relationship between business intelligence and supply chain management should be strengthened in order to maximize the correlation coefficients in the practice of creating of the concurrent logistic strategy of Croatian companies for the EU market.

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ECONOMIC & ENERGY CHALLENGES OF OIL SUPPLY SECURITY OF CROATIA AS EU MEMBER STATE

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ABSTRACT:

The energy supply security is one of the fundamental goals of the energy strategy and policy of both the EU and the Republic of Croatia as its Member State. The oil has a dominant share in the energy consumption for several decades now, yet due to a strategic commitment to the climate protection and creation of the low-carbon economy, it is anticipated that after 2030 the renewables will take over the leading role in the energy consumption.

The paper will outline the economic and energy challenges, the global, regional and local ones, which affect the oil supply security of the Republic of Croatia, especially in a transition period of the energy sector decarbonisation. These relate primarily to the energy and climate policies, oil prices, political risks, yet also to the trends and forecasts regarding the domestic production of crude oil and petroleum products, the refineries competitiveness and consolidation, as well as to the system of the compulsory stocks of crude oil and petroleum products. Moreover, an analysis shall be given as to the connection between the oil pipeline systems of Croatia and South Eastern Europe, since the possibility of crude oil supply from several directions and sources represents an important factor of the supply security.

1. INTRODUCTION

The paper analyses the challenges related to the security of crude oil supply given the fact that the oil will remain a dominant energy source, yet with a falling trend in the next fifteen years. The factors are considered that influence the supply security at the global level, and especially at the level of Croatia and the EU. The paper will try to show that the oil business is one of key parts of the energy and economic sectors, which need to obtain also the national dimension and control, although it will change in a transition period of decarbonisation when non-fossil sources will take over the leading role in the energy consumption.

There are only a few economic sectors that are exposed to so many challenges and uncertainties in their businesses as the oil industry. The changes are most often characterised by leaps and bounds and are of turbulent nature, having a strong impact on the economy and security of supply. Most often, they cannot be predicted, and thus the adjustment follows only after the political crises, "new" oil prices, supply disruptions and others have already shown their strong influence and provoked negative effects.

Besides, there is a presence of full exposure to the market influences, unlike other energy sources that are more or less regulated and are subject to the government measures in the field of prices, finances and similar.

In 2030, Croatia will continue to consume about 36% of the energy coming from the oil, although with a trend inclining to growing consumption of the renewables (renewable energy sources - RES). In a transition period it is necessary to respond to the challenges of the security of supply by increasing the domestic reserves and production, crude oil imports from several supply routes and sources, further enhancement of the compulsory stocks systems, modernisation of the refining sector and further modernisation and upgrades of the oil pipeline and storage infrastructure.

2. GLOBAL ENVIRONMENT

The oil market is exposed to numerous changes, primarily related to the global policies and measures concerning the climate changes, the trend of the energy consumption structure moving towards RES, oil prices, political uncertainties, the USA taking over the leading role in crude oil production and exports from Saudi Arabia and Russia, etc.

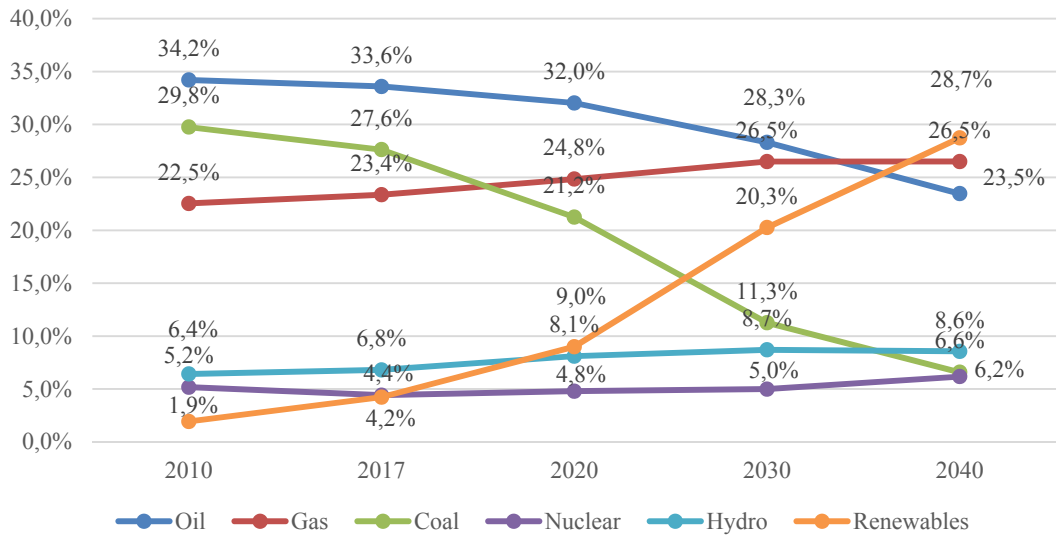
The important determinant of the future energy policies and trends in the energy consumption is the *climate changes* issue, as defined by the United Nations Framework Convention on Climate Change (UNFCCC), adopted in May 1992 and until today ratified by almost 200 member countries of the United Nations (Croatia in 1996).

Within UNFCCC, during the Paris climate summit entitled Conference of the Parties (COP21), on 13 December 2015, 195 countries of the world signed the agreement to voluntarily limit the greenhouse gas emissions with the aim of keeping the warming increase below 2^0 C compared to the pre-industrial period, aspiring towards 1,5 degrees. In all this, the paramount importance is given to the long-term goal to remove the greenhouse gas emissions produced by a man by the middle of this century. The agreement came into force on 4 November 2016 (and was ratified by Croatia in 2017).

2.1. Oil demand – dilemmas and uncertainties

Under the influence of commitment towards the climate protection and measures that will be conducted more intensively than until now, the reduction of oil share is anticipated, as well as a cease of its dominance in the energy consumption already around 2030 (Figure 1).

Figure 1 *Structure of the world primary energy consumption in the 2010 – 2040 period*



Source: The above figure is made based on the data from *BP Energy Outlook,* Summary Tables, RT scenario [1]

According to the rapid transition (RT) scenario, it is foreseen that the *oil share in the primary energy consumption* will reach approx. 28,3% in 2030, with a trend of falling down to 23,5% in 2040, compared to 33,6% in 2017. In the same period, the growth of renewables (RES) is foreseen to proceed with accelerated speed, and therefore their share (renewables and hydro sources) would amount to 29% in 2030 and 37,3% in 2040, compared to 11% in 2017. The world would consume 3,8 billion tons of crude oil in 2040, i.e. 15% less than in 2017.

According to the evolving transition (ET) scenario, 4,9 billion tons of crude oil would be consumed in 2040, and the crude oil would retain its leading position in the energy consumption with a 27,2% share, while the RES share would be 22,4%, gas share 25,8% and coal share 20,3%. (*Note: The RT consumption scenario will be analysed below since the Paris Agreement targets can be realised under its "stricter" requirements).*

The global oil demand will be encouraged by Asian markets, while the OECD developed countries will reduce their consumption by 38,5% until 2040. In the same period, the Asian countries (India and China primarily) will increase their consumption until 2030 and then decrease it by 2040. Thus, their share would reach 23,6% in the total global consumption compared to 22,7%, as much as would amount the share of the USA and ~~the~~ EU together. The demand will be encouraged by the growth of the petrochemical product consumption (i.e. plastic) and the air traffic, although it will be destimulated by growing number of electric vehicles and alternative fuels in the traffic. The refineries and market are also facing the challenge of regulatory changes (according to the 2020 International Maritime Organization regulations) that will affect the fuel quality in the maritime traffic, where the product specification is changed dramatically, from a fuel oil with high sulphur content to a new fuel gasoil with ultra-low sulphur content, and finally to the marine gas oil. The change in the

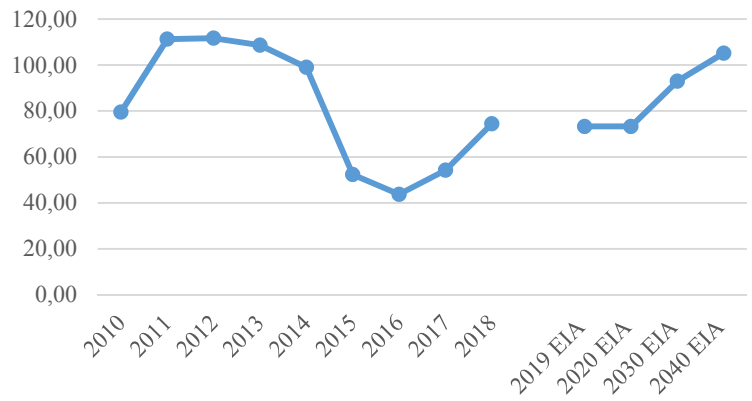
petroleum product demand structure (towards the petrochemicals, jet fuel and new marine fuel and others) affects the demand for lighter crude oil grades with less sulphur content, yet also the change of supply routes and sources, refinery technologies and oil pipeline and storage infrastructure.

Huge differences in the oil consumption forecasts between scenarios show "enormous" uncertainties that the oil industry and the entire energy sector and the economy respectively will face. It primarily concerns the realisation of the Paris Agreement goals and thus the availability and a wide use of necessary technologies, reduction of specific RES costs, creation of conditions for wide use of RES, CO_2 emission price increase and others, which influence the consumer supply security, plans of the producers, transporters, distributors, storage operators, traders of oil, petroleum products and other energy sources from which flexibility and adjustment are expected in the process towards a low-carbon energy.

2.2. Oil prices

Volatility, ups and downs observed in *oil prices* in the last four and a half decades were one of the greatest challenges for the oil industry and economy, and this is also the case in the last ten years (Figure 2).

Figure 2 *Oil prices in the 2010 – 2040 period (Brent Oil, $/bbl)*



Sources: The above figure is made based on the data from: *BP Statistical Review of World Energy* [2], for the 2010 – 2017 period; *Annual Energy Outlook*, Table: Total Energy Supply, Disposition, and Price Summary [3], for the 2019 - 2040 period.

In the next decades the prices are predicted to grow, although in some periods the extreme situations can be expected given a possible disbalance between supply and demand as result of: slowing down the explorations and discoveries of new reserves; demand greater than expected as shown in 2015 and 2016 when the oil demand grew in the price fall circumstances; political tensions; growth of production costs due to more and more complex technical and technological conditions of its recovery, processing, transport, storage and other.

2.3. Oil supply - changes at the top of the list of major producers and exporters

In the long term, the *oil supply* (in terms of quantity, quality, supply directions and other) will represent a challenge to refineries and traders, and thus also to consumers. Namely, in 2017/2019, the USA have become the leading oil producer and exporter, owing to the

"revolution" of the production in shallow layers and fracturing production technique. However, their proved reserves account for only 2,9% of the global reserves and the production for 13% [2], while the Middle Eastern countries hold 47,6% of the global reserves (Saudi Arabia 15,7%) with a share in the production of 33,8% (Saudi Arabia 12,8%). Russia is important for European supply security. Yet, it also has a disproportion between a share in the global reserves (6,3%) and the production (12,7%). Due to the security of supply and cost-effectiveness of refining, Europe imports more and more oil from other sources too (the USA, Caspian states, Middle East, Africa). Venezuela also holds huge reserves, but its share in the global production amounts to only 2,5%. The market expects to see the growth in the supply of oil from Brazil, Canada, Guyana and from Norway again.

According to the forecasts from the BP Energy Outlook [1]), the Middle Eastern countries will remain the major market oil suppliers in 2040, with a share of 36,6%, then the North America with a 23,3% share, and Russia and the CIS countries (Commonwealth of Independent States, i.e. mainly the Caspian states) with a 15,7% share.

The forecasts from the same source show significantly higher market oil supply than its demand according to the RT scenario, from 2030, and the balance between supply and demand respectively according to the ET scenario, which predicts a gradual transition towards the low-carbon energy.

Therefore, the supply uncertainty factors will still be, on one side, *the lack of balance between supply and demand,* as well as the need of the countries with emerging markets to import more and more quantities of crude oil, political tensions and price volatility, and, on the other side, the process of reduction and change in the petroleum product consumption structure, together with ability of oil industry to become flexible to the changes.

3. EU ENERGY - CLIMATE POLICY AND OIL SUPPLY SECURITY

3.1. Energy Policy and Strategy and its implementation[1]

The European Union (EU) is the leader of the global climate movement and, in accordance with the agreed goals, has determined the own targets of the 2030 energy policy. Documents such as *A policy framework for climate and energy in the period from 2020 to 2030* [5] and so-called Winter Package [6] foresee a 40% cut in greenhouse gas emissions compared to the 1990 levels and at least a 27% share of renewables in the total energy consumption. A preferable target is also an energy efficiency increase of at least 30%. It will affect a further trend of decrease in crude oil and petroleum products consumption and the oil industry activities in general. Therefore, the oil companies have already commenced with the implementation of their diversification strategies in other business activities, especially into the renewables, yet also in emerging markets with growing energy consumption.

In compliance with the strategic energy objectives, the European Energy Security Strategy [7] foresees the actual implementing measures, such as, to:

- discuss with industry and the Member States how to diversify crude oil supplies to EU refineries with the aim of reducing dependency on Russia;

[1] The text given here is partly taken from the article entitled: S*trategic Role of Oil Pipelines in EU Energy Supply* [4]

- identify EU-wide strategic assets in the oil value chain and coordinated action to ensure that consolidation of the EU's refinery capacity occurs in a manner that *improves the EU's energy source diversification through strengthening interconnection capacities between countries;*
- strengthening strategic partnerships between consuming and producing countries through ownerships, common investments, etc.;
- propose instruments for implementing the strategic infrastructural priorities that will enable competitiveness, environmental sustainability, as well as supply security.

The EU policy is actually realised through the *projects of common interest* [8], representing one of the methods of establishing nine priority energy corridors and three thematic areas, aimed at the more efficient connection of European energy networks, enhancement of supply security, and especially promotion of competitiveness and development and reduction of energy prices.
In order to speed up a successful implementation of PCIs, the 2013 energy infrastructural package, which also includes the TEN-E Regulation [9] specified, inter alia, the following: accelerated permitting procedure, reduction of administration costs for project promotors, as well as possibility of receiving a financial support in accordance with the Connecting Europe Facility [10].

The existing EU regulations, i.e. the Regulation on guidelines for trans-European energy infrastructure [9] (Article 14, point 1), indirectly determines that the oil projects are not eligible for the financial support by the Union in the form of non-refundable funds. Such restriction represents, in fact, discrimination of oil projects compared to the other energy projects since they contribute to the same goals of the energy policy and are selected according to the similar criteria.

In accordance with the set regulatory framework, the European Commission adopted the first PCI list of 248 projects in 2013. The second PCI list of 195 projects was adopted on 18 November 2015, while the third list was adopted on 23 November 2017.

It needs to be highlighted that the number of oil projects is very low, only six PCI and all are pipelines, especially intended to strengthen the oil supply security by oil pipeline connection projects in Central Eastern Europe given the fact that certain countries are land-locked without sea access and that they import the oil predominately from one direction, i.e. by the Druzhba oil pipeline from Russian direction. Therefore, the PCIs related to oil pipelines are anticipated only for that region within the priority corridor of the *Oil Supply Connection in Central Eastern Europe* (abbr. OSC).

These pipelines are: Litvinov (Czech R.)-Spergau (Germany), Adamovo (Poland)-Brody (Ukraine), the second line of Pomerania (Poland), including Gdansk Terminal extension, JANAF (Croatia)-Adria (Hungary), Bratislava (Slovakia)-Schwechat (Austria), TAL Plus. At the same time, they represent the only new pipelines planned to be built in Europe, while only the PCI entitled *JANAF-Adria Pipeline* is realised until today by their promotors, MOL, Transpetrol and JANAF.

A special part of the EU oil supply security is the system of *compulsory stocks of crude oil,* which are intended to be available in cases of emergencies or crisis and to be allocated quickly where needed. The EU Member States need to maintain the compulsory stocks equal to at least 90 days of net oil imports or 61 days of consumption, while during the crisis the

European Commission is responsible for organising consultations between the EU Member States on placing stocks on the market, except in a very urgent situation [11].

Most of the EU countries have already formed the compulsory stocks, even beyond the minimum levels, among which the least was formed by Estonia (70-day consumption) and the most by Finland (164-day). Croatia formed reserves for 88-days consumption [12].

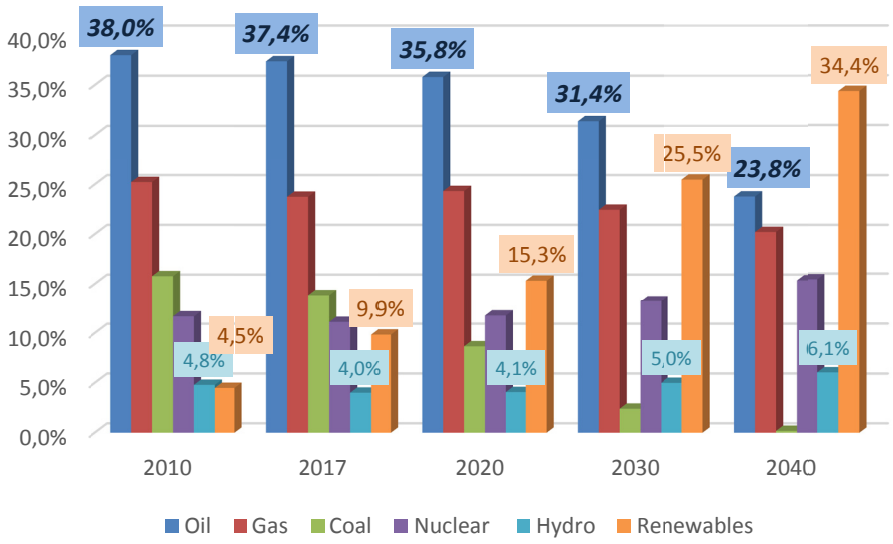
Therefore, the fundamentals for the security of oil supply to the EU and Europe are created by means of the legislation framework and energy policy. The actual measures relate to the establishment of the compulsory stocks in all Member States and the realisation of the PCI oil pipelines, thus enabling the diversification of routes and sources of oil supply for the Central Eastern European countries. Given the fact that only one project has been realised so far, the uncertainty of supply still remains one of the challenges for oil consumers in the region. Certain countries (Poland, Lithuania, Hungary, Slovakia, Czech Republic) that dominantly imported the crude by land routes from Russia, now more and more import the crude from several directions: the Black Sea, the Middle East, Iran, the USA, the North Sea, Canada and Nigeria. Hungary and Slovakia diversified their crude oil supply using the JANAF oil pipeline, and the Czech Republic by using the TAL pipeline, with a plan to transport also by the JANAF pipeline. Thus, these countries are given the opportunity to supply crude oil from numerous sources and to obtain the security of supply, more cost-efficient processing, and others.

The security of oil supply to the EU also depends on the development of domestic energy sources (primarily renewables, yet also crude oil), which will have the effect on *the consumption structure* and reducing the *import dependency*.

3.2. Oil consumption is influenced by the speed of transition to low-carbon energy

Oil holds a dominant share of energy consumption (37,4%) in the EU, similarly as in 2010 (Figure 3), notwithstanding the goals of the energy policy and the measures which are still not producing the desired results, especially during periods of low oil prices, which proves their competitiveness over other energy products.

Figure 3 *Primary energy consumption structure (%)*



Source: The above figure is made based on the data from *BP Energy Outlook*, Summary Tables [1] RT scenario

The rapid transition (RT) scenario forecasts an equalisation in the consumption of oil and RES (hydro sources included) with a share in total energy consumption of about 31,4% in 2030 already, and subsequently a significant decrease of oil consumption to 23,8%, followed by a rise of RES to 40,5% in 2040.
Such a strategic change in energy consumption will present many challenges, including, in particular, availability and development of necessary technologies, a reduction in the costs of renewable sources and creation of favourable conditions for their wide use, rapid growth of energy efficiency, revolutionary changes in the structure of fuel consumption in transport, electricity sector, etc., with the ultimate aim of achieving goals of the Paris Agreement within an appropriate regulatory framework and measures to encourage the reduction of greenhouse gas emissions, as well as affordable energy prices.

It is due to the intensity of the challenges and the likelihood of their realisation that, according to the evolving transition (ET) scenario, RES (hydro sources included) would become a dominant source of energy around 2040 with a share of 34%, i.e. approximately ten years later than according to the RT scenario. Oil share is forecast to be at 27,1%, and gas share at 26,6%. In 2030, the EU would consume around 514 million tons of oil, which would represent a decline of 27,1% compared to the present 631 mil. tons (in 2017), while the share of oil in the consumption would be 32,6%.
Further, the challenges of oil supply also arise from *high import dependency* and *insufficient diversification of supply routes*.

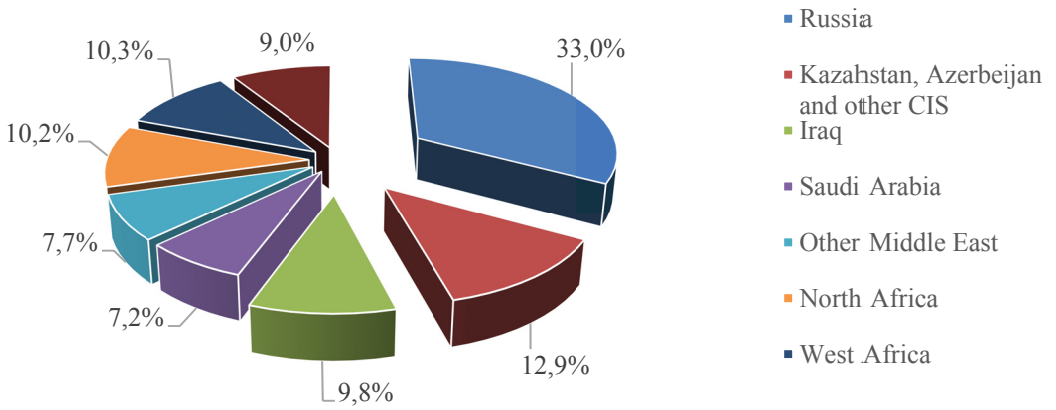
3.3. Import dependency – an ongoing challenge

Over the last decade, the European Union has continued to reduce its proved oil reserves to only around 600 million tons (in 2017), which accounts for less than its annual consumption. At the same time, production has decreased to only 69,2 mil. tons compared to 114 mil. tons in 2007, which means that reserves are expected to last only 9 years. Thus, there is a *high import dependency* (around 88–89%), and it will stay high in the following decade.

The EU encourages the growth of *domestic production of energy products*, which reduces import dependency and contributes to economic growth and enhanced security of supply. At the same time, there has been extensive research of hydrocarbons in the recent years in the Mediterranean (Israel, Egypt, Tunisia, Spain, Italy, etc.), in the North Sea, the Barents Sea and the Black Sea, and in some places, considerable potential was identified, and new production is expected.
Particularly important are the latest discoveries and activities offshore Norway (which is not a Member State, but is an important supplier of the EU and a member of its integrated energy market). It is estimated that the daily production of the new *Johan Sverdrup* oil field will reach 440 000 barrels/day (b/d) in 2019, and up to 660 000 b/d (around 33 mil. tons) from 2020.

An important factor of the security of supply is also *oil import from multiple sources and routes*. European countries mostly import oil from Russia (33%), while other sources are sufficiently diversified with a share in total European imports ranging from 7,2% (Saudi Arabia) to 12,9% (countries of the Caspian region and the CIS) (Figure 4).

Figure 4 *European oil import routes (2017)*



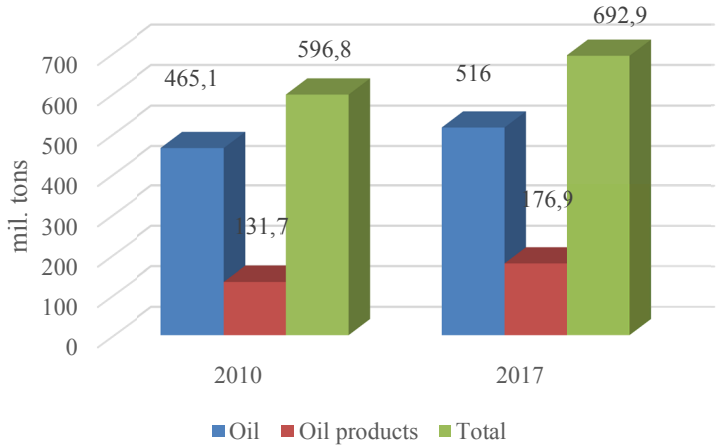
Sources: The above figure is made based on the data from the *BP Statistical Review of World Energy [2]*

A contributing factor to this situation was the construction of the following major oil pipelines for the export of Caspian crude at the beginning of the millennium: BTC (Baku-Tbilisi-Ceyhan) and CPC (Caspian Pipeline Consortium), also owned partially by European companies. Russia also built new pipelines to supply Europe by the sea – the Baltic Pipeline System I and II with export ports of Primorsk and Ust-Luga.

Further diversification is especially challenging for the Central Eastern European countries, which nowadays are dominantly supplied from the Russian direction. Therefore, construction of oil pipelines through the realisation of the EU projects of common interest is one of the strategic challenges for the security of supply of the countries in the region (further elaborated under point 3.1.).

The trend of importing oil (516 mil. tons) and petroleum products (177 mil. tons) to the European market (Figure 5) continued in 2017 and was 16% higher than in 2010, which shows that the market is influenced by fluctuations in oil prices and the competitiveness in petroleum product imports from the major oil-producing countries with large and modern refinery facilities and others.

Figure 5 *European import of oil and petroleum products*

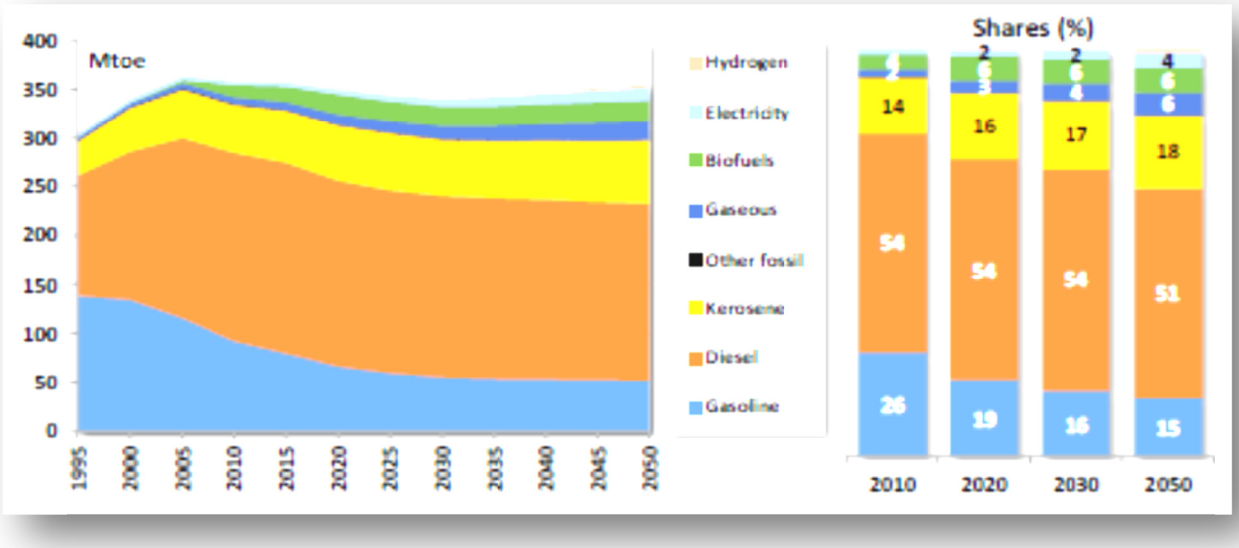


Sources: The above figure is made based on the data from the *BP Statistical Review of World Energy* [2], [13]

3.4. Refinery sector, competitiveness and flexibility

The European refinery sector is facing many changes. From 2009 to 2015, 21 refineries were shut down [14] due to a decline in consumption and the growth of international competition. It is considered that the trend could continue, but not to the extent from recent years.
European refineries are generally less complex, about 40 years old, technologically configured for gasoline, while American, Middle Eastern and Russian refineries are more competitive due to their complexity, they are bigger and newer (especially the Middle Eastern ones), they can produce more diesel fractions, and they fully or dominantly process domestic oil.
An important determinant of future refinery processing will be a further decline in the share of gasoline consumption for transport (Figure 6), with an expected growth of kerosene production and a steady share of diesel fuels. It needs to have in mind that transport accounts for 58% of the total consumption of petroleum products [15].

Figure 6 Final energy demand in transportation by fuel type



Source: European Commission [16], page 65

These challenges should be addressed by the refining industry, which is trying to adapt to the current and future demand by upgrading its facilities, turning towards petrochemicals and new standards of fuel quality, by processing up to 40 grades of crude oil in order to maximise margins, etc. Some refineries underwent serious restructuring to turn into bio-refineries (Porto Marghera, Gela–Italy, La Mède–France), storage facilities and import terminals (Wilhelmshaven–Germany, Coryton–UK) [14].

Having in mind challenges related to low-carbon energy development, oil companies also develop the projects (renewables, electricity, petrochemical, etc.) contributing to the reduction of greenhouse gas emissions, thus ensuring long-term successful business operations and growth.

4. CHALLENGES TO THE SECURITY OF OIL SUPPLY IN CROATIA AND GROWTH OPPORTUNITIES

Security of energy supply, including the security of oil supply, is one of the fundamental goals of the *Croatian energy policy and strategy*.

Some of the fundamental goals of the oil sector indicated in the White Book of a new Strategy [17] are primarily related to:

- enhancement of supply security of domestic crude oil and petroleum product markets,
- alignment of energy infrastructure with actual requirements in terms of safety and security and environmental protection,
- enabling technological development of energy activities in the oil sector,
- enhancement of crude oil and petroleum product compulsory stocks system.

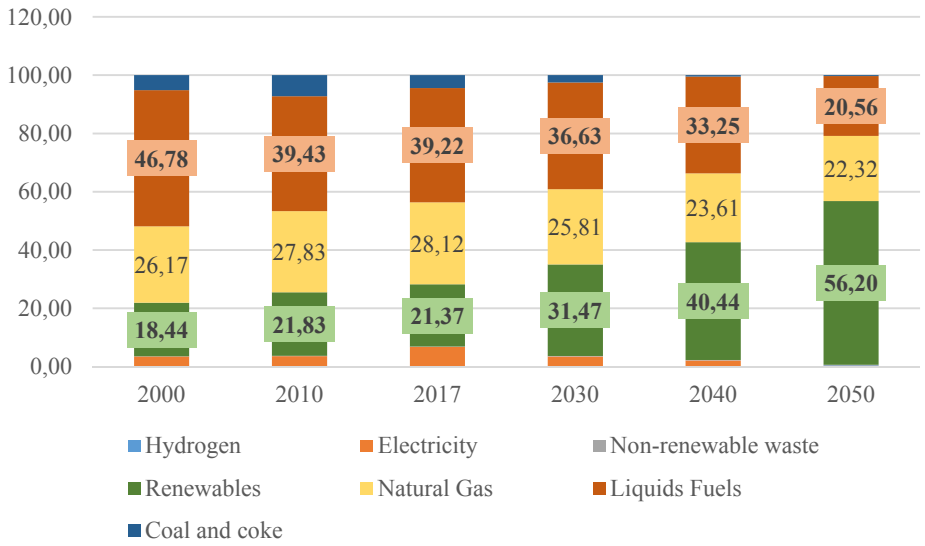
Oil, i.e. liquid fuels, has been a dominant source of energy in Croatia for decades, with a share of 39,2% in the total energy consumption in 2017 and exhibiting a downward trend. The security of supply, just like the oil sector itself, is affected by numerous challenges that cannot be controlled (oil price volatility, global and EU climate and energy policies, political events, and other), yet the oil industry needs to adapt to them and seek opportunities for growth.

Some challenges can be addressed, thus rendering the oil supply more secure, primarily through the growth of domestic production, diversification of supply routes, adapting refinery facilities to new market demands and improving the system of compulsory stocks, and through further development and modernisation of the oil pipeline and storage infrastructure. In this situation, the Croatian oil pipeline and storage infrastructure held by JANAF is of high geo-strategic importance because it has been a factor of supply security in Central Eastern European countries for 40 years and it can respond to the challenges of their more intensive diversification.

4.1. Changes in the dynamics and structures of oil consumption in the transition period

The downward trend in the share of oil (liquid fuels) in total energy consumption is expected to continue, especially after 2040. According to the *rapid transition scenario*, this share would amount to 20,6% in 2050 (Figure 7). This scenario will depend on several key factors, such as the dynamics of building renovation, changes in the structure of fuel consumption in the transport sector, rapid growth of production and consumption of RES etc., which pose great challenges to the security of supply because the realisation of such assumptions would require significant investments and implementation of plans and measures, especially in the field of energy efficiency and the renewables.

Figure 7 Liquid fuels in total energy consumption



Source: The above figure is made based on the data from the *Energy Strategy of the Republic of Croatia, Draft* [18]

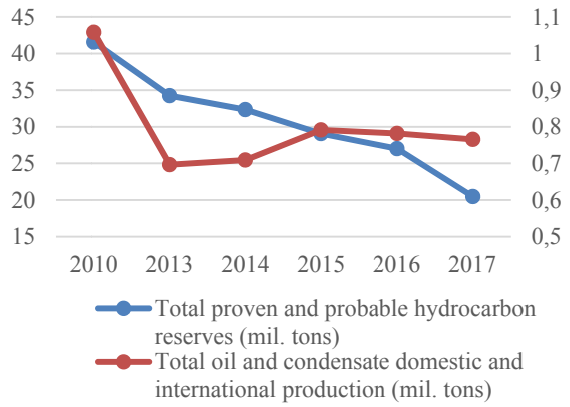
Nevertheless, over the next 15 years, liquid fuels (oil) would prevail in energy consumption with a share of 36,6% in 2030 and consumption of 3 mil. tons compared to 3,5 mil. tons in 2017 and 3,95 mil. tons in 2010. With an intensive growth of consumption, the RES would take the leading position in supplying consumers with energy after 2030, with a share of 40,4% in 2040 and 56,2% in 2050. Total energy consumption is estimated to reach 8,4 mil. tons of oil equivalent (tEN) in 2050, which is 22,4% less than in 2017, meaning that the measures for energy efficiency will have to take effect.

According to the *evolving transition scenario*, the decline in the total consumption in the 2017-2050 period would be less sharp than in the RT scenario, i.e. by 16,6%. The oil consumption of 3,1 mil. tons in 2030 would still secure it the leading position with a share of 36% in the total energy consumption compared to a 31,5% share of RES, which would become the leading source of energy in 2040 with a share of 39,3%. The share of oil would then amount to 31,5% and would be further reduced to 24,2% in 2050, i.e. to 1,8 mil. tons, which would be twice as-lower than today.

4.2. Domestic production of oil and petroleum products – reliable factors of the supply security

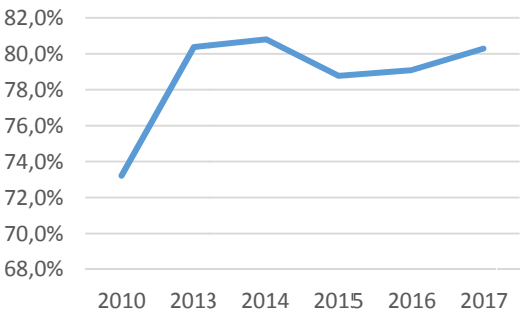
As a result of the continuing decline in oil (and gas) exploration and production over the last decade (Figure 8), the oil import dependency continues to grow, amounting to around 80%, with an upward trend (Figure 9).

Figure 8 Hydrocarbon reserves and oil production



Source: The above figure is made based on the data from: INA Annual Business Reports [19]

Figure 9 Oil import dependency

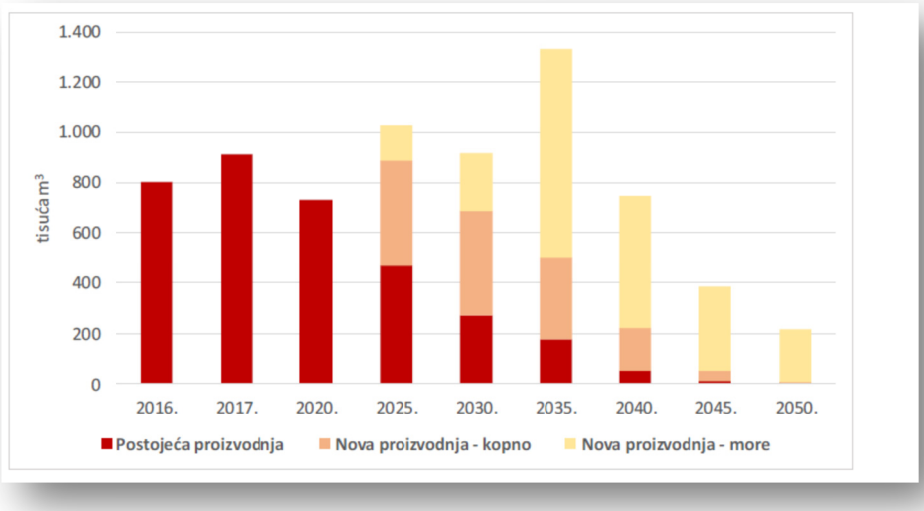


Source: The above figure is made based on the data from: Energy in Croatia [20]

However, one of the strategic objectives of Croatian energy development by 2030 and 2050 is the *development of exploration and production of hydrocarbons*, which represents an opportunity for further growth of this sector to influence directly an increase in the security of energy supply.

The projections of oil production by 2050 (Figure 10) presume further investment in the recovery of reserves, with new commercial discoveries and production expected around 2025. The full production potential of oil fields is expected to be achieved around 2035 when the predicted production would be around 1,3 mil. tons. It would significantly reduce import dependency to 53,4% since consumption would also be reduced by 20% compared to 2017.

Figure 10 Projections of oil and condensate production



Source: Analyses and bases for the preparation of the Energy Development Strategy of the Republic of Croatia, White Book

Notes: tisuća/thousand; Postojeća proizvodnja/Production without new exploration; Nova proizvodnja-kopno/New production-on-shore; Nova proizvodnja-more/New production-off-shore

One of the challenges related to the security of supply will also be market supply from domestic refineries. This is the reason why one of Croatia's strategic objectives [18] is to

accelerate the modernisation of the refining sector (consisting of the refineries in Rijeka and Sisak, petrol stations and the relevant infrastructure) in order to increase competitiveness on the domestic and foreign markets (see point 3.4.). Thus, the processing of domestic oil in the refineries will be of strategic importance for market supply in emergencies.

4.3. Compulsory stocks of oil and petroleum products

One of the key factors of the security of supply of oil and petroleum products is the functioning of the *compulsory stocks system* to ensure supply in case the energy security of the country is threatened due to unexpected disruptions in market supply, which is based on the Oil and Petroleum Product Market Act (Official Gazette No. 19/14, 73/2017) and EU legislation, for which the Croatian Hydrocarbon Agency (CHA) is the authorised and responsible body.

For this purpose it was necessary to build storage tanks in accordance with the *Plan for securing, forming and renewing the compulsory oil and petroleum product stocks, and for organising storage and regional arrangement* of the Ministry of Economy (Official Gazette No. 149/2009), at the following terminals: 240.000 m³ for crude oil at JANAF's Omišalj Terminal; 240.000 m³ for crude oil at JANAF's Sisak Terminal; 120.000 m³ for petroleum products at JANAF's Žitnjak Terminal (Zagreb); 130.000 m³ for petroleum products at two terminals owned by the Republic of Croatia, which will be given for long-term use to CHA (formerly HANDA); 3.000 m³ for jet fuel at Zagreb Airport in Pleso.

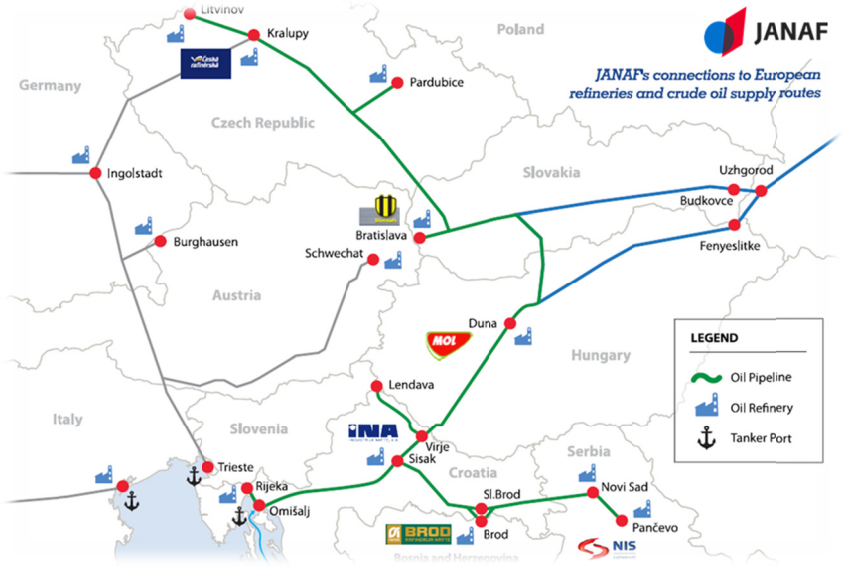
According to the requirements from the Plan, the oil pipeline and storage company JANAF has built storage tanks for storing the crude oil at the terminals at Sisak and Omišalj, with the total capacity of 480.000 m^3, and purchased the Žitnjak Terminal with the capacity of 42.000 m^3, which was modernised and upgraded with 100.000 m^3 of storage tanks for storing petroleum products. In these capacities, JANAF stores the compulsory stocks for CHA and is thus an important factor for the successful functioning of the compulsory stocks system.
According to CHA's report [21], Croatia has fulfilled its legal obligation and formed compulsory stocks of oil and petroleum products, which are sufficient for regular market supply with oil and petroleum products.

In order to further improve the compulsory stocks system, the reserves should be fully stored in Croatia avoiding the potential risk of transferring reserves from abroad in case of market disruption.

4.4. Oil pipeline and storage infrastructure – its geo-strategic position in the region, challenges and opportunities

One of the key factors of the security of oil supply in Croatia is JANAF's oil pipeline and storage system, which has held strategic importance for the security of supply of consumers in Central Eastern European countries for forty years (since 1979).

Figure 11 *JANAF-s connections to global oil sources and the European oil pipeline network*



The oil pipeline runs for 631 km across Croatia and is connected to two Croatian refineries and to the European oil pipeline network and seven refineries. The storage capacities are located throughout Croatia at four locations – Omišalj (crude oil and petroleum products), Sisak (crude oil), Virje (crude oil) and Žitnjak-Zagreb (petroleum products). Today (May 2019), JANAF has a total of 1,94 mil. m^3 of crude oil storage capacity and 222.000 m^3 of petroleum products storage capacity. Most of the storage tanks are located at the Omišalj Terminal (crude oil – 1,4 mil. m^3), which is branded as the Adriatic-Mediterranean storage centre.

Over the last five years, the storage capacities for crude oil and petroleum products has more than doubled. This means that one of JANAF's development goals – *diversification of operations through the development of storage activities* – has been achieved and storage today accounts for about 40% of the company's revenues. It is also an answer to the challenge of long-term variability in the volumes of transported oil. The availability of new storage capacities has enabled the company to seize market opportunities (growing demand for storage and transport while oil prices are low and expected to rise) and to experience growth, resulting in an increase in revenues by more than 70%, export orientation at the level of 70%, and intensive investment activity and continuity of business performance.
The realisation of the business development strategy was accompanied by improvements in the environmental protection and safety and security through investments in the modernisation of the oil pipeline and storage system (SCADA, electricity system, etc.), the pipeline rehabilitation and repairs, storage tanks repairs, etc., which will remain the company's priority goals for the upcoming period.

JANAF's significance in the security of supply for refineries is reflected in the possibilities of transporting crude oil from *two directions and numerous sources*.
JANAF can supply INA's oil refineries in Sisak and Rijeka (Croatia) from Omišalj, i.e. via the Mediterranean route, with crude oils from the Middle East, the Caspian region, Africa, the USA, the North Sea, etc. INA-Sisak Oil Refinery can import the crude oil by JANAF from Hungarian direction, i.e. via the Druzhba oil pipeline, which means that, if we also take into account the supply from domestic oil fields, the refinery has three supply routes and, thus, high security of supply.

JANAF transports 100% of imported crude oil to refineries in Croatia, Bosnia and Herzegovina and Serbia from two oil supply directions – Omišalj, i.e. the Mediterranean, and the Druzhba oil pipeline.

The EU recognised the strategic role of the JANAF oil pipeline for the security of supply through the project of common interest entitled *JANAF-Adria pipelines*, with the aim to diversify the directions and sources of supply by importing oil from the direction of Omišalj. It is also the only project out of six oil pipeline projects of common EU interest, which was realised and resulted in the construction of the Százhalombatta-Sahy (Hungary-Slovakia) oil pipeline and the subsea oil pipeline from the island of Krk to the mainland (Croatia) and was 100% financed by the companies MOL, Transpetrol and JANAF, as oil pipeline projects are not eligible for EU funding.
Implementation of the project contributed to the restoration of oil transport for Hungarian and Slovak refineries as of 2013, and the same is expected for Czech refineries. So far, imports have been modest, with only 19% of total oil imports (2018) for Hungary and Slovakia, which are mostly supplied by land via the Druzhba oil pipeline. JANAF has available capacities and other potentials to significantly increase transport of crude oil for the refineries in Hungary, Slovakia and the Czech Republic, which represents an opportunity for their enhancing the security of their supply.

In order to respond to the growing challenges, JANAF intensively cooperates with oil companies and is oriented towards the *development of new services* (adding biofuels and additives, blending oils, etc.), which enables companies to import and process several types of crude oil and be more successful in their business operations, which in turn creates *new demand for storage* and opportunities for building new capacities.

Considering the transitional processes towards low-carbon energy, one of JANAF's strategic challenges is a *gradual transition to more complex companies*, which entails potential development of projects for renewable energy sources, electricity and information technologies, as well as projects related to the local community and others, with the aim of encouraging further growth of the company, as well as contributing to the implementation of the policy of climate improvement and low-carbon economy development accompanied by the security of energy supply in the conditions of decreased oil consumption, as well as increased production of domestic energy resources.

5. CONCLUSION

The oil has the leading position in energy consumption both in the world, in the EU and Croatia, and thus, the security of its supply is one of the strategic goals of energy policies of many countries. With the implementation of global and especially EU climate policies, the consumption of oil and petroleum products will decrease, and their share in total energy consumption will change. In 2030 and 2040 respectively, depending on the speed of transition to low-carbon energy, the oil will concede its leading position in energy consumption to renewable energy sources, which are expected to grow faster than any energy source so far. In the transitional period, the oil sector will face many challenges that will require the best solutions as they will concern both the security of consumer supply and the economic development of countries and companies, which hold great economic potential and affect the economic growth.

One of the main challenges is the issue of rapid or gradual implementation of policies and measures of the Paris Agreement, i.e. the issue of transition. It will affect the activities of oil companies, primarily investments in oil exploration and production to ensure a balance between supply and demand. It is also related to price volatility, especially to considerable fluctuations of prices, but also to political tensions. The best solution to the security of supply is provided by domestic production, but there is also a need for oil imports due to limited reserves. Therefore, diversification of import routes and sources is one of the ways to ensure the security of supply. JANAF's oil pipeline and storage system in Croatia has been continuously upgraded and expanded and enables oil imports from two directions and several sources not only for domestic refineries, but also to the refineries of Central Eastern Europe, and it has capacities available for increased transport and storage demands. The refining sector will face the challenge of decreased total demand for petroleum products and increased demand for petrochemicals and jet fuels, and especially the challenge of decreased gasoline consumption, resulting from changes in fuel consumption in transport, which requires rapid and continuous modernisation and adjustment.

In the next fifteen years, the oil will still have high energy and economic potential, which will provide opportunities for new development projects. Oil companies have already launched or are considering projects, which will ensure a successful transition to a low-carbon economy and energy, thus making the achievement of this goal a long-term strategic challenge.

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PRODUCTION EFFICIENCY AND DEPENDENCE ON SUBSIDIES OF FARMS SPECIALISING IN FIELD CROPS IN THE SELECTED EUROPEAN UNION COUNTRIES

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Key words: farms specialising in field crops, production efficiency, importance of subsidies,

JEL codes: D33, Q12, Q14.

ABSTRACT

The objective of the studies was to assess the production efficiency and dependence on subsidies of farms specialising in field crops and classified according to economic size classes in five EU countries, i.e. Poland, Lithuania, Hungary, Bulgaria and Romania. For the purposes of the analysis, the EU FADN data, average for the years 2015-2016, was used. The production efficiency at the production and technical level, cost intensity of production and dependence of farms on support of subsidies on operating activities was analysed. The highest production and technical efficiency in all countries has been recorded in farms from first and second class. The lowest efficiency was recorded in Lithuanian farms from the fifth class and Hungarian and Polish from sixth class. The economically effective production was only in Romanian farms. In other countries, in some groups of farms, costs exceeded the value of production. The loss which occurred in the production process was covered by subsidies. In the Romanian farms, the lowest income per 1 ha of UAA was in the farms from the first class. In other countries, the income was lowest in the economically stronger farms. The improved results can be perceived mainly in the improved efficiency of management.

1. INTRODUCTION

The membership in the European Union and covering agriculture in the individual countries with the Common Agricultural Policy instruments has a fundamental impact on the conditions of its functioning. The presence in the EU structures creates new possibilities of creating income, *inter alia*, due to the size of the EU market and implementation of subsidies under the CAP (Poczta, 2003; Zegar, 2008; Poczta et al., 2009). A large part of the CAP budget is allocated for support and stabilisation of farmers' income by means of direct payments. Farm income due to the pursued activity is subject to significant fluctuations over time (e.g. in terms of changes in prices, yields). Therefore, direct payments have a significant impact on the amount of income. According to the European Commission (European Commission, 2010), in the years 2006-2008 direct payments accounted for about 27% of income in EU farms, and therefore they are very important for guaranteeing the viability of farms. They also contribute to increasing income of the rural population and providing public goods (Severini, 2016).

In addition to benefits, subsidies may also have negative effects. From the studies conducted by Quiroga et al. [2017] it results that in most EU Member States subsidies may have a negative impact on the crop production which means that they generate situations discouraging from improving the competitiveness of farms. This phenomenon is dangerous as in the conditions of globalisation the competition among producers becomes aggravated. European farms are forced to compete not only with each other but also with non-EU farms. In order to face the competition, they need to improve the land productivity, take care of the quality of products, reduce production costs, make better use of fixed assets, use inputs of other means more efficiently, increase the labour productivity and be more efficient managers (Klepacki and Grontkowska, 2007).

The results of the studies conducted show that field farms (type TF8 according to the FADN typology) covered by the FADN study in Bulgaria, Poland, Romania, Lithuania and Hungary, on average, in the years 2015-2016, were representative of the numerous group of farms in these countries. They represented from 20.7 to 51% farms in total, thus, their impact on the situation in agriculture was significant. According to the European Commission's forecasts, in connection with the demand for feed and good export prospects, the production of cereals in the European Union in 2030 will grow to 340.8 million tonnes (i.e. by 13.1% on 2017). It is expected that the demand for cereals in the EU will grow by 10% when compared to the average from the years 2012-2017. Therefore, it can be assumed that the importance of field crops in the EU will remain high in the nearest future (European Commission, 2017).

The production capacity of agriculture depends significantly on the production potential of farms, i.e. resources of means of production and their interrelations (Poczta, 2003). On the other hand, the efficiency of the production process depends on the proportions of used means of production and their productivity (Rajtar, 1984). Determination of this efficiency allows to assess the process of transformation of inputs into outputs. The higher is the output per input, the higher is the efficiency (Kulawik, 2007). Then, when analysing the efficiency of resources used in the production process, we can determine the efficiency of management. The production potential of farms and efficiency of management are of decisive importance for entire management and determine the level of income in a longer term (Gorton and Davidova, 2004; Zegar, 2011).

The objective of the studies was to assess the production efficiency and dependence on payments of farms specialising in field crops and classified according to economic size classes in five EU countries, i.e. Poland, Lithuania, Hungary, Bulgaria and Romania.

2. MATERIALS AND METHODS

The subject of the studies were the farms specialising in field crops, i.e. in cultivation of cereals, oleaginous and protein plants (type 15) and various types of field crops (type 16) in five EU countries, i.e. in Poland, Lithuania, Hungary, Bulgaria and Romania. The selection of the countries was purposive, the selection criterion was the approximate date of accession to the EU (Poland, Lithuania, Hungary – 1 May 2004, Bulgaria and Romania – 1 January 2007) and quite comparable climatic conditions. Account was also taken of the number of farms represented in the sixth economic size class and the minimum threshold of the economic size defining the farm as commercial. It has been assumed that this threshold would be EUR 2 or 4 thousand, which guaranteed a study sample of farms in the first economic size class (European Union, 2015; European Union, 2015a). It was assumed that the study sample of all countries included in the study contained the farms from 6 economic size classes.

The analysis covered two-year averages, i.e. average results obtained in two years of studies, i.e. in 2015 and 2016, which have been collected and processed in the EU FADN system (Farm Accountancy…, 2018). The results of the farms have been presented in a tabular form, on average, in the study sample and in six groups of the farms identified by economic size expressed by the value of standard output (SO)[1]. Below, there is the nomenclature of economic size classes of the farms expressed in thousand EUR of standard output (SO):

(1) 2 ≤ 8 – very small,
(2) 8 ≤ 25 – small,
(3) 25 ≤ 50 – medium small,
(4) 50 ≤ 100 – medium large,
(5) 100 ≤ 500 – large,
(6) ≥ 500 – very large.

The studies used the horizontal analysis by comparing parameters describing the farms in the individual countries and in the identified groups. The analysis covered the area of utilised agricultural area (UAA), labour intensity of production i.e. labour resources expressed in the number of annual work units per 100 ha of UAA and the share of fixed assets in total assets. Also, production organisation and intensity in the farms were analysed. The measure of production organisation was the share of cereals and other field crops in the area of UAA while the measure of production intensity were direct costs per 1 ha of UAA, costs of external factors and total costs. What was also analysed, was the dependence of the farms on support by subsidies on operating activities. Therefore, the impact of the Common Agricultural Policy on the economic results of the farms has been determined, the measure of those results was net value added and farm income. The production efficiency has also been assessed. According to P.A. Samuelson and W.D. Nordhaus [2005], the efficiency is identified with the lack of waste. In the studies, the efficiency has been assessed using the following indices:

- The share of gross margin[2] in the value of agricultural production – efficiency at the production and technical level (Kulawik, 2013 after: Dabbert and Braun, 2012),

- Relation of total costs to the value of production manufactured – cost intensity of production

[1] Standard output is the average from 5 years of the production value from the specific activity of crop and livestock production, obtained within a year from 1 ha and from 1 animal in the production conditions average for the given region (Bocian et al., 2014).
[2] Gross margin = agricultural production less the value of direct costs and the value of direct costs of forestry production.

3. RESULTS AND DISCUSSION

3.1. Characteristics of the farms

Table 1 showed the data describing the farms specialising in field crops in five EU countries. The results have been presented on average in the sample and in the groups of farms classified according to the economic size expressed by the standard output (SO) value.

Table 1. Characteristics of field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Utilised Agricultural Area (ha)							
Bulgaria	109.54	5.17	21.36	55.79	114.26	457.11	1752.75
Hungary	63.73	9.58	25.42	53.01	99.92	274.43	1165.67
Lithuania	79.93	20.87	32.76	70.49	127.90	320.76	1273.52
Poland	21.82	8.76	16.50	33.24	65.31	184.16	949.63
Romania	27.15	5.61	15.71	51.08	121.97	392.11	1653.71
Share of leased agricultural area (%)							
Bulgaria	86.9	65.4	81.0	86.0	92.8	92.5	83.8
Hungary	59.1	27.9	23.8	38.1	50.0	65.1	97.0
Lithuania	53.8	46.1	41.5	56.2	55.8	53.3	65.7
Poland	27.0	10.7	20.3	29.5	34.0	33.8	54.8
Romania	70.4	19.6	50.8	72.7	80.5	85.1	83.6
Total labour inputs (AWU/100 ha UAA)							
Bulgaria	2.73	24.66	7.54	3.94	2.80	2.05	1.55
Hungary	2.02	4.91	2.36	2.08	1.83	1.50	2.01
Lithuania	2.11	5.87	4.15	2.06	1.37	1.01	1.39
Poland	6.62	12.85	9.00	5.51	3.29	1.91	1.88
Romania	4.07	16.06	6.84	2.72	1.66	1.11	0.93
Share of fixed assets in total assets (%)							
Bulgaria	63.3	67.6	61.5	56.4	38.2	65.1	66.0
Hungary	64.0	60.7	65.1	68.8	68.3	68.8	49.8
Lithuania	64.9	67.0	64.7	64.3	65.4	68.8	57.4
Poland	90.2	93.0	92.3	91.5	91.3	87.3	61.8
Romania	80.4	92.6	87.9	81.6	67.0	69.8	71.6

Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

On average, in the analysed farms the area of UAA ranged from 21.92 to 109.54 ha, the smallest farms in terms of land resources were the Polish farms while the largest – the Bulgarian farms. As the economic size of the farms increased, the area of UAA increased, so did the share of leased land. In the identified groups of the Bulgarian farms, the share of foreign land was largest (65.4%-92.8%) while that of the Polish farms was smallest (10.7%-54.8%).
The labour intensity of production, on average in the sample, was smallest in the Hungarian farms and largest in the Polish farms, it was, respectively, 2.02 and 6.62 AWU per 100 ha of UAA. As the economic size increased, the labour intensity showed a downward trend. The

share of unpaid labour inputs also decreased gradually. In the farms from the first economic size class, the share of unpaid labour in total inputs was from 79.8% in Hungary to 98.8% in Lithuania, and in the farms from the sixth class – from 0.8% in Hungary and Poland to 4.6% in Lithuania.

In total assets, fixed assets were predominant, their share was smallest in the Bulgarian farms (63.3%) and largest in the Polish farms (90.2%). In other groups of the farms, identified according to the economic power, the share of fixed assets decreased but this decrease was not always unidirectional. Given the extreme values, the share of fixed assets was within the following range: in the Bulgarian farms 38.2-67.6%, Hungarian 49.8-68.8%, Lithuanian 57.4-68.8%, Polish 61.8-93.0%, and Romanian 67.0-92.6% – Table 1

3.2. Production organisation and intensity

On average, in the analysed sample of the farms, the share of cereals and other field crops in the area of UAA was similar, ranging from 84.5% in Hungary to 90.5% in Romania. As the economic size and the farm area increased, this share increased, but in the case of the Hungarian and Polish farms this was not a unidirectional increase. Given the extreme values,

Table 2.Production organisation and intensity in field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Share of cereals and other field crops in the agricultural area (%)							
Bulgaria	89.5	53.0	70.5	82.4	82.6	91.4	93.0
Hungary	84.5	77.6	73.7	82.5	83.8	89.4	88.2
Lithuania	84.8	41.3	69.0	83.7	93.0	94.3	95.0
Poland	86.2	78.7	83.2	87.4	90.7	92.7	91.8
Romania	90.5	76.7	81.8	86.8	89.5	94.1	97.5
Direct costs per hectare of UAA (EUR)							
Bulgaria	261	283	233	235	205	240	286
Hungary	402	232	233	305	296	397	687
Lithuania	310	127	157	221	305	383	457
Poland	371	234	309	394	430	442	592
Romania	251	257	273	244	229	245	258
Costs of external factors per hectare of UAA (EUR)							
Bulgaria	303	236	268	235	240	307	318
Hungary	184	68	53	79	118	187	385
Lithuania	80	23	30	47	60	82	195
Poland	103	33	59	81	91	145	343
Romania	127	45	79	109	133	149	163
Total costs per hectare of UAA (EUR)							
Bulgaria	860	931	792	782	702	813	922
Hungary	973	744	617	714	743	949	1 583
Lithuania	685	422	452	517	643	774	1 013
Poland	913	755	829	910	928	964	1 370
Romania	647	762	699	585	563	595	664

Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

the share of cereals and other field crops in the area of UAA was within the following range: in the case of the Bulgarian farms 53.0-93.0%, Hungarian 73.7-89.4%, Lithuanian 41.3-95.0%, Polish 78.7-92.7%, and Romanian 76.7-97.5%.

The production intensity level has been determined by the amount of direct costs, the cost of external factors and total costs per 1 ha of UAA. On average, in the sample of the farms from each country, the direct costs were within the limit of EUR 251-402, the cost of external factors was EUR 80-303, and total costs were EUR 647-913 per 1 ha of UAA. In almost all countries, these costs were highest in the sixth class farms, i.e. those which were strongest in economic terms. The exception were the Romanian farms classified into the second class, where the direct costs per 1 ha of UAA were highest and the Bulgarian and Romanian farms from the first class were total costs were highest – Table 2.

3.3. Production efficiency

The efficiency is one of basic categories used to describe the functioning and development opportunities of farms. In the conditions of environmental variability, the efficiency is an important determinant of the success of farms.

The efficiency at the production and technical level is reflected by the indicator of the share of gross margin in the production value. On average, in the sample of the Lithuanian farms, this indicator was lowest – 56.0%, while in the farms from other countries it was from 62.0 to 66.5%. In all countries included in the study, the highest production and technical production efficiency was recorded in the farms from the first (67.4-76.3%) and second (63.0-71.4%) economic size class. In the economically stronger farms, this efficiency was lower. Definitely, the lowest efficiency was recorded in the Polish (52.4%) and Hungarian (53.5%) farms classified into the sixth economic size class and in the Lithuanian farms classified into the fifth class (53.3%). On the other hand, in the Romanian farms, there was a relatively high and fairly even level of efficiency, the share of gross margin in the production value ranged from 65.4 to 69.4% – Table 3.

Table 3. Production and technical efficiency in field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016 (w %)*

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Bulgaria	64.7	76.3	71.4	66.1	63.6	63.7	63.7
Hungary	62.0	74.1	70.6	65.5	67.6	62.2	53.5
Lithuania	56.0	67.9	63.0	56.1	53.5	53.3	56.9
Poland	62.2	69.1	66.2	62.2	59.8	59.0	52.4
Romania	66.5	67.4	69.4	65.8	65.7	65.4	66.5

*Ratio of gross margin to the production value.
Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

The costs in the manufacturing process are an important part of decision-making and their level depends to a large extent on the farmer. By referring the total costs to the production value produced with them, we can obtain the information useful in managing the manufacturing process. This indicator illustrates the economic efficiency of management. On average, in the sample of the Bulgarian farms the costs exceeded the production value

(revenues) by 16.4% which means that the production was economically inefficient. In the farms from other countries included in the study, the costs accounted for from 86.3 to 97.5% of revenues, respectively, in the Romanian and Lithuanian farms – Table 4.

Table 4. Cost intensity of production in field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016 (w %)*

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Bulgaria	116.4	78.0	97.1	112.7	124.7	122.9	116.7
Hungary	91.8	82.9	78.1	80.8	81.4	90.3	107.1
Lithuania	97.5	106.4	106.6	102.8	98.0	94.4	95.6
Poland	93.0	99.6	90.7	87.4	86.6	89.5	110.2
Romania	86.3	96.7	78.4	82.2	84.6	83.9	86.3

*Ratio of total costs to the production value.
Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

In the groups of farms identified by economic size, the cost intensity of production was subject to significant fluctuations. The particularly high cost intensity was characteristic of the production in the Bulgarian and Lithuanian farms. The study results show that in the Bulgarian farms in classes 3-6 and in the Lithuanian farms in classes 1-3 the production was economically inefficient. In the Bulgarian farms, the costs exceeded the value of the production produced from 12.7 to 24.7% and in the Lithuanian farms from 2.8 to 6.6%. The analogous situation also took place in the Hungarian and Polish farms in the sixth class, the indicator specifying the cost intensity of production was, respectively, 107.1 and 110.2%. Only in the Romanian farms, the production economically effective, which means that farmers did not record any loss, the costs incurred were lower than revenues received – Table 4.

3.4. Dependence of farms on subsidies

Net added value is appropriate for analysing the economic results of the farms where there are large differences as regards the ownership of manufacturing factors. This category of income reflects the payment of production factors, i.e. labour, land and capital regardless of their owner. What is eliminated at this stage of the account, is the impact of the cost of external factors (cost of paid labour, rent and loan interest) on the results. The account is based on an assumption that all means of production and capital belong to the farmer.

Table 5. Ratio of subsidies on operating activities to net added value with subsidies in field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016 (w %)

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Bulgaria	53.0	40.6	45.9	61.1	73.1	54.2	51.5
Hungary	52.4	57.1	56.9	54.7	50.9	50.3	52.3
Lithuania	64.1	108.7	101.3	86.4	70.0	53.4	35.4
Poland	64.6	98.8	70.9	59.4	54.9	49.1	52.4
Romania	42.4	72.5	38.1	41.8	42.1	39.2	39.5

Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

The results in Table 5 show a different level of dependence of the farms on subsidies on operating activities. On average, in the sample, the share of these subsidies in net added value was smallest in the Romanian farms (42.4%) and largest in the Polish farms (64.6%). Dependence of the farms different in terms of the economic size on subsidies was also different. In the Polish and Romanian farms, the most dependent entities were those from the first economic size class, the indicator was, respectively, 98.8 and 72.5%, in other classes this dependence was less. In the Hungarian farms, the share of payments in net added value was within the range of 50.3-57.1% and in the Bulgarian farms 40.6-73.1%. Particularly disadvantaged were the Lithuanian farms from the first and second economic size classes, subsidies exceeded net added value by, respectively, 8.7 and 1.3%.

Greater dependence on subsidies is visible at the level of farm income, which is the economic surplus left after deducting, from net value added, the cost of involving foreign production factors (i.e. labour, land and capital) and increased by the balance of payments and taxes on investment activities. The study results show that, on average, in the sample of the Bulgarian farms, payments exceeded farm income with subsidies by 108.9%, which means that without this support the income was negative. In the farms from other countries included in the study, the ratio of payments to farm income with subsidies ranged from 62.7 to 85.0%. The results of the calculations included in Table 6 show that in a relatively favourable situation were the Romanian farms, in the identified group of the farms the share of subsidies in the income was from 45.9 to 91.5%. This means that the production was profitable. On the other hand, in other countries, in some groups of the farms payments exceeded farm income including subsidies. This situation applied to the Bulgarian farms from classes 3-6, Hungarian farms from the sixth class, Lithuanian farms from the first class and Polish farms from the first and sixth class. The results obtained confirm the study results presented so far in the literature and pointing to the increasing importance of subsidies on operating activities in creating farm income (Zawadzka, Strzelecka, Szafraniec-Siluta, 2013; EEIG Agrosynergie, 2011).

Table 6. Ratio of subsidies on operating activities to farms income with subsidies in field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016 (w %)

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Bulgaria	208.9	53.1	76.5	116.8	168.9	481.1	291.0
Hungary	79.7	69.0	64.4	65.1	64.8	75.0	170.3
Lithuania	80.4	100.9	94.3	90.5	81.6	68.5	71.3
Poland	85.0	111.8	82.8	70.3	65.2	69.2	675.0
Romania	62.7	91.5	45.9	56.7	63.2	60.1	62.9

Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

Farm income is an economic effect of activities pursued, its level determines the level of satisfaction of the farmer's family's consumer needs and the farm's development capacity. The objective of agricultural producers is to seek to increase the income, as its level determines the amount of payment for unpaid labour of the farmer and his family members and the amount of payment for involved other production factors belonging to the farm family, i.e. land and capital.

Table 7. Farm income without subsidies on operating activities per 1 ha of UAA in field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016 (w EUR)

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Bulgaria	-109	350	91	-41	-119	-146	-128
Hungary	71	110	149	149	155	94	-119
Lithuania	41	-2	14	21	37	67	52
Poland	47	-31	60	120	140	101	-166
Romania	94	12	184	121	95	106	97

Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

The study results included in Table 7 show that the return on involving the land factor, on average in the sample of the Bulgarian farms was not implemented, income without subsidies per 1 ha of UAA was a negative value (-EUR 109). In other countries, this income ranged from EUR 41 in the farms from Lithuania to 94 EUR in those from Romania. The amount of income without subsidies per 1 ha of UAA (i.e. land profitability) in the groups of the farms identified by economic size was different. In all countries – an exception was only Romania – there were the farms where this income was negative, which means that farmers suffered a loss. The greater loss was recorded in the groups of the economically stronger farms. The highest land profitability was recorded in the Bulgarian farms (EUR 350) classified into the first economic size class. In contrast, the further positions were occupied by the Romanian farms (EUR 184) classified into the second class, Hungarian farms (EUR 155) and Polish farms (140 EUR) in the fourth class, and Lithuanian farms (EUR 67) in the fifth class.

The strength of the impact of subsidies on the farm results is determined by the value of economic surpluses from production and the amounts of subsidies received. The study results showed that in the event of a loss in the production process, it has been covered by subsidies. Therefore, subsidies had an impact on the final amount of income, however, its higher level did not stem from the improved agricultural production efficiency. Table 8 shows farm income including subsidies per 1 ha of UAA.

Table 8. Farm income with subsidies on operating activities per 1 ha of UAA in field farms grouped by economic size in the selected EU countries, on average, in the years 2015-2016 (w EUR)

Country	Average in sample	Economic size classes of holdings, thousands of euro SO					
		(1) 2 ≤ 8	(2) 8 ≤ 25	(3) 25 ≤ 50	(4) 50 ≤ 100	(5) 100 ≤ 500	(6) ≥ 500
Bulgaria	100	746	386	244	173	38	67
Hungary	351	354	417	426	440	375	169
Lithuania	209	187	246	216	204	211	183
Poland	313	263	350	402	404	330	29
Romania	251	147	341	280	257	267	262

Source: Own study based on EU FADN (Farm Accountancy ….., 2018).

The scale of supporting farm income with the CAP instruments, i.e. subsidies on operating activities is also reflected by the level of financing the cost of producing the unit of economic power of the farms (EUR). This support was different in each country. On average, during the analysed period (2015-2016), the level of financing the cost of producing 1 EUR of economic

power of the farms by subsidies was lowest in Romania – 24.7%. The further positions were occupied by the farms from Poland – 27.3%, Lithuania – 30.7%, Bulgaria – 33.6% and Hungary – 38.0%. When comparing the extreme values of indicators, this means that in the Hungarian farms, when compared to the Romanian farms, it was higher by 13.3%. This attests to the greater dependence on subsidies, which is also confirmed by the results of the studies carried out.

4. CONCLUSIONS

Farms specialising in field crops – against a background of other farming types – are quite a numerous group, their impact on the situation in whole agriculture in the countries included in the study is thus significant. The analysis of economic results of farms specialising in field crops and classified by economic size has been carried out based on two-year averages, i.e. average results obtained in 2015 and 2016. The study results allow to formulate the following conclusions:

1. On average, in the study sample, the largest land resources were those of the Bulgarian farms (109.54 ha) and the smallest were those of the Polish farms (21.82 ha). The farms in all countries included in the study used leased land, its largest share was recorded in the Bulgarian farms (86.9%) and smallest – in the Polish farms (27%).

2. As the economic size of the farms increased, both the area of UAA and the share of leased land increased (however, this share was subject to fluctuations). In the Polish farms from classes 1-5, the majority (i.e. more than 50%) was own utilised agricultural area, the similar situation applied to the Hungarian farms from classes 1-3, Lithuanian farms from classes 1-2 and Romanian from the first class. These results point to the high involvement of land as a foreign production factor. In this regard, the Bulgarian farms are outstanding – in all groups, the majority was leased land (from 65.4 to 92.8%). This situation had a negative impact on the cost intensity of production.

3. The increase in the economic size and the area of UAA was conducive to the decrease in the labour intensity of production. It also stimulated positive changes in the structure of assets. In the Hungarian, Lithuanian and Polish farms classified into the sixth economic size class the share of fixed assets in total assets was smallest (49.8-61.8%). In the case of the Bulgarian (38.2%) and Romanian (67%) farms, this situation occurred in the fourth class.

4. The production intensity was generally largest in the economically strongest farms, i.e. those from the sixth class. In the farms from this class, the intensity measured by the cost of external factors incurred per 1 ha of UAA (EUR 163-385) was largest in the farms in all countries, and the intensity measured by the amount of direct costs (EUR 286-687/ha of UAA) – except Romania. On the other hand, the intensity measured by the amount of total costs (EUR 1013-1583/ha of UAA) in the farms from the sixth economic size class was largest in the Hungarian, Lithuanian and Polish farms.

5. The highest production and technical efficiency was recorded in the farms of all countries classified into the first (67.4-76.3%) and second (63.0-71.4%) economic size class. In the economically stronger farms, the production and technical efficiency was lower. Definitely, the lowest efficiency was recorded in the Lithuanian farms (53.3%) from the fifth class and in the Hungarian (53.5%) and Polish (52.4%) farms from the sixth class.

6. When analysing the cost intensity of production, it was found that the production was economically efficient only in the Romanian farms (on average in the sample and in identified groups). On the other hand, in the Bulgarian farms, the costs exceeded the value of production produced – on average in the sample and in economic size classes 3-6, in the Lithuanian farms – in classes 1-3 and in the Hungarian and Polish farms from the sixth economic size class.

7. Farmers suffered a loss, i.e. farm income without subsidies was not implemented in the Bulgarian farms – on average in the sample and in economic size classes 3-6, in the Lithuanian and Polish farms classified into the first class and in the Hungarian and Polish farms from the sixth class. Subsidies covered the loss resulting from the production process and guaranteed a specific amount of income.

8. The lowest farm income, together with subsidies, per 1 ha of UAA was obtained in the economically stronger farms. In the Bulgarian farms from the fifth economic size class, this income was EUR 38, and in the Hungarian farms from the sixth class – EUR 169, in the Lithuanian farms – 183 EUR and in the Polish farms – 29 EUR. Only in the Romanian farms the lowest income was obtained in the farms from the first economic size class (EUR 147).

In the context of the results obtained, the situation of farms, especially economically stronger ones, is very worrying. The reduction of subsidies may be very detrimental to these farms. Currently, significant EU and state budget resources are allocated for agriculture and rural areas. However, this situation will not last forever, it is possible that this support will be limited in the future. In view of the results obtained, it is assessed that the improvement in the situation of farms should be sought primarily in the improved efficiency of management. Particularly important are rational management decisions made by farm managers as well as actions and mechanisms that determine the changes stimulating the improvement in the efficiency of agricultural production.

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INDIVIDUAL DIFFERENCES AND WOM COMMUNICATION: CROSS-GENERATIONAL ANALYSIS

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ABSTRACT

Word-of-mouth (WOM) communication represents a very powerful tool in marketing, for both individual consumers and businesses, while individual differences denote central consumer traits playing an important role in creating an adequate marketing strategy. In the focus of this study were three large consumer groups, i.e. generational cohorts (Baby boomers, Generation X and Generation Y). The main purpose of this paper was to determine the differences and similarities of generational cohorts in the context of WOM communication (both sending and receiving information) with respect to their personality traits. Researched traits encompassed consumer innovativeness, the need to belong, the need for uniqueness/individuality, time perception, price sensitivity and intellect. The sample included 413 Baby boomer respondents, 317 Generation X and 261 Generation Y representatives. The results show that there are significant differences among the researched generational cohorts, but they also tend to share some personality characteristics (consumer innovativeness, the need to belong, price sensitivity) influencing WOM sending and receiving information with different intensity. The paper also provides the main conclusions, limitations and future research suggestions.

1. INTRODUCTION

Researching consumers and their behaviour provides numerous opportunities for developing marketing mix elements, such as new products, prices, channels and messages; therefore, marketing experts strive to successfully influence consumers' decision making processes. It is important not only to identify, but to understand different consumer generations in order to connect with them in the best way, especially today when many communication means are available to marketers (Costa e Silva et al., 2017). Word-of-mouth (WOM) communication is ''one of the most powerful influences on consumption and has significant potential to influence consumer behavior'' (Sweeney, 2018, p. 19). It impacts the consumers' attitudes, product buying decisions, switch decisions and overall consumer behaviour (Kotler et al., 2006; Wangenheim and Bayon, 2004). WOM is very important tool when it comes to engaging the consumers and including them as value and offerings co-creators (Sweeney, 2018), as well as modelling consumers' preferences (Adamopoulos et al., 2018).

All businesses strive to develop mechanisms of stimulating positive WOM due to its influential nature and no need for high and expensive investments. That is an opportunity to follow the customers' needs and sell the products and services (Huete-Alcocer, 2017). On one side, consumers are showing the decrease in trust of companies and advertising, while on the other side companies are trying to stay competitive on a dynamic market. Here, WOM offers a way of developing and employing the competitive advantage (Sweeney, 2018). When it comes to traditional and electronic WOM comparison, the research results (Meuter et al., 2013) show that traditional WOM is more powerful and influential than the electronic (eWOM) one. Keller and Fay (2012 in Sweeney, 2018) point out that WOM communication is 90% obtained face-to face or via telephone, which represents a strong reason for exploring the traditional WOM communication.

According to the consumer behaviour literature (Schiffman et al., 2012), individual consumer characteristics are important for communication strategy and the success of communication usually depends on the compatibility with the individual differences of consumers. Cheema and Kaikati (2010) argue that decision to transfer the information depends on the consumer as an individual. Lam et al. (2009) indicate that the intensity and frequency of WOM communication relies on consumer personality as well. Existing literature shows that the variety of individual traits were researched mostly from the aspect of one WOM domain, usually WOM sending information. Therefore, WOM receiving information offers a space for additional research. In addition, the researchers (Cheema and Kaikati, 2010; Shin, 2007) stress the necessity of further studying the motives stimulating word-of-mouth communication.

Sicilia et al. (2016) claim that prior studies mostly dealt with motivations, such as commitment and satisfaction, whereby less attention was paid to the personal characteristics that support WOM behaviour. Hence, personality traits are seen as crucial motivators influencing word-of-mouth communication justifying the further research of such characteristics. The traits that are the subject of this particular research are consumer innovativeness, the need to belong, the need for uniqueness/individuality, time perception, price sensitivity and intellect. The common relationship among these personality traits is the notion that these are the psychological constructs describing personality and individual motivation to act. They cover the aspect of individual differences encompassing personal orientation, needs, preferences and ''self'' construct. Personality traits are stable over time

and are important for marketing segmentation and strategy purposes (Steenkamp and Maydeu-Olivares, 2015).
According to some general marketing notions (Schiffman et al., 2012), along with message and medium, the communication process entails sender and receiver, which justifies the research of both perspectives in terms of WOM communication. Existing studies mostly researched one perspective, mainly sending WOM information (Li et al., 2010; Ho and Dempsey, 2009; Shin, 2007; Mazzarol et al., 2007). Therefore, this can be seen as a research contribution. Another and major research contribution is the approach of researching the WOM sending and receiving information from the comparative study perspective. Namely, this study provides the cross-generational analysis of traditional WOM sending and receiving information based on the selected personality factors, i.e. individual differences. Scarce studies used comparative approach in studying the generations in the context of WOM communication. Nevertheless, the literature analysis shows that the studies mostly focused on Generation Y. According to Chaney et al. (2017) WOM studies usually explored one generation. Some researchers studied two generations (Baby boomers and Generation Y or Generation X and Y) in the context of social media (Dabija et al., 2018; Matos de Oliveira, 2017), electronic WOM (Bento et al., 2018; Karabulut and Bulut, 2016), and general media (Dagorn, 2015). Studies that dealt with comparison of all three researched generations are scarce. As it can be seen, generations, most commonly two, were explored mainly in the online context of social media and social networking. No study has been found that researched selected personality traits (consumer innovativeness, the need to belong, the need for uniqueness, time perception, price sensitivity and intellect) of all three generations (Baby boomers, Generation X and Y) within the context of traditional word-of-mouth sending and receiving information. Thus, this represents the major contribution of this research.

The reason for researching these generations lies within the motive of discovering the differences and potential similarities when it comes to WOM communication perspectives. Baby boomers, as the oldest consumers, cover a great portion of the population and have a big purchasing power, while the ''youngest'' Generation Yers are innovative and modern, thus playing an important role in adoption of the new products. According to Noh et al. (2014) the buying behaviour of Gen Yers can influence the acceptance and rejection of the new products on the market within a very short period of time. Generation Xers are very challenging target group in terms of preferences, but also have a higher portion of income. Researchers stress that generational differences in buying behaviour should be further explored (Costa e Silva et al., 2017). Bolton et al. (2013) suggest the further research of personality traits in terms of Generation Y. In addition, Chaney et al. (2017) emphasize studying generations in order to be more effective in developing marketing strategies. The main purpose of this research is to investigate the individual differences and similarities of Baby boomers, Generation Xers and Yers within the WOM sending and receiving information framework.

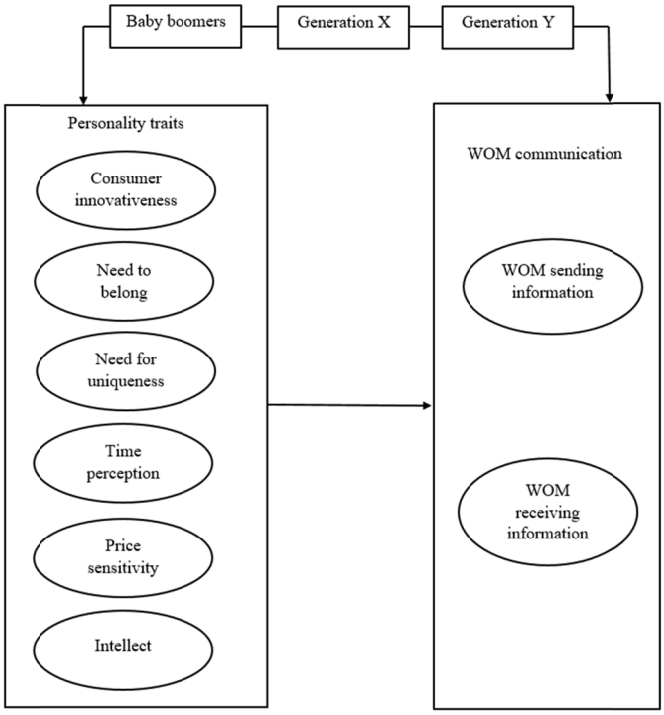
This paper is divided into five sections. The introductory part is followed by the literature overview section, research methodology and results sections. At the end of the paper conclusions, limitations and further research suggestions are provided.

2. LITERATURE OVERVIEW

This paper researches the influence of several individual characteristics (consumer innovativeness, need to belong, need for uniqueness/individuality, time perception, price sensitivity and intellect) on WOM communication, including WOM sending and receiving

information. The research is positioned around three different generations, that is, Baby boomers, Generation X and Generation Y. The major purpose is to compare these cohorts in terms of WOM sending and receiving information based on their personality traits and thus to reveal the differences and similarities among them. The research model is visible in Figure 1.

Figure 1. Research model of personality traits' influences on WOM communication across cohorts



Source: Author

2.1. Generational cohorts and WOM communication

WOM communication is an informal, non-personal form of communication that offers a higher credibility to information senders and seekers, while focusing on the sole customer. It is the most influential component impacting both consumers and companies (Huete-Alcocer, 2017; Adams, 2015; Murray, 2014).

In general, Baby boomers, Generation X and Generation Y representatives differ in their consumer behaviour, attitudes towards brands, advertisements (Schiffman et al., 2012), and values and psychographic profiles (Valentine and Powers, 2013), which has the implications for the marketing practice in reaching them through segmentation and communication strategies. This is the reason for studying these groups in terms of different marketing issues including the WOM communication as well.

Baby boomers

Baby boomers, sometimes called yuppies, represent an older consumer generation born between 1946 and 1964 covering more than 40% of the adult population, which makes them a large age category alive today. Due to the number of these consumers, they can be seen as change drivers. They frequently make important purchase decisions, and are therefore a desirable target market group. Furthermore, these consumers are older, have a greater sum of money and are socially responsible. Boomers are seen as narcissistic, hedonically oriented and brand loyal. In addition, they are highly motivated and consumption oriented consumers who like to buy for themselves, for their homes and for other people. Baby boomers are

oriented towards many industries, such as insurance and especially finances since they are older generation and want to make sure they have enough resources for the 'old days' (Hoyer et al., 2013; Schiffman et al., 2012; Solomon et al., 2006). Moreover, baby boomers represent unique cohort due to their life-style relying on autonomy, self-expression and hedonism (Sudbury-Riley, 2016).

According to Sudbury-Riley (2016), Baby boomers are an important market group, yet companies mostly advertise and target younger population. This makes WOM communication central to the older consumers. Previously mentioned author also stresses the notion that the past studies failed to reach consensus on the nature of the relationship (positive, negative, insignificant) between the age and market mavenism as a form of message/information diffusion. In addition, boomer mavens behave differently than non-mavens; they are innovative, like novelties, check the prices and special deals in the stores (Sudbury-Riley, 2016). This can be seen as the support for a further research of WOM sending information and age cohorts that might result in novel findings.

Based on the past literature analysis, no study exploring the selected personal characteristics of Baby boomers in relation to traditional WOM communication (both sending and receiving information) was found. Therefore, this research might shed some new light on this age cohort with respect to the researched framework and in comparison to other generations.

Generation X

Generation X representatives, sometimes called Xers, busters or slackers, cover roughly the period between 1965 and 1979. They are seen as materialistic and price sensitive, while ''fighting'' the brands and trends. They also do not like designer labels nor marketing efforts, especially insincere advertising, and value job satisfaction more than a salary. Generation Xers perceive themselves as in their own right preferring diversity and fun. They are more oriented towards flexibility, enjoyment and freedom. When it comes to media, they favour newspapers and TV in comparison to Baby boomers (Schiffman et al., 2012). Xers are the cohort difficult for marketers to be fully understood, but do represent a segment whose opinions and preferences in fashion, culture and marketing should be taken into consideration. Furthermore, these consumers are perceived as cynical and pessimistic, and appealing to these values was not successful so far. Nevertheless, Xers represent an interesting target group for marketers due to their higher discretionary income (Hoyer et al., 2013; Solomon et al., 2006). In the literature, this generation is usually described as independent, informal, oriented towards emotional security and entrepreneurship, and better educated (Krishen et al., 2016).

When it comes to WOM communication, Karabulut and Bulut (2016) compared Gen Xers and Yers in terms of electronic WOM showing that Gen Xers have less using experience of eWOM and are less impressed by eWOM than Gen Yers. Dagorn (2015) points out that Generation X is more offline WOM oriented. According to Dabija et al. (2018), Gen Xers can be easily influenced by the opinion of other people, which suggests an important role of WOM. They search for high-quality products, compare them and search for more information necessary for some future purchases. This indicates that Xers might be inclined towards information search.

Literature analysis shows the open space for this age cohort research with respect to the selected individual differences and traditional WOM sending and receiving information, as well as the comparison to other generations. These can be seen as novel insights.

Generation Y

Generation Yers, also known as echo boomers and Millennials or millennium generation, encompass the age cohort born between 1977 and 1994 (some researchers mention 1979, 1980 as starting years). They are perceived as clever, savvy and pragmatic, more technology oriented and opened towards brands and new experiences. Although they are more oriented towards online channels, they also prefer reading 'on paper' and read more magazines than Baby boomers (Nielsen, 2014). According to Valentine and Powers (2013), Gen Yers are more prone to TV, Internet, magazines and radio respectively. In addition, they are seen as social and environmentally aware. This age cohort has a substantial amount of money and influences the purchases of others, and as such, is highly attractive for marketers. Millennials are saturated by different media, but are more oriented towards Internet (Zhang et al., 2017; Adams, 2015; Schiffman et al., 2012, Smith 2012). Greškova and Kusa (2015) state that the individualism is the most typical trait describing this generation. Millennials highly value creativity and authenticity; they want to express themselves and show their uniqueness (Nielsen, 2014). They are the consumers that have been greatly researched, but are the least understood target group important for the new product adoption (Nielsen, 2014; Valentine and Powers, 2013), which makes them attractive for further exploration. In addition, the studies (Nielsen, 2014) suggest that marketing experts and companies do not interact with this age cohort properly and thus do not have an adequate feedback. Noh et al. (2014) argue that past research describes these consumers as unique, innovative and knowledgeable exhibiting strong opinion leadership tendencies.

Considering WOM behaviour, Dagorn (2015) argues that Generation Y is both WOM offline and online focused. They like social interaction and are prone to information sharing with friends and strangers (Nielsen, 2014). Furthermore, Generation Yers tend to be market mavens sharing the general product information (Smith, 2012). Zhang et al. (2017) determined the propensity of Gen Y active social media users towards engaging in positive eWOM after satisfactory service experience.

In addition to sharing information, WOM information receiving perspective remains opened and subject of research that might provide some novel findings. Also, the majority of studies were conducted in online setting and no similar study that explored selected personality traits in terms of traditional WOM communication processes and compared to other generations, was found.

2.2. Personal traits and WOM communication

Past literature analysis shows that the individual differences researched with respect to WOM communication were knowledge, status, superiority (Ho and Dempsey, 2009; Leeuwis, (Leeuwis, 2009; Hennig-Thurau et al., 2003), self-confidence (Leeuwis, 2009), ego satisfaction (Kotler and Keller, 2008; Hennig-Thurau et al., 2003), attitudes towards sender (Li et al., 2010; Leeuwis, 2009., Sweeney et al., 2008; Shin, 2007), self-confirmation (Mazzarol et al., 2007).

Moreover, motivations that were mostly researched and associated with generations were brand affiliation, opportunity seeking, entertainment (Bento et al., 2018; Matos de Oliveira, 2017), belonging/membership, interactivity, affinity, emotional connection, satisfaction, innovativeness (Krisher et al., 2016). Researchers (Chaney et al., 2017) suggest further exploration of differences between generational cohorts.

Consumer innovativeness

Consumer innovativeness is an individual difference trait that can be described as the person's inclination towards new experiences and novelty among products (Manning et al., 1995 in Bearden et al., 2011). When it comes to WOM communication, literature (Mowen et al., 2007) indicates that the influence of innovativeness on WOM communication was studied in the traditional setting. In this sense, the negative relationship was found in terms of WOM information receiving. Ahrens et al. (2013) see consumer innovativeness as an important WOM marketing driver. Sun et al. (2006) found positive relationship between consumer innovativeness and information search in offline environment. According to Chang et al. (2016) innovativeness, as counter-conforming aspect of service, outlines consumers' self and social images and thus influences their tendency to generate WOM recommendations.

The research results show that in terms of Generation Y consumer innovativeness positively influences traditional and online WOM, whereby the stronger intensity was proven for the traditional WOM (Kursan Milaković and Ivasečko, 2018). According to some researchers (Steenkamp and Maydeu-Olivares, 2015) little is known about the impact of aging on consumer traits. Namely, it seems that consumer innovativeness decreases as people get older.

When it comes to exploration of the consumer innovativeness and WOM communication, existing literature analysis indicates contradictory results, as well as the scarcity of researches, especially from the aspect of including both sending and receiving perspectives and cross-generational approach. Thus, this might result in novel findings.

Need to belong

Need to belong can be defined as an internal need to be part of a group or to be socially accepted (Baumeister and Leary, 1995). This characteristic was mostly researched in online setting from the aspect of WOM sending information (Cheung and Lee, 2012; Leeuwis, 2009; Ho and Dempsey, 2009). To be a group member represents a fundamental internal characteristic of a consumer, while WOM communication inevitably includes social interaction between the consumers (Lopez et al., 2017; Sicilia et al., 2016). Leeuwis (2009) indicates that consumers take part in electronic communication due to the need to belong to online communities. Lovett et al. (2013) argue that the consumers are more prone to send the information about brands due to their motive for socialization or belonging. Mowen et al. (2007) point out that the need to belong was the unexplored factor from both WOM perspectives, sending and receiving information, and suggest the further exploration. The results of Chen's (2017) study confirm that WOM can be seen as a strategy of achieving the social acceptance. Sicilia et al. (2016) argue that the need to belong may stimulate people to talk to others about brands.

Study of Adams (2015) signifies that Generation Y representatives may be oriented towards searching the group member's affirmation, whereas for other generations no results, on need to belong impacting WOM communication, was found. This opens space for novel findings in terms of traditional WOM, especially receiving information domain. Furthermore, new insights can be gained within the context of all three generations.

Need for uniqueness/individuality

The need for individuality refers to a need or desire to be different from others, which can be seen as a way of developing one's self or achieving the social image representing an important driver of consumer behaviour (Sharma et al., 2018; Thomas and Saenger, 2017). When it comes to relationship of the need for uniqueness and WOM communication, it can be

seen that this relationship was searched greatly in online context and mostly from the context of sending WOM information. For example, Ho and Dempsey (2010) claim that more individualistic online users tend to share more online content. Lovett et al. (2013) found the significance of expressing the uniqueness in online setting. Another approach is offered by Cheema and Kaikati (2010) who argue that highly unique individuals abstain from WOM communication in order to prevent other people from ‘’their’’ products. These authors found a negative influence of the need for uniqueness on positive WOM behaviour in terms of the publicly consumed products. Wien and Olsen (2014) argue that individualism increases the probability of transmitting WOM. Sharma et al. (2018) confirmed the positive influence of consumer’s need for uniqueness on market mavenism. Thomas and Saenger (2017) detected the association of consumer’s uniqueness with the propensity of sending WOM information in the context of brands and brand connection. According to Sicilia et al. (2016) studies about the influence of need for uniqueness on WOM are inconclusive, and thus the further research of this relationship is suggested.

Considering the contradiction and inconclusiveness of the results in terms of the need for uniqueness and both WOM perspectives in traditional setting, further exploration of this relationship might result in new insights, especially considering researched age cohorts.

Time perception

Time aspect is closely tied to the frequency of communication, which is important for understanding the WOM communication and its connection to other factors (Allsop et al., 2007). Abrantes et al. (2013) argue that information exchange may be in association with the amount of time, emotional strength and closeness of the included relations. In addition, they stress that individuals spend their time and energy for conversations with other people as a way of learning and enjoying. Moreover, time perception entails the availability of time and describes how individuals see and use the excess of time. According to Shih et al. (2013) consumers who have time to take part in online discussions are more prone to exchange the information with other people. Past researches mainly dealt with the lack of time and WOM information receiving (Sweeney et al., 2008). It can be assumed that the availability of time might be a stimulus for engaging in WOM sending and receiving information. Considering the generational cohort context, the literature on this particular relationship has not been found, except one study. Namely, according to Lissitsa and Kol (2016), besides more disposable income, Generation X is the one that has more free time. This may be relevant for the WOM context.

Due to scarcity of literature, new findings about time perception and WOM communication, both sending and receiving information, might reveal some novel insights when it comes to the researched generations, which were not explored with respect to this relationship or proposed framework.

Price sensitivity

According to relevant literature (Zeng et al., 2011; Irani and Hanzaee, 2011), price perception entails the price awareness, value awareness and perception of quality. Price awareness comprises the level at which the consumers are sensitive to price differences. Price sensitivity is another synonym that describes the consumer’s tolerance to price increases and the range whereby the consumers perceive the prices and price changes, and thus react to them. Irani and Hanzaee (2011) stress the importance of studying the prices and price sensitivities from the consumers’ perspectives. Zeng et al. (2011) point out that less price sensitive consumers might be prone to positive WOM sending information. Contradictory to this, Kursan

Milaković and Mihić (2016) determined positive influence of price sensitivity on WOM sending information. Choi and Kim (2007) claim that the value for money and high price consciousness impact the readiness of consumer to recommend the store to others. Jalilvand et al. (2017) found positive relationship between perceived value and WOM behaviour in the context of restaurant industry.

Bento et al.'s (2018) researched Generation X and Y in online referral and eWOM context and determined that Generation Yers are more cost-conscious. Chaney et al. (2017) mention that younger generation cohorts associate high prices with high quality and value, and tend to more question the prices. The authors also indicate that price sensitivity differs among the age cohorts. It can be concluded that past research on price sensitivity focused mostly on WOM sending information and that the studies in terms of generational cohorts are scarce. This opens space for novel findings with respect to the researched framework.

Intellect

Intellect represents a personality determinant that can be found within the Big Five model describing a person having excellent ideas, being fast thinkers spending time reflecting and processing a lot of information. Such individuals tend to be more creative and prone to non-conventional solutions and abstract thinking (Bratko et al., 2007; Goldberg, 1992; Costa and McCrae, 1992). Intellect encompasses practical value relating to a reasoning ability of the consumer (van Tonder et al., 2018). Picazo-Vela et al. (2010) analysed Big Five theory in online setting of users' reviews and did not established the significance. Goossens (2008) stresses the negative relationship between intellect, as a Big Five model component, and WOM sending information. Adamopolous et al. (2018) determined the positive relationship between intellect, as openness to experience, and eWOM.

Literature review indicates the paucity of findings when it comes to intellect and WOM communication, both sending and receiving information, relations. In addition, no study was found exploring this relationship in terms of the researched generational cohorts. Therefore, this research might shed new light with respect to the studied generations.

Based on the elaborated theoretical notions and gaps that need to be filled, the main research question is: ***How different (and similar) are the researched generational cohorts in terms of WOM communication (sending and receiving information) based on their personality traits?***

3. RESEARCH METHODOLOGY

Research was conducted on the representative sample of respondents of Republic of Croatia entailing three-group perspectives: Baby boomers (413 respondents), Generation X (317 respondents) and Generation Y (261 respondents). Data was purified, whereby univariate and multivariate outlies were detected; it was also checked for normality of distribution, (multi)collinearity and heteroscedasticity.

Measurement scales used in this research were adapted from other authors. *Consumer innovativeness* statements were adapted from Manning et al. (1995) and Mehrabian and Russell (1974) (in Bearden et al., 2011). *Need to belong* was measured using Leary et al.'s (2005) measurement scale. *Need for uniqueness/individuality* was explored using the adapted statements from Singelis et al. (1995), Triandis and Gelfand (1998) and Tian et al. (2001) (in Bearden et al., 2011). For measuring *time perception,* the measurement scale was developed

by the author, while *price sensitivity* and *intellect* were measured using the scales from Sproles and Kendall (1986,1990 in Bearden et al., 2011) and Goldberg (1999). WOM sending and WOM receiving information scales were adapted from Mowen et al. (2007). All scales applied Likert-scale 5-point system (1 – strongly disagree, 5 – strongly agree). For data analysis, exploratory factor analysis (EFA) and multiple regression (MR) in statistical package SPSS 23 were conducted.

4. RESEARCH RESULTS

4.1. Scale reliability and sample adequacy

All measurement scales were analysed in terms of their reliability (Cronbach alpha coefficient). The results show that the measurement scales exhibit valid reliability, i.e. Cronbach alpha 0,70 or higher (Table 1).

Table 1. Measurement scale reliability

Measurement scale	Cronbach alpha coefficient
Consumer innovativeness	0,80
Need to belong	0,70
Uniqueness/individuality	0,73
Time perception	0,86
Price sensitivity	0,80
Intellect	0,70
WOM sending information	0,86
WOM receiving information	0,81

Source: Research.

The sample adequacy for conducting the exploratory factor analysis was assessed using Kaiser Meyer Olkin (KMO) and Bartlett's test of sphericity indicators (Table 2).

Table 2. Sample adequacy test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,856
Bartlett's Test of Sphericity	Approx. Chi-Square	11483,095
	df	496
	Sig.	,000

Source: Research.

The results show that the sample is adequate for exploratory factor analysis conduction since KMO indicator is above 0,5 and Bartlett's test of sphericity is significant (Pallant, 2011).

4.2. Exploratory factor analysis

Exploratory factor analysis relied on principal component analysis and Varimax raw method of rotation. Eigenvalue was set as >1 and factor loadings as >0,4. Eight factors were extracted (Table 3) explaining 62% of variance.

Table 3. Factor structure

Items and factors	WS	WR	CI	NB	U/I	TP	PS	IN
I like to help others informing them about products.	,680							
Other people often ask me about information regarding the products, selling places and sales.	,804							
My friends think of me as a good source of information about products or sales.	,814							
I often inform others about new products or brands.	,784							
I like when others inform me about different products.		,595						
I often ask others about products, selling places or sales.		,805						
My friends are good sources of information about new products or sales.		,740						
I often ask others information/advice about new products or brands.		,807						
I am constantly searching for new experiences and personal challenges.			,754					
I like to try out new and different things.			,752					
I am always prepared for something new if it is fun.			,679					
I prefer job offering changes, variety and travelling, even if it is somewhat risky.			,650					
I do not like to be alone.				,642				
I usually do not do things for which others might reject or avoid me.				,695				
It is hard for me if I am separated from my friends for a longer period of time.				,720				
It hurts when I feel that others do not accept me.				,722				
I think I am special and different person than others.					,753			
I like to be unique and different from others.					,753			
I avoid buying products or brands which everyone buys.					,630			
I always dress differently even when others do not like it.					,721			
I always have enough time for all of my needs.						,853		
I think I have enough time for everything compared to my friends, colleagues and family members.						,833		
I always have enough time for the most of my needs or desires.						,871		
I always manage to make everything I have planned.						,759		
Whenever I can, I buy on sales or discounts.							,687	
I usually search for more stores in order to find the lower priced products.							,803	
I often check for the prices within the store even for the cheap articles.							,796	
When buying, I pay a great attention to prices.							,748	
I believe I am a fast thinker.								,699
I often spend time thinking about different things.								,630
I can handle a lot of information very well.								,676
I like to make up new ways of doing something.								,518

Factors: WS – WOM sending information, WR – WOM receiving information, CI – consumer innovativeness, NB – the need to belong, U/I - the need for uniqueness/individuality, TP – time perception, PS – price sensitivity, IN – intellect

Source: Research.

4.3. Multiple regression results

In order to check the differences and potential similarities among three different consumer cohorts, with respect to their personality traits and WOM sending and receiving information, multiple regression analyses were conducted. The results showing differences among Baby boomers, Generation X and Generation Y are visible in Table 4.

Table 4. Multiple regression standardised coefficients

	Baby boomers		Generation X		Generation Y	
Personality traits	**WOM sending**	**WOM receiving**	**WOM sending**	**WOM receiving**	**WOM sending**	**WOM receiving**
Consumer innovativeness	0,192	0,235	0,144	0,190	0,154	/
Need to belong	0,097	0,175	/	0,178	0,117	0,155
Need for uniqueness/individuality	/	0,100	/	/	/	/
Time perception	/	/	0,142	/	/	/
Price sensitivity	0,321	0,312	0,315	0,244	0,286	0,412
Intellect	/	/	0,230	0,111	0,171	/

Notes: Sign ‘’/’’ indicates that the relationship was not significant. Other values represent standardised beta coefficients and show significant relationships. The cut off p-value was 0,05.
Source: Research.

The results show that generations differ in significance and intensity of the researched personality traits’ influences on WOM communication. When it comes to Baby boomer WOM information senders, they are characterised by the consumer innovativeness, need to belong and are price sensitivity. Baby boomer WOM information receivers score higher on consumer innovativeness, need to belong, and are price sensitive to a lesser extent than WOM senders.
Unlike WOM senders, Baby boomer WOM information receivers are also characterised by the need for uniqueness/individuality. For this age cohort, time perception and intellect do not exhibit significant impact on WOM information sending and receiving.

Generation X WOM senders are price sensitive, intellectual, innovative and time perceptive. Generation X WOM receivers differ from WOM senders in terms of time perception that does not influence WOM information receiving, but are price sensitive, innovative, intellectual and, unlike Generation X WOM senders, are characterised by the need to belong. Need for uniqueness/individuality does not influence WOM information sending and receiving of Gen Xers.

Generation Y WOM information senders exhibit the characteristics of price sensitivity, are intellectual and innovative, and do express the need to belong. The need for uniqueness and time perception do not play significant roles for WOM sending information. Generation Y WOM receivers are also price sensitive, express the need to belong, but are not innovative and do not have the need to express their uniqueness. In addition, Gen Y WOM receivers do not find time and intellect components relevant for WOM information receiving.

When it comes to WOM information sending based on the personality traits, these generational cohorts share some characteristics. Namely, all groups are characterised by the consumer innovativeness, whereby this trait is stronger for Baby boomers, followed by the Generation Y and then Generation X. They are also price sensitive, especially Baby boomers, followed by Generations X and Y.

WOM information receivers across generations share the characteristics of need to belong and price sensitivity. The need to belong is strongly present at Generation X segment, followed by Baby boomers and Generation Y. Price sensitivity is, in the case of WOM receivers, stronger for Generation Y, then Baby boomers and eventually Generation X. Moreover, there are differences from the aspect of the intellect factor, which is not significant for Baby boomer WOM senders and receivers and Generation Y WOM receivers, while it plays a role for Generation X WOM participants, both senders and receivers, and for Generation Y WOM senders.

5. CONCLUSIONS

The main purpose of this paper was to explore the influence of the individual differences on WOM communication across generational cohorts of Baby boomers, Generation X and Generation Y. WOM communication encompassed sending and receiving information perspectives, while the explored individual differences included consumer innovativeness, the need to belong, the need for uniqueness/individuality, time perception, price sensitivity and intellect.

The results show that generational cohorts differ in the variety of factors influencing WOM communication, but also tend to share some characteristics of a different intensity. Namely, Baby boomer WOM senders are price sensitive, innovative and exhibit a need to belong. Generation X WOM senders are price sensitive, intellectual, innovative and value time available for sending WOM information. Generation Y WOM senders are also price sensitive, intellectual, innovative and are characterised by the need to belong. Consumer innovativeness impacting WOM sending information is stronger for Baby boomers followed by Gen Yers and eventually Gen Xers. The need to belong is higher for Generation Y WOM senders than Baby boomers. The need for individuality/uniqueness does not influence WOM sending information for neither of the generations. Time perception positively impacts WOM sending information only in the case of Gen Xers, while the price sensitivity is the highest for Baby boomer WOM senders, then Gen Xers and Gen Yers. Intellect seems to be relevant driver of WOM sending information in the case of Gen Xers an Yers. Therefore, considering the main research question, it can be stated that three generations are similar in positive influences of consumer innovativeness and price sensitivity on WOM sending information and non-significance of the need for uniqueness/individuality. The visible difference is also in the case of time perception and intellect factors. With respect to the analysed literature and researched generational cohorts, these are the novel findings.

Considering WOM receiving information, Baby boomers are, as WOM receivers, less price sensitive and more innovative than senders; show the needs to belong and uniqueness, whereby the latter one was not significant for senders. Generation X WOM receivers are also less price sensitive and more innovative than senders, show the need to belong unlike the senders and are less intellectual than senders. Gen Y WOM receivers tend to be more price sensitive than Gen Y WOM senders having a stronger need to belong than senders. Consumer innovativeness influences stronger WOM receiving information for Baby boomers than Gen

Xers. The need to belong is the highest for Gen Xers, followed by Baby boomers and Gen Yers. The need for uniqueness/individuality is present only at Baby boomer WOM receivers' case. Time perception is not relevant for any of the generational WOM receivers, while the most price sensitive WOM receivers are Gen Yers followed by Baby boomers and Gen Xers. Intellect positively influences WOM receiving information only in the case of Gen Xers. With respect to the main research question, it can be concluded that the generations as WOM receivers are similar, though different intensity, in terms of the need to belong and price sensitivity. They differ greatly in terms of the innovativeness, uniqueness and intellect. Considering the elaborated literature and studied generations, these are the novel findings.

In the light of scientific contributions this research has a practical relevance as well. Namely, the marketing managers can benefit from a better understanding of the generations' characteristics in terms of WOM sending and receiving information. In this sense it is necessary to examine both WOM perspectives separately and approach each in a different way. Also, each generation can be suited to an adequate marketing communication strategy, but should be acknowledged that generations share some similarities when it comes to WOM communication and personality traits. From this point of view, in order to stimulate the information sending, marketers should use appeals to innovativeness and stress the price offerings and savings. Baby boomer and Gen Y WOM information senders can be reached employing the appeal of belongingness, though using different media channels (e.g. online channels, TV, magazines). Clever usage of time appeals (e.g. through time saving, spending a great time, having fun) can be aimed towards Gen X WOM senders, and rationality appeals towards Gen X and Gen Y WOM senders. In order to stimulate the search of information, marketers can stress the values of innovativeness towards Baby boomers and Gen Xers, and the need to belong and price deals towards all generational cohorts. Furthermore, the need for uniqueness can be used in reaching Baby boomer WOM information seekers. Using the mentioned values, marketers can develop campaigns in order to stimulate positive WOM communication.

This study has some limitations that can be used as further research suggestions as well. Namely, the research was taken at certain point of time and did not include other determinants such as, situational and cultural aspects. Therefore, longitudinal approach might provide additional insights for understanding the generations' consumer behaviour. Also, other factors can enrich the existing knowledge about the generational cohorts and WOM communication. Another limitation can be sought within the generalisation approach. Thus, the future research can encompass certain industries, such as banking, insurance, tourism. Moreover, future studies might explore the negative WOM communication and/or cross-cultural context.

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