EKA UNIVERSITY OF APPLIED SCIENCES

ECONOMICS AND CULTURE

Volume 18, Issue 1

Riga 2021

Economics and Culture 2021, Volume 18, Issue 1

ISSN 2255-7563

e-ISSN 2256-0173

Full-text papers are available at https://content.sciendo.com/view/journals/jec/jec-overview.xml

The publication of the journal is financed by the EKA University of Applied Sciences.

Lomonosova 1/5, Riga, LV1019, Latvia

Publisher

SCIENDO

Bogumiła Zuga 32A Str.
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ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0001

CREATIVE COMMUNICATION TOOLS IN VILNIUS ARCHITECTURAL HERITAGE COMMUNICATION

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Abstract

Research purpose. The purpose of this study is to single out the tools of creative communication and to identify which of them are most used in the communication of architectural heritage in Vilnius.

Design / Methodology / Approach. Comparative analysis of scientific literature, qualitative expert interviews.

Findings. The communication of the architectural heritage is multifaceted because the heritage is multifunctional. Heritage communication operates through various channels and is focused on different target groups; however, in order for the communication to be effective, as expected, the coherence of communication is required, as well as a comprehensive approach to all aspects of communication. Structured communication is essential for the best communication impact.

Originality / Value / Practical implications. Heritage communication is an actively developing field that is receiving increasing attention from scientists and the public. Much attention is paid to heritage during various cultural events, during which the public has the opportunity to get acquainted with the usually inaccessible heritage or its premises. In this way, the revitalisation of heritage involves urban residents, communities, interested groups who, for cultural, religious or other reasons, are concerned with heritage preservation. Although much attention is paid to heritage communication and sponsors are being attracted, there are fears that the communication of architectural heritage is not sufficient due to the lack of funding for architectural heritage. The consequence of the lack of funding is the disappearance of architectural objects. Thus, the analysis of architectural heritage communication is a relevant and researched topic.

Keywords: Culture; Heritage; Technology; Creativity.

JEL codes: L83

Introduction

Communication is a science, an interdisciplinary field that requires a combination of multidisciplinary approaches. Effective and continuous communication is ensured by companies and organisations for which it is important to sell a product, promote an event or attract investment in cultural heritage (Ciurea & Filip, 2019). Communication is widely studied by scholars, but heritage communication, which is linked to a variety of heritage information, is explored in a fragmented way.

The problem of this research is to define what are the tools of creative communication and to single out which of the tools of creative communication can be used communicating in architectural and cultural heritage in Vilnius. Creative communication tools are a relatively new approach to communication. They provide an opportunity to improve existing communication processes and adapt them to the social habits of the current social groups (Ciurea & Filip, 2019). In the communication of architectural heritage, creative tools of communication such as the use of digital content and the introduction of new technologies allow the architectural heritage to be presented to the public in an innovative way attracting interest to various groups of society. The current research differs from other pieces of research because of its object, that is, the analysed tools of creative communication. Prior to this research, it was not investigated which of the creative tools of communication are most applicable

imparting Vilnius architectural and cultural heritage. During the current research, the city of Vilnius was chosen because of its size, as it is the largest city in Lithuania. Vilnius was also chosen because of its historical centre is included in the UNESCO World Heritage List as a unique example of a city formed in the Middle Ages; therefore, all architectural objects in this historical centre must be protected according to UNESCO World Heritage List instructions. This shows that it is crucial to study the case of communication of Vilnius city architectural heritage.

Heritage communication is communication that is transmitted to the public through various channels. Communication not only helps to popularise the heritage object but also contributes to its preservation and attracts investment (Xue, 2019). There are many architectural and cultural heritage objects in Vilnius that are disappearing because there is too little communication about them or the communication message is not attractive to the visitor. In order to increase the accessibility of heritage information to a wider circle of visitors and make the communication message more attractive, it is proposed to use more creative tools of communication. Introducing technology to communication does not suffice in aiming at applying new, creative tools of communication; using the human factor is also required – art installations, performances, workshops. Such a division of creative communication (use of technologies and adaptation of artistic forms) describes the creative tools of heritage communication (Aragón et al., 2019; Šerić, 2020). It is noted that aforementioned tools are already being used in heritage communication but are not fully developed, and have not been used to their full potential. Due to inadequate and insufficiently creative communication of architectural heritage, visitors lose interest in heritage, and architectural objects disappear (Raptis et al., 2019). Thus, the aim of this article is to single out the tools of creative communication and to identify which of them are most used in the communication of architectural heritage in Vilnius. The first part of the article presents selected tools of creative communication as the most applicable for communicating architectural and cultural heritage. In the second part, qualitative research of expert interviews was carried out, which aimed at analysing the specifics of architectural heritage communication in Vilnius and identify which of the presented creative communication tools are most used in architectural heritage communication in Vilnius. The last part of the article is devoted to conclusions and suggestions.

Literature review

In today's tourism industry, it is not enough to just offer visitors a variety of cultural events. It is important to understand that the supply of such cultural events is ample, the visitor has an extensive choice; therefore, it is crucial to look for new creative tools of attraction through which the visitor can personally engage and be influenced by the medium through which information is conveyed (Swensen & Nomeikaite, 2019). This comparative analysis of scientific literature and strategic documents aims to answer two questions: what creative communication is and what creative communication tools are already used to communicate architectural heritage.

Understanding effective communication as a source of transmitted information about the object and the target audience thus reached, it is necessary to single out the tools of creative communication through which information reaches the public. In this article, creativity is perceived as a new, original, innovative tool, an art form through which heritage is communicated (Saris, 2020; Smaliukienė & Survilas, 2018). Creative tools of communication are identified as the use of new technologies and artistic forms in heritage communication (Park & Kim, 2021; Šerić, 2020). The importance of new technologies in heritage communication is also emphasised by strategic documents regulating heritage preservation. The ICOMOS doctrine recommends preserving, restoring and strengthening the heritage using new technologies (Markevičienė et al., 2017). The Faro Convention encourages investment in new technologies, thus increasing the accessibility of heritage and its protection (Faro Convention, 2005). One of the key principles in UNESCO Commission documents is to strengthen the creative industries by emphasising the diversity of heritage, which is identified as a driving force for development not only in terms of economic development but also in terms of intellectual, emotional, moral, technological and spiritual development (UNESCO World Heritage Centre, 2005). The use of the new technologies, 3D technologies, is related to communication is also supported by the scientific

literature. Growing technologies play a vital role in today's world. They allow information to be shared not only quickly and efficiently but also creatively so that the information transmitted leaves a lasting impression. It is the visual language presented by 3D technology that delivers information in a modern way which can also be applied in the communication of architectural heritage (Poudel & Roy, 2019). It is the use of 3D technologies in heritage illumination that puts the architect's ideas to life without recreating the entire architectural object; properly selected technologies highlight the most important parts of the object, allowing to see the overall territory (Fabola et al., 2017). According to Esposito & Ricci (2020) and Bernárdez et al. (2019), the use of digitisation of heritage information is the best ways to present and preserve heritage. This also applies to the architectural heritage, digitising its individual parts and then integrating them into a common whole, and later presenting them to the public. Such digitised heritage content is applied in the creation of a variety of platforms through which the architectural and cultural heritage is presented in an innovative and attractive way by means of technology (Bräuchler, 2019; Eliëns et al., 2007). Analysing the scientific literature and strategic documents regulating heritage protection, the following tools of creative communication were singled out as the most applicable for communicating architectural heritage: illumination of architectural heritage using 3D installations, use of digitised architectural heritage content in communication, the opening of closed architectural heritage sites through inclusive creative works.

Research methodology

Lithuanian heritage communication is a widely analysed topic (Lauzikas et al., 2018; Makhotina, 2020; Markevičienė et al., 2017; Rudokas, 2013). Still, the application of creative communication tools in the communication of architectural heritage in Vilnius has not been analysed so far. Therefore, this case study fills the research gap in the field of Lithuanian heritage communication research with creative communication tools to impart architectural heritage in Vilnius.

The main research question of this case study is the specifics of creative communication in architectural heritage in Vilnius. In order to answer this core research question, sub-questions have been developed, which are depicted in Figure 1.

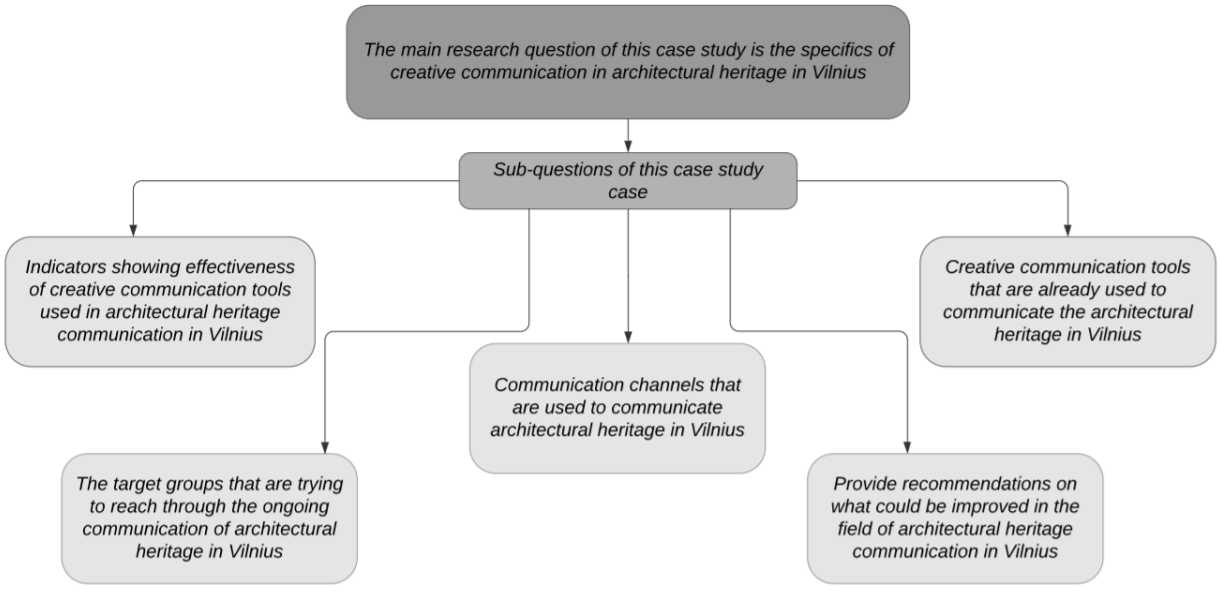

Fig. 1. Questionnaire development (Source: Compiled by the author)

Qualitative expert interviews were chosen in the study because of the aim of the research, which seeks to single out creative tools of communication and identify which of them are most used in the

communication of architectural heritage in Vilnius. In order to identify and describe creative tools of architectural heritage communication, the expert interview was conducted by reaching the experts directly.

In order to determine the criteria, the interview questions were formulated, interviewees were chosen, an analysis of the scientific literature was performed, and a qualitative study of expert interviews was prepared. Upon the analysis of the scientific literature, a qualitative study of expert interviews was completed.

An interview is the most widely used method of collecting qualitative research data. It is similar to the conversation method but is more formal and specific. During the process, the interviews require participants to answer questions accurately and in detail (Barrado-Timón et al., 2020; Creswell et al., 2016; Ladores, 2020). In order for the research process to be successful, a logical diagram was created, which depicts the qualitative research process (see Figure 2).

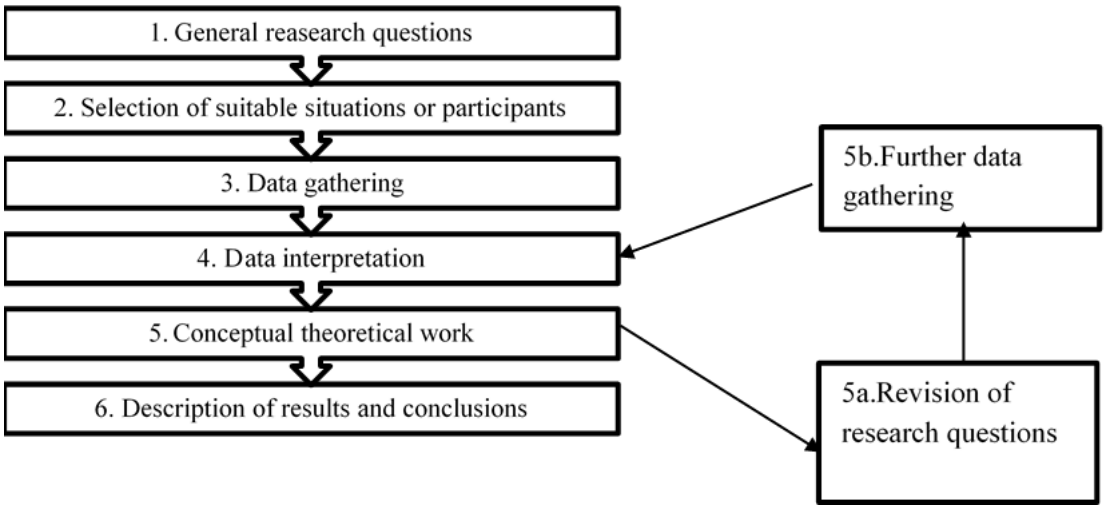

Fig. 2. Qualitative research process (Source: Compiled by the author based on Bryman (2008))

Following this sequence of the process, the subjectivity and bias of the interviewees, which is mentioned by many researchers being the biggest drawback of this study, can be at least partially avoided.

Structure of the research instrument. The interview plan consisted of 5 open-ended questions aimed at finding out the specifics of architectural heritage communication. All interviewees were asked the same questions before the interview, and interviewees were given prior access to the interview questions upon request. The case study was conducted in the form of semi-structured interviews, i.e. the obligatory and the optional questions with the help of which the interview was conducted were set in advance. The questions were clarified and explained at the request of the interviewees, and examples were provided. A direct interview was conducted, i.e. one expert was interviewed during one interview.

Sample validity. One of the most important tasks is to select the appropriate number of experts because the reliability of the study results depends on it. The number of interviewees is selected based on the recommendations of Libby and Blashfield (1978). The authors state that the number of experts should be between five and nine. The reason for this is the accuracy of the expert assessment of a small group. Below is a graph of the correlation between the number of experts and the reliability of the study results. Rudzkienė (2009) also proposes interviewing 5-9 experts in a sample of experts for qualitative research.

Based on the recommendations of Libby and Blashfield (1978) and Rudzkienė (2009), five interviewees were interviewed during the semi-structured interview. The subjects were selected by the following criteria: they had to work in the institutions operating in Vilnius, which are responsible for the preservation and communication of architectural heritage as communication experts/specialists. The research was attended by communication specialists from five leading institutions in Vilnius, responsible for the preservation and communication of architectural heritage, who expressed a common opinion on the communication of architectural heritage in Vilnius. The positions of these interviewees, the title of the institution in which they work and the characteristics of the position are given in Table 1.

Table 1. Characteristics of interviewees (Source: Compiled by the author)

Nr.	Position	Institution	Job characteristics
E1	Senior specialist of communication/Exhibition curator	National Art Gallery	Responsible for communication in the National Art Gallery.
E2	Senior specialist of communication	State commission of Cultural Heritage	Responsible for communication in Heritage and Strategic Planning Department.
E3	Communication department coordinator	National Museum – Palace of the Grand Dukes of Lithuania	Responsible for the communication in Palace of the Grand Dukes of Lithuania
E4	Senior specialist of communication /Vilnius city guide	Vilnius city municipality	Responsible for communication in Culture Department.
E5	Communication manager	Institute of Literature and Folklore of Lithuania	Responsible for the publicity and communication in the Institute of Literature and Folklore of Lithuania.

The results of the qualitative research were analysed by the method of content analysis, distinguishing categories and subcategories. The systematisation of the results obtained for the main categories was also performed. According to Bitinas et al. (2008), qualitative content analysis is a qualitative diagnostic tool that includes four certain steps:

- recurring trends highlighted;
- the transcripts of the interviewees' answers are read many times, distinguishing the essential categories according to certain "keywords";
- semantic elements are identified, the content of some categories is broken down, distinguishing the main elements;
- semantic elements are divided into subcategories, and content data are interpreted;

Based on the aforementioned stages, interviewees' answers were analysed.

Research results

Regarding the creative tools of communication that are already used to communicate the architectural and cultural heritage in their institution, the interviewees singled out five main ones, which are presented and described in Table 2. As can be seen from the data in Table 2, the first four tools, i.e. virtual reality, 3D technologies, heritage illumination and heritage digitisation, are all related to the use of innovative technologies in communicating heritage. The interviewees emphasised in their responses the importance of introducing new technologies into heritage communication. Another

important aspect highlighted by the respondents was the possible opening of closed sites to the public. The Vilnius Open House festival was singled out as an example of such practice; what is more, the opinion was expressed that state institutions, which are located in historic buildings, should allow visitors during various activities. The example of the opening of such sites was provided by the senior specialist of the State Commission of Cultural Heritage. The respondent told about the various quizzes organised by their institution, during which the participants are shown their premises and the history of the building is told. A similar activity, carried out by the Institute of Lithuanian Literature and Folklore, was told about by the respondent, who is responsible for the communication in this institution. The respondent said that various literary evenings are organised in their institution, during which their participants have the opportunity to see the normally closed premises of the institute. During such activities, it is possible to see the interiors of usually closed buildings.

Table 2. Creative communication tools (Source: Compiled by the author)

Tool	**Description**
Virtual reality	Communication uses virtual reality glasses, which tell a story.
3D technology	A 3D scanner scans certain individual architectural objects, the matrices of which are used in education to present heritage objects. Models of architectural objects are made with a 3D printer, are used in museums as an alternative to information stands.
Heritage illumination	Festival of Lights in Vilnius, during which various architectural objects are illuminated. A light installation in the Reformers Square - "Luther's Rose" - created to commemorate the 500th anniversary of the Reformation.
Heritage digitalisation	An app is being created with the photos of gone buildings to present visual information of what the part of the city one is passing through used to look like. A website is being created using a scanned archive of drawings and blueprints by architect Jonas Mulokas.
Increasing public access to closed sites	During the Vilnius Open House festival, visitors can visit more interesting architectural buildings, most of which are usually closed to visitors or have a very limited number of visitors. Special initiatives of state institutions, during which the visitor is given the opportunity to inspect the interior of the architectural object.

Summarising the creative tools of communication of architectural heritage, which are already used to communicate architectural heritage, it can be concluded that a great deal of attention is paid to state-of-the-art technologies. It is the use of the latest technologies in communication, conservation and restoration of heritage that is also recommended in the strategic documents on heritage conservation. Thus, it can be deduced that Lithuanian state institutions follow the European recommendations and implement them in practice.

After discussing the creative tools of communication that are used to communicate architectural heritage, it is important to discuss the effectiveness of these measures as well. During the interviews, the interviewees were asked to name indicators showing the effectiveness of creative communication tools used in architectural heritage communication. The respondents singled out the following indicators: formation of a long-term connection, establishment of secondary contacts, and formation of feedback.

The majority of the interviewees singled out the formation of a long-term connection when the same visitors regularly visit the architectural heritage sites and participate in the activities organised in them. The interviewees noted that such connection is mainly formed with students who are constantly involved in various educational activities, and seniors who participate in third-age university activities through which architectural heritage is presented.

Another important indicator covered by the interviewees is the establishment of secondary contacts. Activities related to the communication of architectural heritage involve constant cooperation with various institutions, organisations or simply private individuals who provide filming, photography or other technical services. A specialist working at the State Commission of Cultural Heritage shared information that in organising photography exhibitions, they cooperate with university and college students who photograph architectural sites for the exhibition. This connection is mutually beneficial - it gives students first-hand experience, and the institution gets a quality product to use in communication.

The third efficiency indicator singled out by the interviewees is the formation of feedback. Experts describe this indicator as receiving some kind of feedback from a visitor. After the event, during which the architectural heritage was presented, the visitor expresses his/her opinion to the organisers of the event. Opinions are usually expressed via e-mails or comments on social media. The opinion expressed is not always positive, but it shows that the visitor has been reached, it is relevant to him. Expressed remarks, advice or thanks are very important; they help to improve, understand the needs of the visitor, they motivate to work.

After discussing the indicators showing the effectiveness of communication tools, it can be seen that special attention is paid to the formation of long-term connection and feedback with the visitor and the cooperation that occurs after the activities.

Interviewees were asked what communication channels are used to communicate in their institutions. All case study respondents singled out social networks as the main communication channel used to reach society most effectively and quickly. Interviewees singled out three social networks in which the institutions they represent have accounts and post information: Instagram, Facebook, Twitter.

Another channel of communication mentioned is articles in the media. However, this communication channel was mentioned by only one institution, which provides information to the media about the events organised. Other interviewees stated that providing articles to the media or communicating information about the event on the television is expensive, so these communication channels are practically not used in reality or are used minimally depending on the importance of the information and the scope of the event.

The interviewees also mentioned that communication takes place on the websites of their institutions, where information about upcoming and past events, seminars, lectures, etc., is published. The aim is to present the information as simply as possible, to divide it into sections so that it is convenient for the visitor to use it, to make the page informative and user-friendly.

Summarising the communication channels mentioned by the interviewees, it can be seen that social networks are the main communication channel; however, it is not fully exploited, as only three main social networks are mentioned, experts of case study institutions do not use other social media, or institutions do not have accounts in them. Due to the high costs, the media is rarely used as a communication channel. Communication is also carried out on the institutions' websites. They try to provide information as simply as possible so that the visitor can find the information they need conveniently and quickly.

During the interviews, the interviewees were asked to name the target groups that their institutions are trying to reach through the ongoing communication of architectural heritage. The following target groups were identified: the public, pupils, students, individual visitors. In answering this question, most interviewees first mentioned that they do not have one target group because it is important for them to reach the whole society. This is because the interviewees work in state institutions, one of the functions of which is to inform the public about their activities. However, when asked to specify

certain target groups at which events, lectures or other activities are targeted, the respondents clarified and identified pupils and students for educational activities, interactive games, quizzes, competitions, as well as seniors whose activities are mainly related to third-age university activities. These are usually seminars, lectures, book presentations, etc. It was also mentioned that the communication carried out is also intended to keep in touch with regular visitors in an effort to involve them on a regular basis in the activities carried out by the same site.

Upon the summary of the received answers, it can be concluded that communication is aimed at the whole society, and the specific events are aimed at attracting different target groups to the architectural heritage. The interviewees singled out pupils, students and seniors as their main target groups.

The interviewees were asked to provide recommendations on what could be improved in the field of architectural heritage communication. As can be seen from the recommendations and expert comments in Table 3, there is a strong focus on public involvement through volunteering and public involvement in amateur heritage research.

Table 3. Interviewees' recommendations (Source: Compiled by the author based on the answers of the interviewees)

Recommendation	**Interviewee's comment**
To provide quality content through communication	...it is very important to provide people with quality content..."
To engage people in amateur heritage research	„...amateur involvement in heritage communication <...>, "An Intelligent Strategy in 21st Century" announces that many people are happy to engage in amateur heritage research, but it would be possible to organise that activity directly ..."
To act at the more political level	„ ... we need to work at different levels, the best strategy is to do something in more than one direction, to act in all directions <...> at the political level we really need more democracy <...> heritage protection in Lithuania is still perceived as a task of a state institution, not for society as a whole ..."
To encourage volunteering	"... volunteering could be one of the areas that need to be improved, pupils really need to be activated to make them more aware of and interested in heritage ..." "... volunteering for pupils ... during the summer holidays, students could do various internships in a museum or other site ..."
To improve communication in social media	"... we also need to make the best possible use of the new tools that the world is now using - social networks, they are an alternative to official media ..."
To introduce the society to science departments	"... the public should be better acquainted with the scientific departments and their work, show how restorers, archaeologists, dendrologists work ..." "... the public could see how the whole heritage conservation process takes place"

It is also proposed to improve the quality of the content of the communication, as well as to communicate more on social networks, as it is substituting the traditional media. It is suggested to act at a more political level in order to bring together all the interested groups into the communication of the architectural heritage, to act at as wide of a scope as possible, in different directions. Authorities should assist communities by teaching them how to communicate architectural heritage properly. It is proposed to acquaint the public with the whole process of heritage restoration, to open scientific departments that carry out the preservation of architectural heritage.

Conclusions

The analysed case study demonstrates that the following creative communication tools to communicate architectural and cultural heritage in Vilnius already used architectural heritage illumination, 3D installations, digital heritage content, and opened closed architectural heritage sites through inclusive activities. This case study fills the research gap of Lithuanian heritage communication research with creative communication tools to communicate architectural heritage in Vilnius.

Regarding the indicators showing the effectiveness of communication tools, it can be seen that special attention is paid to the formation of long-term communication and feedback with the visitor and the cooperation that occurs after the activities.

The communication of the architectural heritage is multifaceted because the heritage is multifunctional. Heritage communication works through various channels and is focused on different target groups; however, in order for the communication to be effective, it requires consistency of communication and an integrated approach to all aspects of communication. Structured communication is essential for the best communication impact. Depending on the analysed case study, it is proposed to develop the coherence of communication by creating a constant flow of information on social media (Instagram, Facebook, Twitter), providing more information on the context of architectural heritage (ongoing activities related to cultural, architectural heritage) to interest audience and involve it in heritage protection activities.

It is recommended that Lithuanian state institutions, responsible for heritage preservation, develop inter-institutional cooperation (between institutions responsible for heritage protection and involving representatives of the education and cultural sectors and creative industries), train employees responsible for architectural heritage communication processes, hone their competencies in working with creative tools of communication.

Although Lithuanian state institutions, responsible for heritage protection, perform the communication functions for architectural heritage and use creative tools of communication, the use of the latter is not developed and is limited to fragmented initiatives. The lack of specialised knowledge, specialists and resources are cited as the reasons for underdeveloped creative communication in the field of cultural heritage.

References

Aragón, C., Buxton, J. ir Infield, E. H. (2019). The role of landscape installations in climate change communication. Landscape and Urban Planning, 189, 11-14. https://doi.org/10.1016/j.landurbplan.2019.03.014

Bernárdez Rodal, A., Padilla Castillo, G. ir Sosa Sánchez, R. P. (2019). From Action Art to Artivism on Instagram: Relocation and instantaneity for a new geography of protest. Catalan Journal of Communication & Cultural Studies, 11(1), 23-37. https://doi.org/10.1386/cjcs.11.1.23_1

Bitinas, B., Rupšienė, L., & Žydžiūnaitė, V. (2008). Kokybinių tyrimų metodologija [Qualitative Research Methodology]. Klaipėda: S. Jokužio Press.

Bryman, A. (2008). Social research strategies. Social Research Methods. (3rd ed.). New York: Oxford University Press.

Bräuchler, B. (2019). Brokerage, Creativity and Space: Protest Culture in Indonesia. Journal of Intercultural Studies, 40(4), 451-468. https://doi.org/10.1080/07256868.2019.1628721

Ciurea, C., & Filip, F. G. (2019). The globalisation impact on creative industries and cultural heritage: a case study. Creativity Studies, 12(2), 211-223. https://doi.org/10.3846/cs.2019.7753

Council of Europe, (27 October 2005). Framework Convention on the Value of Cultural Heritage for Society. Faro Convention. [Accessed 27.01.2021]. Available from Internet: https://rm.coe.int/1680083746

Creswell, J. W., & Poth, C. N. (2016). Qualitative inquiry and research design: Choosing among five approaches. Sage publications.

Eliëns, A., Wang, Y., van Riel, C. ir Scholte, T. (2007). 3D digital dossiers: a new way of presenting cultural heritage on the web. In Proceedings of the twelfth international conference on 3D web technology (pp. 157-160). ACM. https://doi.org/10.1145/1229390.1229418

Esposito, P., & Ricci, P. (2020). Cultural organisations, digital Corporate Social Responsibility and stakeholder engagement in virtual museums: a multiple case study. How digitisation is influencing the attitude toward CSR. *Corporate Social Responsibility and Environmental Management*. https://doi.org/10.1002/csr.2074

Fabola, A., Kennedy, S., Miller, A., Oliver, I., McCaffery, J., Cassidy, C., ... & Vermehren, A. (2017, June). A virtual museum installation for time travel. In *International Conference on Immersive Learning* (pp. 255-270). Springer, Cham. https://doi.org/10.1007/978-3-319-60633-0_21

Ladores, S. (2020). Applying Petitmengin's Explicitation Interview Method to Elicit the Lived Experience of Breathing Upon Waking by an Individual with Cystic Fibrosis. *Journal of Patient Experience*, *7*(6), 856-868. https://doi.org/10.1177/2374373520956740

Laužikas, R., Dallas, C., Thomas, S., Kelpšienė, I., Huvila, I., Luengo, P., ... & Vaitkevičius, V. (2018). Archaeological knowledge production and global communities: Boundaries and structure of the field.*Open Archaeology*, *4*(1), 350-364. https://doi.org/10.1515/opar-2018-0022

Makhotina, E. (2020). Between heritage and (identity) politics: dealing with the signs of communism in post-Soviet Lithuania. National Identities, 1-20. https://doi.org/10.1080/14608944.2020.1784123

Libby, R., & Blashfield, R. K. (1978). Performance of a composite as a function of the number of judges. Organisational Behavior and Human Performance, 21(2), 121-129.

Markevičienė, J. (2016). Kultūros paveldas šiuolaikiniame pasaulyje: tarptautiniai kultūros paveldo apsaugos principai ICOMOS dokumentuose 1965–2014 metais.

Park, E. J., & Kim, M. J. (2021). Visual Communication for Students' Creative Thinking in the Design Studio: Translating Filmic Spaces into Spatial Design. *Buildings*, *11*(3), 91. https://doi.org/10.3390/buildings11030091

Poudel, M., & Roy, D. (2019, March). 3D printing and technical communication in a creative factory classroom: a case study in Japan. In Proceedings of the 2019 7th international conference on information and education technology (pp. 92-99). https://doi.org/10.1145/3323771.3323802

Raptis, G. E., Sintoris, C., & Avouris, N. (2019). DeCACHe: Supporting Designers in Creating Cognition-Centered Adaptive Cultural Heritage Activities. Heritage, 2(3), 2573-2596. https://doi.org/10.3390/heritage2030158

Rudokas, K. (2013). Culture Based Communication: Architecture as Image Making Strategy. Coactivity: Philosophy, Communication/Santalka: Filosofija, Komunikacija, 21(1), 35-45.

Rudzkienė, V. (2009). E-government guidelines of the Republic of Lithuania: research study of future insights (pp. 163–260). Vilnius: Mykolo Romerio University.

Saris, B. (2020). A Review of Engagement with Creativity and Creative Design Processes for Visual Communication Design (VCD) Learning in China. *International Journal of Art & Design Education*, *39*(2), 306-318. https://doi.org/10.1111/jade.12262

Smaliukienė, R., & Survilas, A. (2018). Relationship between organisational communication and creativity: how it advances in rigid structures?. Creativity Studies, 11(1), 230-243. https://doi.org/10.3846/cs.2018.4004

Swensen, G., & Nomeikaite, L. (2019). Museums as narrators: heritage trails in a digital era. Journal of Heritage Tourism, 14(5-6), 525-543. https://doi.org/10.1080/1743873X.2019.1574803

Šerić, M. (2020). The impact of communication technology vs human-related factors on classroom performance: a cross-cultural study. The International Journal of Information and Learning Technology. https://doi.org/110.1108/IJILT-03-2020-0037

World Heritage Centre. (2005). Basic Texts of the 1972 World Heritage Convention. UNESCO.

Xue, B. (2019). Development and Design of the Virtual Design System Based on the Visual Communication. In The International Conference on Cyber Security Intelligence and Analytics (pp. 86-91). Springer, Cham. https://doi.org/10.1007/978-3-030-15235-2_14

ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0002

FINANCIAL INCLUSION AND LABOUR MARKET PARTICIPATION OF WOMEN IN SELECTED COUNTRIES IN AFRICA

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Abstract

Research purpose: This study investigates the impact of financial inclusion on female labour force participation in Africa. It also complements the existing studies by evaluating how advancement in information and communication technology (ICT) and Trade openness (TO) modulate the relationship between financial inclusion and female economic participation in selected African countries.

Design/methodology/approach: The study focuses on twelve African countries while the empirical evidence is based on Fixed Effects, Random Effects and Generalised Least Square estimators (GLS). Data over the period of 2005-2016 are sourced from the World Bank Development database and IMF international Financial Statistics.

Findings: The results show that financial inclusion has a non-monotonic relationship with female labour force participation. The study establishes that if the level of financial inclusion can be increased to the range of 33-57 per cent, it would improve the level of women participation in economic activities. The results further show that ICT moderates the nexus between financial inclusion and female economic participation at a threshold level of 38.17 per cent. These findings persist when the TO is used as the moderating factor at a threshold value of 80.90 per cent. The results are robust enough to suggest an alternative proxy for female labour force participation and alternative estimation techniques.

Originality/value/practical implications: Ending gender inequality has become one of the priorities in the global development policies in which most African nations domesticate the same for their national planning. There are voices at every corner in Africa demanding the possibility of achieving gender equality in employment, among others. This article is one of the few articles that evaluate whether financial inclusion can be used to accelerate female economic participation in Africa.

Keywords: Financial inclusion; Female empowerment; Africa.

JEL Codes: E02, G20.

Introduction

In this study, we examine the impact of financial inclusion on female labour force participation in Africa. It also complements the existing studies by evaluating how advancement in information and communication technology (ICT) and Trade openness (TO) modulate the relationship between financial inclusion and female economic participation in selected African countries. It is no longer a revelation that women have limited access to formal financial services in Africa. One of the major reasons is the inability to provide collateral required by banks and other financial services. Most African women engage in small scale businesses while borrowing to finance such businesses increase their transaction costs. To further accelerate their economic engagement, financial inclusion is proposed due to its opportunity to encourage financial access at a lower cost. Financial inclusion policy focuses on bringing less privileged groups, including women, into the formal financial system

of the economy. Through financial inclusion, financial institutions can provide comprehensive packages at a cheaper rate to women, including small loans, saving facilities, payment services, money transfers and insurance packages to the formally excluded households (Fofana, *et al*. 2015; Cooray, *et al*. 2017; Ajide, 2020; Ajide 2021).

Financial inclusion is seen as a means of achieving poverty alleviation in African nations because it enables individuals to build up physical and financial assets, start a new business and further enhance women's financial education. Providing these serves empowers more women and strengthens the African economic, social and cultural settings (Fofana, *et al*. 2015). Furthermore, female economic participation through financial inclusion has become one of the components of international labour organisation's agenda of promoting decent work, derived from sustainable development goals (International Labour Organisation, ILO, 2019). Encouraging women's access to employment opportunities is a move towards gender equality which has attracted the attention of scholars and policymakers in Africa (Anyanwu & Augustine, 2013). Scholars show that economic growth, information and communication technology, country openness, among others, influence female economic participation (Cooray, *et al*. 2017; Efobi *et al*, 2018; Altuzarra, *et al*, 2019). The recent study of Morsy (2020) shows that access to a bank account can influence the economic participation of women.

In the present study, we advance our understanding of the nexus between finance and female economic participation by investigating the impact of financial inclusion on female economic participation in Africa. There are wide disparities between females and males' labour force participation rate in Africa. Within the same region, there are gender gaps in financial inclusion that vary across countries (Cooray, *et al*. 2017; Morsy, 2020). For instance, Tanzania, Mali and Mauritania have a low rate of female participation. In the same vein, this variation continues to persist across the African continent (Cooray, *et al*, 2017). It has been discovered that the traditional services of financial institutions are not really serving the poor, including the women (Arnold & Gammage, 2019). More than 65 per cent of the female population have no access to financial services, and less than this percentage own small business enterprises compared to about 72 per cent of male counterparts. This gender gap persists despite the impressive development in access to finance in Africa. This gap is wider among poor households (Demirgüç-Kunt *et al.* 2018).

Meanwhile, it has been acknowledged that the financial exclusion of women is a global issue, but there is wider gender gap in Africa compared to other regions (Demirguc-Kunt, Klapper & Singer, 2013). More than 70 per cent of African women are financially excluded. Even where they have access to finance, it is behind that of males' counterparts. Improving African women's access to finance requires sustained efforts to ensure that economic opportunities and their rights are enhanced, which will improve the level of their economic participation. Reducing the wider financial inclusion gap can encourage female labour force participation rate, as pointed out by previous studies (Cooray, *et al*. 2017; Morsy, 2020). For instance, it has been well documented that countries with little or no financial inclusion gap have experienced an improvement in female labour participation. In Albania, there is about 4 percentage points reduction in the gender economic participation gap, while in Bahrain, it is about 6 percentage points reduction. In Malta, it reduces from 32 to 26 percentage points. The World Bank's analysis indicates that a reduction of 10 percentage points in the labour force participation gap can improve financial inclusion equity by 6 percentage points (World Bank, 2019). Despite this development, there is little or no study that empirically investigates whether financial inclusion can be used as part of toolkits to influence women economic participation in Africa.

Our study contributes to the existing literature in a number of ways. First, we formulate financial inclusion using Sarma (2008) normalisation procedures after considering six financial inclusion dimensions for Africa. The financial inclusion index is measured by normalising the inverse of Euclidean distance from the ideal point. Financial inclusion provides the basic skills to have a financial education. Improving the level of financial access can make women manage business risks better and smooth their consumption, most importantly, in the face of economic shocks (Dupas & Robinson 2013). Financial inclusion can provide low-income women with the adequate financial tools to save, borrow, make and receive payments, and, most importantly, be self–employed within the

formal economic systems, which would eventually reduce the African poverty population (Holloway, Niazi, & Rouse, 2017).

Second, it has been established by Asongu and Odhiambo (2018) that information and Communication Technology (ICT) moderates the relationship between access to finance (by deposit and credits channels) and female labour force participation rate. Our study complements the established findings by investigating the modulating effect of ICT infrastructure (by African ICT composite index) in the relationship between financial inclusion and female economic participation. It is also of a significant benefit to further reinforce the existing prepositions that finance improves the investment opportunities for household and women in business which is capable of uplifting the African women's standards of living (Wale & Makina, 2017; Hendriks, 2019). Third, we take a further step to examine the non-monotonic relationship between financial inclusion and female labour participation rate in Africa. Most economic literature document the U-shape relationship between economic variables and female labour force participation (Altuzarra, *et al*. 2019). This means that during the early stage of economies, female labour participation rate declines due to structural changes, while in a later stage, it improves with the level of economic opportunities. Since financial inclusion brings more structural changes and transitional impacts in the financial system of an economy, it is worthwhile to test for the non-monotonic relationship, especially now that financial inclusion in Africa is still at the developing stage. In addition, this paper is within the realms of Sustainable Development Goals (SDGs) that preaches that empowering African females financially is very important at this time because of the low rate of female labour force participation in Africa. Financial inclusion policy can further empower women to make economic decisions and have better control over the allocation of resources (Karlan *et al.* 2016). Women's access to funds and personal savings foster economic resilience by allowing them to make financial choices within the households (Dupas *et al.* 2016). Inclusive finance as a policy intervention has the tendency of encouraging more female labour participation through female entrepreneurial financial supports. Female entrepreneurial activities not only create employment for themselves but may also increase job opportunities in Africa. Policymakers need to be advised adequately with empirical evidence on improving the present position of female empowerment in Africa. Hendriks (2019) opines that female financial inclusion can lead to better outcomes for children, household nutrition and society in general. Digital transfer can improve both dietary options and conventional cash transfer. In this case, most females living in poor households with pensioners would demonstrate better nutrition with good financial education and empowerment (Duflo, 2003).

This paper is organised into 6 sections. The next section explains the rationale for the study, followed by a literature review. In section 4, we discuss the methodology of the study. Section 5 reports the empirical results, while section 6 concludes the paper.

Literature review

The hypothesis that explains the relationship among economic variables and economic participation of women is theoretically embedded in the feminisation U-curve that suggests that female participation in the labour market reduces in the first stage of development and then increases as economic development opportunities emerge. However, apart from economic development opportunities, women's decisions to participate in the labour market are affected by many factors. These factors may include current and future market conditions, educations, fertility rate, marital status and spacing for childbearing (Altuzarra, 2019). Meanwhile, studies on female labour force participation in Africa are diverse, ranging from the role of education (Khanie, 2019), information and communication technology (Efobi *et al.* 2018) to general determinants (Anyanwu & Augustine, 2013). In recent studies, finance plays a prominent role in the economic participation of women, and it is generally considered to have an important impact on female labour force participation. Armendariz and Roome (2008) show that microfinance loans improve income generation of women and, at the same time, increases the standard of living. This is called an empowering effect. Asongu and Odhiambo (2018) analyse how financial access improves female labour force participation in Africa through ICT as a modulating factor. Their study relies on theoretical and empirical literature that stress that finance creates and improves investment opportunities for both male and female households which eventually

reduces gender inequality and improve the standard of living (Wale & Makina, 2017; Tchamyou *et al*. 2019).

The study of Arouri and Nguyen (2017) examines the impact of microcredit on men and women's labour supply in Egypt with the intent to investigate whether microcredit reduces the employment gap. Their study documents that microcredit improves women participation in economic activities and reduces gender employment gap. This opposes the submission of Taha (2001), who investigates the impact of microcredit in Cairo. The author documents that there is no significant impact of microcredit on empowerment. The study of Niaz and Iqbal (2019) considers and tests the impact of microfinance on women empowerment in Pakistan empirically, using OLS and Propensity Score Matching for the data of 670 respondents. They find that exposure to such financial tools positively impacts women empowerment. The recent study of Khan *et al.* (2020) analyses how microfinance influences female entrepreneurs in Pakistan. They confirm that microfinance improves the level of female participation in economic activities and as well makes them financially stable. Furthermore, Fofana, *et al*, (2015) examine the effect of microcredits on women's livelihood and empowerment in Coˆte d'Ivoire's rural areas. Using a cross-section survey, the study reveals that microcredits have significantly increased female empowerment. The work of Samant *et al.* (2019) investigates the impact of microcredit on women empowerment indicators in the Haridwar district of Uttarakhand. Using structured questionnaires to source data from 362 samples, they reveal that there is no association between empowerment and microcredits.

In addition, some recent studies provide that financial inclusion plays a significant role in income inequality and gender gaps in the economy. For instance, Cihak and Sahay (2020) relate finance to inequality. Their work establishes that (1) financial depth reduces income inequality, and (2) financial inclusion reduces inequality, especially when women gain more access to finance. Signorelli *et al* (2012) show that financial constraints or crisis play a role in the agenda of improving female labour participation rate between 1980-2005 in about 86 countries. Their study presents new econometric reports categorised based on income level. According to their submission, "it provides information about the persistence and severity of crisis impact for women".

On other factors that determine female economic participation, the current literature has established that culture, institutions, financial crisis, unemployment rate, foreign direct investment and other macroeconomic factors affect economic participation of women in developed and developing countries. The economic impact of unemployment on economic participation of women is ambiguous. An increase in the unemployment rate may lower female participation. Furthermore, an increase of the rate may as well improve the level of female participation in economic activities in order to compensate for the decline in household income, especially from a husband. There are other factors that include gender norms that affect female participation. In Africa, women are excluded in some industries due to social stigma, while the urbanisation rate can also be a force affecting female labour participation. Cooke (2010) demonstrates the pattern of women empowerment in Asian economies by comparing the women empowerment situation in China, Japan, India and South Korea. The study demonstrates the heterogeneous features inherent in political regimes, institutional factors and societal values as they manifest in employment and human development in Asian countries. In conclusion, the study reveals that all these factors demonstrate similar outcome in each country. The study of Anyanwu and Augustine (2013) analyses the features of gender equality in Africa and empirically examines factors that drive gender equality in the region. Using a cross-sectional data of African countries, their study establishes that democracy, domestic investment, education, urbanisation improve the level of gender equality in Africa while real GDP per capita, higher foreign direct investment, sex population ratio lower gender equality in oil-exporting countries in Africa.

Cooray *et al.* (2017) employ data of 48 Sub-Saharan African countries over a period of 1985-2012 to examine the impact of trade openness on labour force participation rate. They explore the role of democracy, political rights and civil liberties in driving the relationship between trade openness and labour force participation in Africa. The results confirm that all these institutional variables enhance the positive relationship between labour force participation and trade openness. Democracy and political rights play major roles in improving the beneficial effect of trade openness in SSA. Khanie

(2019) examines the role of education in female labour market participation in Botswana. Using the 2015/2016 Botswana Multi-Topic Household Survey data and a multinomial logit model, the study finds that women with higher qualifications are more likely to be employed. In the study of Yusnandar *et al*. (2020), it was revealed that there are striking differences in the effect of major determinants of economic participation of men and women in various age cohorts in Indonesia after using a survey conducted in the year 2018. Marital status positively influences men, while education is the major determinant for women. They also discover a U-shaped relationship in the impact of various determinants of female labour participation likewise males. Education and training as well encourage a decent standard of living. Li *et al.* (2019) provide evidence for the existence of threshold effects in trade openness, which affect the female labour force participation rate (FLFPR) in Asian countries. Using panel threshold regression, they document that there is an optimal value in the correlation between trade openness and female labour participation. The study further demonstrates that below the threshold an increase in trade openness increases female labour participation.

Although there are studies that examine the impact of finance on female economic participation, little or nothing is known on the roles of financial inclusion on economic participation of women in Africa. This present study builds on the existing literature and advances the previous studies by empirically examining the relationship between financial inclusion and female labour force participation rate in African nations. The following hypotheses have been formulated in this study to achieve the mentioned objective with regard to the theoretical framework and literature review:

H1. Financial inclusion has a significant impact on female labour market participation.

H2. There is a non-monotonic relationship between financial inclusion and female labour participation.

H3: ICT modulates the impact of financial inclusion on female labour market participation.

H4. Trade Openness modulates the impact of financial inclusion on female labour market participation.

To sum up, Figure 1 presents the key variables of the study and their interactions. It illustrates the hypotheses of the study. It shows that financial inclusion may impact female labour participation directly and indirectly through ICT and trade openness, as described above.

Fig. 1. The conceptual framework (Source: designed by author)

Research methodology

The main objective of this paper is to investigate the impact of financial inclusion on female labour force participation in Africa. To do this, we consider the fixed effect and random effect panel estimation techniques while Hausman Test is conducted for the selection of the appropriate estimations. We also examine the reliability of the goodness of fit and models' overall significance via Adjusted R-square and Wald Test (F-statistics). Robustness checks are also performed via alternative dependent variables and the Generalised Least Square (GLS) estimation technique. Following the

previous studies (Tam, 2011; Anyanwu & Augustine, 2013; Asongu & Odhiambo, 2018), our empirical model to test hypothesis 1 and 2 is stated in equation (1):

$$FLFP_{i,t} = \beta_0 + \beta_1 FII_{i,t} + \beta_2 FII_{i,t}^2 + \sum_{k=1}^{5} \delta_k X_{k,i,t} + e_{i,t} \quad (1)$$

where *FLFP* is female labour force participation rate, and it is the dependent variable.

We also use Female Employment to population ratio as a robustness check in the alternative estimation. The key independent variable is financial inclusion. In the specification above, *FII* is the financial inclusion index. At the initial stage, Morsy (2020) notes that females may probably be excluded from the financial system in a region where there is little or no presence of foreign banks, the state owns a substantial portion of ordinary shares in most existing financial institutions, credit information is less available and, most importantly, there is a large difference in education attainment between males and females. This means that it is possible to have a U-shaped relationship between female labour participation and financial inclusion in Africa. As the country's financial inclusion grows, female labour force participation rate may not increase. Because in Africa, women face discrimination, and they are disproportionately vulnerable as far as employability is concerned. Discrimination in gender roles has implications for self-determination, dignity, freedom, and it influences financial inclusion or lack thereof. Women are likely to get engaged in the informal sector, and they are vulnerable to low-paid or undervalued employments. Females do not enjoy the same access to financial services as males. About 56 per cent of all those without a bank account are females. This means that most females are unbanked in Africa, and those with bank accounts do not necessarily have control over them, but this could be a starting point towards financial inclusion in Africa (ILO, 2019).

However, a number of hypotheses have been put forward to explain why female labour force participation rate may initially fall after reaching a certain point of increase in association with financial or macroeconomic variables. This is often termed female labour force participation U-shaped trajectory (Tam, 2011; Anyanwu & Augustine, 2013). It has been suggested that males' greater access to finances, education, and mobile phone financial technology may deter females from the labour market during the early stage in the economy. As these structural changes continue and females gain more access to finances, education and mobile phone financial technology, the female labour market participation rate increases (Boserup, 1970). We can also relate this relationship to the 'income and substitution effect'. As financial development in an economy occurs, access to more liquidity improves, and households' unearned incomes increase. This reduces women's incentive to participate in formal economic activities. This negative implication is called the 'income effect', since more household income implies that households are able to afford more female leisure time. Meanwhile, the substitution effect operates in the opposite direction—as female wages rise, more women have the incentive to enter the labour market (Bloom *et al.* 2009; Chaudhuri, 2009; Tam, 2011). In order to properly capture financial inclusion impact on female labour force participation rate, the study includes a non-linear term for financial inclusion (FII^2) to evaluate any possible potential threshold level of financial inclusion. We use this variable to examine any potential optimal financial inclusion as prescribed by Ozili (2020).

Furthermore, X represents a matrix of control variables. Our choice of control variables is guided by the current literature and economic theory. The control variables include Trade Openness, Inflation rate, Female Unemployment rate, Democracy variable, GDP per capita growth rate, Foreign Direct investment (as a percentage of GDP), Information and Communication Technology, Financial Crisis and Remittance (as a percentage of GDP), e is the error terms. Anyanwu (2012), Asongu and Odhiambo (2018), and Meniago and Asongu (2018) suggest the inclusion of remittances in women economic participation model because it has the tendency to increase income and gender inequality in Africa. The majority of the migrants are from wealthy families who can afford the financial constraints and administrative bottleneck of visas' processing. This implies that remittances have a negative redistributive effect because of their tendency to skew towards the direction of improving the wealth

of the rich in African society. We also consider democratic accountability in our study because political freedom and accountability are expected to promote gender economic empowerment and economic inclusion. It provides enabling atmosphere for investment on the part of women in society (Anyanwu & Augustine, 2013). Furthermore, the study considers ICT as a control variable due to the recent evidence established in the study of Asongu and Odhiambo (2018). They show that ICT modulates the relationship between finance and female labour force participation rates. We consider trade openness and FDI in this study because previous studies show that globalisation through international trade and FDI can generate employment opportunity for women, most specifically in multinational corporations (Richards & Gelleny, 2007; Oostendorp, 2009). However, FDI is likely to make women lose their jobs or push them down the production process due to advancement in technical development in which men may have faster access to(Parpart *et al*, 2000; Ernesto, 2011). The financial crisis, *CRISIS*, is included because women (including housewives) are vulnerable to crisis, especially when it affects the husband employability, as documented by Signorelli, *et al* (2012). The inflation rate is included in our model to take care of price adjustments in the economy (Jacobsen, 1999). The impact of the unemployment rate on female labour force participation is ambiguous (Altuzarra, *et al*, 2019). Vlasblom and Schippers (2004) argue that a higher level of unemployment rate may lower the women's economic participation rate due to the inability to find a good job in the labour market, thereby lowering their incentives to participate in economic activities. Furthermore, an increase in the male unemployment rate may lower the chances of female participation rate in economic activities (Ozerkek, 2013). However, an increase in male unemployment can encourage females to participate in order to get compensation for a decrease in household income (Fatima & Sultana, 2009). Due to the influence of the unemployment rate on female economic empowerment, we include the variables in our model. This study takes a further step to test the third and fourth hypothesis of the study by examining the modulating and the interaction impact of ICT and TO with financial inclusion in Africa. In order to do this, we specify equations (2) and (3). Hypothesis Testing Equation 2:

$$FLFP_{i,t} = \beta_0 + \beta_1 FII_{i,t} + \beta_2 ICT_{i,t} + \beta_3 (ICT_{i,t} \times FII_{i,t}) + \sum_{k=1}^{4} \delta_k X_{k,i,t} + e_{i,t} \quad (2)$$

Hypothesis Testing Equation 3:

$$FLFP_{i,t} = \beta_0 + \beta_1 FII_{i,t} + \beta_2 TO_{i,t} + \beta_3 (TO_{i,t} \times FII_{i,t}) + \sum_{k=1}^{4} \delta_k X_{k,i,t} + e_{i,t} \quad (3)$$

$(ICT_{it} \times FII_{it})$ is the interaction term to test if ICT could influence financial inclusion impact on the labour participation of women. $(TO_{it} \times FII_{it})$ is the interaction term to test if trade openness could influence financial inclusion impact on the labour participation of women. X is the vector of k=4 control variables as discussed above, i is the index of countries, t is the years, and e_{it} is the error term.

On Data and variable measurements, this study covers a period of 2005-2016. The sources of the data are the World Bank development indicators, IMF International Financial Statistics and the African Infrastructure Development Index of the African Development Bank. The sources and the data structures are explained in Table 1. The study considers twelve (12) countries in Africa due to the non-availability of data to meaningfully calculate the financial inclusion index and to have balanced panel data. We consider the following countries: Tunisia, Botswana, Nigeria, Algeria, Ghana, Gabon, Uganda, Malawi, Zambia, Sierra Leone, Republic of Congo and Ethiopia. We compute the financial inclusion index to follow the methodology of Sarma (2008) (*see Appendix*). We use six financial inclusion dimensions to compute the index. These dimensions include automated teller machines per 100,000 adults, commercial bank branches per 1000 adults, depositors with commercial banks per 1000 adults, domestic credit to GDP ratio, bank borrower per 1000 adults and number of commercial bank accounts per 1000 adults. All indicators are sourced from World Bank Development Indicators and International Financial Statistics of IMF.

Table 1. Sources of data and measurements of variables (Source: author's compilation)

Variables	Definitions	Sources
FLFP	Female Labour Force Participation rate (% of female population ages 15+) (modelled ILO estimate)	World Bank Development Indicators.
IF	Inflation rate	World Bank Development Indicators
UN	Unemployment rate, Female	World Bank Development Indicators
GR	GDP Per capita growth rate	World Bank Development Indicators
ICT	Information and Communication Technology	ICT Composite Index (Consists of Telephone subscription, Internet penetrations. The data were sourced from African Infrastructure Development Index (2019)
FDI	FDI inflows (as a percentage of GDP)	World Bank Development Indicators
REM	Remittance (as a percentage of GDP)	World Bank Development Indicators
TO	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Bank national accounts data, and OECD National Accounts data files.
CRISIS	Systematic Banking crisis	Laeven and Valencia (2008)
DA	Democratic Accountability index	International Country Risk Guide
EMP	Employment to population ratio, ages 15-24, female (%) (modelled ILO estimate)	World Bank Development Indicators
FII	Financial inclusion index	Computed by the author using Sarma (2008)'s formula (See Appendix)
ATM	Automated teller machines per 100,000 adults	World Bank Development Indicators and International Financial Statistics of IMF
BRAN	Commercial bank branches per 1000 adults	World Bank Development Indicators/ International Financial Statistics of IMF
DEPO	Depositors with commercial banks per 1000 adults	World Bank Development Indicators /International Financial Statistics of IMF
DOME	Domestic credit to GDP ratio	World Bank Development Indicators /International Financial Statistics of IMF
BORR	Bank borrower per 1000 adults	International Financial Statistics of IMF
ACCT	Number of commercial bank accounts per 1000 adults	International Financial Statistics of IMF

Research results

Table 2 presents the descriptive statistics of the variables, while Table 3 presents the correlation matrix. The female labour force participation rate seems to be about 55 per cent on average, while the financial inclusion index is about 22 per cent on average. The female employment rate is about 33 per cent. When compared with female labour participation rate, it means about 22 per cent difference is either related to the female self-employment rate or those that are engaged outside formal employment in Africa.

Furthermore, the inflation rate is about 9 per cent, while the economic growth is on average 6 per cent in Africa. In addition, the FDI as a percentage of GDP is about 4.9 per cent, while the trade openness as a percentage of GDP is very high in Africa. This means that most countries in Africa are trade-dependent. With the exception of the association between female labour participation rate and female employment rate, it is very clear that the correlation among the variables is within the toleration rate. Meanwhile, the correlation between the financial inclusion index and female labour force participation rate is positive but to gain a good understanding of the relationship we present our estimated results in Table 4 as discussed in the next section.

Table 2. Descriptive Statistics (Source: author's computation)

	FLFP	EMP	FII	GR	INF	DA
Mean	54.755	33.486	0.226	6.007	8.891	3.409
Median	60.421	34.081	0.153	5.568	7.503	3.500
Maximum	74.435	67.960	0.851	20.715	44.356	5.000
Minimum	12.842	4.8470	0.020	-7.652	-1.409	1.040
Observations	144	144	144	144	144	144
	TO	FDI	ICT	CRISIS	UN	REM
Mean	74.361	4.914	4.864	0.166	8.816	1.883
Median	70.430	3.287	1.130	0.000	6.446	0.425
Maximum	165.645	50.018	44.570	1.000	20.390	13.270
Minimum	20.722	-0.506	0.000	0.000	1.870	0.000
Observations	144	144	144	144	144	144

Note: FII, GR, INF, DA, TO, FDI, ICT, CRISIS, UN, REM denote: financial inclusion, growth rate of GDP per capita, inflation, democracy, trade openness, foreign direct investment, ICT infrastructure, unemployment and remittance respectively.

Table 3. Correlation (Source: author's computation)

	FLFP	EMP	FII	GR	INF	DA
FLFP	1.000					
EMP	0.808	1.000				
FII	-0.547	-0.584	1.000			
GR	0.439	0.463	-0.324	1.000		
INF	0.456	0.544	-0.316	0.212	1.000	
DA	0.118	0.134	-0.080	0.172	0.199	1.000
TO	-0.097	-0.367	0.249	-0.199	-0.221	-0.382
FDI	0.240	0.049	-0.223	0.068	-0.073	-0.123
ICT	-0.349	-0.372	0.570	-0.208	-0.273	-0.043
CRISIS	0.001	0.012	-0.044	-0.097	0.138	0.014
UN	-0.280	-0.576	0.451	-0.320	-0.313	-0.373
REM	-0.079	-0.112	0.336	-0.011	0.014	0.064
	TO	FDI	ICT	CRISIS	UN	REM
FLFP						
EMP						
FII						
GR						
INF						
DA						
TO	1.000					
FDI	0.431	1.000				
ICT	0.123	-0.087	1.000			
CRISIS	-0.065	0.001	-0.254	1.000		
UN	0.661	0.089	0.256	-0.024	1.000	
REM	-0.249	-0.081	0.137	-0.009	-0.227	1.000

Note: FII, GR, INF, DA, TO, FDI, ICT, CRISIS, UN, REM denote: financial inclusion, growth rate of GDP per capita, inflation, democracy, trade openness, foreign direct investment, ICT infrastructure, unemployment and remittance respectively.

In Table 4, we present the fixed effect panel estimation results after observing the Hausman Test. The results column (1-2) show that financial inclusion significantly reduces female labour force participation rate. So it can be concluded that financial inclusion has a significant impact on labour force participation of women in Africa. Accordingly, hypothesis one (H1) is supported at 5 per cent significance level. We further examine the non-linear impact of the financial inclusion variable, we discover that the square of FII becomes positive and significant. This means that there is a threshold at which, if reached, financial inclusion would start to improve the level of female participation in economic activities in Africa.

Table 4. Results from Estimated Model (Dependent Variable: FLFP) (Source: created by author)

Variables	(1)	(2)	(3)	(4)	(5)
C	55.719*** (0.000)	59.321*** (0.000)	60.523*** (0.000)	62.902*** (0.000)	61.228*** (0.000)
FII	-10.311*** (0.067)	-14.898** (0.014)	-9.5674** (0.038)	-37.129*** (0.0000)	-21.212*** (0.001)
FII-square	15.584** (0.012)	20.174*** (0.002)			18.570*** (0.009)
ICT×FII			0.248** (0.011)		
TO× FII				0.458*** (0.000)	
GR		-0.025 (0.645)	-0.049 (0.366)	-0.025 (0.587)	-0.027 (0.626)
INF		-0.010 (0.743)	-0.007 (0.816)	0.024 (0.368)	-0.006 (0.848)
DA		-1.012** (0.011)	-1.443*** (0.001)	-0.341 (0.296)	-1.233*** (0.003)
TO		0.012 (0.460)		-0.092*** (0.000)	0.020 (0.260)
FDI		-0.036 (0.306)	-0.045 (0.219)	-0.022 (0.456)	-0.040 (0.254)
ICT			-0.024 (0.656)		0.081** (0.034)
CRISIS					0.368 (0.441)
UN					-0.061 (0.597)
REM					-0.057 (0.551)
Adjusted R-squared	0.988	0.989	0.989	0.992	0.131
F-statistic	972.414*** (0.000)	719.147*** (0.000)	690.530*** (0.00000)	987.950*** (0.0000)	18.238*** (0.005)
Hausman Test	4.879* (0.0872)	22.738*** (0.001)	22.655*** (0.003)	15.483** (0.030)	11.715 (0.385)
Threshold (FII)	0.331	0.369	-	-	0.571
Threshold (ICT)	-	-	38.17		-
Threshold (TO)	-	-	-	80.90	-
No. of obs	144	144	144	144	144
No. of Countries	12	12	12	12	12

Note: *, **, *** mean significant at 10%, 5%, 1% FII, GR, INF, DA, TO,FDI, ICT, CRISIS, UN, REM denote: financial inclusion, growth rate of GDP per capita, inflation, democracy, trade openness, foreign direct investment, ICT infrastructure, unemployment and remittance respectively.

In other words, we test a hypothesis that financial inclusion in Africa has a non-monotonic relationship with female participation in economic activities; the squared financial inclusion index is included as an independent variable. The quadratic term is positive in sign and significant at the 1 per cent level in Africa. In this case, hypothesis 2 *(H2)* is supported. This result provides evidence of a U-shaped relationship between the financial inclusion index and female labour force participation rate. This suggests that although a higher level of financial inclusion is negatively associated with female labour force participation, the impact is not constant. Rather, for levels of financial inclusion above a certain point, higher levels of financial inclusion act to increase the level of female labour force participation rate in Africa, holding other factors constant. This association between the two variables suggests that the marginal effect of financial inclusion exhibits increasing returns for female labour force participation rate in Africa. Thus, this is consistent with the submission of Boserup (1970), who states

that a curvilinear relationship may exist between economic variables and female economic participation. However, this U-shaped relationship contradicts the findings of Eastin and Prakash (2013).

In addition, to test the third and fourth hypothesis, we interact the ICT index with the financial inclusion index (FII). The coefficient is positive and significant at 5 per cent level of significance, which is consistent with the submission of Asongu and Odhiambo (2018). These authors confirm that ICT modulates the negative effect of the financial system in Africa on female labour force participation rate. Moreover, significant positive impacts are also apparent from interactions between Trade openness and the financial inclusion index. These results support the third and fourth hypothesis *(H3 and H4)* of the study. Furthermore, the democracy variable has a negative and statistically significant effect on female labour force participation rate. This result, therefore, does not support the proposition that democracy enhances gender equality participation in formal employment. Other control variables are not significant.

In addition, it is important to note that it is possible, using equation (1) to calculate the threshold value of financial inclusion. We also use equations (2) and (3) to calculate the marginal impact and thresholds of Trade openness and ICT through partial derivatives of the equations to follow existing literature (Efobi, *et al*, 2018; Asongu, & Nwachukwu, 2018a; Asongu, & Nwachukwu, 2018b). To do this, we follow Ehigiamusoe *et al.* (2019), Ehigiamusoe *et al.* (2020) in our computation of threshold. The results of partial derivatives of Eq. (1), (2) and (3) are expressed as follows:

$$\frac{\partial(FLPL)}{\partial FII} = -14.898 + 40.348FII \quad (4)$$

$$\frac{\partial(FLPL)}{\partial FII} = -9.567 + 0.248ICT \quad (5)$$

$$\frac{\partial(FLPL)}{\partial FII} = -37.129 + 0.458TO \quad (6)$$

We use the results in Table 4 (columns 2, 3, and 4) for the computations. The two equations connote that the interactive impacts of ICT and financial inclusion complement each other in mitigating female labour force participation in Africa. Similarly, financial inclusion and trade openness (TO) perform complementary roles in improving the level of female labour force participation in Africa. In addition, if we set these resultant partial derivatives equal to zero, we have the following

$$\frac{\beta_1}{\beta_2} = Threshold\ for\ value\ for\ FII \quad (7)$$

$$\frac{\beta_1}{\beta_3} = Threshold\ for\ values\ for\ (TO\ \ and\ ICT) \quad (8)$$

Consequently, we obtain the threshold value of 0.369 for financial inclusion while the current average value is 0.226. The threshold value for ICT is 38.47, while the threshold value of 80.90 is attributed to trade openness. It follows that the marginal impact of financial inclusion on female labour force participation is conditional on the ICT and trade openness. However, if the above thresholds could be reached, financial inclusion would contribute meaningfully to the improvement of labour force participation of women in Africa. Meanwhile, these thresholds need to be persistently sustained over time.

Table 5 presents the robustness test of the analysis. For this purpose, (1) we change our dependent variable to the female employment rate. This is measured as female employed as a percentage of the total female population. It has been established that this variable serves as an important policy variable in the case of female economic participation (Kabeer *et al*., 2013, Eforb, *et al*, 2018). (2) We further estimate our model using Generalised Least Square (GLS). This estimating technique controls autocorrelation and heteroskedasticity. The findings from the estimations are not different from the earlier estimations, with the exception that the inflation rate is now positive and significant at 1 per cent. This means that the inflation rate increases the level of inclusive finance; this is because

inflation reduces people's real income. Moreover, to maintain the same standard of living, they would resort to the use of financial institutions to borrow for the purpose of making up for the shortfall in their real income (Anarfo et al. 2019).

Table 5. Results from GLS Estimated Model (Dependent Variable: *Emp)* (Source: created by author)

Variables	(1)	(2)	(3)
C	3.942*** (0.000)	3.324*** (0.000)	3.627*** (0.000)
FII	-2.638*** (0.000)	-3.032*** (0.000)	-2.747*** (0.000)
FII-square	1.100*** (0.040)	2.241*** (0.000)	2.662*** (0.000)
GR		0.027*** (0.003)	0.016* (0.052)
INF		0.021*** (0.000)	0.018*** (0.000)
DA		0.067** (0.030)	0.044 (0.112)
TO		-0.001 (0.607)	0.002* (0.042)
FDI		0.003 (0.608)	0.003 (0.516)
ICT			-0.003 (0.382)
CRISIS			-0.072 (0.307)
UN			-0.057*** (0.000)
REM			-0.005 (0.516)
Adjusted R-squared	0.673	0.644	37.656
F-statistic	148.474*** (0.000)	38.091*** (0.000)	37.656*** (0.000)
Threshold value (FII)	1.12	0.676	0.516
No. of Obs	144	144	144
No. of Countries	12	12	12

Note: *, **, *** mean significant at 10%, 5%, 1% FII, GR, INF, DA, TO,FDI, ICT, CRISIS, UN, REM denote: financial inclusion, growth rate of GDP per capita, inflation, democracy, trade openness, foreign direct investment, ICT infrastructure, unemployment and remittance respectively.

Although financial inclusion is known to be a globally acclaimed policy objective (Johnson &Williams, 2016), this study heightens the need for inclusive financial policy in the African economies, especially in light of the pressures to improve the level of female economic participation in developing countries. Financial inclusion is a policy that seeks to provide the less-privileged with effective access to credit, savings, and payment and insurance services through a formal financial system (Pearce, 2011). As evidenced in the results, although at an earlier stage, financial inclusion may not be effective in improving women empowerment. This is because a large number of women is still financially excluded in Africa. According to World Bank (2011), more than 2 billion adults still remain unbanked in which half of them are female adults. This reflects the urgent needs for new development in the financial sector.

In response to this, many countries in Africa are now committed to promoting effective financial development through financial inclusion policy based on its suitability in the features of their economies. For instance, in Nigeria and some other African nations, agent banking initiatives have been embraced which serves as one of the hallmark initiatives which leverages on advanced

technology and provides effective financial services to rural and other groups of the unbanked population. Furthermore, the financial inclusion development has been boosted in most African countries because it has been accepted as part of national policy development. One of the benefits of these policy actions is that the financial inclusion structure becomes developed. As evidenced in our results, a mature and effective financial development would encourage women to be meaningfully engaged in economic activities by giving them access to useful and affordable financial products and services that meet their needs, including effective payment system, savings, credit and insurance services in a responsible and sustainable way. Meanwhile, for financial inclusion to be more meaningful and to improve the level of African women economic participation, the development of financial inclusion sustainability would deserve more attention (Yin, *et al*, 2019). This is because most African regions are without sufficient financial resources, and financial inclusion can play an important role in income growth and industrial gender balance that would enhance female labour force participation. Therefore, financial inclusion may assist policymakers to provide solutions to the agenda of women's poverty reduction and gender inequality in Africa. It can also help African citizens to invest in future, smoother consumption and management of financial risk. Financial inclusion also assists in climbing women out of poverty and ensuring investment in quality education and small businesses. It may also assist households by providing adequate ways of managing income shocks such as unemployment or a loss of a breadwinner (Allen, *et al*, 2012). In a more practical explanation, a digital payment system, which is one of the technologies of the financial inclusion, has consistently helped the government in reducing poverty and enhancing the transfer of welfare and palliative packages to women in most African countries. For instance, in Niger, a study shows that mobile transfers assist in attending to urgent social welfare. It cuts the administrative expenses by 20 per cent compared to manual distribution (Aker *et al.,* 2013). In South Africa, the cost of disbursing social grants in 2011 by smart card was a third that of a manual cash disbursement (Consultative Group to Assist the Poor, 2011). To round up, our study demonstrates that financial inclusion has a potential developmental outcome for women and encourages their adequate economic participation only if optimal attention is given to the workability of the policy in Africa.

Conclusions

In this study, we investigate the impact of financial inclusion on female labour force participation in Africa. It also complements the existing study by evaluating how advancement in ICT and Trade openness modulate the relationship between financial inclusion and female labour force participation rate for a period of 2005-2016. The study focuses on twelve African countries while the empirical evidence is based on Fixed Effects, Random Effects and Generalised Least Square estimators (GLS). The results show that financial inclusion has a non-monotonic relationship with female labour force participation rate. This means that improving the level of financial inclusion to a certain threshold would improve women's participation in economic activities in Africa. The results further show that improving Information and Communication Technology moderates the nexus between financial inclusion and female economic participation in Africa. This result is also similar when trade openness is used as the modulating factor. These findings are robust enough to suggest an alternative proxy for female labour force participation and alternative estimation techniques.

What policy can we derive from this? First, it would be a starting point for all African policymakers to encourage female economic participation through inclusive financial policy. Equipping African females with proper ICT training would enable them to explore the opportunities created by ICT and further improve their level of economic participation coupled with effective implementation of financial inclusion policy. They also need to be encouraged by giving them less-restricted access to low-cost financing to enable them to take risks and start businesses instead of waiting for employment opportunities. In addition, it is also very important to reach a formal relationship with industries (such as banking industries) by African governments to encourage the creation of employment opportunities for African women through strategic skill repositioning development to suit what is needed in African countries. According to Anyanwu and Augustine (2013), it is necessary to address skills mismatch so as to improve the level of employability of African women. Furthermore, the government needs to

develop an innovative public-private partnership to ease the training of females and, in particular, to encourage on-the-job training (Ncube & Anyanwu, 2012). Since our results support the fact that ICT can modulate the impact of financial inclusion in improving female economic participation, we encourage policy measures that can promote access to ICT.

Our results support the complementary role of trade openness and financial inclusion in enhancing female economic participation. Policies that increase the admission of female labour to the trade sector are very important in Africa. There still is a gender gap in the financial inclusion process in Africa; most females are still lagging behind their male counterparts. In this case, a policy that can focus on female financial inclusion would help in this regards. A simple and easy way of opening bank account at a formal bank and non-bank financial institutions may improve female inclusion (Morsy, 2020). Formal financial inclusion should be encouraged to bring more females on board. Microfinance institutions are doing their best, but they still need to do more in Africa in bringing more females to the formal financial system and equip them to have good financial awareness. The major limitation of this study is the use of only twelve African countries due to the non-availability of data; future studies can overcome these challenges when data are available. They can further examine other venues for encouraging female labour force participation in Africa.

References

Ajide, F.M. (2020). Financial inclusion in Africa: does it promote entrepreneurship*? Journal of Financial Economic Policy, 12(4*), 687-706.

Ajide, F.M. (2021). Shadow economy in Africa: how relevant is financial inclusion? *Journal of Financial Regulation and Compliance,* DOI 10.1108/JFRC-10-2020-0095

Aker, J., Boumnijel, R., McClelland, A., & Tierney, N., (2013). *How do electronic transfers compare? Evidence from a mobile money cash transfer experiment in niger*. Tufts. University Working Paper.

Allen, F.; Demirguc-Kunt, A.; Klapper, L., & Peria, M.M. (2012). *Foundations of financial inclusion.* Policy Research Working Paper; Washington, DC: World Bank

Altuzarra, A., Gálvez-Gálvez, C., & González-Flores, A., (2019). Economic development and female labour force participation: The case of European Union countries. *Sustainability*, 11, 1962; doi:10.3390/su11071962

Anarfo, B. E., Abor, J.Y., Osei, K. A., & Gyeke-Dako, A. (2019). Monetary policy and financial inclusion in Sub-sahara Africa: A panel VAR approach, *Journal of African Business,* DOI: 10.1080/15228916.2019.1580998

Anyanwu, J.C., (2011). International remittances and income inequality in Africa. .*African Development Bank Working Paper* No. 135, Tunis.

Anyanwu, J. C. (2012). Accounting for female employment in Africa, *European Economic Letters, 1(1),* 14–26.

Anyanwu, J.C., & Augustine, D. (2013).Gender equality in employment in Africa: Empirical analysis and policy implications. *African Development Review, 25(4),* 400–420.

Arnold, J., & Gammage, S., (2019) Gender and financial inclusion: the critical role for holistic programming, *Development in Practice*, 29:8, 965-973, DOI: 10.1080/09614524.2019.1651251

Asongu, S. A., & Odhiambo, N.M., (2018). ICT, financial access and gender inclusion in the formal economic sector: Evidence from Africa, African Finance Journal

Asongu, S. A., & Nwachukwu, J. C., (2018a). Openness, ICT and Entrepreneurship in Sub-Saharan Africa", *Information Technology &People, 31(1),* 278-303.

Asongu, S. A., & Nwachukwu, J. C., (2018b). Educational quality thresholds in the diffusion of knowledge with mobile phones for inclusive human development in sub-Saharan Africa. *Technological Forecasting and Social Change. 129(April*), 164-172.

Buserup, E., (1970). *Women's roles in economic development*. NY: St. Martin Press

Čihák, M., & Sahay, R., (2020). *Finance and Inequality*. IMF Discussion paper

Chaudhuri, S. (2009). *Economic development and women's empowerment*, Working Paper, University of Wisconsin – Eau Claire.

Consultative Group to Assist the Poor (CGAP, 2011). *CGAP G2P Research Project: South Africa Report*. Washington, DC. World Bank Publication.

Cooke, L. F., (2010). Women's participation in employment in Asia: a comparative analysis of China, India, Japan and South Korea. *The International Journal of Human Resource Management, 21(12),* 2249-2270, DOI: 10.1080/09585192.2010.509627

Cooray, A., Dutta, N., & Mallick, S. (2017). Trade openness and labor force participation in Africa: The role of political institutions. *Industrial Relations, 56(2),* 319-350.

Demirguc-Kunt, L.A., Klapper & D. Singer (2013). *Financial inclusion and legal discrimination against women: Evidence from developing* countries.World Bank Policy Research Working Paper 6416

Demirgüç-Kunt, A., L. F. Klapper, D. Singer, S. Ansar, & J. Hess. (2018). *The global findex database 2017: Measuring financial inclusion and the fintech revolution*. Washington, DC: World Bank.

Duflo, E. (2003).Grandmothers and granddaughters: Old-age Pensions and intrahousehold allocation in South Africa. *The World Bank Economic Review 17 (1):* 1–25.

Dupas, P., D. Karlan, J. Robinson, & D. Ubfal. (2016). *Banking the unbanked? Evidence from three countries.* NBER Working Paper 22463. Cambridge, MA: National Bureau of Economic Research

Hendriks, S. (2019). The role of financial inclusion in driving women's economic empowerment, *Development in Practice, 29(8*), 1029-1038, DOI: 10.1080/09614524.2019.1660308

Holloway, K., Z. Niazi, & R. Rouse. (2017). *Women's economic empowerment through financial inclusion: A review of existing evidence and remaining knowledge gaps*. New Haven, CT: Innovations for Poverty Action.

International Labour Organisation (ILO, 2019). Gender and financial inclusion. Access on February 2020 at https://www.ilo.org/empent/areas/social-finance/WCMS_737729/lang--en/index.htm

Johnson, S., & Williams, R. (2016). The political economy of financial inclusion: Tailoring donor policy to fit. *Development Policy Review, 34 (5),* 721—743.

Khan, T. A., Khan, F. A., Violinda, Q., Aasir, I., & Jian, S. (2020). Microfinance facility for rural women entrepreneurs in Pakistan: An Empirical Analysis. *Agriculture,* 10, 54; doi:10.3390/agriculture10030054

Khanie G. (2019). Education and labor market activity of women: The case of Botswana. *Labor and Society*.1–15. https://doi.org/10.1111/lands.12455

Efobi, U. R., Tanaken, B. V., & Asongu, S. A., (2018). Female economic participation with information and communication technology advancement: Evidence from sub- Saharan Africa, *South African Journal of Economics*, 86(2), pp. 231-246.

Ehigiamusoe, K. U., Lean, H. H., & Lee, C. C. (2019). Moderating effect of inflation on the finance–growth nexus: insights from West African countries. *Empir Econ 57(2),* 399–422

Ehigiamusoe, K. U., Lean, H. H., & Smyth, R. (2020). The moderating role of energy consumption in the carbon emissions-income nexus in middle-income countries. *Appl Energy 26(1):*114-215. https ://doi.org/10.1016/j.apene rgy.2019.11421 5

Ehrenfeld, D. (2004). Foreign aid effectiveness, political rights and bilateral distribution. *Journal of Humanitarian Assistance*. Available at: http://sites.tufts.edu/jha/archives/75.

Ernesto, A.- T. (2011). *The impact of trade liberalization policies and fdi on gender inequalities*. Background Paper for the World Development Report 2012, The World Bank, Washington, DC.

Fatima, A. &; Sultana, H. (2009). Tracing out the u-shape relationship between female labor force participation rate and economic development for Pakistan. *Int. J. Soc. Econ.*, 36, 182–198.

Fofana, N. B., Gerrit Antonides, G., Niehof, A., & Van Ophem, J. A. (2015).How microfinance empowers women in Coˆte d'Ivoire. *Rev Econ Household, 13,* 1023–1041 DOI 10.1007/s11150-015-9280-2

Karlan, D., Kendall, J., Mann, R., Pande, R., Suri, T., & Zinman, J. (2016*). Research and impacts of digital financial services (No. w22633).* Cambridge, MA: National Bureau of Economic Research.

Laeven, L.A., & Valencia, F. (2008) *Systemic banking crises: A New Database.* Washington DC:IMF Working Paper 224.

Li, Z. Z., Su C., Tao, R., & Hao, L. N., (2019) Enhance or depress? The effect of trade on active females in the labour market. *Economic Research- Ekonomska Istraživanja, 32(1),* 2680-2698, DOI: 10.1080/1331677X.2019.1653785

Morsy H., (2020). Access to finance – mind the gender gap, *Quarterly Review of Economics and Finance,* doi: https://doi.org/10.1016/j.qref.2020.02.005

Mohamed Arouri, M., & Nguyen, C. V., (2017). Does microcredit reduce gender gap in employment? An application of decomposition analysis To Egypt. Working paper 1017, Université d'Auvergne & EDHEC Business School, France

Niaz, M. U., & Iqbal, M. (2019). Effect of microfinance on women empowerment: A case study of Pakistan. *Paradigms, 13(1),* 53-60.

Ncube, M., & Anyanwu, J. C., (2012). Inequality and the Arab Spring revolutions in North Africa and the Middle East', AfDB Africa Economic Brief, 3(7), July. P.1

Oostendorp, R. (2009). Globalization and the gender wage gap. *World Bank Economic Review, 23(1),*141–61.

Ozerkek, Y. (2013) Unemployment and labor force participation: A panel cointegration analysis for European countries. *Appl. Econ. Int. Dev., 13,* 67–76.

Ozili, P. K. (2020): Financial inclusion research around the world: A review, *Forum for Social Economics*, DOI: 10.1080/07360932.2020.1715238

Parpart, J. L., M. P. Connelly & V. E. Barrideau (eds.), (2000), *Theoretical perspectives on gender and development*, Commonwealth of Learning, Ottawa, Canada.

Pearce, D. (2011). *Financial inclusion in the Middle East and North Africa: Analysis and roadmap Recommendations.* Washington, DC: The World Bank

Psacharopoulos, G., & Tzannatos, Z., (1989). Female labor force participation: An international perspective. *World Bank Research Observer, 4(2).* 187–201.

Richards, D. L. & R. Gelleny (2007). Women's status and economic globalization, *International Studies Quarterly, 51(4),* 855–76.

Samant, P., Singh, A.B., Misra, R., & Dwivedi, R. (2019). Impact of microcredit on women empowerment indicators: An empirical reserach in the state of Uttarakhand. *International Journal of Recent Technology and Engineering (IJRTE), 8(3*), 3702-3709.

Sarma, M., (2008). *Index of financial inclusion*. Working Paper no. 215. Indian Council for Research on International Economic Relations. India.

Signorelli, M., Choudhry, M., & Marelli, E., (2012). The Impact of Financial Crises on Female Labour, *European Journal of Development Research*, 24(3), 413-433.

Tam, H. (2011). U-shaped female labor force participation with economic development: Some Panel Data Evidence', *Economic Letters, 110 (2),* 140–42.

Tchamyou, V.S., Erreygers, G., & Cassimon, D., (2019). Inequality, ICT and financial access in Africa. *Technological Forecasting and Social Change*. DOI: 10.1016/j.techfore.2018.11.004

Vlasblom, J.D., & Schippers, J.J. (2004) Increases in Female Labour Force Participation in Europe: Similarities and differences. *Eur. J. Popul., 20,* 375–392.

Wale, L. E., & Makina, D., (2017). Account ownership and use of financial services among individuals: Evidence from selected Sub-Saharan African economies, *African Journal of Economic and Management Studies*, 8(1), pp. 19-35.

Yin, X., Xu, X., Chen, Q., & Peng, J. (2019). The Sustainable development of financial inclusion: How can monetary policy and economic fundamental interact with it effectively? *Sustainability, 11,* doi:10.3390/su11092524

Yusnandar, Y., Nazamuddin, Masbar, R., & Jamal, A., (2020). Determinants of labor force participation and its impact on the standard of living of working age individuals in Indonesia, a gender perspective. *Economics Bulletin, 40(2),* 989-1001.

Appendix

The Sarma (2008)'s financial inclusion index is formulated as:

$$d_i = \frac{A_i - m_i}{M_i - m_i} \qquad (*)$$

A_i is the actual value of dimension *i*, m_i represents minimum value of dimension *i*, M_i is the maximum value of dimension *i*,. The financial inclusion index is measured by normalising the inverse of Euclidean distance of point d_i , computed in equation (*) from ideal point *I* is one. The formula is hereby given as:

$$FII = 1 - \frac{\sqrt{(1-d_i)^2 + \cdots + (1-d_n)^2}}{\sqrt{n}} \qquad (**)$$

The normalisation equation (**) makes the index lie between 0 and 1.

ECONOMICS AND CULTURE 18(1), 2021
DOI: 10.2478/jec-2021-0003

GENDER IMPACT ON PERSONAL INVESTMENT STRATEGIES

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Abstract

Research purpose. This study is dedicated to investigating the peculiarities of personal investment decisions among female and male investors to analyse the gender differences that occur during personal investment strategy establishment processes. This study is based on the literature research and aims at exploring the existing knowledge on financial behaviour and gender influence on personal investment selection. The importance and originality of this study are that it assesses the collective evidence in the personal investment field and explores its processes through the prism of gender impact. The understanding of the gender bias impact on the personal investment strategy development process can play an important role in addressing the issue of gender inequality in finance and investment areas. This paper is dedicated to answering the question of how gender impacts personal investment strategies.

Design/ Methodology/ Approach. The major task was to conduct the research on the male and female personal investment decision peculiarities presented in literature sources and to prepare the survey to conduct practical research while applying theoretical knowledge and presenting the findings along with the suggestions on how to improve the female situation in investment field.

Findings. The most prominent finding to emerge from this study is that females lack knowledge and understanding in finance and especially investment areas; therefore, this leads to inadequacy in self-confidence in finance and investment matters and, as a result, neglect of successful personal finance management and, more significantly, poor investment strategy decisions.

Originality/ Value/ Practical implications. The main goal of the current study was to determine whether the gender difference exists in personal finance and especially investment area, to refine the reasons behind this phenomenon, to analyse what could be done to improve the situation and introduce suggestions for further research. The research was done based on relevant literature, reports, surveys, statistical data used for literature analysis, and Lithuania's case study for the practical part of the research. The primary objectives were to find out what are the main peculiarities between males and females when it comes to personal investment strategy choices and to analyse financial literacy and investment fields through the female perspective. The main points revealed during this study were that men tend to invest more often than women, as females, in general, prefer to save rather than invest; women tend to choose less risky investment strategies compared to men or save rather than invest. The main factors of this phenomena are the influence of cultural, social, or psychological factors, low financial literacy level, differences in economic status, longer life expectancy, the lack of confidence when it comes to knowledge applied to the financial decisions; males are more likely to choose a higher-risk investment strategy and to be more confident in their investment ability even if they have less knowledge on the matter. The analysis of Lithuania's case has also confirmed the main literature review findings and reported females to lack financial and investment knowledge, spare funds and prefer to save rather than invest or invest into the low-risk tools.

Keywords: Investment strategy; Personal investment strategy; Investment decision; Investment risk; Gender difference; Female investing.

JEL codes: G23, G53.

Introduction

There is a growing body of literature that recognises the importance of investment processes based on the sacrifice of a certain present value for the uncertain future returns, and many of us choose to invest to get an additional source of income by gaining profit. Every investor models a personal investment strategy applying a unique technique, and it was established in various literature sources (Stanyer & Satchell, 2018; Walker & Walker, 2013; Malkiel, 2019; Farrell, Fry, & Risse, 2016; Shaikh, Karim Katpar, Kalhoro, Abro, & Phanwar, 2019) that this practice could be based on a several of influencing factors such as the number of funds that could be dedicated for investment purposes, the goals that are set, the desired returns, the applicable time frame, etc. As the right strategy assures the highest profit, accordingly one of the fundamental goals to achieve by the investor is to develop the most successful personal investment strategy that would include the primary investment management aspects such as setting investment objectives, establishing an investment policy, selecting an investment strategy, selecting the specific assets, and measuring and evaluating investment performance.

Recent evidence suggests that women tend to invest less compared to men (Jawaheer & Manual, 2016; Farrell, Fry, & Risse, 2016; Charness & Gneezy, 2007). This is related to even more significant discovery that has been introduced by many other authors, global surveys and financial reports (Tengler, 2014; Levine, 2019; Itkin, 2014; The Standard & Poor's Ratings Services, 2015, Australian Security Exchange, 2020), which states that women tend to have less knowledge about finances in general and particularly investment processes; hence, it leads to their lack of interest in investment field and the possibility of poor money management. Many behavioural finance and gender doctrines experts attribute these inequalities to behavioural biases. They claim that it is due to the gender differences as female investors appear both to be more risk-averse and to have less confidence in their investment decisions than male (Dickason, Nel & Ferreira, 2017; Hussain, et al., 2015; Lee, Miller, Velasquez & Wann, 2013). The other researchers associate this phenomenon with insufficient financial literacy level among females (Hasler & Lusardi, 2017; The Standard & Poor's Ratings Services, 2015, Australian Security Exchange, 2020). This, among many other inequalities, to name a few, pay gap, unpaid work, or lack of balance in managing positions at the workplace, creates the investment and wealth generation gap among men and women. Since females generally live longer (World Health Organization, 2018), their retirement period is increases accordingly, and by not investing or choosing less risky, and therefore, less profitable investment tools, women deprive themselves of possible additional profits of around 6 to 8 years compared to male investors. The facts provided above confirm the significance and possible positive impact of women beginning to invest or adjusting current personal investment strategies to improve their financial situation and earn additional funds.

The combination of negative impacts mentioned above and the tendency to invest in small risk and low returns investment option indicates one of the possible reasons for the wealth inequality among genders and the possible place for improvement in investment field among females. This is an important issue for further research, and the leading suggestions would be to concentrate on female education and respective financial and investment programs creation to improve the current situation by creating the method to encourage women to invest more and not to limit themselves by safe investment tools, but to create broader diversified personal investment strategies with the inclusion of bearing higher-risk, subsequently, benefiting greater returns investing instruments. However, as represented by this paper, first, the emphasis should be placed on introducing and explaining a wider variety of investment instruments to females. This could also be done by introducing an example portfolio that would be created based on individual needs. To achieve this, the target groups, for example, based on age, need to be indicated, and the preliminary personal investment strategy could be adapted accordingly. The examples of the countries with well-developed female investment and finance areas could be applied as a good practice method and used by the less advanced countries. More information on female personal investment strategy formulation peculiarities would help us establish a greater degree of accuracy on this matter.

Therefore, the study conducted during this article aims to research why the differences among female and male investors appear first and, based on the findings, suggests how females could be motivated to invest more actively; hence, how the gender inequality gap in investment area could be decreased. To answer this question, the research on available literature was conducted, and it revealed the fundamental characteristics of men and women personal investment strategies decisions. The biggest limitation that appeared during the data collection for this article was the lack of more profound and more concentrated relevant information; hence, the lack of surveys or research on the personal investment strategies among female and male investors.

Literature Review

According to many authors, global surveys, and financial reports (Tengler, 2014; Levine, 2019; Itkin, 2014; The Standard & Poor's Ratings Services, 2015, Australian Security Exchange, 2020), women tend to have less knowledge about finances in general and particularly investment processes; hence, it leads to their lack of interest in investment field and the possibility of poor money management. Many behavioural finance and gender doctrines experts attribute these inequalities to behavioural biases. They claim that it is due to the gender differences as female investors appear both to be more risk-averse and to have less confidence in their investment decisions than male (Dickason, Nel & Ferreira, 2017; Hussain, et al., 2015; Lee, Miller, Velasquez & Wann, 2013). The other researchers associate this phenomenon with insufficient financial literacy level among females (Hasler & Lusardi, 2017; The Standard & Poor's Ratings Services, 2015, Australian Security Exchange, 2020). Based on the literature review and findings, the assumption could be made that this is rather the combination of a variety of reasons, and the ultimate correct answer does not exist.

Due to savings accounts, real estate, pension funds, bonds and similar investment options providing lower returns and being considered low risk, combined with the discoveries on male and female investment behaviour peculiarities presented in this section, it should be assumed that women would prefer the less risky type of investment tools. Viewed in this way, female investment choices could generate low returns, and the reasons behind these investment decisions might be gender-specific behavioural biases.

One major theoretical issue that has dominated the field for many years concerns whether gender can influence personal investment strategy. It is now well established from a variety of financial behavioural studies (Stanyer & Satchell, 2018; Walker & Walker, 2013; Malkiel, 2019; Farrell, Fry, & Risse, 2016; Shaikh, Karim Katpar, Kalhoro, Abro, & Phanwar, 2019) that the investors are not rational and that female investment decisions differ from those of a male. The success and the number of returns of the investment essentially depend on the performance of the choice the investor made, and since the decision is influenced by the gender factor, which leads to the declaration that women and men tend to invest differently, their personal investment strategies are dissimilar. Many researches revealed that women tend to invest less and in less profitable but safer investment tools, consequently, gain less profit from the investment (Farrell, Fry, & Risse, 2016).

It is important to identify the main differences between male and female personal investment strategies to figure out why this phenomenon occurs and how to encourage women to invest more, and by doing this, to increase the profit from their investments and, accordingly, accumulate more wealth. By finding the answers to these questions, the suggestions could be presented on how to solve the wealth inequality problem between genders, which is directly related to the investment process and particularly has a major impact on the decision-making process of the personal investment strategy. A number of papers and books have been written, researches have been conducted, and the outcomes that were presented show the importance and relevance of the topic. For instance, one of the studies that was conducted in the USA has shown that gender influences investment decision-making in three ways: risk, confidence, and preferences (Hira & Loibl, 2008). A couple of more studies regarding the same topic was conducted in Australia by the government, and the major discoveries were that women tend to choose the less risky investment strategies and the most popular between all of them were savings account, which is paying highest interest rates; men are more likely to choose the higher risk

investment strategy and to be more confident in their investment ability even if they have less knowledge on the matter; women and men choose to buy their own homes instead of renting and this fact reveals that both of the genders tend to invest in real estate, rather than rent it (Australian Government Financial Literacy Foundation, 2008a, 2008b; Australian Securities and Investment Commission, 2008; Mottola, 2015). The research related to the female and male investment decision differences have been conducted in Lithuania as well, and the key findings of these articles showed that Lithuanian men tend to invest more, whereas women choose to save instead. Additionally, females were found to plan their finances ahead and know more details on how much spend daily than males. In addition, the studies have shown that men choose to invest in riskier portfolios than women (INVL Asset Management, 2018; Macijauskas, 2012).

The research discussed in this section revealed significant differences between gender personal investments selections:

- Risk acceptance.
- Confidence level.
- Preferences.

This section of the article establishes and presents the evidence that the strong relationship between gender and risk perception, confidence and investment decisions have been indicated and reported in the scientific literature, surveys, and other research on the personal investment area. It seems to be possible that these results are due to the previously established gender biases and differences that appear in the investment area.

The risk factor, as one of the most important aspects that influence any investment, seems to be highly relevant to the female and male investment decision making as well. Many authors have been studying and discussing the importance that risk element has in female investor's choice of the investment tool. The findings show that the risk segment plays the major role in women's personal investment strategy planning, and it tends to be the lower level than in men investment choices: "women make smaller investments in the risky asset than men do, and so appear to be financially more risk-averse <…> women's portfolios are less risky than men's (Charness & Gneezy, 2007), they tend to be more conservative while investing and generally have a preference for low-risk securities <…> They are more likely to choose fixed income securities (Mittal & Vyas, 2009). Based on the ideas presented in these articles, the assumption could be made that the main difference between women and man investing choices and style when it comes to risk level is that females choose the lower risk investment options than males. The literature review revealed that women are more risk-averse than men and choose more conservative personal investment options. Since the lowest risk investment strategies are such as savings account, deposit, bonds, real estate or pension fund, the prediction could be made that women most likely should choose these types of investment strategies. Whereas men, as exclaimed in the articles, tend to be able to accept the higher risk level in relation to investment choices. This leads to the assumption that men choose the riskier investment options such as stocks, shares, various funds and others.

Discussing the role of the risk in the investing process in their article Bayyurt, Karışık, & Coşkun introduce four main ideas why risk acceptance differs so drastically between genders:

- It was found that women and men may differ in their underlying attitudes or utility functions for risk. Cultural, social, or psychological factors may cause men to bear more risk than women.
- Gender differences in risk-bearing might be due to differences in economic status.
- Women's longer life expectancy and a greater probability of outliving their spouses could affect their willingness to accept financial risk.
- Gender differences in risk-taking may occur due to gender differences in information and confidence in their financial knowledge.

Perhaps every advocate of Behavioural Finance theory would agree that one's psychological and personal traits, as well as the influence of social and cultural aspects, affect the possibility to bear the risk and accordingly to make the choice of the investment option. The ideas of Oprean could be

presented as an elaboration on this statement: "The most common human traits (fear, anger, greed, and selflessness) place considerable emphasis on our decisions about the money. Intellect (grasping a situation), the reason (long-term consequences of the action taken) and emotion (considering a course of action) are all interrelated; they are the springs behind the human decision" (Oprean, 2014). This statement also has been explained by looking from a psychological point of view. It has been researched why females tend to choose lower-risk investments than men and stated that the reason behind this behaviour is women having more of the enzyme "monoamine oxidase", which prevents them from seeking amplified sensations, which suggests that they would prefer less risk since it is less stressful (Felton, Gibson, & Sanbonmatsu, 2003).

The second statement leads to the topic, which is highly relevant nowadays, and it refers to the economic status difference between genders and the pay gap. It is a known fact that females tend to earn less than men. For instance, the Statistics of Lithuania presented the research finding called "Women and men in Lithuania 2016". The key findings related to the pay gap and economic wealth differences between genders are that women tend to earn less than men and the pay gap was 14.4% in 2016 (Statistics of Lithuania, 2017). Besides, in the USA females earn 77.9 cents for every dollar that men earn, and it was around a 23% wage gap in 2018 (PayScale, 2018). Additionally, the statistics show that overall, in the European Union, the pay gap between genders was 16.2% (N. McCarthy, N. McCarthy & Richter, 2018). This data provides an explanation of why the lower risk acceptance level is possible for female investors. The reason is the lower wage, and accordingly, the loss of the investment becomes a more significant risk as women earn less, they can afford to lose less.

According to statistics presented by the World Health Organization in 2016, the life expectancy was 72.0 years (74.2 years for females and 69.8 years for males) (World Health Organization, 2018). Consequently, women tend to live longer than men, and while creating the personal investment strategy, they must take this fact into consideration in order to be able to ensure a financially stable future. Due to women's greater longevity, less wealth will have to support a longer retirement, resulting in a disparity between retired men and women (Mittal & Vyas, 2009).

Confidence is one of the major aspects of the investment decision-making process, and, unfortunately, it appears that mainly female investors tend to have less self-confidence than men. The research took place in the USA and was done to examine the situation of female financial behaviour, particularly concentrating on measuring how women address their finances, what the reasons they for them holding back and not being fully engaged are and how to improve the situation. The revelations of the study were presented in the report, and the key findings were that women are keen on gaining more knowledge about finances, want to learn more about financial planning, money and investment, and get more involved in their finances, yet the majority of them hold back when it comes to discussing money and finances, especially investment, and the leading factor of this issue is lack of confidence with additional deficiency of knowledge and experience in the finance area (Fidelity Investment, 2015). As Siva (2012) found in his research, "Women are more calculative, less confident, less aggressive, and easier to persuade and have inferior leadership and problem-solving abilities when making a decision under risk".

While risk and confidence play a major role in the personal investment strategy creation process, there are more important factors that affect the investment choices and are quite vivid between genders in the selection process. It is important to take into consideration the pay gap and employment inequality, the fact that the higher positions in a workplace tend to be occupied by men, that the women tend to be less confident when it comes to investment and overall financial matters, longer life expectancy of women, and that women are more likely to have to take care of their kids and overall family and, henceforth, the fewer recourses are left to be invested (European Union, 2018; Uited Nations, 2017; Ravazzini & Kuhn, 2018; Brown & Patten, 2018). The other authors have described the importance of women's personal investment strategy, with the primary focus on retirement as: "Women have lower lifetime earnings, lower earnings growth, lower wealth, and lower pension coverage and participation rates. Women's greater longevity implies that, even with the same investment strategy and pension accumulation, retirement wealth must support a longer period of retirement." (Bajtelsmit, Bernasek, 1997). These authors have pointed out the main factors that influence women's personal investment

choices and answered the question, why women tend to choose the less risky investments than men. The presented factors could be considered as the key aspects for female investor preferences when it comes to personal investment strategy and future planning.

Research Methodology

To begin with, before choosing the right investment strategy, it is important to determine the method which would assist with evaluating the current personal financial situation, setting the goals, and creating the investment plan. (Tyson, 2019; Birtch, Au, Chiang, & Hofman, 2018; Gerrans, Moulang, Feng, & Strydom, 2018). While choosing the investment tool, it is essential to know what options are presented for selection in the financial market and which one is the most applicable to the investor. As an example, one can take such financial institutions as Nasdaq, Economy Watch, Westpac and National Australia Bank summary of explanations on the investment strategies choices (Nasdaq, 2019; National Australian Bank Limited, 2018; Economy Watch, 2018; Westpack banking corporation, 2018) Based on these sources the development of the personal investment strategy should involve such steps as:

- Specification of personal investment objective.
- Setting the timeframe.
- Asset allocation which involves diversification among asset classes that may protect the investments against underperformance in any one asset class.
- The decision of the investment that will be made.
- Must have a risk management plan in which identification of the risks for the chosen investment strategy and the plan on how to mitigate those risks should be presented.
- The information and assistance should be assessed. Some of the tools available to do this are company research and stock recommendations, charting and technical analysis, economic research, news services, watch lists and alerts, financial planners, or adviser's assistance.

In the current economic situation, people are gradually more often becoming investors to gain profit, to get the additional source of income and thus to secure their future. The main aim of every investor is to increase the income and value of the returns while minimising the risk of loss. To achieve this goal, such authors as Swenson (2005) and Malkiel (2019) in their books stated that it is important to create an investment strategy that would be based on investor's goals, resources, willingness to take risks and the length of the growth objectives. The investment strategy is like a systematic plan to allocate investable assets among different investment options; however, to be able to choose the most acceptable personal investment strategy, the individual has to have the additional amount of assets, preferably liquid funds, which would be dedicated to investment purposes. In addition to this, the investable assets should be allocated among the investment options considering the investor's tolerance level to the risk, the age, and the objectives, that the investor wishes to achieve. Consequently, to be able to make the most paramount decision in investment strategy alternative, a thorough analysis of the investment options has to be done, and the arguments for and against each of them have to be introduced.

Many authors share the same opinion that the most popular investment instruments (Liem & McInerney, 2018; Huang, 2018; Lei, 2018) could be distinguished as follows:

- Savings account.
- Shares and stocks.
- Bonds.
- Investment funds.
- Pension funds.
- Real estate.

It is significant to know the main peculiarities of the investment strategies before making the final decision on which investment tool to select.

This research has been conducted to find out the fundamental investment strategies and their tendencies and to compare the differences among female and male investors; and the methodology contains two main stages. The first stage - the data collection initiation, and the second stage is the analysis of the data and presentation of findings for further step - optimal portfolio formation.

The best method to collect data for public and sociologic research is a survey, and for the economic research area the best approach is statistical data analysis (Saris & Gallhofer, 2014). To satisfy these requirements and to gather data for female investment strategy management, a quantitative research survey dedicated to collecting statistics of female investing peculiarities has been created. The most substantial part of collecting accurate data for this study is to clarify and implement the questionnaire's components precisely. The main segments included in the survey are sampling, question design, mode of data collection, and total survey design (Fowler, 2014). Considering previously mentioned details of questionnaire formation, the respondents' sample size has been calculated, based on the Slovin's formula (Mclean, Guilford, & Fruchter, 1979):

$$n = \frac{N}{(1 + Ne^2)} \quad (1)$$

Where:

n = Number of samples

N = Total population

e = Error tolerance (level).

The sample calculation returns the result are as follows:

$$n = \frac{1500000}{(1 + 1500000 * 0{,}1^2)} \quad (2)$$

n ~ 100

The relative question to the topic has been prepared and presented in five different forms:

- Dichotomous questions (Yes/No).
- Open-ended questions.
- Multiple choice questions.
- Ranking questions.
- Matrix questions.

The questions included in the questionnaire are as follows:

- On a scale of 1 to 5, how much knowledge do you have about investment and finances?
- Have you taken any courses, classes or any other kind of education related to investment/economics (please shortly describe if you have)?
- Do you plan your savings?
- How much do you save every month?
- On a scale of 1 to 5, evaluate the importance of the saving factors below (1 being the highest and 5 being the lowest importance): Financially stable retirement, Investing, "Rainy day", Kids' education, Leisure.
- Do you invest?
- Where do you invest?
- What, in your opinion, is the most important information to know in order to be able to invest

- Why do you not invest?
- If you were offered a piece of advice on investment, what would be the main priorities for you (1 being the highest and 5 being the lowest importance)? Decrease/ elimination of risk, As high as possible returns, To get the returns in a short time period, To get the returns in a long time period, To start with the smaller amount of money.

Questions have been divided into three main areas - demographics, personal finance management and personal investment. Demographics included age, location, family status, marital status, employment status, monthly income, and financial education. Personal finance topic has been analysed by inquiring about expenditure, monthly savings, savings planning and preferences, whereas personal investment strategy related queries included the choice of investing or not, reasons for not investing, the selection of where to invest, self-evaluation of investment knowledge, and supposed investment plan preferences. The survey has been designed and delivered to the participant group via social media and personal contacts.

In conclusion, the methodology part of the research includes the fundamental reasons and tools of investing, the sample size of the research on female participants in Lithuania, survey structure and the main questions.

Research Results

It is now well established from the literature and methodology parts that differences among males and females exist in the investment and finance management area and plays a critical role in wealth inequality among genders. To further thoroughly research and obtain sufficient knowledge Lithuania's case analysis has been used for this study. The first step was to collect as much data as possible, and, in Lithuania's case, there were not many articles or statistics available in this area. Department of Statistics under the Government of the Republic of Lithuania has been contacted, and the information was received that currently there has been no official research done by this authority, and none of the data exists on the investors' profile, personal investment, or female investment decisions matters. The decision was made to use publicly available information and to conduct the research on personal investment peculiarities among genders in Lithuania, with emphasis on female investment strategies.

To compare the differences among male and female investment, pension, and financial stability areas, the study was conducted by "INVL Asset Management" and published on their website (Invalda, 2017). This research took place in 2017 and included 1011 Lithuanian residents between 18 and 75; it was most informative and thorough, besides including gender differences and priorities. The main topic that has been assessed during this research is the difference between female and male investment and pension choices. The main discovery presented by "Invalda" is that Lithuanian women investor’s profile tends to be more conservative than men; additionally, females tend to choose to save rather than invest. The subject of pension has been discussed to substantiate these findings, and a summary of findings was presented. It concluded that a higher percentage of female participants – 48.5 % stated that to keep living in dignity during their pension time, the compensation itself should be equal to the current salary, whereas 39.7 % of the males expressed the same aspiration. Women also tend to lean towards the safer side while asked about savings management habits. The data from this survey has shown that in their opinion (33.5 % of respondents), people should start saving for their retirement from ages 19–25, and 8.1 % of female questionnaire partakers suggested that the age should even be 18. In this case, male participants were a bit more nonchalant and 19 to 25 years as the age point to start putting money aside for this purpose was chosen by 28.9 % and 6.6 % 18 years old. However, the opinions almost coincide with starting to save for retirement at the age of 26-35 and continually differed on the oldest age to be 36-45 years old (chosen by 16.1 % of males and 13.5 % of females). The other important findings have been presented during this research are more women (36.1 %) than man (32.7 %) are expecting to be able to use money from their retirement or pension funds, majority of participants are planning to use the funds for their retirement from "Sodra" (females – 89.8 % and males – 88.7 %), and 19.6 % of women and 20.8 % of men are planning to work during their retirement. The interesting fact is that more male than female participants plan to live from their

savings once the retirement period comes – 35.5 % and 30.9 %, respectively. Regarding the investment subject, females were presented as more restrained since 14.3 % responded positively to the question of whether they invest; as a comparison, 18.7 % of male respondents answered the same. Women investors could also be called more careful once it comes to the invested amount since more of them agreed that it consists of 20 EUR – 12.5 %, respectively 4.8 % of males choose the same option. Male investors preferred to start with 51 to 100 EUR investment funds – 37.5 % and 27.1 % of females. A similar percentage of participants declared that they invest 21-50 and 101-200 EUR per month.

The first set of analysis examined the overall distinctness among genders in financial and investment fields in Lithuania, whereas the second series of the study concentrates on Lithuanian women's personal finances and investment selections. Based on the results presented at Global Financial Literacy Survey (The Standard & Poor's Ratings Services, 2015) in 2015, the key findings included the astonishingly low level of financial literacy among the worldwide participants, the surprising fact that inflation and numeracy were the most understood concepts. In contrast, the risk diversification was undeservedly neglected; moreover, the young people group was declared a vulnerable class, and the concentration should be placed on education programs dedicated to improving this group's financial knowledge and literacy. Lastly, the most related to this paperwork; hence, the most significant discovery women's financial literacy levels were lower than men. There was also mentioned that females had weaker financial skills despite the country's economy, age, education, or income.

It is important to develop the understanding of the Lithuanian female knowledge and self-perspective in finance and investment areas to clarify the idea on how to improve the current situation. To do so, the survey has been conducted, and the questions about financial literacy, financial education level, current employment status, salary, personal investment strategy and the reasons for not investing have been introduced. The question of how much knowledge one has in investment and finance areas in the survey revealed that self-evaluation on financial understanding, which also reflects confidence level of financial literacy grew in correlation to age growth; however, on average Lithuanian females evaluated their financial literacy as the medium level.

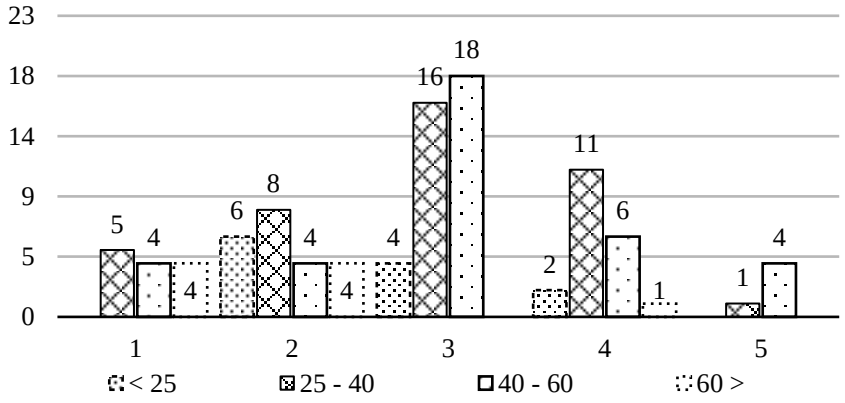

Fig 1. Self-evaluation of knowledge level in finance area by Lithuanian females (Source: created by author)

The next question asked the informants how they obtained their financial education. The summary of the answers revealed that around 27% of female participants have gained their understanding in finance and investment fields from their studies such as high school, Bachelors, or master's degrees, one participant, was a PhD holder in Economics. On the other hand, around 16% of all females were seeking advanced financial, economic, and investment literacy independently by reading magazines, books, or watching related videos either on top of their formal education or independently.

Surprisingly, most survey participants (59%) did not have any finance or investment related education; hence, profound knowledge about the subject.

The other demographical questions analysed Lithuanian females' employment and salary situation. When asked about the work status, most participants (69%) responded to be working for the company, 16% owned an enterprise, 7% were retired, and 9% were studying. Regarding the monthly salary, 52% of the respondents replied to be earning €1000 - €3000, 37% and 11 % - €1000 and over €3000, respectively. Respondents were asked to indicate whether they are currently investing, and 53% answered positively.

The most popular investment tools were life insurance, pension funds and real estate.

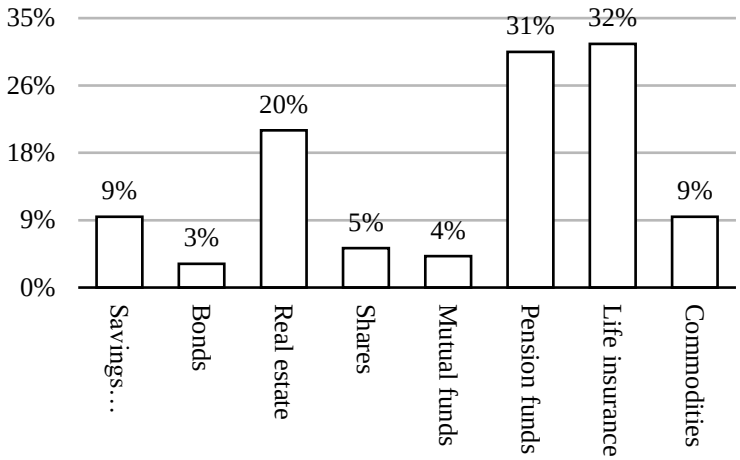

Fig 2. The investment options among females in Lithuania (Source: created by author)

As can be seen from the figure (Fig. 2) above, the least popular investment options among females in Lithuania are bonds, mutual funds, shares, commodities, and savings account. The second part of this personal investment management query implemented in the survey was why women in Lithuania do not invest. The responses have been presented in the figure below:

Figure 3 provides the summary of the replies from participants and what stands out is that 43% and 38 % answered not to have enough funds or knowledge about investment, and this being the main reason not to invest.

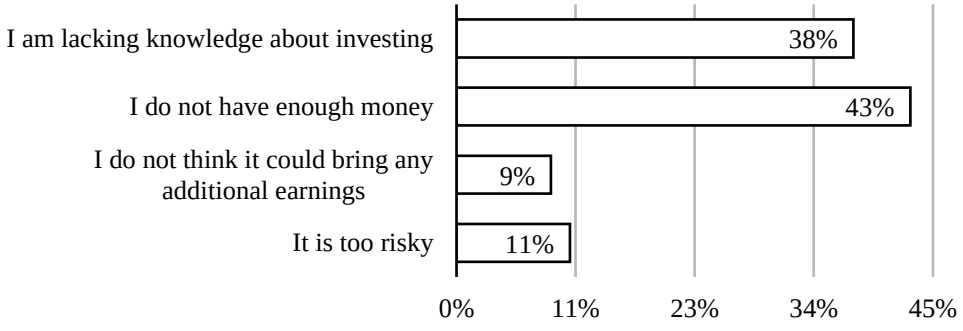

Fig 3. The reasons for not investing among Lithuanian females (Source: created by author)

This section of the study was researching Lithuanian female investors profile and has shown that women are more conservative investors than men and rather choose to save more than invest, and this is mainly related to retirement planning and being cautious about the future. The other finding was related to the formal financial education and financial knowledge self-evaluation - in this section it was disclosed that respondents believe to be holding the average level of financial and investing understanding, only 27% out of all survey attendance had formal education related to finance and 59% claimed to not have any financial knowledge at all. Regarding the monthly salary majority of participants earned €1000 - €3000, which could be seen as a sufficient amount for a possibility to raise spare funds for investment purposes. On the contrary, the current investment tool selection seems to be not fully explored, and the opportunities to exploit additional beneficial recourses are available; for example, bonds, stocks and commodities have been overlooked and could be a highly rewarding source of income if used in a proficient way. To summarise this section of the article, the most significant discovery established in this section of the study was that Lithuanian females chose not to invest due to the lack of additional funds, since investing is inseparable from the risk, and the shortage of financial knowledge, such as understanding investing processes and investment tools.

Conclusions

The research was done based on literature, reports, surveys, and statistical data. The primary objectives were to find out what the main peculiarities between males and females when it comes to personal investment strategy choices are. The main points revealed during this study were as follows:

- Men tend to invest more often than women, as females, in general, prefer to save rather than invest.
- Men are more likely to choose a higher-risk investment strategy and to be more confident in their investment ability even if they have less knowledge on the matter.
- Women tend to choose less risky investment strategies compared to men. The main factors of this phenomena are the influence of cultural, social, or psychological factors, low financial literacy level, differences in economic status, longer life expectancy, the lack of confidence when it comes to knowledge applied to the financial decisions.
- Lithuania's case analysis confirmed literature findings and the ideas of the other authors that have been introduced in the article that Lithuanian females lack financial and investment knowledge and understanding, are more conservative compared to man and prefer to save, and, if choose to invest, select safer investment options such as pension or life insurance funds, real estate, or savings accounts.

This is an important issue for further research, and the leading suggestions would be to concentrate on female education and respective financial and investment programs creation to improve the current situation by creating the method to encourage women to invest more and not to limit themselves by safe investment tools, but to create broader diversified personal investment strategies with the inclusion of bearing higher-risk, subsequently, benefiting from greater returns investment instruments. In Lithuania's case, this could be done by using countless opportunities to implement this project idea, the main being through various women organisations such as non-profit institutions like Women information centre (Moterų informacijos centras), Social Innovations Fund (Socialinių inovacijų fondas), Public Institution Equal Opportunity Development Centre, (Viešoji įstaiga Lygių galimybių plėtros centras), Public Institution European Innovation Centre (Viešoji įstaiga Europinių inovacijų centras), Knowledge Economic centre (Žinių ekonomikos forumas), Association of the Third Age University (Trečiojo amžiaus universitetų (TAU) asociacija) and many others in line with collaboration with Lithuanian Ministry of Education and Science.

References

Australian Government Financial Literacy Foundation. (2008a). *Financial literacy. Women understanding money* (Report number ISBN: 978 1 74207 648). Retrieved from *https://financialcapability.gov.au/files/women-understanding-money.pdf*

Australian Government Financial Literacy Foundation. (2008b). *Financial literacy. Women understanding money*. Retrieved December 9, 2018, from *https://financialcapability.gov.au/files/women-understanding-money.pdf*

Australian Securities and Investment Commission. (2008). *Australian investors: at a glance* (Report Number 121). Retrieved from https://download.asic.gov.au/media/1344854/rep_121_Australian_investors_at_a_glance.pdf

Australian Security Exchange (2020). ASX Australian Investor Study 2020. Retrieved from https://www2.asx.com.au/blog/australian-investor-study/investor-profiles#female-investors

Bajtelsmit, V. L., & Bernasek, A. (1997). Why Do Women Invest Differently than Men? *SSRN Electronic Journal*. *doi:10.2139/ssrn.2238*

Bayyurt, N., Karışık V., & Coşkun, A. 2015. *Gender Differences in Investment Preferences.* Retrieved from *https://www.researchgate.net/publication/277313389.*

Birtch, T.A., Au, K.Y., Chiang, F.F.T., & Hofman, P. S. (2018). How perceived risk and return interacts with familism to influence individuals 'investment strategies: The case of capital seeking and capital providing behavior in new venture financing. *Asia Pacific Journal of Management*, *Volume 35*, Issue 2, 471–500. https://doi.org/10.1007/s10490-017-9525-0

Brown, A., Patten, P. (2018). *The narrowing, but persistent, gender gap in pay.* Pew Research Center. Retrieved from: *http://leametz.pbworks.com/f/Gender pay gap has narrowed, but changed little in past decade.pdf*

Charness, G., & Gneezy, U. (2007). Strong Evidence for Gender Differences in Investment. *SSRN Electronic* Journal. 23 p. *https://dx.doi.org/10.2139/ssrn.648735*

Dickason, Z., Nel, I., Ferreira, S.J. 2017. GENDER: BEHAVIOURAL FINANCE AND SATISFACTION OF LIFE. Gender & Behaviour, 15 (3), 2017, 9550-9559. 2017. Life Centre for Psychological Studies/Services, Nigeria.

Economy Watch. (2018). Investment Strategy, Guide to Investment Strategy. Retrieved from http://www.economywatch.com/investment/investment-strategy.html

European Union. (2018). *2018 Report on equality between women and men in the EU* (Report number ISSN: 1831-2802). Retrieved from European Commision: doi:10.2838/168837

Farrell, L., Fry, T. R., & Risse, L. (2016). The significance of financial self-efficacy in explaining women's personal finance behaviour. *Journal of Economic Psychology*, *54*, 85-99. *doi:10.1016/j.joep.2015.07.001*

Felton, J., Gibson, B., & Sanbonmatsu, D. M. (2003). Preference for Risk in Investing as a Function of Trait Optimism and Gender. *Journal of Behavioral Finance*, *4*(1), 33-40. doi:10.1207/s15327760jpfm0401_05

Fidelity Brokerage Services LLC (2015) *Money fit women study: Executive Summary.* Retrieved from Fidelity Investments website: *https://www.fidelity.com/bin-public/060_www_fidelity_com/documents/women-fit-money-study.pdf*

Finra Investor Education Foundation. (2016). *Investors in the United States 2016* (Report Nr. 16_0388.1 — 12/16). Retrieved from *https://www.usfinancialcapability.org/downloads/NFCS_2015_Inv_Survey_Full_Report.pdf*

Gerrans, P., Moulang, C., Feng, J., & Strydom, M. (2018). Individual and peer effects in retirement savings investment choices. *Pacific-Basin Finance Journal*, *Volume 47*, February 2018, 150-165. https://doi.org/10.1016/j.pacfin.2017.11.001

Hasler, A., & Lusardi, A. (2017, July). The Gender Gap in Financial Literacy: A Global Perspective. Retrieved from https://gflec.org/wp-content/uploads/2017/07/The-Gender-Gap-in-Financial-Literacy-A-Global-Perspective-Report.pdf

Hira T. K., Loibl C. (2008). Gender Differences in Investment Behavior. In J.J. Xiao (Eds), *Handbook of Consumer Finance Research*. New York: Springer.

Huang, X. (2018). Mark Twain's Cat: Investment experience, categorical thinking, and stock selection. *Journal of Financial Economics. Volume 131*, Issue 2, February 2019, 404-432. https://doi.org/10.1016/j.jfineco.2018.08.003

Hussain, S., Ali, S., Ibrahim, M., Balouch, W., Yousouf, M., Ghafoor, A. 2015. Impact of Women Behavior on Financial Decision Making. Global Journal of Management and Business Research: C Finance. Volume 15 Issue 1 Version 1.0 Year International Research Journal. Global Journals Inc. (USA) ISSN: 2249-4588.

Invalda (2017). INVL: Turto valdymo grupė. Tyrimas: Moterys reiklesnės būsimai pensijai, o investuoti renkasi daugiau vyrų Retrieved from: https://www.invaldainvl.com/1/lt/articles/articles/view/3244/tyrimas-moterys-reiklesnes-busimai-pensijai-o-investuoti

INVL Asset Management. (2018). *Lietuvoje vyrai dažniau investuoja, moterys – taupo ir planuoja*. Retrieved from: *https://www.invl.com/lit/lt/naujienu-centras/naujienos/256/lietuvoje-vyrai-dazniau-investuoja-moterys-taupo-ir*

Itkin, L. (2014). Every woman should know her options: Invest your way to financial empowerment. San Diego, CA: The Options Lady Press.

Jawaheer, B. M., & Manual, V. (2016). Gender Differences in Investment Decision Making Among the Working Class of Mauritius. *Imperial Journal of Interdisciplinary Research (IJIR)*, *2*(9).

Lee, K., Miller, S., Velasquez, N. & Wann, C. (2013) The Effect of Investor Bias and Gender on Portfolio Performance and Risk. *The International Journal of Business and Finance Research*, v. 7 (1) pp. 1-16, 2013. SSRN: https://ssrn.com/abstract=2148664

Lei, S. (2018). Single women and stock investment in individual retirement accounts. *Journal of Women & Aging*. https://doi.org/10.1080/08952841.2018.1510241

Levine, J. P. (2019). Million-dollar women: The essential guide for female entrepreneurs who want to go big. London: Piatkus.

Liem, G. A., & McInerney, D. M. (2018). *Big theories revisited 2*. Charlotte, NC: Information Age Publishing.

Macijauskas, L. (2012). *Investavimo strategijos. Lietuvos investuotojų tyrimas.* Retrieved from: https://www.synergyfinance.com/file/repository/news/pdf/Lietuvos_investuotoju_tyrimas_2013_01_.pdf

Malkiel, B. G. (2019). *A random walk down Wall Street: The time-tested strategy for successful investing*. New York: W.W. Norton & Company.

McCarthy, N., McCarthy, N., & Richter, F. (2018). *Infographic: The Gender Pay Gap In Europe*. Retrieved from *https://www.statista.com/chart/13174/the-gender-pay-gap-in-europe/*

Mclean, L. D., Guilford, J. P., & Fruchter, B. (1979). Fundamental Statistics in Psychology and Education. *Educational Researcher*, 8(3), 22. doi:10.2307/1174363

Mittal, M., & Vyas, R. (2009). Do Women Differ in Their Investment Information Processing Style? *Indian Journal of Gender Studies*, *16*(1), 99-108. *doi:10.1177/097152150801600105*

Mottola, G. (2015). *Finra Investor Education Foundation. Insights: Financial Capability.* Retrieved from: https://www.finrafoundation.org/sites/default/files/A-Snapshot-of-Investor-Households-in-America_0_0_0.pdf

Nasdaq. (2019) The 10 Commandments of Investing. Retrieved from *https://www.nasdaq.com/investing/10-commandments-of-investing.stm*

National Australia Bank Limited. (2018). Personal investments. Retrieved from NAB https://www.nab.com.au/personal/investments

Oprean, C. (2014). Effects of Behavioural Factors on Human Financial Decisions. *Procedia Economics and Finance 16* (2014) 458 – 463. DOI: 10.1016/S2212-5671(14)00825-9

PayScale. (2018). The State of the Gender Pay Gap In 2018. Retrieve from PayScale: *https://www.payscale.com/data/gender-pay-gap*

Ravazzini, L., & Kuhn, U. (2018). Inequality and Wealth: Comparing the Gender Wealth Gap in Switzerland and Australia. *Feminist Economics Journal*, *Volume 24*, Issue 4, 83-107. https://doi.org/10.1080/13545701.2018.1458202

Saris, W. E., & Gallhofer, I. N. (2014). Design, Evaluation, and Analysis of Questionnaires for Survey Research (2nd ed.). Somerset: Wiley.

Shaikh, G. M., Karim Katpar, N., Kalhoro, M., Abro, Y. K., & Phanwar, G. A. (2019). Do behavioral biases in gender differences affect investment decisions? Sociology International Journal, 3(4). doi:10.15406/sij.2019.03.00194

Siva, S. (2012). A study on Gender Difference in Investment Choice & Risk–Taking. *International Journal of Applied Research in BUSINESS ADMINISTRATION & ECONOMICS.* IJAR-BAE, *1*(1), 01– 06.

Stanyer, P., & Satchell, S. (2018). *The Economist Guide to Investment Strategy 4th Edition: How to Understand Markets, Risk, Rewards, and Behaviour*. New York: Public Affairs.

Statistics Lithuania (2017). Women and Men in Lithuania 2016. Retrieved from Statistics Lithuania:

Swenson, D. F. (2005). *Unconventional success: A Fundamental Approach to Personal Investment*. New York: Free Press.

Tengler, N. (2014). The Women's Guide to Successful Investing: Achieving Financial Security and Realising Your Goals(2014th ed.). New York: Palgrave Macmillan.

The Standard & Poor's Ratings Services (2015, November 18). Global Financial Literacy Survey. Retrieved from https://gflec.org/initiatives/sp-global-finlit-survey/

Tyson, E. (2019). *Personal finance for dummies* (9th edition). New York: John Wiley & Sons.

United Nations. (2017). *UNITED NATIONS DEVELOPMENT PROGRAMME*. Human Development reports. Gender Inequality Index (GII). Retrieved from: http://hdr.undp.org/en/data

Walker, R. B., & Walker, K. P. (2013). *Personal finance: Building your future*. New York, NY: McGraw-Hill/Irwin.

Westpac Banking Corporation. 6 steps to developing an investment strategy (2018). Retrieved from Westpac bank Australia: https://www.westpac.com.au/personal-banking/investments/the-share-market/investment-strategy/

World Health Organization (2018, May 15). Life expectancy. Retrieved from: *https://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends_text/en/*

ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0004

IMPORTANCE OF STAKEHOLDERS WITHIN UNIVERSITY SOCIAL RESPONSIBILITY

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Abstract

Research purpose. The paper follows a definition of University Social Responsibility (USR) recently formulated by Kouatli in 2019. In accordance with the definition, the main objective of this study is to identify and establish the importance of individual stakeholders to the university. The article also includes several case studies demonstrating the possibilities of cooperation between university management and other stakeholders to address the social aspects of sustainable development primarily.

Design / Methodology / Approach. The focus group method was used to identify all stakeholders. For individual focus groups, respondents rated their importance for universities on a scale from 1 to 7. Subsequently, different stakeholders were divided into relevant groups by factor analysis. The obtained outputs were used for the identification of important university stakeholders in the field of education and science.

Findings. The university's most important stakeholders in education were found to include applicants for study and their parents, student, and academic staff, and last but not least, foreign students. In the field of science and research, the university's main stakeholders are academics, enterprises, and the professional public. Emphasis is placed on how the university can cooperate with its stakeholders in CSR activities.

Originality / Value / Practical implications. The value of the proposed stakeholder framework can be seen in the identification of important stakeholders for universities. The paper also includes case studies related to the cooperation with the Czech university to fulfil its USR objectives.

Keywords: Stakeholders; University social responsibility; Covid-19; Best practices; Framework.

JEL codes: M14.

Introduction

Consumer social responsibility (CSR) has been a significant topic since the 70s. Authors used different constructs that included environmental perspective, ethical approach, or social aspect. (Anderson and Cunningham, 1972; Fisk, 1973).

The success of customer organisations depends on positive customer response to their products, services, actions. One of the most important factors for a customer is that company is focused on CSR.

The topic of corporate social responsibility is becoming increasingly attractive. Based on a survey conducted in the Czech Republic, it is important for two-thirds of the population of the Czech Republic whether the company from which they purchase products or services is socially responsible. In the case of employees, this emphasis is even higher - almost 90% of employees consider social responsibility to be an important activity of their employer (Holubová, 2017).

The TOP Responsible Company competition is regularly announced in the Czech Republic, and the 17th year took place last year. It is a rating that allows companies to find that their strategies and

projects to promote sustainability and social responsibility follow current trends and needs, contribute to their competitiveness in the market, inspire institutions and the public, and effectively involve their employees. However, what is interesting about this competition is that last year it reacted to the situation in the Czech Republic and newly included the Top Responsible Companies category - the COVID 19 subcategory. Subcategories (special awards) for companies that have supported diversity and inclusion in the workplace during the COVID-19 crisis. We will appreciate companies that have supported an endangered or disadvantaged group of employees during the crisis in terms of age, gender, disability, nationality, sexual orientation and other aspects.

COVID-19 situation in the Czech Republic – education

The COVID 19 pandemic affected the whole world, including the Czech Republic. In the Czech Republic, life basically stopped from the beginning of the pandemic. On March 12, 2020, the government of the Czech Republic declared a state of emergency, which also closed schools - primary, secondary and tertiary. Primary and secondary school students were allowed to return to school at least for a while. The situation at universities is basically different, with a few exceptions; students from most universities in the Czech Republic no longer saw their school. In essence, the teaching had to be brought online. No one was ready for that - neither the school's information system nor the teachers or the students. It was and still is a new situation for everyone. At the Faculty of Business and Management, most teaching has been conducted online for a year, and examinations for most subjects took place remotely in the winter semester. All meetings of the faculty management, the academic senate, and the meetings of individual departments have been taking place online for a year. We can observe that the transition to an online system of teaching and functioning has already been mastered by most people. However, everyone started to miss personal encounters, contact with other people, non-verbal communication, and everyone is also much more aware of the values and meaning of their work. Therefore, even in these difficult times, projects have started to help the disadvantaged and needy groups.

Literature review

Corporate social responsibility – stakeholder perspective

CSR, in general, refers to the firms' social responsibility (Mcguire, 1988) with regard to various stakeholders (Maignan, 2004). One of the possible approaches was created by Henriques. The stakeholders can be classified into four major groups: organisational stakeholders such as customers, employees, suppliers and shareholders; community stakeholders such as the residents; regulatory and governmental stakeholders such as municipalities; and finally media stakeholders (Clarkson and Henriques, 1995).

According to Welford (2004), CSR to employees includes the corporate activities that involve the employees' welfare and business ethics, such as non-discrimination policies in the workplace, equal education opportunities to develop the employees' skills, vocational training, and human rights protection within the organisation.

Employees are a key stakeholder group of any organisation and the core asset of any company. Organisations can achieve their goals and high performance only in case they have engaged employees. Employee engagement has a direct linkage to organisational performance and greater business results. An engaged employee advocates for the organisation, its product and services and self-motivated to contribute to organisational success. It can be concluded that engaged employees accelerate the organisation towards success. Employee engagement is a growing strategy for dynamic performance and building a competitive advantage.

It is important to note that employees have their own set of values, personality, self-concept and life goals, and that may care about CSR more than some companies realise.

Employee engagement through CSR: this aspect means that companies want to involve employees and increase employees' passion for an organisation by using CSR.

The second aspect is employee engagement in CSR, which interprets the level of employee participation in CSR efforts, from leading to taking part in existing programs.

The relationship between these two aspects is reciprocal. Employees who are more engaged in the workplace tend to engage in extra activities, including CSR and corporate volunteering. On the other hand, employee participation in CSR and corporate volunteering may lead to higher levels of satisfaction, commitment and engagement.

Organisations cannot implement strategic CSR without involving the employees. By involving employees in CSR company creates an organisational culture of CSR. To apply strategic CSR, it is essential to build a strong and shared culture of caring, giving, responsibility and sustainability, and this cannot be achieved without the involvement of employees. Employees present the link between the company and the community.

Models of engagement

There are good reasons for companies to more fully engage their employees, ranging from simple decency to competitive advantages in recruiting and retention to more effective human resources management.

Mirvis's model

Three different ways companies design and manage their efforts:

1. A transitional approach: programs are undertaken to meet the need and interest of those employees who want to take part in the socially responsible efforts of a company.
2. A relational approach: an organisation and its employees together make a commitment to social responsibility.
3. A developmental approach: a company aims to more fully activate and develop its employees and companies to produce greater value for business and society.

In each of these three models, companies can aim to do good for society and to do well in terms of employee commitment, reputation and benefits, and long–term financial returns. (Mirvis, 2012)

CSR congruence model

According to this model, the optimum results will occur when employees with an intertwined social responsibility pattern work for employers with the very same pattern.

Consistent with the CSR congruence model, when an alignment exists between employees' and employers' socially responsible behaviour and identity, positive outcomes may emerge, such as employee engagement, job satisfaction, and commitment.

The CSR congruence model tries to offer an explanation for why CSR leads to employee engagement but not in all companies and not for all companies. It offers a way of understanding the underlying psychological mechanisms of CSR and employee engagement.

Shareholders involvement in CSR

For the companies, it is important to communicate their values and CSR to all stakeholders and shareholders. Companies can use their annual reports to do that.

It is also essential to develop good relationships with shareholders who understand that CSR and sustainability are important for the company. There are several significant reasons that can motivate shareholders to support a company's CSR.

Firstly, consumer requirements for sustainable development and corporate social responsibility are rapidly increasing. More and more capital investors take into account the social impacts when they consider future investments. Individual shareholders can prefer socially responsible companies to those with higher financial performance (Riedl and Smeets, 2017).

Secondly, managers of the companies are usually rewarded for increasing the value of the company, turnover or profit (Chevalier and Ellison, 1997). Managers have to achieve the financial goals of the company, and therefore they strive to meet consumer demand and satisfy all customer segments. Consumers are increasingly interested in buying products from companies with sophisticated CSR concepts. For this reason, shareholders invest their money into projects, products and services with a higher social return. The management strategy has changed from negative screening to positive engagements with social and environmental impact (Barber et al., 2017).

Thirdly, shareholders are willing to invest their money into the larger portfolio of companies to reduce their financial risks. A lot of shareholders are interested in investing their capital into companies with the ability to provide sustainable, innovative products and long-term, high-quality services. These companies bring shareholders long-term and safe financial incomes.

CSR and Sustainable consumption

Sustainable consumption is a key issue and has received due attention from various international policy organisations such as Organisation for Economic Co-operation and Development, United Nations or Commission for Sustainable Development. A lot of scientists argue that today's consumption pace of natural resources is not sustainable. Therefore, it is necessary to encourage and make appropriate changes in sustainable consumption.

Nowadays, sustainable consumption has to take into account economic, social, ecological, and ethical aspects. A lot of people are aware of the necessity to change the view of society on consumption. However, a substantial amount of the population remains ignorant of sustainable consumption. Peattie and Collins (2009) emphasise that many customers find it difficult to consume sustainably predominately because the acts of consuming and sustaining are contradictory to each other. To implement changes in consumer behaviour, it is important to define a basic framework of sustainable consumption. This framework includes the following points:

1. Meets the basic needs of the current generation
2. Does not impoverish future generations
3. Does not cause irreversible damage to the environment
4. Does not create a loss of function in natural systems such as ecological and human value systems and also environmental and social responsibility
5. Increase resource use efficiency
6. Increase the quality of life
7. Avoids consumerism and modern hyper-consumption

Sustainable consumption is combined with production as well. This whole concept is called sustainable consumption and production (SCP), and it contains a life cycle perspective and equity dimension besides the seven points aforementioned.

Each customer should behave as a sustainable consumer and positively contribute to sustainable goals. Consumers can buy products and service that comply with environmental norms and regulations, are made of recycled materials and support the local economy. Producers should implement technologies that enable to decrease carbon and ecological footprints. A sustainable consumer should be aware of producers that take care of the ecological, social and economic aspect of production. Consumers get appropriate information from companies through labels and standards. The behaviour of consumers and companies has to be in harmony to reach sustainable development goals effectively.

University Social Responsibility – Stakeholder perspective

Even before University Social Responsibility (USR) was recognised as a separate subject, Matten and Moon (2004) proposed CSR education in business schools, where they reported on social

responsibility and ethical behaviour. The formal difference between CSR and USR began around 2009, where Sawasdikosol (2009) addresses the need to provide a universal USR framework. In terms of the education and knowledge gained from university, graduates are expected to be empathetic, altruistic, benevolent, selfless and caring as part of their competencies.

Vasilescua et al. (2010) described the shift from CSR to USR by presenting a framework, pointing out expectations of a specialised type of stakeholders. For instance, students at universities cannot be seen from the same perspective as customers or employees in the private sphere. This fact is one of the main drivers that emphasises the need for a specific area of USR for universities instead of general CSR.

Kouatli (2019) formulated the following definition of USR:

"University Social Responsibility is one of the strategic dimension of a university targeting the well-being and involvement of all stakeholders in encouragement and management of holistic view of economic, social, environmental and academic knowledgeability as well as acting as a hub among corporates and local and global environmental needs of the society by creating shared value activities and projects with the objective of achieving high sustainability."

The author of this definition further states that it is necessary to improve the quality of life of university stakeholders, predominately students as the most important university stakeholder. From this perspective point of view, it is advisable to identify other important stakeholders of universities in the context of the main college fields – Education and Science. Furthermore, the definition implies that the main objectives of university management should include activities that enhance both the well-being of stakeholders and also contribute to sustainable development. In accord with the above-mentioned information, the main objective of this study is to identify and establish the importance of individual stakeholders to the university. The article also includes several case studies demonstrating the possibilities of cooperation between university management and other stakeholders to address the social aspects of sustainable development primarily.

Bjørkquist (2009) lists in his dissertation four possible management regimes in relation to college stakeholders. His work makes the following distinction: expert regime, social regime, bargaining regime and business regime. Under the expert regime, a university is seen as a cultural institution with a high degree of autonomy, and academic freedom is seen as an integral part of that organisation. Under the welfare regime, the college is heavily state-run and performs the role of an institution to meet the objectives set by the state's policy. Its organisation is strictly hierarchical and structured. Under the negotiating regime, college is seen as an institution with democratic governance, where individual interest groups have divided power. Negotiation and participation are key factors in this regime. In a business regime, a university acts as a business entity providing services in a market environment. The above breakdown is mainly based on research by Olsen (2005). For each of those schemes, they are defined as relevant distinct groups of stakeholders.

As far as university interest groups are concerned, what is interesting is the division given in terms of the importance of these stakeholders in the dean's assessment relationship. Kezar and Lester (2009) provide the following breakdown:

Primary stakeholders – those responsible for designing the rector's job evaluation system, its implementation of modification, etc.

Secondary stakeholders – these are groups that are directly influenced by the chancellor's decisions and also act as occasional evaluators of his work.

Tertiary stakeholders – they come into contact with the rector only occasionally, mostly not as evaluators but interested in the results of the rector's work.

This division shows that stakeholders can be divided by different criteria, factors and situations. Matlay (2010) also uses the division of college interest groups into primary, secondary and tertiary.

Universities in the Czech Republic and CSR

A university is a legal entity, an educational institution providing tertiary education. Students and teachers form an academic community. The university is the only institution that has the right to award academic degrees. The university implements accredited study programs (these are divided into individual fields of study) and lifelong learning programs. The type of higher education activities is determined by the type of accredited study programs carried out - the types of study programs are bachelor's, master's and doctoral.

Public universities are established and abolished by the Higher Education Act. There are currently 26 state universities with 138 faculties and 33 private universities in the Czech Republic.

The bodies of the public university are:

Academic self-government bodies:

- academic senate
- rector
- a scientific council or artistic council or an academic council at a non-university college
- the Internal Evaluation Board, if established
- disciplinary board

Other public university bodies:

- Board of Directors
- questor

At prestigious foreign universities, social responsibility and sustainability are an automatic part of their strategy, and supporting the solution of socially beneficial goals is one of the priority areas.

Although universities are often perceived as institutions that are mainly supposed to teach and develop knowledge with the help of scientific approaches, they are also important employers and actors in the public sphere. They should therefore improve the working environment of employees, strive to protect the environment, promote volunteering or award public contracts responsibly and transparently. In addition, because they are educational institutions, they can educate their students and lead by example to such an approach.

Many universities are already engaged in some activities within the framework of social responsibility, but most of them are more activities of individuals or isolated deeds. In some schools, they are already beginning to apply these principles systematically and to include them in their strategic plans.

At Czech universities, we are still at the beginning of implementing the principles of social responsibility. This is a relatively new topic for universities.

Universities should be environmentally friendly or charitable. Universities provide education and, in social responsibility, should focus mainly on whether and how they meet the expectations of potential employers and society as a whole. Scientific work should contribute to the development of society and cooperate in this with private companies or local governments.

The most important thing is working with students. Not only that, universities should prepare students professionally. Students should behave responsibly and adhere to ethical and moral principles and principles of social responsibility and should disseminate them further in the management of companies. It is, therefore, necessary to prepare students for this but to set an example for them.

Universities are most often involved in philanthropic activities in the Czech Republic, and Covid-19 has helped to increase the number of volunteer activities. Still, in contrast to foreign universities, the area of environmental protection and compliance at universities remains problematic.

For the purposes of this article, we will use the Brno University of Technology as an example. The Brno University of Technology is a public university-type university focused on technical, economic and artistic sciences. The Brno University of Technology (BUT) has eight faculties and three university institutes, in 2019 BUT had 17,975 students.

Cooperation with practice is an important part of every university. Representatives of companies can get involved in university life, for example, by conducting students' diploma theses, offering students internship opportunities, etc. Companies can become equal partners of universities and can influence university operations, university strategic plans and the structure of individual study programs. In the context of university social responsibility, companies can put pressure on the establishment and greater involvement of universities in corporate social responsibility.

Foreign students

International students play a major role in corporate social responsibility, although it might not seem so at first. This role is that foreign students can bring experiences and best practices from their home universities to the university and can thus be a great inspiration.

Other stakeholders

A customer is defined as the person who is using a specific product or service. In the case of the school, the main customers are students who chose a particular school and used its educational services. Parents are also important when choosing a school because they can advise their children on a course or programme. In addition, parents financially support their children in their studies and can therefore have not an insignificant influence on their choice of university (Světlík, 2006). There are other noteworthy stakeholders who cooperate with universities, such as suppliers, competitors, secondary schools, enterprises, media etc. Suppliers are companies or individual who provide the necessary resources for the school to provide services (education) or produce goods. Suppliers have a significant influence on the school's activities with their price, sufficient supplies and availability (Francová, 2003).

Competition - every business faces competition and educational institutions are no exception. Especially in the 21st century has seen a lot of new schools, new lucrative fields and the supply of education services has started to outstrip demand. Competition in education intensifies, and universities cannot ignore it. The universities' competitive environment concerns, in particular attracting pupils or students, quality teachers, positive reputations (goodwill), sponsors, etc. Media are also important partners as they offer a space where universities can communicate and promote important information about education, science and research.

Research methodology

In the first phase, a pilot study was carried out to identify all possible stakeholders of the university. For this purpose, the focus group technique was used in combination with the brainwriting technique. Controlled interviews were conducted with 6 focus group of 6-7 people. The respondents included 18 women and 15 men. The members of the focus groups were the staff of the rectories and faculties who are responsible for the marketing communications of these institutions. These members of focus groups came from 14 public universities in the Czech Republic. The interviewees were asked the following question: What are the interest groups of the university? Respondents identified 14 university stakeholders. Identification of the interest group occurred when it was mentioned by at least one of the respondents. Figure 1 contains the full list of university stakeholders.

In the second phase, the same 33 experts assessed the importance of individual stakeholders from the university's perspective within the questionnaire. The significance of individual stakeholders was assessed on a scale of 1 to 7 when 1 signified the lowest importance, and 7 signified the highest importance.

It is advisable to use exploratory factor analysis to detect latent links between individual stakeholders (variables) because this analysis tries to describe each observed variable as a linear combination of the

influences of individual factors using the matrix operations of a typical correlation or variation-covariance matrix. The number of factors used can vary; the more factors are extracted, the greater the percentage variance of variables is explained. On the other hand, the point of factor analysis is to find as few acceptable factors as possible. Therefore, the number of search factors must be determined by specific data. We can use a theoretical assumption based on knowledge of the field of investigation or some method to identify the number of factors (for example, Kaiser rule, scree fence analysis etc.). New variables can be created from identified factors and further worked with statistically. The exploratory factor analysis allows splitting the stakeholders into more latent factors that help to identify and understand the structure and logic of stakeholder relationships. This is significant for universities in terms of cooperation with their stakeholders.

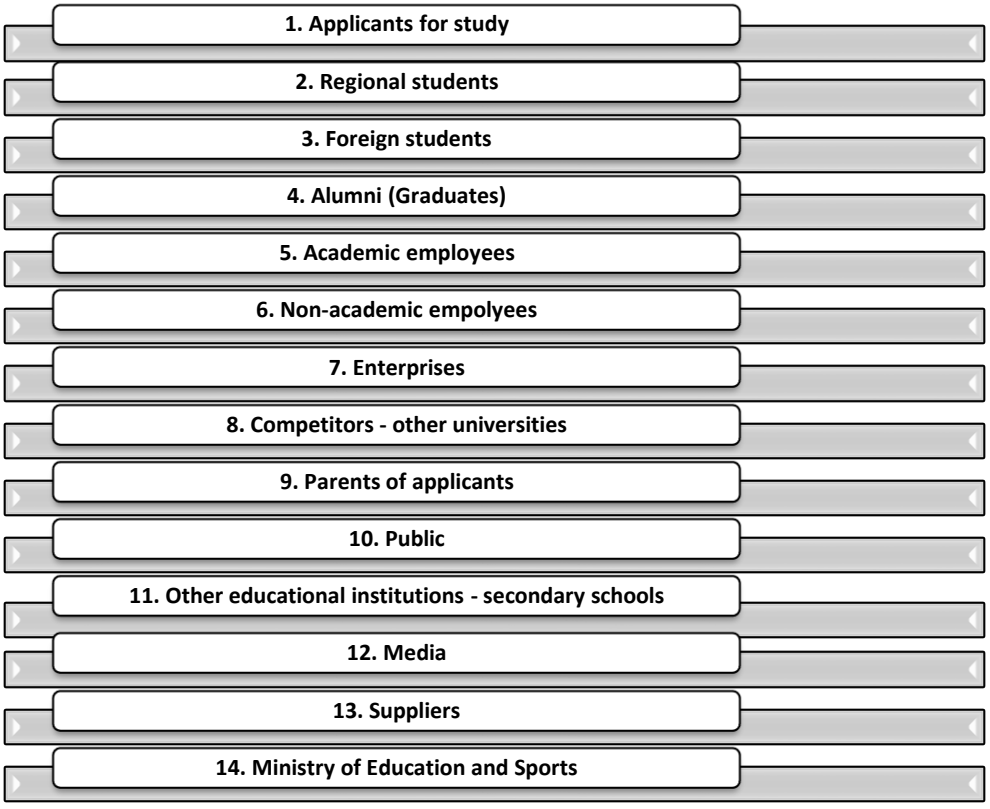

Fig.1. Stakeholders of University (Source: created by the authors)

Factor Analysis

Factor analysis is a statistical method used to explain the variance of observed variables using fewer latent variables so-called factors. The idea is, therefore, to measure something that is not measurable directly.

Today, there are two main approaches: so-called Exploratory Factor Analysis (EFA), which seeks to identify individual factors (and generally assumes that each observed variable is "saturated" by each extracted factor), and Confirmatory Factor Analysis (CFA), which places certain restrictions on the model (e.g. limits which items are saturated by which factors). Confirmatory factor analysis is, therefore, a simpler variant of so-called structural modelling (SEM).

The factor analysis explains the linear interdependence of the observed variables by the existence of fewer unobservable factors called common factors and other sources of variability called error or specific factors or also interfering or residual components. Common factors produce correlations between variables, while error factors only contribute to the variance of individual observed variables.

Factor analysis is primarily concerned with common factors. The basis of factor analysis is the assumption that observed covariates, respectively correlations between variables, are the results of common factors and not the interrelationship between variables.

Let us assume that $x^T = (x1, x2, \ldots, xp)$ is one object described by "*p*" observed variables. The general factor analysis model assumes that "*m*" exists in the background of the common factors *F1, F2, ..., Fm*, which is less than "*p*". Then we can write the object as a linear combination of common factors as follows:

$$x_1 = l_{11}F_1 + l_{12}F_2 + \ldots + l_{1m}F_m + e_1$$

$$x_2 = l_{21}F_1 + l_{22}F_2 + \ldots + l_{2m}F_m + e_2$$

$$x_p = l_{p1}F1 + l_{p2}F_2 + \ldots + l_{pm}F_m + e_p ,$$

where F1, F2, ... Fm are common factors that produce correlations between p and original variables. These factors have a zero mean and unit variance. In the model, further are the error components e1, e2, ... ep, referred to as specific factors that contribute to the variance of individual variables. We call lik coefficients to factor weights or loads (factor loadings) i-th variables on j-th common factor, i=1,...,p, j=1,...,m. In other words, The factor loads of lij, assuming the same measurement units, can be interpreted as contributing to the i-th factor of the explained variable. Factor loads, therefore, represent (if certain conditions of resolution) covariance or correlation between original and new variables. We can rewrite this factor model in matrix form as

Research results

Factor analysis with varimax rotation was used to examine the individual links between the variables (stakeholders) in depth. Based on the gained results, two latent factors were defined in the factor analysis. The number of latent factors was determined on the basis of the graphical results in scree plot – Fig.2. In the second node, a significant change in trend can be observed, which is how the number of latent factors was determined.

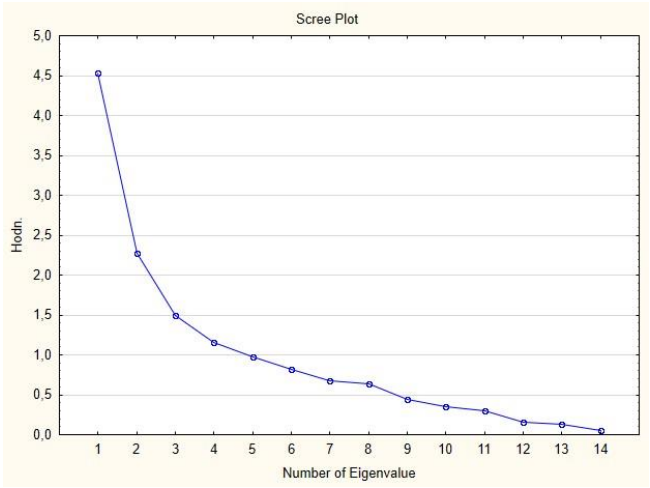

Fig. 2. Number of Eigenvalue in Scree Plot Graph

The cumulative variance of gained data from the questionnaire is almost 49%. The eigenvalue of the first latent factor explains 4.53 linear combination of original factors, and the eigenvalue of the second latent factor is 2.26. Figure 3 clearly summarises the aforementioned results.

Value	Eigen Value Extraction: Principal Components			
	Eigenvalue	% total variance	Cumulative Eigenvalue	Cumulative variance (%)
1	4,536129	32,40092	4,536129	32,40092
2	2,268914	16,20653	6,805043	48,60745

Fig. 3. Eigenvalue and Variance of Latent Factors

Original factors (stakeholders) that had a factor load greater than 0.5 (which indicates at least a medium relationship) were marked in bold type in Fig. 4.

The first latent factor was named "Education" because the structure and relationships between the variables (stakeholders) logically reflect this area within the university. Latent factor - "Education" includes the following important stakeholders – applicants for study, regional students, foreign students, parents of applicants and the public. This mix of stakeholders primarily reflects the area of education within the university. Applicants of study and students form the core of education because their factor loads were above 0.7 respectively 0.8, indicating a strong dependency. These stakeholders are potential customers and clients of universities. Parents are also important in the field of education, as they can give good advice to their offspring on what college to choose. University's goodwill is one of the main aspects by which interested students choose the college they want to study. The university's reputation is largely made up of public opinion. The public, therefore, plays an important role in interacting with the university. Figure 4 shows the factor loading of original factors within the latent factors - education and science.

Kinds of Stakeholders	**Factor Loading (Varimax rotation)**	
	Education	**Science**
Applicants for study	**0,783834**	-0,146795
Regional students	**0,817320**	0,038500
Foreign students	**0,814745**	0,140446
Alumni (Graduates)	0,075534	**0,648457**
Academic employees	-0,170720	**0,624892**
Non-academic empolyees	0,497673	0,260696
Enterprises	-0,038343	**0,827603**
Competitors - other universities	0,041841	**0,505530**
Parents of applicants	**0,672881**	-0,163654
Public	**0,644573**	0,483293
Other educational institutions - secondary schools	0,494162	0,228128
Media	0,393605	**0,580378**
Supliers	0,368061	0,442653
Ministry of Education	0,493519	0,468306

Fig. 4. Factor Loadings – Varimax Rotation

The second latent factor was named "Science" as the structure and relationships between the variables (stakeholders) logically reflect this area within the university. Latent factor "Science" contains the following important stakeholders – alumni, academic employees, enterprises, competitors (other universities) and media. This mix of stakeholders reflects the area of education within the university. Enterprises are the leading stakeholder within the science field with factor loads above 0.8, indicating a strong dependency. Enterprises can be considered as the most significant partners of universities in connection with research and development activities. Another important group is made up of alumni and academic employees, who often become prospective members of expert teams in the scientific collaboration between enterprises and universities. Other colleges are competitors of the university,

particularly in the field of education. In the case of science and research, the situation is the opposite. Very often, several universities have to work together on research projects. This is mainly due to the multi-disciplinarity of scientific research and its financial demands. Thus, individual science and research universities act as partners and not competitors. Media is the last major target group in science and research. Results of research projects are published in renowned scientific journals, and the media are also behind the popularisation of science and research.

Discussion and conclusions

This part of the article describes six case studies from the Brno University of Technology and its approach to the university social responsibility and the involvement of their important stakeholders in the whole process. The authors of the article chose this university because they know its environment very well and participate in some of the examples themselves.

These case studies serve as recommendations and practical examples of how universities and their stakeholders can engage in university social responsibility. Some examples have been in operation at the university for some time; others have originated and been instigated by the COVID - 19 pandemic.

1. *Christmas Tree of the Faculty of Business and Management of the Brno University of Technology*

Every year, the Faculty of Business and Management of the Brno University of Technology organises the FBM Christmas Tree event, where the management, employees and students of this faculty help obtain gifts for children from foster families. The main objective of this event is to give as many gifts as possible to make as many children as possible happy. Gifts usually include books, art supplies, cosmetics (for teenage girls), plush toys, and other toys. Gifts are bought based on the requirements of the children themselves. This event is an excellent example of charity and philanthropy and has a great impact on the development of the community of the Faculty of Business and Management. The management is aware of the importance of building good relationships with faculty stakeholders and regularly invites seniors (former employees), employees on maternity leave with children or representatives of selected companies, with which the faculty cooperates, on scientific and educational projects. The pleasant Advent atmosphere at the FBM Christmas Tree event is topped with a choir of art school pupils.

This event has a long tradition, as it has been held regularly since 2008. During the whole time, faculty students, employees and management have offered gifts to more than 1,000 children. Every year we manage to collect about one hundred gifts. This example indicates that charity does not only have to be carried out by private organisations but also by public institutions. The Christmas Tree event of the Faculty of Business and Management of the Brno University of Technology is an example of connecting and strengthening several areas within CSR. This is not just a charitable activity but a significantly more comprehensive matter. The Faculty of Business and Management has long been striving to develop an organisation with a positive approach to CSR and build relationships with its stakeholders. It seeks to promote ideas such as humanism, philanthropy or building a sustainable community.

2. *The Brno University of Technology helps to solve the crisis situation related to the coronavirus pandemic.*

- Production of disinfection

The Faculty of Chemistry managed to obtain a permit for the production of ANTI-COVID disinfectant. This disinfection was provided free of charge for the needs of the university, organisational units of the state, county and cities. All this happened at a time when there was a lack of disinfectants in the Czech Republic. Faculty staff worked in the production of disinfection in their free time.

- Production of protective shields

The Brno University of Technology has produced and distributed more than 36,000 protective shields. It was a purely voluntary action, which operated in an exchange regime to prosecute production. The shields were handed over to paramedics, nursing homes and school facilities. The Faculty of Business and Management also took part in this initiative.

- Mobile application

BUT students have created a mobile application Nepanikař, which helps with depression or panic. The user of the application has the opportunity to quickly and directly on the spot handle a panic attack. The application also helps with depression, anxiety, self-harm, etc. The Nepanikař application is the only one of its kind in the Czech language. To date, the application has saved more than a hundred lives and registers 120,000 downloads from 151 countries. Covid-19 has increased downloads. In the beginning, it was around 30%; today, the number is doubled. Covid-19 caused, in addition to the application, online counselling, and a non-profit company was established.

3. *Alfons - BUT consulting centre*

The Alfons advisory centre was established within the BUT. Jehovah's mission is to provide counselling and services to students and applicants with special needs. On average, the centre has 140 to 150 clients in the academic year.

Next to specific learning disabilities, such as is dyslexia, dysgraphia, dysorthography, attention deficit disorders or hyperactivity, they can be hearing, vision, movement, further chronic somatic disease, autism, mental illness or impaired communication skills.

Compared to consulting centres at other universities, Alfons is at a very good level. As the only university counselling centre, Alfons offers Biofeedback. Biofeedback is a training method that harmonises brain activity.

4. *Non-profit organisations and students from the Faculty of Business and Management*

Students of the Faculty of Business and Managements actively cooperate within their subjects with non-profit companies. For these companies creating, for example, marketing campaigns, proposals for marketing strategies and posters for various event centres. Thanks to this cooperation, students will be given the opportunity to look at the operation and functioning of non-profit companies, they have the opportunity to participate in meaningful projects. Non-profit organisations, on the other hand, will receive help from our students and young people's ideas.

The results of the study indicate that universities have to seek to deepen relationships with their stakeholders constantly. Moreover, the external environment is influencing universities to further develop corporate social responsibility in economic, social and environmental terms. The University's objectives influence the behaviour of other stakeholders and vice versa, so key activities need to be planned and implemented in line with the objectives of the university's partners.

As part of the research carried out using factor analysis, two crucial areas were identified within the university's management. This is an area of education and science. Education area (factor) includes the following most relevant stakeholders – applicants for study, regional students, foreign students, parents of applicants and the public. The field of research and development contains the following most relevant stakeholders – alumni, academic employees, enterprises, competitors (other universities) and media.

Currently, the entire world is facing many challenges, such as climate change or the epidemic caused by the Covid-19 virus. Also, due to these problems, it is essential for the Brno University of Technology in close cooperation with their stakeholders to rapidly increase the momentum for change in university social responsibility.

The ongoing COVID-19 pandemic has further increased the pressure on universities to engage in social responsibility and to include university social responsibility in university's strategic plans. The Brno University of Technology is striving to incorporate USR in its strategic objectives. It would also

be beneficial to establish the USR department as an integral part of the organisational structure of the university.

This article brought several real case studies that show the possibilities of involving the academic community in CSR. These case studies can serve as an example and guide for other universities not only in the Czech Republic but also abroad, how universities can include their most important stakeholders in the university social responsibility. The given examples showed that university could involve their employees, students, and university counselling centres in the university social responsibility. In this way, they can lead by example to companies and enterprises and at the same time help them to educate a socially responsible society.

References

Anderson Jr, W.T. and Cunningham, W.H. (1972), "The socially conscious consumer", Journal of marketing, 36(3), pp.23-31.

Bjørkquist, C. (2009). Stakeholder Influence in Higher Education: Old Ideas in New Bottles? (Doctoral dissertation, Karlstads universitet).

Clarkson, M.B.E. (1995), "A Stakeholder Framework for Analysing and Evaluating Corporate Social Performance. Acad. Manag. Rev. 1995", *Sustainability*, 92-117.

Fisk, G. (1973), "Criteria for a theory of responsible consumption", Journal of marketing, 37(2), pp. 24-31.

Francová, E. (2003). Marketing ve školství. Olomouc: Univerzita Palackého v Olomouci.

Holubová, R. (2017) Společenská odpovědnost všude kolem nás. Opravdu? *Ipsos.com* [online]. IPSOS, [cit. 2021-03-17]. Dostupné z: https://www.ipsos.com/cs-cz/spolecenska-odpovednost-vsude-kolem-nas-opravdu

Kezar, A., & Lester, J. (2009). Organizing higher education for collaboration: A guide for

campus leaders. San Francisco, CA: Jossey-Bass.

Kouatli, I. (2019). The contemporary definition of university social responsibility with quantifiable sustainability. Social responsibility journal.

Maignan,I.; Ferrell, O.C. (2004), "Corporate Social Responsibility and Marketing: An Integrative Framework", J.Acad. Mark. Sci., 32, 3–19.

Matten, D. and Moon, J. (2004), "Corporate social responsibility education in Europe", Journal of

Business Ethics, Vol. 54 No. 4, pp. 323-337

Matlay, H. (2011). Developing enterprising graduates: Stakeholder involvement, investment and expectations of entrepreneurship education. In ICSB World Conference Proceedings (p. 1). International Council for Small Business (ICSB).

Mcguire, J.B.; Sundgren, A.; Schneeweis, T. (1988), "Corporate Social Responsibility and Firm Financial Performance", Acad. Manag. J., 31, 854–872.

Meloun, M., & Militký, J. (2011). Statistical data analysis: A practical guide. Woodhead Publishing Limited.

Mirvis, P. (2012), "Employee Engagement and CSR: Transactional, Relational, and Developmental Approaches", *California Management Review*. ISSN 0008-1256, eISSN 2162-8564.

Olsen, J. P. (2007). The institutional dynamics of the European university. In University dynamics and European integration (pp. 25-54). Springer, Dordrecht.

Peattie, K., and Collins, A. (2009), "Guest editorial: Perspectives on sustainable consumption", *International Journal of Consumer Studies*, 33, 107–112.

Sawasdikosol, S. (P.M.) (2009), Driving Universities' Collaboration toward the New Era of Sustainable Social Responsibility University-Community Engagement Conference 2009 23-26 November, Penang.

Světlík, J. (2009). *Marketingové řízení školy*. Wolters Kluwer Česká republika.

Vasilescua, R., Barna, C., Epure, M. and Baicu, C. (2010), "Developing university social responsibility: a model for the challenges of the new civil society", Procedia Social and Behavioral Sciences, Vol. 2 No. 2, pp. 4177-4182.

Welford, R. (2004), "Corporate Social Responsibility in Europe and Asia Critical Elements and Best Practice", *J. Corp. Citizsh*. 13, 31–47.

ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0005

EVALUATION OF INFLUENCING FACTORS ON GREAT BRITAIN‘S EXPORT VALUES

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Abstract

Research purpose. The research aimed at identifying the main factors influencing export values in the region of Great Britain (GB) for the period of the last 30 years.

Design / Methodology / Approach. In order to implement the investigation, the following tasks were intended: (1) To analyse scientific literature and mark out at least five non - dependent variables that impact export values of Great Britain. (2) Basing on findings, outlined in a scientific review, suggest or choose the methodology that is the most appropriate for this kind of tasks' determination. (3) Collect the data for dependent and non-dependent variables (at least 30 samples). (4) Based on the presented methodology, determine the selected factors' impact and make the statistical and economic analysis. The research was mainly done using quantitative analysis methods (descriptive, correlation, regressive analysis). Quantitative modelling and descriptive statistics methods are selected for investigation because they can suggest a different approach to analysing the factors influencing export values.

Findings. Five non-dependent variables were marked out as factors influencing the export values in the selected region: gross domestic product (GDP); the number of employees in the region; amounts of cargo transportation; average salary in the region and labour costs. Calculation of the correlation coefficients showed that all independent variables were statistically significant. There is a very strong relationship between export values and GDP, employment, and labour costs.

Originality / Value / Practical implications. The findings of this research can be applied in order to evaluate and determine the economic impact of the GB processes on the entire world, as Britain’s export values are among the top ten in the world. It is important to emphasise that the deeper analysis of the influencing factors of the volume of export in Great Britain showed an interrelation of these factors. So further investigation of this factor’s impact is essential.

Keywords: Impact analysis; GB export values; Quantitative analysis; Influencing factors.

JEL codes: E01, D20.

Introduction

Trade may affect incomes through specialisation because of comparative advantage exploitation of returns from economies of scale, information exchange, arising from improved communication channels and travel, as well as the technological spillovers through investments and exposure to new goods and services. This created new methods of production and new ways of organisation. International trade is also a great way to increase investment opportunities that create new technologies and boost the country's economy. Exports are an important source of income and an engine of growth, so a successful export drive stimulates a positive multiplier effect on the economy with important feedback effects (Caleb et al., 2014).

Export intensity is an essential indicator of each country and plays a crucial role in the world economy. Comparing this indicator between different countries, the international exchanges can be foreseen and the way it is being developed in different countries. Higher exports show that one or another country has more influence in the world trade. The volume of exports is also an important indicator of economic development. Exports help to establish economic relations with other countries, help to improve the economy of their country. Without exports, a country may not generate enough revenue or even incur losses.

Exports are a bilaterally dependent variable. From one point of view, it depends on various factors such as GDP, transport volume, unemployment rate, but it influences the economy in general. The level of imports depends on the volume of exports, the same as the level of unemployment. Exports contribute to the country's economic growth, providing that the demand for goods grows. Britain's exports are among the top ten in the world, and this country's exports have a direct impact on the World economy.

This paper analyses the main factors influencing export values in the region of Great Britain from the period of 2000-2019 in order to identify the level of impact being done by active economic elements.

Literature review

There are plenty of researches investigating the impact of various factors on export values in different regions and even continents. They cover very different topics, multiple themes, and economic factors affecting export value, which is definitely one of the most significant economic indicators of each country and plays an essential role in the world economy. The newest researches undoubtedly include the most relevant topics, like the impact of the COVID-19 pandemic on exports (LIN & ZHANG, 2020) or COVID-19 pandemic economic impacts on some particular issues like livestock exports (Mtimet et al., 2021). Some studies examine the effect of destination tariffs on exports in some specific regions (Xu et al., 2020), or the impact of tighter controls on chemical exports in general (Hosoe, 2021), either the impact of de-globalisation on economic transformation, regarding the manufacturing export (He et al., 2020). Some innovative topics are on top as well, such as the impact of innovation ambidexterity on export performance (Yan et al., 2021), and disentangling the effect of various innovation types, financial constraints, and geographic diversification on SMEs' export growth (Bodlaj et al., 2020), or the impact of environmental policies and innovation on EU exports (Costantini & Mazzanti, 2012). There are not too many researches examining the effect of greatly influencing economic factors like GDB, number of employees, cargo transportation volumes, average salary, and labour costs. There are some reviews and analyses, but not much and they excludes the newest research and statistics (Chen et al., 2020; Fontes et al., 2020b; Ni & Kurita, 2020b; Trlaković et al., 2018b). This literature review here and after is an analysis of each of these factors seriatim.

One of the main factors influencing exports is the gross domestic product (GDP). Part of the domestically produced products or services travels abroad. In this way, the country generates income, exports also contribute to the improvement of the micro and macro environment and thus promote economic efficiency, and this has a significant impact on gross domestic product (Trlaković et al., 2018a). A professor of economics studying Chinese exports proved that rising wages and rising monetary rates had an impact on the volume and price of output. As a result, production and exports declined, along with the gross domestic product. Thus, changes in GDP also have a direct impact on changes in exports (Xing, 2018).

The number of employees is also one of the factors affecting exports. Companies invest heavily in human resources, so they need to raise prices to increase sales revenue. This leads to a reduction in sales turnover and lower export values (Katsikea et al., 2016). The scientific article "Employee quality and financial reporting outcomes" expresses a different opinion on the dependence of exports on employees. It is stated that highly qualified employees can perform more complex and better-performing work. They do the work more efficiently, faster, and more consistently. Due to sound quality, competent work, and good work results, the volume of exports also increases (Call et al.,

2017). Thus, a smaller number of highly educated employees can improve financial performance and, at the same time, improve export values.

Also, an important factor contributing to the change in exports is the volume of freight transported. All products require transportation, without which the goods would not reach their destination, and each company chooses which mode of transportation is best for them: planes, ships, lorries, etc. However, all transportation is aggregated into one total quantity and freight volumes are calculated in each country. The most popular way to export goods is to export by air. This method helps to save time, reach harder to reach places. Rapid response to customer's needs stimulates demand, which is especially important for exports (Larrodé et al., 2018). In developing countries, there is a direct relationship between export values and shipments. Poor logistics infrastructure increases trade costs and time, which hampers the efficient movement of products in global production networks (Töngür et al., 2020).

One more factor influencing export growth is average wages. It has been observed that industries around the world pay higher wages to their workers when exporting large quantities of goods to high-income countries. This is because such companies that export to high-income countries, export goods of better quality. In rich countries, there is a greater demand for quality products. Ensuring good quality is expensive and requires the use of a highly skilled workforce. As a result, the production of high-quality products creates higher wages and increases average wages (Brambilla & Porto, 2016). A study of Chinese export companies also found that companies with higher export intensities pay higher wages to their employees (Kong et al., 2018). This situation could have occurred due to the fact that companies engaged in international trade are economically stronger. They are more likely to expand and generate high incomes. This makes it easier for exporting companies to cover export costs, all other costs incurred, to spend a bigger share of the revenue on wages. Another study of Brazilian companies supports the claim that exports are contingent on wages because companies that employ highly skilled workers tend to be successful in export activities. Moreover, by earning high revenues, a firm has the ability to pay higher wages as well (Fontes et al., 2020a).

Finally, labour costs also contribute to the change in export values. Sometimes there is no need for highly skilled workers to increase exports. A large workforce is sufficient because more workers can work for lower wages and, thus, incur lower wage costs. For countries dominated by cheap labour and low-skilled workers, this can become an advantage for international trade. High labour costs relatively increase exports (Ni & Kurita, 2020a). This is because more employees can get the job done faster, so the work is done more efficiently. This produces more products and can expand export values to more countries. In this way, higher profits can be made, and higher profits help companies become economically stronger.

Table 1 below summarises the investigated export relationship with five different variables. Taking as an example the exports, it can be seen that it impacts growth in GDP, average wages, freight volumes, and labour costs. By increasing those factors, exports decrease the number of employees.

Table 1. The review of the variables (Source: created by author)

Metric	Relationship
GDP	+ GDP ➡ + Exports - GDP ➡ - Exports
Number of Employees	+ No. Employees ➡ - Exports - No. Employees ➡ + Exports
Freight volumes	+ Freight volumes ➡ + Exports - Freight volumes ➡ - Exports
Average wage	+ Average wage ➡ + Exports - Average wage ➡ - Exports
Labour costs	+ Labour costs ➡ + Exports - Labour costs ➡ - Exports

Upon the summary of and based on the scientific sources five factors influencing the volume of exports were identified: gross domestic product, number of employees, freight volumes, average wages, and labour costs. Basically, the authors in their particular researches have chosen the monetarist point of view. Most ideas are related to controlling the supply of money (or other incomes) that flows into the economy while allowing the rest of the market to fix itself. With the constant development of technology and the expansion of manufacturing companies, it is important to pay attention to how these factors change the volume of exports. However, it is also necessary to address the fact that the export values could skyrocket and eliminate all the variables as a contributing factor. Thus, in the following parts of the work, the aim is to determine the influence of active factors on the research subject.

Research methodology

The literature review was the basis for identifying the main factors influencing the investigated indicator. The analysis of the scientific literature identified few factors influencing the volume of exports. In this work, after finding five (5) independent variables, it is necessary to determine, based on the reliable methodology, whether they are significant and affect the volume of exports. If the independent variables are significant, it will be necessary to identify and elucidate the strength of the relationship.

The proposed set of variables has been chosen based on the descriptive scientific literature review and overview, considering the insights of authors who investigated in their works the GDP as a variable, which is being influenced by the spectrum of possible different factors. The distinguished variables that will be used to solve the tasks are the following:

Dependent variable:

Y - British export values;

Independent variables:

x_1 - gross domestic product;

x_2- number of employees;

x_3- cargo transportation volumes;

x_4- average salary;

x_5-labour costs.

Specific clarification of the difference between “average wages” and “labour costs” is as follows: labour cost here defines the total of wages, benefits, and payroll taxes paid for all employees. Average wages here show a benchmark for the wage level of individual workers in a country.

In order to be able to structurally systematise and graphically represent the investigated data, it is appropriate to use the method of descriptive statistics. This statistical method allows for the concentrated recording of information contained in large data sets and is therefore often used to process data for the whole population and to provide reasonable conclusions. Descriptive statistics will be used first to study these factors. Čekanavičius and Murauskas (2000) defined descriptive statistics as a “systematic representation of data. The advantage of this method is that it will allow the concentrated recording of information in large arrays." In this work, seven methods of descriptive statistics were analysed: arithmetic mean, median, mode, standard deviation, variance, and the minimum and maximum values. The results calculation are presented in the research results’ section.

Further, after performing and analysing the descriptive statistics, the correlation analysis methodology was used to model the relationship between random variables. The correlation analysis method is an appropriate statistical model used to study the relationship between economic indicators. In this particular case, the relationship between export values and GDP, number of employees, freight volumes, average wages, and labour costs are examined. Correlation analysis allows determining

whether there is a relationship between the analysed factors, expressed in quantitative indicators (Činčikaitė & Pabedinskaitė, 2016).

First, statistical hypotheses need to be put forward to calculate the correlation coefficient. Hypotheses help to organise the activities of researchers purposefully (1):

$$\begin{cases} H_0: r = 0 \\ H_1: r \neq 0 \end{cases} \quad (1)$$

here:

r- sample correlation coefficient;

When the hypothesis is assigned, the correlation coefficient is calculated. Using this coefficient, conclusions are made in order to determine the strength of the correlation with formula (2).

$$r = \frac{n\sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{(n\sum x_i^2 - (\sum x_i)^2) \times (n\sum y_i^2 - (\sum y_i)^2}}, \quad (2)$$

here:

r - correlation coefficient;

y_i - is a dependent variable;

x_i - is an independent variable;

n - is the sample size.

Further, the regression analysis is performed. It helps to identify a functional relationship of several quantities or, in other words, regression analysis shows whether there are independent variables in the model that have a relationship to the dependent variable. First, a linear regression analysis is performed. It is performed only with statistically significant indicators. Finding the relationship between the dependent and independent variables in the form of a line, the regression curve formula (3) (Činčikaitė & Pabedinskaitė, 2016).

$$y = ax_i + b, \quad (3)$$

here:

y - is a dependent variable;

a - coefficient;

b - free member.

The following formulas (4) are used to calculate the unknowns a and b:

$$a = \frac{n\sum x_i y_i - \sum x_i \sum y_i}{n\sum x_i^2 - (\sum x_i)^2}, b = \frac{\sum y_i}{n} - a \times \frac{\sum x_i}{n}, \quad (4)$$

Multivariate correlation analysis can also be used to check the relationship between dependent and independent variables. The advantage of this analysis is that several independent variables and a dependent variable can be studied simultaneously. To construct a polynomial regression equation, it is also necessary to pay attention to the same conditions that were used in the calculation of the multivariate regression. However, in this case, all calculated p-values must be less than 0.05; otherwise, the regression equation cannot be constructed. If all variables meet the conditions, the equation can be calculated with the formula (5) (Činčikaitė & Pabedinskaitė, 2016):

$$y = a_0 + a_1x_1 + \ldots + a_nx_n, \quad (5)$$

All calculated indicators will be relevant for the study. Descriptive statistics will help to identify the main features and interrelationships of the variables, and correlation analysis will help to assess the strength of the dependency. The equations generated with the help of linear regression analysis will show the dependence between the dependent variable and each statistically significant factor separately, and the multivariate regression analysis will show the strength of the relationship between the analysed variable and all other factors together.

The correlation analysis and simple and multiple linear regressions can suggest a different approach to analysing the factors influencing the country's GDP. For this reason, every mentioned method is used in this research. Descriptive statistics will help see the main tendencies of the retrieved data, while correlation and regression models will help to learn the dependency of the investigated GDP indicator.

Research results

The first step that needs to be taken to properly evaluate the third task to determine the impact of the selected indicators is to compute the descriptive statistics. Twenty years' worth of data was calculated, from 1998 to 2018, which includes the change in British export values, which are potentially being influenced by GDP, the number of employees, freight volumes, average wages, and labour costs. The main indicators of descriptive statistics have been calculated (Table 2). These results will influence further calculations.

Table 2. Descriptive statistics (Source: by author)

	Number of employees (thousand)	**Cargo transportation volumes (thousand tons)**	**Average wage**	**Labour costs (thousand people)**	**Export value (million dollars)**	**GDP ($)**
Mean	28213.65	149965.19	39592.29	30188.1	562189.60	27225.19
Median	28260.46	152604.40	43452.23	29694.28	557918.66	27088.29
Standard Deviation	2114.78	12245.94	8780.14	1944.817	174592.35	9185.07
Sample Variance	4472295.63	149963054.8	77090893.4	3782311	30482487380	84365464.75
Minimum	25088	123600	3126.59	27895	282584.38	12906.63
Maximum	32354.05	173080	46728.22	33700.73	844728.85	42522.18

The second step is correlation analysis. Its aim is to find out whether there was a link between GB export values and GDP, the number of workers, freight volumes, average wages and labour costs. To achieve this goal, a hypothesis was put forward that was applied to all calculations.

$$\begin{cases} H_0: r = 0 \\ H_1: r \neq 0 \end{cases}$$

Correlation coefficients were then calculated, and the relationship between the variables considered was determined. The calculated data show (see Table 3) that there is an average relationship between the value of exports and freight volumes, there is a strong relationship between exports and average wages, and there is a very strong relationship between export values and all other variables. Also, the correlation coefficient is more than 0 everywhere, so it is concluded that the relationship is positive.

Table 3. Correlation coefficients (Source: by author)

	Export value (million dollars)
Export value	1
GDP	0.985097319
Number of employees	0.948644329
Cargo transportation volumes	0.604438348
The average salary	0.797842942
Labour costs	0.934082336

The next step is linear regression analysis. Using this method, each independent variable will need to be checked with the dependent variable separately.

When performing the linear regression analysis between UK export values and GDP, the coefficient of determination shows that as much as 97% of the gross domestic product explains export values. Also, the significance coefficient and the p-value are less than 0.05, which means that there is at least one significant x in the equation, and we can form an equation (6).

$$Y = 18{,}73x_1 + 52397{,}72 \quad (6)$$

In constructing the regression equation, the number x_1 shows how many times the export volume will increase if we increase x1 by one unit. In the present case, if we increase GDP by one unit, the volume of exports will increase by times 18.73.

Economist Adam Smith was one of the first to take an interest in the link between exports and gross domestic product. According to him, countries with high incomes tend to trade more with foreign countries, and their export values are growing, as are revenues. Productivity growth also contributes to GDP growth (Michelis & Zestos, 2004).

When performing the regression analysis between export values and the number of employees, the coefficient of determination is greater for 0.25, and as much as 89% of the variance of the variables explains the equation. The significant factor is less than 0.05, so we can interpret the equation; the P-value is also statistically significant. The regression equation is constructed (see formula (7)). This can be interpreted as follows: if we increase the number of employees by one, the volume of exports will increase by times 78.32. Equation (see formula (7)) confirms that the number of employees is important for exporting companies. The change in the number of employees depends on the amount of demand, since production increases as demand increases. Workers are needed to work efficiently and produce enough. Thus, increasing their number indicates that the company is increasing production. In most cases, an increase in production increases the volume of exports as part of the production travels to a foreign market.

$$Y = -1647455{,}85 + 78{,}32x_2 \quad (7)$$

The regression between export and freight volumes is calculated. The coefficient of determination shows that 37% of the variance of the dependent variable is explained by the independent variable. The significance factor is 0.004 and is less than 0.05, which means that there is at least one significant x in the equation. The P-value is also less than 0.05, so we can form an equation.

A regression equation can be constructed based on the calculated data (see formula (8)).

$$Y = -730146{,}67 + 8{,}62x_3 \quad (8)$$

The resulting equation (see formula (8)) means that increasing the volume of freight transport by one unit will change the volume of exports by times 8.62. From an economic point of view, higher transport volumes mean higher transport of goods. This means that supply to other countries is increasing; in other words, exports are increasing.

The second to last statistically significant factor is the average salary. Therefore, linear regression analysis between export values and average wages is calculated. The coefficient of determination obtained is 0.63. This means that 63% of the data can be explained by the equation below. The significance coefficient and p-value (average salary) are lower than 0.05 (see Table 9); therefore, it can be stated that the coefficients are statistically significant, and a linear regression equation can be formed (9).

$$Y = -65943{,}59 + 15{,}87x_4 \quad (9)$$

It has been observed that export companies tend to hire more highly qualified staff to ensure high-quality goods and services. To such workers exporters pay higher wages, resulting in higher average wages (Bombardini et al., 2019). For many people, wage growth is an incentive to work faster and more efficiently, so it can be argued that wage growth also increases production, which increases exports.

Finally, regression analysis with the fifth independent variable, labour costs, is calculated. The coefficient is statistically significant, and we can construct an equation (10)

$$Y = -1969249{,}28 + 83{,}86x_5 \quad (10)$$

In the present case, if we increase labour costs by one unit, the volume of exports will change by times 83.86. This change will happen because the goods produced depend on costs. Rising labour costs mean increasing production. Production increases as demand increases. When we know how each independent factor individually affects the volume of British exports, a multivariate regression analysis is also needed to find out how export values relate to all or some of the independent variables.

First, a multivariate regression analysis is performed with all independent variables, and a relationship between export values and GDP, number of employees, freight volumes, average wages, and labour costs are sought. The coefficient of determination, the significance of the regression and the p-values must be taken into consideration.

After several tests, determining the regression between the GDP and all the rest independent variables, the solution, which approves the significance of the variables, only examining the relationship between export value and freight volumes and labour costs, it was found that 96% of the variance in the dependent variable is explained by these independent variables. Based on the significance factor, we can interpret the equation because this indicator is less than 0.05.

The coefficient of determination shows that 98% of the scatter of a dependent variable can be explained by independent variables. The significance coefficient is less than 0.05, so it is clear that there are variables that affect the dependent variable.

However, according to the calculations, it can be seen that p-values that less than 0.05 are only for GDP and freight transport; p-values for all other independent variables are statistically insignificant; therefore, a regression equation cannot be formed.

Although all these variables individually had an impact on export values, the calculations showed that together they do not have an impact. This may be because independent variables do not interact with each other.

For a multivariate regression between export values and gross domestic product, the average coefficient of determination was calculated to be 0.97 (see Table 4). This means that 97% of the variance scatter explains the equation. The significance factor is less than 0.05, which means that there will be independent variables in the equation that have an effect.

Table 4. Determinations and significance coefficients of multivariate regression analysis (Source: by author)

Coefficient of determination	0.961256
Significance factor	0.0001

The next step is to check the p-values. In the table (see Table 5), all calculated p-values are less than 0.05 and are statistically significant so that we can interpret the equation.

Table 5. Coefficients and p-values of multivariate regression analysis (Source: by author)

	Coefficients	**P-values**
Free member (constant)	-2348886	0.0001
Cargo transportation volumes	4.530628	0.0001
Labour costs	73.92446	0.0001

Based on the data in Table 4, equation (11) is composed:

$$Y = -2348886 + 4{,}53x_3 + 73{,}92x_5 \quad (11)$$

Based on the equation (see formula 16), it can be explained statistically: if we increase x_3 by one unit, Y will increase by times 4.53, but taking into consideration that the other variables remain unchanged, and if we increase x_5 by one unit, then Y will increase by times 73,92 but provided other indicators remain unchanged.

Increasing the volume of freight transport will increase the value of exports by times 4.53 because if we increase the volume of freight transport, there is a high demand, and we automatically export more; higher exports increase revenue and export value. The same situation occurs with labour costs. Increasing them by one unit will increase the value of exports by times 73.92. This is because rising labour costs mean higher production, and higher production means increased supply and export values. Increased exports increase the revenue generated from them.

To summarise, it can be stated that all independent variables are statistically significant and have a positive relationship with the dependent variable. By constructing a linear regression equation with all independent variables, an analysis of the scientific literature was substantiated, and it was shown that all independent variables influence export values. The multivariate regression analysis was used to construct an equation between export values and freight volumes, and labour costs.

Conclusions

1. Reviewing scientific sources, five factors affecting the number of exports were classified: gross domestic product, number of employees, freight volumes, average wages, and labour costs. Most recommendations of the authors targeted that taking into consideration the continuous technological development and the increase of manufacturing companies, it is important to pay attention to how these factors make an impact on the volume of GB exports. However, it is also necessary to address the fact that the export values could skyrocket and eliminate all the variables as a contributing factor. In other words, the statistical calculation and findings that have been achieved in this research correlate with the facts reviewed in the existing literature.

2. For clarity, the study only considers the GB export values as the primary data set. Additionally, the timeframe of the data does not exceed 30 years. As a result of these limitations, the study does not provide any substantial information regarding other countries or explain other economic tendencies. The study is also limited in terms of available research into the long-term impact of the trade war and the pandemic of Covid-19. As such, the paper claims to imply viable solutions based on currently available data.

3. The calculation of the correlation coefficients showed that all independent variables are statistically significant. There is a very strong relationship between export values and GDP, employment and labour costs. There is a strong relationship between exports and average wages, and there is a moderate relationship between export values and freight volumes. Linear regression analysis showed that all independent variables have different effects on export values, and paired regression equations were developed with all of them. An increase of one unit in all independent indicators will also increase export values in the United Kingdom. Multivariate correlation analysis has shown that an increase in freight transport by one unit will also increase export values when other factors remain unchanged as well as an increase in labour costs by one unit will also increase export values if other factors remain unchanged.

4. The investigation has shown that there are various factors that have an impact on the volume of exports, and those factors are related and interrelated. For further research, it is recommended to determine the relationship of the investigated variables and continue the research by adding new relationships by supplementing the study with additional independent variables. Some ideas of specific themes to expand the research and can be carried out forward are as follows: ranking one variable over another; specific pairwise analysis to analyse the comparison between them; investigation of ability to negate the impact of each criterion due to the technology progress; collinearity tests.

References

Bodlaj, M., Kadic-Maglajlic, S., & Vida, I. (2020). Disentangling the impact of different innovation types, financial constraints and geographic diversification on SMEs' export growth. *Journal of Business Research*, *108*, 466–475. https://doi.org/10.1016/j.jbusres.2018.10.043

Bombardini, M., Orefice, G., & Tito, M. D. (2019). Does exporting improve matching? Evidence from French employer-employee data. *Journal of International Economics*, *117*, 229–241. https://doi.org/10.1016/j.jinteco.2018.11.001

Brambilla, I., & Porto, G. G. (2016). High-income export destinations, quality and wages. *Journal of International Economics*, *98*, 21–35. https://doi.org/10.1016/j.jinteco.2015.09.004

Caleb, G., Mazanai, M., & Dhoro Netsai, L. (2014). Relationship between international trade and economic growth: A cointegration analysis for Zimbabwe. *Mediterranean Journal of Social Sciences*, *5*(20), 621–627. https://doi.org/10.5901/mjss.2014.v5n20p621

Call, A. C., Campbell, J. L., Dhaliwal, D. S., & Moon, J. R. (2017). Employee quality and financial reporting outcomes. *Journal of Accounting and Economics*, *64*(1), 123–149. https://doi.org/10.1016/j.jacceco.2017.06.003

Chen, J., Fei, Y., Wan, Z., Yang, Z., Li, H., Choi, K. S., & Xie, X. (2020). Allometric relationship and development potential comparison of ports in a regional cluster: A case study of ports in the Pearl River Delta in China. *Transport Policy*, *85*, 80–90. https://doi.org/10.1016/j.tranpol.2019.10.018

Činčikaitė, R., & Pabedinskaitė, A. (2016). *Kiekybiniai modeliavimo metodai*. VGTU leidykla TECHNIKA.

Costantini, V., & Mazzanti, M. (2012). On the green and innovative side of trade competitiveness? The impact of environmental policies and innovation on EU exports. *Research Policy*, *41*(1), 132–153. https://doi.org/10.1016/j.respol.2011.08.004

Fontes, L. F., Granitoff, I., & Tiing Tai, S. H. (2020a). Export wage premium for south Brazilian firms: Interaction between export, human capital, and export destination. *EconomiA*, *21*(3), 365–376. https://doi.org/10.1016/j.econ.2020.05.003

Fontes, L. F., Granitoff, I., & Tiing Tai, S. H. (2020b). Export wage premium for south Brazilian firms: Interaction between export, human capital, and export destination. *EconomiA*, *21*(3), 365–376. https://doi.org/10.1016/j.econ.2020.05.003

He, L. Y., Lin, X., & Zhang, Z. X. (2020). The impact of de-globalisation on China's economic transformation: Evidence from manufacturing export. *Journal of Policy Modeling*, *42*(3), 628–660. https://doi.org/10.1016/j.jpolmod.2020.02.001

Hosoe, N. (2021). Impact of tighter controls on Japanese chemical exports to Korea. *Economic Modelling*, *94*, 631–648. https://doi.org/10.1016/j.econmod.2020.02.006

Katsikea, E., Theodosiou, M., & Morgan, R. E. (2016). Why people quit: Explaining employee turnover intentions among export sales managers. *International Business Review*, *24*(3), 367–379. https://doi.org/10.1016/j.ibusrev.2014.08.009

Kong, D., Kong, G., Pang, L., & Zhang, J. (2018). Who gets the wage premium from export: Top managers or employees? *International Review of Economics and Finance*, *58*, 356–370. https://doi.org/10.1016/j.iref.2018.04.006

Larrodé, E., Muerza, V., & Villagrasa, V. (2018). Analysis model to quantify potential factors in the growth of air cargo logistics in airports. *Transportation Research Procedia*, *33*, 339–346. https://doi.org/10.1016/j.trpro.2018.10.111

LIN, B. xi, & ZHANG, Y. Y. (2020). Impact of the COVID-19 pandemic on agricultural exports. *Journal of Integrative Agriculture*, *19*(12), 2937–2945. https://doi.org/10.1016/S2095-3119(20)63430-X

Michelis, L., & Zestos, G. K. (2004). Exports, Imports and GDP Growth: Causal Relations in Six European Union Countries. *The Journal of Economic Asymmetries*, *1*(2), 71–85. https://doi.org/10.1016/j.jeca.2004.02.004

Mtimet, N., Wanyoike, F., Rich, K. M., & Baltenweck, I. (2021). Zoonotic diseases and the COVID-19 pandemic: Economic impacts on Somaliland's livestock exports to Saudi Arabia. *Global Food Security*, *28*, 100512. https://doi.org/10.1016/j.gfs.2021.100512

Ni, B., & Kurita, K. (2020a). The minimum wage, exports, and firm performance: Evidence from Indonesia. *Journal of Asian Economics*, *69*, 101218. https://doi.org/10.1016/j.asieco.2020.101218

Ni, B., & Kurita, K. (2020b). The minimum wage, exports, and firm performance: Evidence from Indonesia. *Journal of Asian Economics*, *69*, 101218. https://doi.org/10.1016/j.asieco.2020.101218

Töngür, Ü., Türkcan, K., & Ekmen-Özçelik, S. (2020). Logistics performance and export variety: Evidence from Turkey. *Central Bank Review*, *20*(3), 143–154. https://doi.org/10.1016/j.cbrev.2020.04.002

Trlaković, J., Despotović, D., & Ristić, L. (2018a). Impact of technology-intensive exports on GDP of Western Balkan Countries. *Journal of Policy Modeling*, *40*(5), 1038–1049. https://doi.org/10.1016/j.jpolmod.2018.01.006

Trlaković, J., Despotović, D., & Ristić, L. (2018b). Impact of technology-intensive exports on GDP of Western Balkan Countries. *Journal of Policy Modeling*, *40*(5), 1038–1049. https://doi.org/10.1016/j.jpolmod.2018.01.006

Xing, Y. (2018). Rising wages, yuan's appreciation and China's processing exports. *China Economic Review*, *48*, 114–122. https://doi.org/10.1016/j.chieco.2017.04.002

Xu, T., Li, W., Jiang, Y., & Chen, Y. (2020). The impact of destination tariffs on China's exports: Country, firm, and product perspectives. *Journal of Asian Economics*, *71*, 101246. https://doi.org/10.1016/j.asieco.2020.101246

Yan, J., Tsinopoulos, C., & Xiong, Y. (2021). Unpacking the impact of innovation ambidexterity on export performance: Microfoundations and infrastructure investment. *International Business Review*, *30*(1), 101766. https://doi.org/10.1016/j.ibusrev.2020.101766

ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0006

MARKET STRUCTURE ANALYSIS WITH HERFINDAHL-HIRCHMAN INDEX AND LAURAÉUS-KAIVO-OJA INDICES IN THE GLOBAL COBOTICS MARKETS

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Abstract

Research purpose. The study is focused on the expected market dynamics of global cobotics markets. This study investigates the current market structure of the global cobotics market. The scientific aim of the research is to report the first data-based market structure analysis of the global cobotics market with the HHI index and with the LKI index analysis. With analysis we are able to show the diversification rate of the global cobotics market.

Design / Methodology / Approach. The methodology is based on conventional statistical index theory and statistics. The methodology is the calculation of the Herfindahl-Hirchman Index and the Lauraéus-Kaivo-oja Index. The authors compare the results of these two methodologies.

Findings. The Herfindahl-Hirschman Index (HHI) and the Lauraéus-Kaivo-oja Index are statistical measures of market concentration, and they can be used to determine market competitiveness. This paper demonstrates novel data analytics possibilities of new market data collected by the Statzon, Ltd with various comparative analytical results and findings. By our analyses we can help multiple industrial stakeholders make faster decisions and better strategic plans with the easiest and fastest access to accurate, reliable, and up-to-date cobotics industry statistics, forecasts, and insights. The finding is that this study reveals the current market structure of global cobotics. It is a novel finding and result.

Originality / Value / Practical implications. This paper demonstrates the novel and exciting possibilities of transparent index calculation tools. The authors provide original results. Authors underline that extra value added to stakeholders and customers will be provided by joint data pooling strategy of various data sources, which is a key approach of this paper. Real-time market structure analyses create reliable and knowledge-based information for decision-makers and stakeholders of the global cobotics industry.

Keywords: Market trends; Market structure of global cobotics market; Herfindahl-Hirschman Index (HHI); Lauraéus-Kaivo-oja Index (LKI); Market data analytics.

JEL codes: C13, C53, C63, D52, G28.

Introduction

This paper studies the current market structure of the global cobotics market and the expected market dynamics of global cobotics markets. We show the first data-based market structure analysis of the global cobotics market with the HHI and the LKI analyses. We aim to show the diversification rate of the global cobotics market with these two analysis methods.

Definition of the concept of cobots: Collaborative robots (cobots) are robots, which enable direct interaction between humans and robots. Cobots promote *human-robot collaboration* (HRC) and differs from the traditional industrial robot, which separates human-robot interaction (HRI) by safety cages (Gervasi et al., 2020).

Collaborative robots differ from industrial robots in several ways, such as (1) the elimination of a safety fence while working alongside humans, (2) simplified programming and reduced setup time, (3) integration of auto-speed reduction and distance monitoring or proximity sensors, and (4) ability to reduce motor power and force during application to avoid harm to a worker (Knudsen & Kaivo-oja, 2020; Stieber 2015).

Compared to traditional industrial robots, cobots are usually lighter, more mobile, cheaper, and easier to reprogram. Experts note that this makes them especially suitable for companies with many productions, variants, small lot sizes, and fluctuating production volumes (Knudsen & Kaivo-oja, 2020; Kopp et al., 2021), for example, SMEs. These features also make them ideally suited for the modern manufacturing paradigms of Industry 4.0, intelligent manufacturing, and mass customisation (Knudsen & Kaivo-oja, 2020).

The recent experience of the COVID-19 pandemic has only leveraged the importance of the industry. Robots do not get the coronavirus (Brakman et al., 2021), and the magazine The Economist reports of a "*surge in demand for material handling equipment and "collaborative robots", designed to interact with people"* (The Economist, 2021). They further note that while cobots aid in keeping the social distance, the technology will be a boon to post-pandemic productivity.

We will introduce the classical Herfindahl–Hirschman Index (HHI index). Based on that, we will show the development of a novel Lauraéus-Kaivo-oja indicator, which will be a more easily comprehensible analysis tool than the conventional HHI index.

Lauraeus-Kaivo-oja index can be defined as an analysis tool for market competition situation and measurement of market concentration.

With the HHI index and the LKI index we have analysed new transparent ways to perform the competition and market structure analyses (Lauraéus & Kaivo-oja, 2017). The HHI index and the LKI index are suitable for analysing the dynamics of competition and emerging trends and structural changes of global innovation ecosystems (Kaivo-oja &Lauraeus 2017).

This paper's research problem is what is the global cobot market competition situation in 2020. Which direction is the global cobot market shifting? How to calculate the LKI index? How do the HHI and the LKI indices differ? The research cap: There is little research about cobot market and even less research about cobot market competition situation analysis. This paper analyses and compares the Herfindahl–Hirschman Index (HHI index) and the novel Lauraéus-Kaivo-oja index and analyses results. The LKI index is calculated from the HHI index.

Literature Review

Collaborative Robots (Cobots) Market

Collaborative robots (also known as cobots) are designed to work alongside humans with precision, strength, and speed to achieve greater efficiency in production. Using robots to assist humans can help to significantly reduce the workload of human workers and relieve them of monotonous, repetitive tasks. Being an emerging automation technology, collaborative robots complement the existing market of industrial robotics. The total cost of ownership of factory automation solutions, especially for small and medium-sized enterprises (SMEs), can be significantly reduced with the adoption of cobots.

Collaborative robotics (cobots) has become one of the most talked-about sectors of the robotics markets (Knudsen & Kaivo-oja, 2020). Cobots differ from traditional robots by enabling direct human-robot collaboration (HRC), whereas traditional industrial robots physically separate humans and machines through extensive security measures. The return of research and market interest in cobotics is consistent with emerging subfields of research that recognise the unique skillsets of humans for perception and adaption (Goldberg, 2019). Therefore, cobot technology promises to leverage the flexibility and adaptive capabilities of humans with the strengths and endurance of machines.

For many industrial plant contexts, cobots also have significant benefits in comparison compared to traditional industrial robots. Cobots are generally cheaper, more mobile, easier to program, and more efficient in configurability for new production process tasks. Therefore, they are well suited for new Industry 4.0 digital paradigms with more attention towards flexibility, customisation, smaller sizes, and faster speed of delivery to market.

The Herfindahl–Hirschman Index (HHI Index)

Definition of the Herfindahl–Hirschman Index, HHI index***:*** The term "HHI" means the Herfindahl–Hirschman Index, a commonly accepted measurement of market concentration. The HHI index is defined as the sum of the squares of the market shares of the firms within the industry. The result is proportional to the average market share, weighted by market share. The Herfindahl–Hirschman Index, HHI, is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them (Herfindahl 1950, Hirschman 1964, Adams 2017).

The calculation of the HHI differs from the standard Concentration Ratio in that it squares each market share value, which places higher importance on those top companies that have a larger market share.

The HHI is calculated by taking the market share of each firm in the industry, squaring them, and totalling up the result (Rhoades 1993, 188).

The HHI accounts for the number of firms in a market, as well as concentration, by incorporating the relative size (market share, MS) of all firms in a market. The HHI is calculated by squaring the market share of each firm competing in the market and then totalling up the resulting numbers (Herfindahl 1950, Hirschman 1964, Adams 2017).

Next, we will present the calculation and every step from the Herfindahl–Hirschman Index (HHI) to the Lauraéus-Kaivo-oja Index, the LKI (Lauraéus & Kaivo-oja, 2017). We aim to provide a novel method to analyse global cobots markets. This kind of novel index is useful for various fields of research policy planning and research (Lauraéus & Kaivo-oja 2017). Lauraéus-Kaivo-oja Index (LKI) is an analysing tool for the measurement of market concentration.

Increases in the HHI or the LKI indices generally indicate that the market situation shifts to the monopoly direction, which means the increase of market power for leading companies.

Decreases in the HHI or the LKI indices indicate shifts to the nearly competition direction and an increase in competition. (Lauraéus & Kaivo-oja 2017, Herfindahl 1950, Hirschman 1964, Adams 2017).

The difference between the HHI and the LKI indices measurements is that the HHI gives more weight to larger firms. The HHI takes into account the relative size distribution of firms in a market. The Herfindahl–Hirschman Index increases both as the number of firms in the market decreases and the disparity in size between those firms increases (Herfindahl 1950, Hirschman 1964, Adams 2017).

Research methodology

The methodology is based on conventional statistical index theory and statistics. The methodology is the calculation of the Herfindahl-Hirchman Index and the Lauraéus-Kaivo-oja Index. The authors compare the results of these two methodologies on global cobots market data.

The Calculation of the Lauraéus-Kaivo-oja Index

The calculation of the LKI index creation is based on the Herfindahl–Hirschman Index demonstrated, using a mathematic formula, HHI, as:

$$HHI = s1^2 + s2^2 + s3^2 + ... + sn^2, \quad (1)$$

which can be written using a mathematic formula:

$$\text{HHI} = \sum_1^k \left(\frac{100*n_i}{N} \right)^2, \quad (2)$$

k= the number of different classes in the sample

N= whole quantity of the sample,

$\bar{n}$ = average value of the sample classes,

n_i= single sample

where the whole quantity of the sample = N, the number of different classes in the sample = k, and the average value of the sample classes = $\bar{n}$. We do not need 100^2 for anything, so we can remove it. We can write the percentages as well with the decimals of 0.01-0.99, which means the same as 1% - 99%. Thus, we will not have a problem with values 0-10000, which are more difficult to understand than the normal percentage value.

Thus, we re-mark the index hhi, which means HHI without 100^2.

$$\text{HHI} = 100^2 * \text{hhi} = 10000*\text{hhi} \quad (3)$$

Thus, we will take out the 100^2, and we will change the HHI formula to the new name "hhi", which is:

$$\text{hhi} = \sum_1^k \left(\frac{n_i}{N} \right)^2 \quad (4)$$

which means the same as:

$$\text{hhi} = \frac{1}{N^2} \sum_1^k (n_i)^2 \quad (5)$$

δ^2= diagonal standard deviation,

k= number of classes of the sample

N=Sample,

$\bar{n}$ = average value of the sample classes,

$\bar{n}^2$= diagonal average value of the sample classes.

On the other hand, the whole quantity of the sample is = N, Which is the same thing as the number of different classes in the sample. The total sum in the sample classes is:

$$\text{N}=\text{k}*\bar{n}=\text{k}\bar{n} \quad (6)$$

Thus, we can write the "hhi" formula as

$$\text{hhi} = \frac{1}{\text{k}\bar{n}^2} \sum_1^k (n_i)^2 \quad (7)$$

Then, the same "hhi" index can be presented as

$$\text{hhi} = \frac{\delta^2}{\text{k}\bar{n}^2} + \frac{1}{k} \quad (8)$$

when $\frac{1}{k}$ means 1 over k number of classes of the sample. We do not need that $\frac{1}{k}$ for anything. Otherwise, we will have a big distorted picture of key trends. If one has different numbers of classes in the sample, one cannot compare the different classes with each other or distort the analytical analysis.

For example, a statistical sample consists of 34 classes of goods ($\frac{1}{k} = \frac{1}{34}$ =0,029 =2,9%) and 11 classes of services ($\frac{1}{k} = \frac{1}{11}$ =0.09=9%). That analysis situation means, the fewer the classes, the bigger the per cent number added to the "hhi" will be. Thus, let us ask why this kind of percentage number should be added to the index? We can remove $\frac{1}{k}$, and thus, we will have a better, more informative, and more relevant trend curve.

$$\text{LKI} = \frac{\delta^2}{k\bar{n}^2} \quad (9)$$

The completely divided material, where all of the numbers of the samples are in one class $\frac{1}{k} = \frac{1}{1}$ =1.

The maximal diagonal standard deviation is δ^2=(k-1)$\bar{n}^2$. That is why the divisor must be (k-1).

The wrong divider is $\frac{\delta^2}{k\bar{n}^2}$, and the right one is (k-1) n^2. We will have the LKI, where the square of standard deviation over completely divided square of standard deviation is.

Thus, the new novel indicator will be:

$$\text{LKI} = \frac{\delta^2}{(k-1)\bar{n}^2} \quad (10)$$

k= number of classes of the sample

$\bar{n}^2$= diagonal average value of the sample classes,

δ^2= diagonal standard deviation

Results

Collaborative robotics has become one of the fastest-growing sectors of the robotics markets. If cobots is the key technology for the advancement of Industry 4.0 (Sherwani et al., 2020), it is also a burgeoning technology sector in its own right. Statzon market intelligence data utilised for this article shows that the global cobot market was already estimated to be at around $1.3 billion in 2020, with a CAGR of almost 40% until 2028 to a total worldwide market size of $16.5 billion. Cobots, in other words, is no longer just a niche industry but a major global industrial sector worth examining in its own right. From 2022 the market is expected to grow eightfold (Fig. 1).

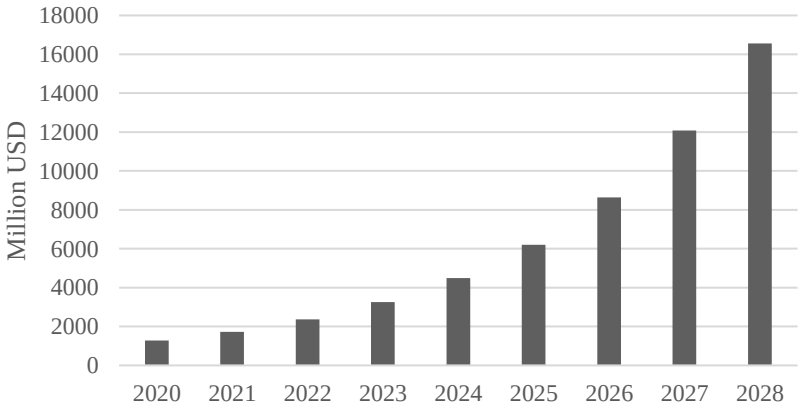

Fig. 1. Global Cobot Market Size 2020 to 2028 (Source: Statzon Ltd.)

Global Cobot Market to 2028 (Collaborative robots) represents the fast-growing industrial robotics market. Cobots currently account for around 5% of industrial robot sales. Technological advancements have made the applications of cobotics technology a reality in many manufacturing industries.

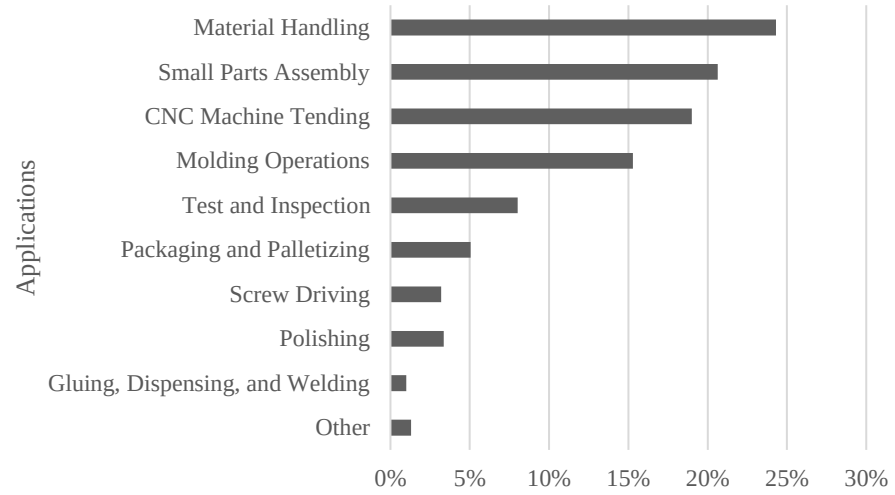

Fig.2. Applications in Global Cobot markets 2020 (Source: Statzon Ltd.)

Fig 2. shows the segments of cobot markets. The most important segments and applications in the global cobot market are Material Handling, Small Parts Assembly, CNC Machine Tending, and Molding Operations. The middle important are Test and Inspection, Packaging and Palletizing, Screw Driving and Polishing. The least important: Gluing, Dispensing, and Welding have only 1 %. Fig 5. reports end-user industries in global cobot markers in 2020.

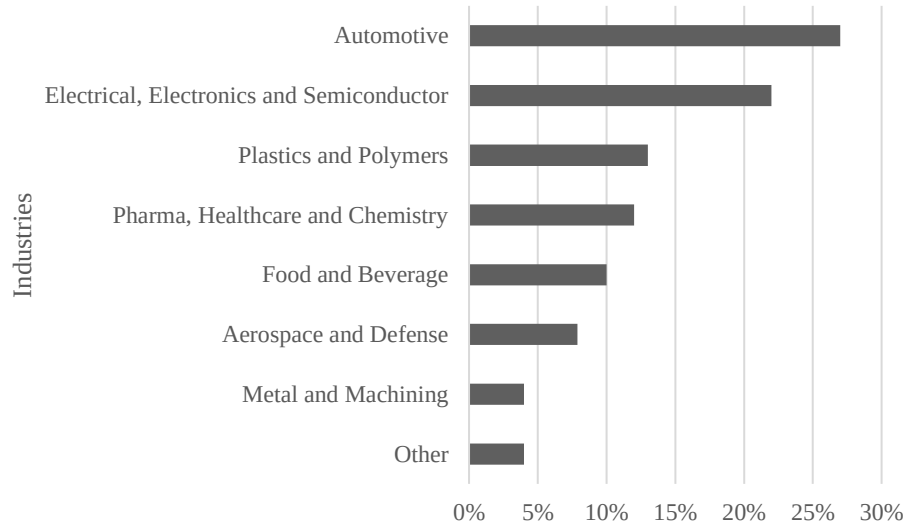

Fig. 3. The industries in Global cobot markets 2020 (Source: Statzon Ltd.)

The Cobots are used in many fields and industries. The Cobots will replace some of the traditional robots. Thus, cobots are disruptive technology and reshape the market and market structure dynamically.

Major companies in the market are Universal Robots (Denmark), Techman Robot (Taiwan), FANUC (Japan), ABB (Switzerland), Precise Automation (US), Motoman. Those are among a few emerging companies in the collaborative robot market (Statzon, Ltd. 2021).

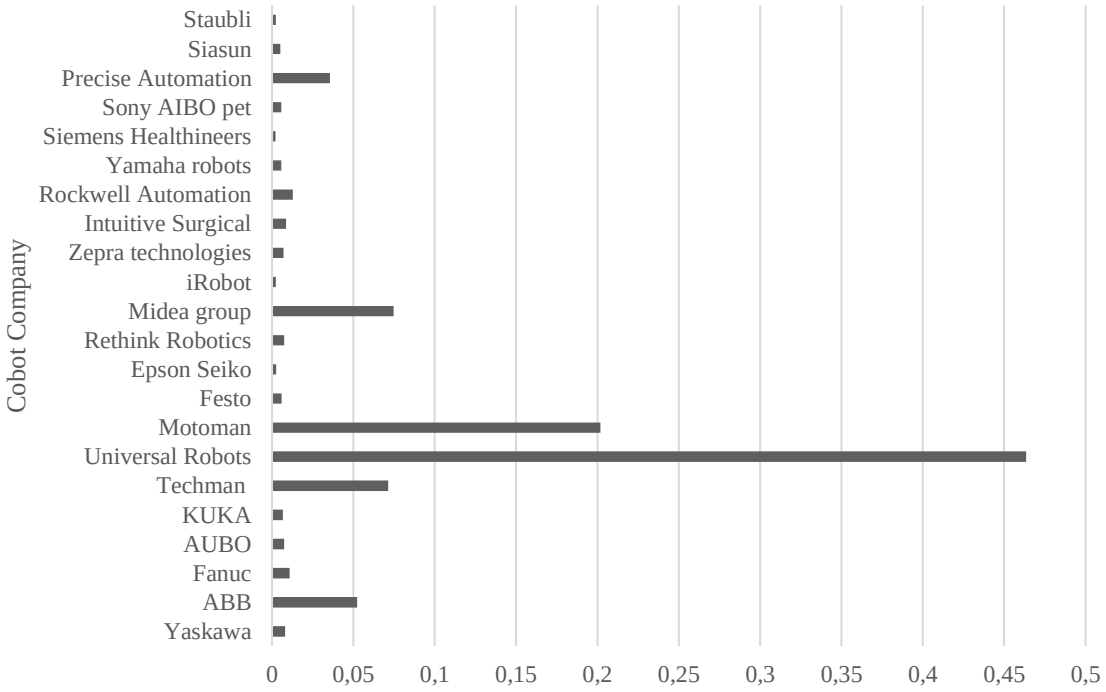

Fig. 4. Global cobot market shares in 2019 (Source: Statzon Ltd.)

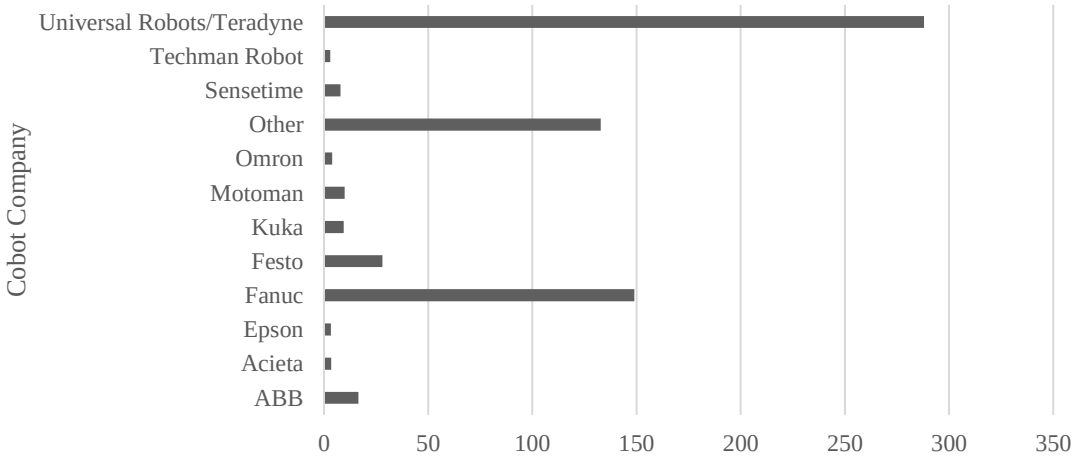

Fig. 5. Global Cobot market Shares 2020 Million USD (Source: Statzon Ltd.)

There are more than 50 cobot manufacturers globally, but only a small number of the companies have so far deployed cobots on any meaningful level of scale. The market is moderately competitive, and companies focus on innovation to remain competitive. Acquisitions and collaboration of large companies with startups are expected in the future. Universal Robots is the clear market leader with nearly half of the global market, 47% market share.

Results of comparing the HHI index and the LKI index

The following figure shows the Herfindahl–Hirschman Index (HHI) for the cobotics market 2019-2020 (the mathematic formula, HHI 1).

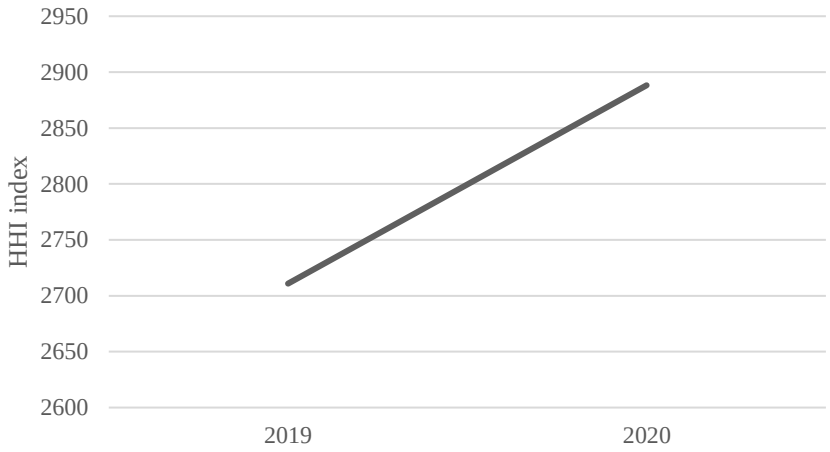

Fig. 6. **The HHI indexes for Cobotics market 2019-2020** (Source: developed by the authors)

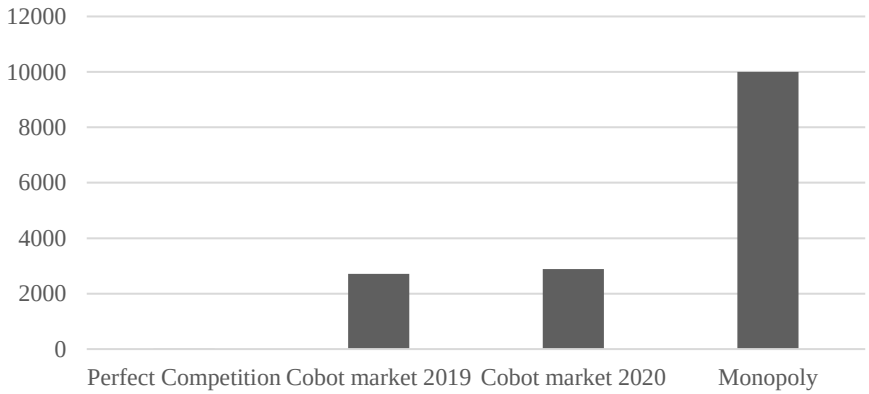

Fig. 7. The HHI analysis for global cobot market 2019-2020 compared to perfect competition and monopoly (Source: developed by the authors)

The following figure shows the new Lauraéus & Kaivo-oja index LKI (Formula 10).

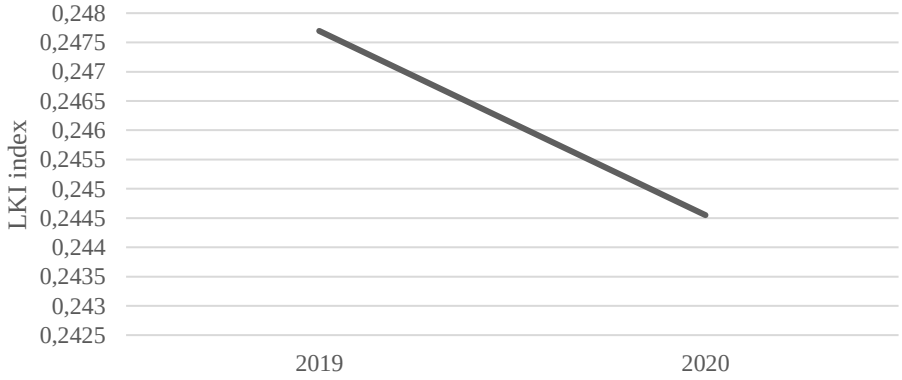

Fig. 9. Lauraéus & Kaivo-oja Index (LKI) Global Cobot market 2019-2020 (Source: developed by the authors)

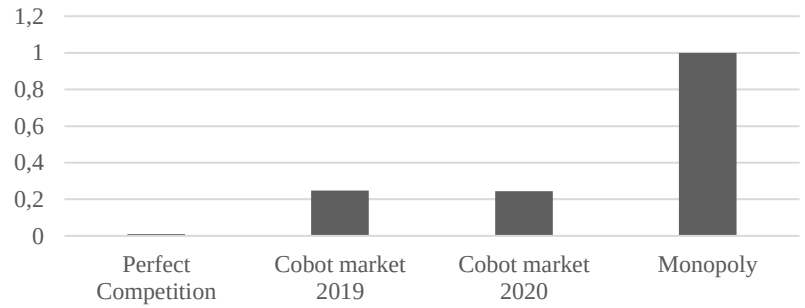

Figure 10. Lauraéus & Kaivo-oja index (LKI) Global cobot market 2019-2020 compared to perfect competition and monopoly (Source: developed by the authors)

The paper shows results with the conventional Herfindahl–Hirschman Index alongside the novel LKI linear index.

Global Cobot Market Competition Analysis

Global cobotics markets are in an oligopoly situation at the moment. There are 1-5 bigger companies. The bigger and smaller companies are producing unique products in the different market segments.

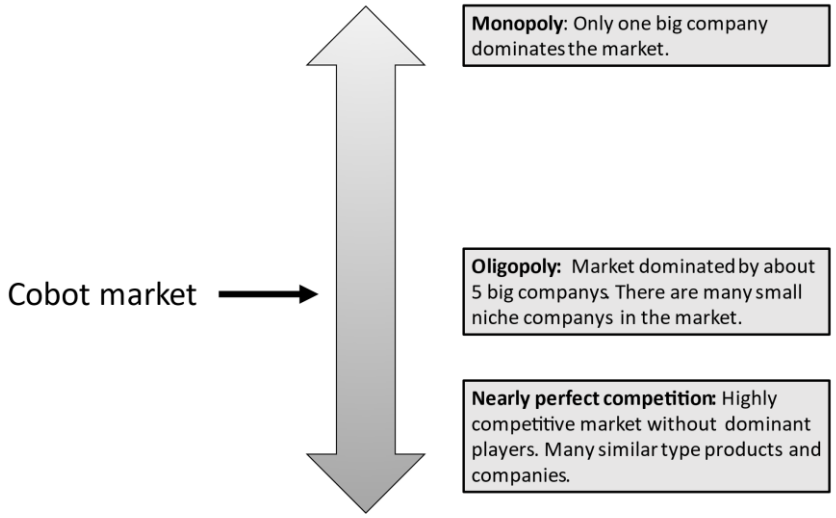

Fig. 11. Market concentration in the global cobot market (Source: developed by the authors)

There are 1-5 reasonably large companies in the cobot market. Major companies in the market are Universal Robots (Denmark), Techman Robot (Taiwan), FANUC (Japan), ABB (Switzerland), Precise Automation (US), Motoman, and Midea Group. Those are among a few emerging companies in the collaborative robot market (Statzon, Ltd. 2021). Cobots are used in many fields and by many kinds of end-users. Cobots will replace some of the traditional robots. Thus, cobots are disruptive technology and reshape the robot and cobot market and market structures.

There are a lot of small companies in the global cobot market. They produce their own special products or niche products for non-competing segments. Companies produce special products for a wide range of industries and end-users. There is a lot of niche market segments in the market that require special expertise.

Conclusions

The Herfindahl-Hirschman Index (HHI) and the Lauraéus-Kaivo-oja Index (LKI) are statistical measures of market concentration, and they can be used to determine market competitiveness. These analyses can help various industrial stakeholders make faster decisions and better strategic plans with the easiest and fastest access to accurate, reliable, and up-to-date cobotics industry statistics, forecasts, and insights. The finding is that this study reveals the current market structure of the global cobotics market. It is a novel finding and result. Even one statistical index can summarise the nature of the trend in the marketplace.

The HHI Index Concentration Ratio Gives More Weight to Larger Firms:

The Herfindahl–Hirschman Index, concerning measures such as the concentration ratio, gives more weight to larger firms. (Rhoades 1993, Adams 2017). We think that this is not a good idea when comparing the different sizes of companies or different sizes of markets. The HHI takes into account the relative size distribution of firms in a market.

The original reason why we started to develop the HHI index further is that we are not able to compare the different sizes of markets and companies with the HHI index. Thus, the number of classes will distort evaluation results of the HHI index values. There are good reasons to avoid this potential statistical bias. We have presented a new index, Lauraéus-Kaivo-oja Index, to avoid biases in market analyses.

The Advantages of Lauraéus-Kaivo-oja Index

The LKI analysis approach, which we will present next in this paper, allows for separate-sized portfolio analyses of global cobots markets. The HHI increases both as the number of firms in the market decreases and the disparity in size between those firms increases. There is no statistical bias in the comparison of markets with different sizes when we present the LKI analyses. In the field market analyses, the statistical comparisons have been a hidden problem for a long time, but now this problem is solved by the LKI approach.

The size-independent analysis of global cobot market is a novel thing, which allows a broad spectrum of implications. The LKI approach allows the size of the cobot markets to be different, and the results are not dependent on the size of the sample. This is a significant advantage with respect to the conventional HHI approach. This is a fundamental methodological issue in the case of our empirical analyses.

As the well-known HHI Index, the LKI approach also helps understand the dynamics of the market structures. The LKI can be used for market, trend and competition analysis and international trade analysis. Thus, the novel LKI approach has great potential for use in these fields of market structure analyses.

The LKI 0-100% number is easier to understand than the HHI, which provides large numbers (0-10000) for decision-makers to consider. In summary, the LKI percentage values are more comprehensible than the HHI values calculated with 100^2. There is no calculation bias towards large companies.

Different Market Situations from Perfect Competition to Monopoly, Comparing the HHI Index and LKI Indices:

In the HHI index market share of each company is shown as a whole number. The LKI index shows the market share of each company as a decimal of the percentage value.

The HHI can have a theoretical value ranging from close to zero to 10,000. The LKI can have a theoretical value ranging from close to 0,00 to 1,00 – the same as 0% - 100%, which we find more comprehensive.

In the HHI and the LKI market analyses I, Monopoly: The closer a market is to be a monopoly, the higher the market's concentration (and the lower its competition). If, for example, there was only one

firm in an industry, that firm would have a 100% market share, and the HHI would equal 10,000, indicating a monopoly. In the same situation, the LKI would equal 1.00, which is the same as 100%, indicating a monopoly. We think that the percentage value is easier and more comprehensive to use.

In HHI and the LKI market analyses II, Nearly perfect competition: If there were thousands of companies competing, each would have nearly a 0% market share. That means the HHI is close to zero, indicating nearly perfect competition. The LKI is 0.00 or 0% in the same situation of nearly perfect competition.

In HHI and the LKI market analyses III, Oligopoly: An oligopoly is a form of imperfect competition in which there are only a few providers of a particular service or product in the market. The oligopoly is characterised by a low level of competition and the resulting unnaturally high or low price level and a low level of production corresponding to perfect competition. In an oligopoly situation, the HHI and the LKI analyses have somewhere middle range values.

Market development forecast based on the HHI and the Lauraéus-Kaivo-oja indices estimates

Based on both the HHI and the Lauraéus-Kaivo-oja indices estimates, the market would appear to be oligopolistic dominated by a few larger firms.

Global cobot oligopolistic market: the market leader has four to five main competitors. Companies produce products for many different industries and thus do not compete with each other. There is a lot of niche markets in the market. It is expected that the market volume will increase sevenfold, and the cobots market will become more attractive and bring a lot of new small players to the market.

The HHI increases the volume of large companies and therefore shows a curve rising in a less competitive direction. The LKI takes better account of all sizes of businesses. The LKI index shows a slightly declining curve as there is a lot of small companies in the market, and the market is moving in the direction of the competitive situation of several companies.

This analysis highlights the advantage of the LKI index. Unfortunately, we did not have a longer time series for this analysis because it does not exist anywhere. Cobots are relatively new products, and this phenomenon creates a new global market. A longer time series would better present the transformation of the competitive situation and market dynamics. A longer time series would show the results better and more clearly.

Future research directions

The LKI shows a more realistic and unbiased picture and shows a better real direction of the competition situation. This shows the rationality of using this novel index. The LKI analysis does not weigh big companies and offers the right picture of market dynamics. The new index can be used for various market dynamics research. The LKI reveals market developments better. The LKI can be used for market, trend and competition analysis, international trade, export, and import analysis. We recommend using the LKI index. It is for one's free use and can be calculated with basic statistical variables.

This paper demonstrated novel and exciting possibilities of transparent index calculation tools. Real-time market structure analyses of the global cobotic industry create reliable and knowledge-based information for decision-makers and stakeholders. We hope that this kind of index will be useful in various evaluations and measurements.

Acknowledgements

The project “Platforms of Big Data Foresight (PLATBIDAFO) has received funding from European Regional Development Fund (project No 01.2.2-LMT-K-718-02-0019) under a grant agreement with the Research Council of Lithuania (LMTLT).

References

Adams, C. (2017). What is the Herfindahl Hirschman Index (HHI) and why would you use it? *Modern analyst*. [Accessed 18.6.2017.] Available at: http://www.modernanalyst.com/Careers/InterviewQuestions/tabid/128/ID/1003/What-is-the-Herfindahl-Hirschman-Index-HHI-and-why-would-you-use-it.aspx

Brakman, S., Garretsen, H., and van Witteloostuijn, A. (2021). Robots do not get the coronavirus: The COVID-19 pandemic and the international division of labor. *Journal of International Business Studies.* https://doi.org/10.1057/s41267-021-00410-9.

Economist, The (2021). Bearing fruit. After years of dithering companies are embracing automation. [Accessed 07.04.2021]. Available from Internet: https://www.economist.com/business/2021/01/16/after-years-of-dithering-companies-are-embracing-automation

Goldberg, K. (2019). Robots and the return to collaborative intelligence. *Nature Machine Intelligence*, 1, 2-4. https://doi.org/10.1038/s42256-018-0008-x

Herfindahl, O.C. (1950). *National Power and the Structure of Foreign Trade*. University of California. Berkley. USA.

Hirschman, A.O. (1964). The paternity of an index. *American Economic Review* September 1964, 54: 761-762.

Knudsen, M.S. and Kaivo-oja, J. (2020). Collaborative robots: Frontiers of current literature. *Journal of Intelligent Systems: Theory and Applications*, 3(2), 13-20. https://doi.org/10.1038016/jista.682479

Kopp, T., Baumgartner, M. & Kinkel, S. (2021). Success factors for introducing industrial human-robot interaction in practice: an empirically driven framework. *The International Journal of Advanced Manufacturing Technology*, 112, 685-704. https://doi.org/10.1007/s00170-020-06398-0

Lauraéus T. and Kaivo-oja J., (2017). New Transparent Way to Perform Competition, Market Structure and IPR Portfolio Analyses: Analysis of the Dynamics of Trademark Competition in Finland as a Case Example, Journal of Business Management and Economics, 5 (12), December, 2017, Manuscript ID :DOI-16473163213

Kaivo-oja, J.; Lauraeus, T. (2017). Emerging trends and structural changes of global innovation ecosystems: Empirical analysis of changing patent and trademark activity of G7 countries and BRICS countries from years 1985-2015. *Eurasian Academy of Sciences. Eurasian Business & Economics Journal* 11, 33-44.

Rhoades. S.A. (1993). The Herfindahl-Hirchman Index, *Federal Reserve Bulletin*, March 1993, 188-189.

Sherwani, F., Asad, M.M. & Ibrahim, B.S.K.K (2020). Collaborative Robots and Industrial 4.0 (IR 4.0). *2020 International Conference on Emerging Trends in Smart Technologies (ICETST)*, Karachi, Pakistan, 1-5. https://doi.org/10.1109/ICETST49965.2020.9080724

Statzon Ltd. 2021 analysis www.stazon.com, [Accessed 12.4.2021].

Stieber, T. (2015) I, Cobot: Future collaboration of man and machine. The Manufacturer. 12 Nov 2015. Web: https://www.themanufacturer.com/articles/i-cobot-future-collaboration-of-man-and-machine/

ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0007

EUROPEAN COVID -19 PANDEMIC DATA AND SOCIAL INCLUSION POLICY IN THE EUROPEAN UNION: DRIVERS-DRIVEN TREND ANALYSIS

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Abstract

Research purpose. The study is focused on the Covid-19 pandemic crisis in the European Union. This study investigates the current driving trends and trade-offs of the Covid-19 pandemic phenomenon and social inclusion trends in the European countries.

Design / Methodology / Approach. The methodology is based on conventional statistical index theory and statistics. The study investigates cases, deaths, and key Covid-19 statistics. The research design combines key social inclusion statistics of the Eurostat and the official Covid-19 statistics of the European Centre for Disease Prevention and Control. Covid-19 data is updated to 1.3.2021. Social inclusion variables are selected from the Eurostat database. Social inclusion variables cover poverty, material deprivation, income distribution, income, quality of life, employment, and education matters. Scattering matrices on the relationships among the key variables under review are reported.

Findings. The study reports basic trends of Covid-19 cases, deaths, deaths/cases and calculates these Covid-19 trends in 29 European countries. This study reports trade-off analyses of key social inclusion trends of the European Union countries. Key indicators are linked to economic income, income distribution, poverty, gender issues, and housing statistics. The 19 key indicators of social inclusion are analysed and reported with Covid-19 data. Statistical correlation analysis tables (2a and 2b) are calculated with key European social inclusion indicators. The study reveals some relevant aspects of the social inclusion policy of the European Union about the ongoing Covid-19 crisis and exit strategies.

Originality / Value / Practical implications. This conference paper demonstrates novel and exciting possibilities of integrated data pooling (The Eurostat and the European Centre for Disease Prevention and Control). Original results of key trend drivers are provided by the authors. Value-adding and interesting results are delivered for European governments and the business community. Results and findings of the study can be used in the planning of economic recovery and Covid-19 exit policies in the member states of the European Union.

Keywords: Covid-19; Pandemic data analytics; Social inclusion; European Union; Trend analysis; Trend drivers; Trade-offs analysis.

JEL codes: H10, I32, I38, J10, N14.

Introduction

The importance of social inclusion variables has been recognised in numerous international studies, also during the Covid-19 crisis. During and after the corona crisis, attention should be paid to the content of social inclusion policies. This research can help decision-makers in this regard. Previous studies have compared the corona crisis to the Great Recession of the 1930s (Arbolino & Di Caro 2021). It is good to understand that social inclusion policy is linked to Industry 4.0 developments (Mendoza-del Villar et al. 2020). The policy of social inclusion in the European Union will have to be reassessed in the wake of the interest rate crisis (see, e.g. Schoukens et al. 2015). The post-coronary crisis strategy for the social inclusion policy in the European Union must be carefully reconsidered.

This article is organised in the following way. First, we present trade-of trends between the Gini coefficient and the number of Covid-19-related deaths in Europe. It shows that in Europe, the trade-off relationship is not very clear between these key variables. In sections 1-5, we investigate various trade-offs between social inclusion variables and the number of Covid-19 deaths concerning the population in European countries. Our approach is explorative, and we aim to study social inclusion variables in thematic groups: poverty variables, material deprivation variables, income distribution variables, income and quality of life variables, employment variables, and finally, education variables. Our data sample covers 29 European countries. In section 4, we present a summary of trade-off analyses (Table 1) and a correlation analysis of key variables. In section 6, we conclude. Thus, section 6 includes conclusions and reflections.

Literature Review

The importance of social inclusion variables has been recognised in numerous international studies, also during the Covid-19 crisis. Several studies have focused on the position of the elderly population during the coronary crisis. There is a lot of literature on the ageing population in a pandemic situations available (Cacioppo & Cacioppo 2014, Courtin & Knapp 2017, Cudjoe et al. 2020, Hayashi et al. 2020, Xie et al. 2020). These studies focus on assessing the COVID-19 crisis and the role of the social inclusion variable in the European Union. Cutiérrez and Ahamed have presented an extensive survey of COVID-19 response need to broaden financial inclusion to curb the rise in poverty (Cutiérrez & Ahamed 2021). COVID-19 crisis is closely linked to three pillars of sustainability. (Ranjbari et al. 2021), where social inclusion is linked to the pillar of social development. This article in the World Development journal discusses the COVID-19 crisis from a global perspective. In this particular article, we focus on the European Union.

Research methodology

Our methodological approach is quite similar to a study in Social Science & Medicine (see Elgar et al. 2020; see also Nummenmaa et al. 2017). In this study, we pay attention to various variables of social inclusion, and in particular to those variables that Eurostat has assessed as key variables. Our basic hypothesis is that the lack of social inclusion exposes EU citizens to corona virus-related deaths. We thus assess the importance of social inclusion in the context of the corona crisis. We aim to assess this research problem by combining social inclusion variables with statistics on Covid-19 mortality and deaths in Europe. Our trend research is focused on the European continent and the European Union. The basic design of the study is shown in Figure 1. We aim to present to the specification the dimensions of social inclusion related to the corona pandemic using different measurable variables. We have selected 19 key variables of social inclusion for this European driver-driven trend study.

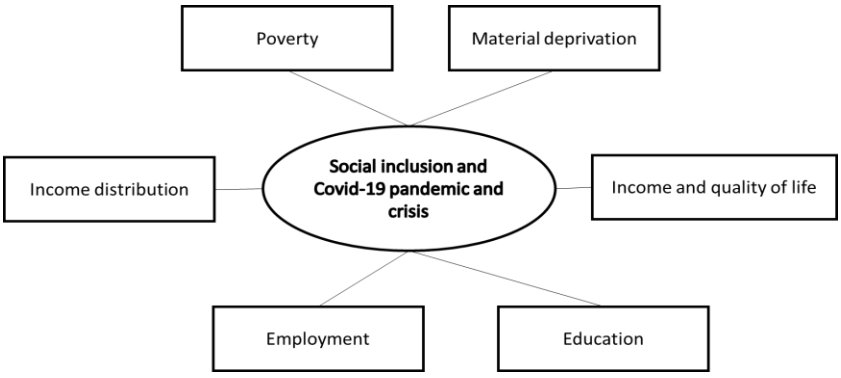

Fig. 1. Social inclusion and COVID-19 pandemic and crisis.

The survey data have been collected from Eurostat's statistical sources (Eurostat 2021) on social inclusion and official statistics from the European Centre for Disease Prevention (ECDP 2021). In this study, we have also make a correlation analysis. The Pearson correlation coefficients (PCC, pronounced /ˈpɪərsən/) are reported following basic guidelines of statistical correlation analysis, also referred to as Pearson's r, the Pearson product-moment correlation coefficient (PPMCC), or the bivariate correlation. It is a measure of linear correlation between two sets of data (see Nummenmaa et al., 2017, chapter 8).

Results

Section 1. Gini-Coefficient and Covid-19 Deaths/Population in Europe

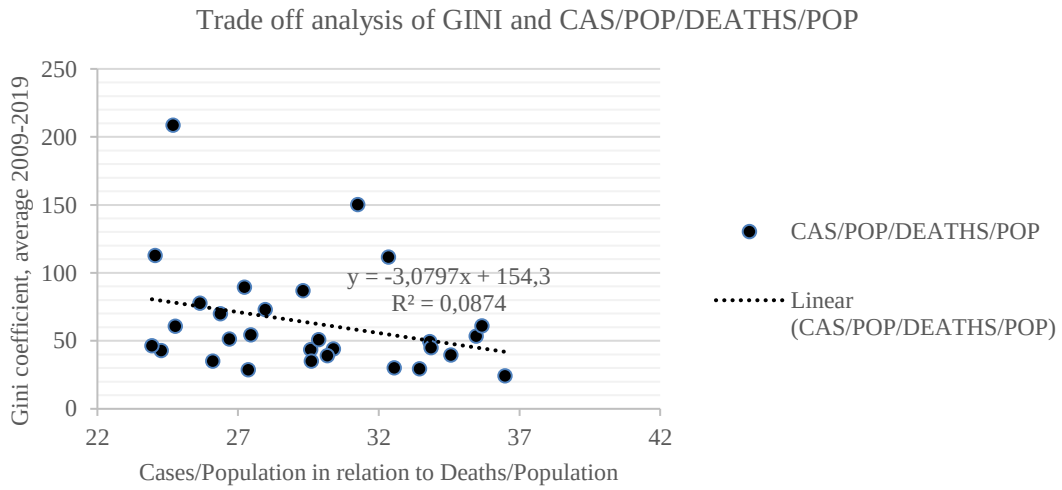

Fig. 2. Trade-off Gini coefficient, average, 2009-2019 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

First, we report our trade-off analysis of Gini-coefficient and Covid-19 deaths/population in the European Union (Fig. 2). As we can observe, there is not a very clear linear relationship between these two variables: Covid-19 deaths/population and Gini coefficient. It is advisable to keep in mind when we analyse other relationships between a variable Covid-19 Cases/Population to Deaths/Population and social inclusion.

Section 2: Social inclusion and deaths per population during Covid-19 crisis: Employment

In this section, we report various trade-offs between social inclusion variables and deaths in 29 European countries. We report conventional scatter diagrams showing two key variables (see Nummenmaa et al., 2017). The aim of the study is to provide information on how social inclusion variables are potentially linked to a variable Covid-19 Cases/Population to variable to Deaths/Population.

This kind of explorative analysis can help us to create a “big picture” of complex phenomena. We are not aiming to present hypotheses of complex causal relationships. We can present some good work hypotheses and test them later with statistical regression models. Our analyses in this article can help to build later more sophisticated linear or non-linear regression models.

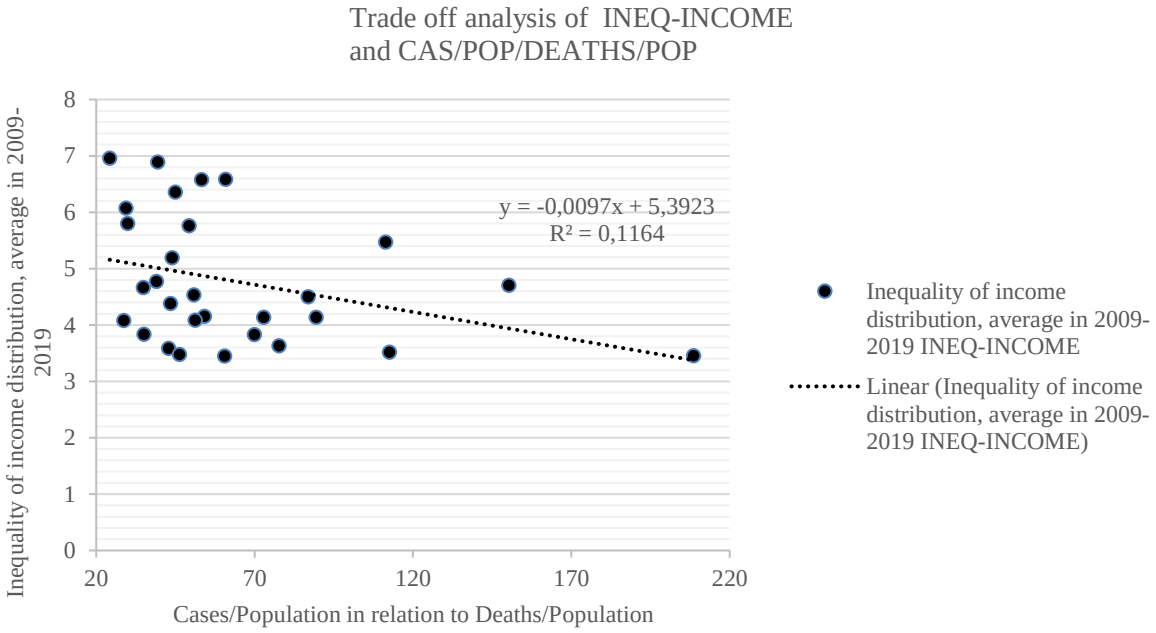

Fig. 3. Trade-off Inequality of income distribution, average in 2009-2019 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

We can observe a negative slope between these two variables (Fig. 3). In European countries, the high average employment rate has been able to lower variable Cases/Population to Deaths/Population. Expressed the other way around, the unemployment rate seems to lead to higher Covid cases and death rates to the population as social inclusion variable. This is, of course, a relevant and very interesting finding. In Fig. 4, we report a trade-off analysis between the average employment rate of older workers, age group 55-64, in 2005-2019, and a variable Covid-19 Cases/Population to Deaths/Population.

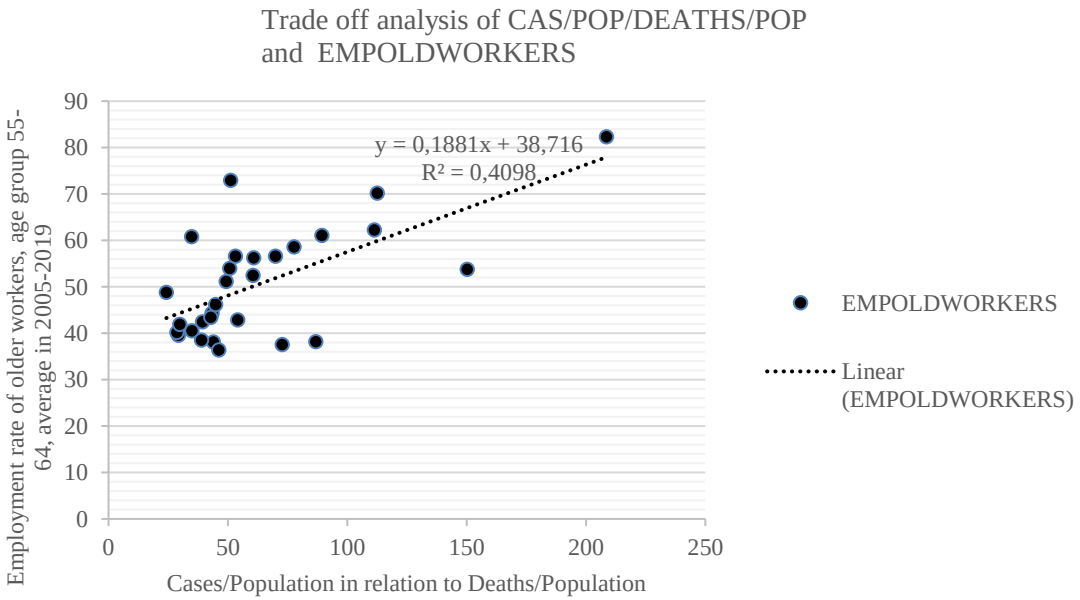

Fig. 4. The trade-off Employment rate of older workers, age group 55-64, average, in 2005-2019 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

We can observe a positive slope between these two variables (Fig. 4). In European countries, the high employment rate of older workers has been able to lower the number of Covid-19 cases and death rates to the population. Expressed the other way around, the unemployment rate of older workers in the age group 55-64 seems to lead to a higher number of cases and death rates as a social inclusion variable. This is a important and remarkable finding for the decision-makers of the European Union. The special attention paid to older people in European countries has been entirely appropriate.

In Fig. 5, we report a trade-off analysis between the average youth unemployment rate by sex, in 2005-2019, and a variable Covid-19 Cases/Population to Deaths/Population.

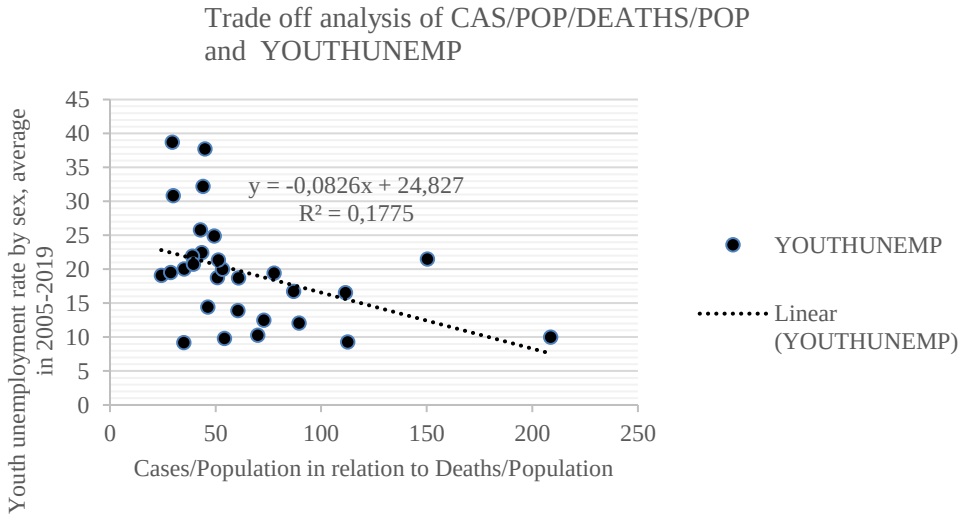

Fig. 5. Youth unemployment rate by sex, average, in 2005-2019 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

We can observe a positive slope between these two variables, the average youth unemployment rate by sex, in 2005-2019, and the variable of Covid-19 Cases/Population to Deaths/Population (Fig. 5). In general, this observation means that in Europe, a higher youth unemployment rate seems to drive Covid-19 cases and deaths per population. In Fig. 6, we report a trade-off analysis between the average gender employment gap, in 2005-2019, and the variable Covid-19 Cases/Population to Deaths/Population.

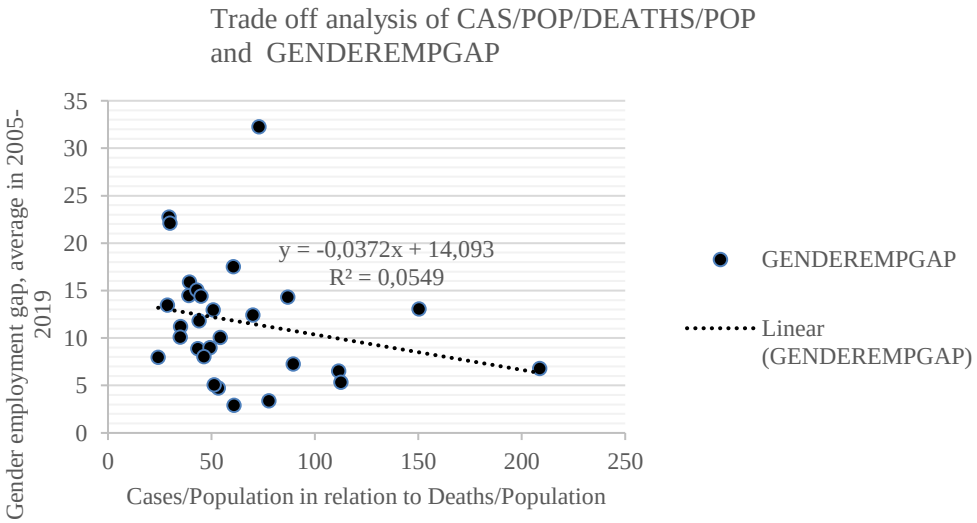

Fig. 6. Gender employment gap, average, in 2005-2019 and Cases/Population to the variable Covid-19 Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

We can observe a negative slope between these two variables; the average gender employment gap, in 2005-2019, and the variable of Cases/Population to Deaths/Population (Fig. 6). In general, this observation means that in Europe, the lower gender employment gap drives the variable Covid-19 Cases/Population to Deaths/Population slightly down. However, this result has a very weak statistical significance level, and we cannot take it as the final conclusion. There is a need to make more detailed analyses about this complex issue, which is not having a linear statistical relationship. There are many European countries that have a high gender gap, but quite low Covid-19 deaths per population. Such outlier countries are Malta and Greece, for example. There can also be some measurement problems in these cases. At least we can hesitate measurement errors.

We can observe a negative slope between the following two variables: the average long-term unemployment rate by sex, in 2005-2019 to a variable Covid-19 Cases/Population to Deaths/Population (Fig. 7). In general, this observation means that in Europe, the long-term unemployment rate by sex drives the variable Covid-19 Cases/Population to Deaths/Population variable down**.** Statistically, this result is not very strong, just a rough indicative result, because we can observe some outliers like Greece in Fig. 7.

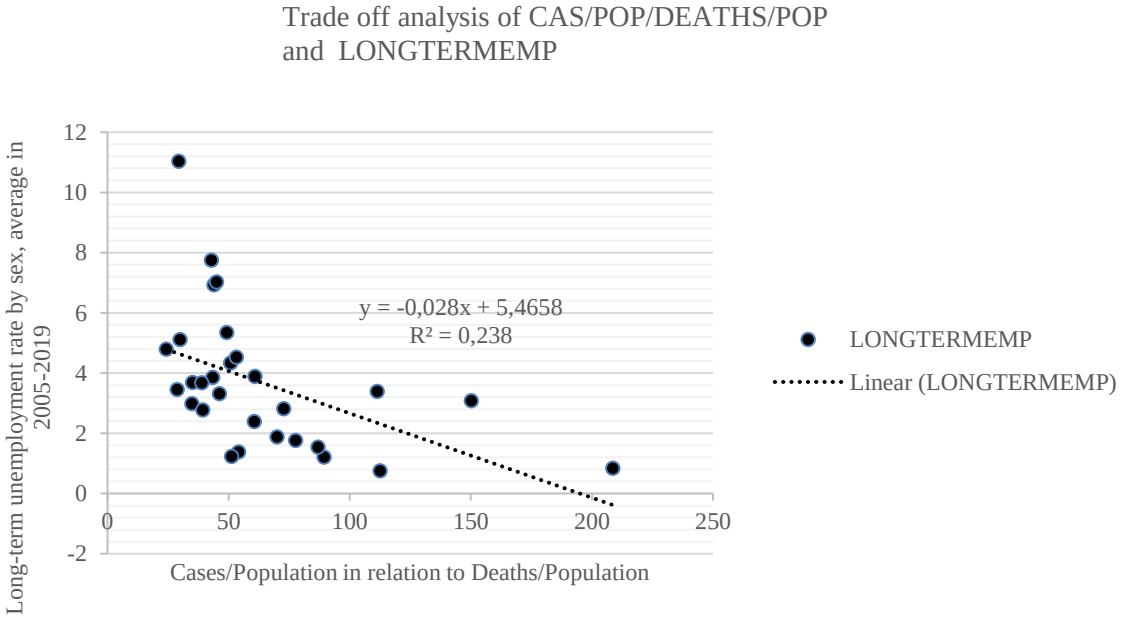

Fig. 7. Long-term unemployment rate by sex, average, in 2005-2019 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

Section 3. Critical Trade-Offs: Education, Social Inclusion and Covid-19 Cases and Deaths

A positive slope between these two variables: the average adult participation in learning by sex, in 2000-2019, and the variable of Cases/Population to Deaths/Population (Fig. 8), can be observed. In general, this empirical observation means that in Europe, adult participation in learning decreases Covid-19 deaths per population. Low participation in learning is a driver of Covid-19 Deaths/Population. Again, we can observe some out-layers in Fig. 8.

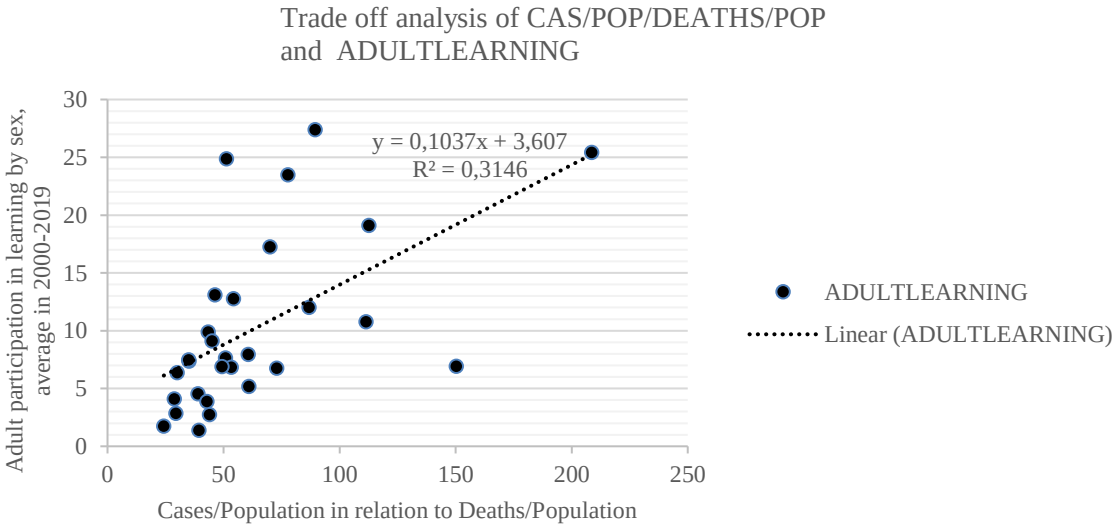

Fig. 8. Adult participation in learning by sex, average, in 2000-2019 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

In Fig. 9, neither a positive nor a negative slope between these two variables, percentage of the population with at least upper secondary educational attainment, age group 25-64, and Cases/Population to Deaths/Population**,** cannot be observed (Fig. 9). Scientifically we can conclude that secondary education attainment is not a strong driver for Covid-19 cases and deaths.

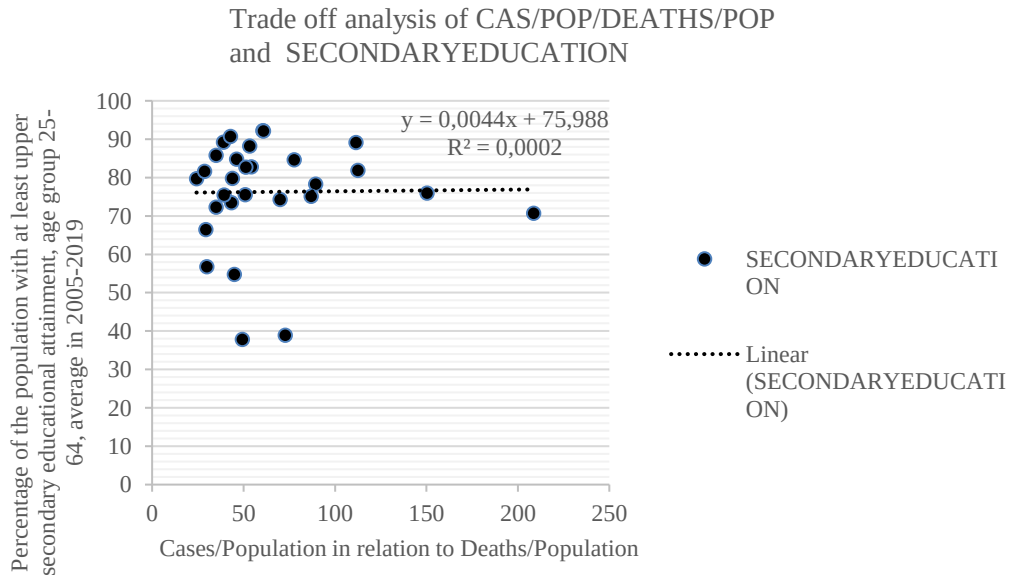

Fig. 9. Percentage of the population with at least upper secondary educational attainment, age group 25-64, average, in 2005-2019, and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

A positive slope between the following two variables: tertiary educational attainment, age group 30-34, average in 2005-2019, and the variable of Cases/Population to Deaths/Population, can be observed. (Fig. 10). In general, this empirical observation means that in Europe, tertiary educational attainment predisposes, to some extent, Covid-19 diseases, cases, and deaths per population. Tertiary educational

attainment is a driver for a higher number Covid-19 cases and deaths. However, some out-layers can be observed in Fig. 10, as well.

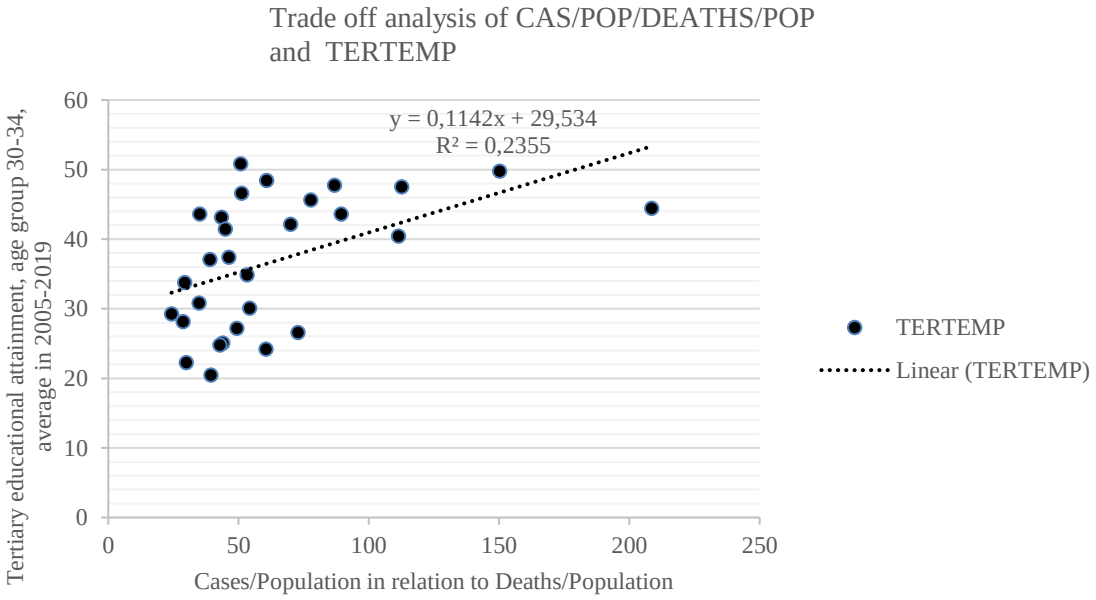

Fig. 10. Tertiary educational attainment, age group 30-34, average, in 2005-2019, and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

The educated guess for this result is that the mobility of those with higher education is higher than the mobility of those with lower education. This fact is apparently behind the result.

Section 4. Critical Trade-Offs: Income and Quality of Life, Social Inclusion and Cases/Population to Deaths/Population

A positive slope between these two key variables, median income by a broad group of citizens, average in 2011-2019, and the variable of Cases/Population to Deaths/Population, can be observed (Fig. 11). In general, this empirical observation means that in Europe, a higher average income increases, to some extent, the number of Covid-19 cases and deaths. The high-income level is a driver for a higher number of Covid-19 cases and deaths to the population. What is interesting in Fig. 11, we can see a non-linear S-curve. Again, we can observe some out-layers in Fig. 11. If we exclude them from the sample, the S-curve hypothesis seems to be quite a realistic hypothesis. The trade-off curve is not very linear in this case. By removing a few extremes from the scattering pattern figure, we might see a fairly linear relationship between the transducers.

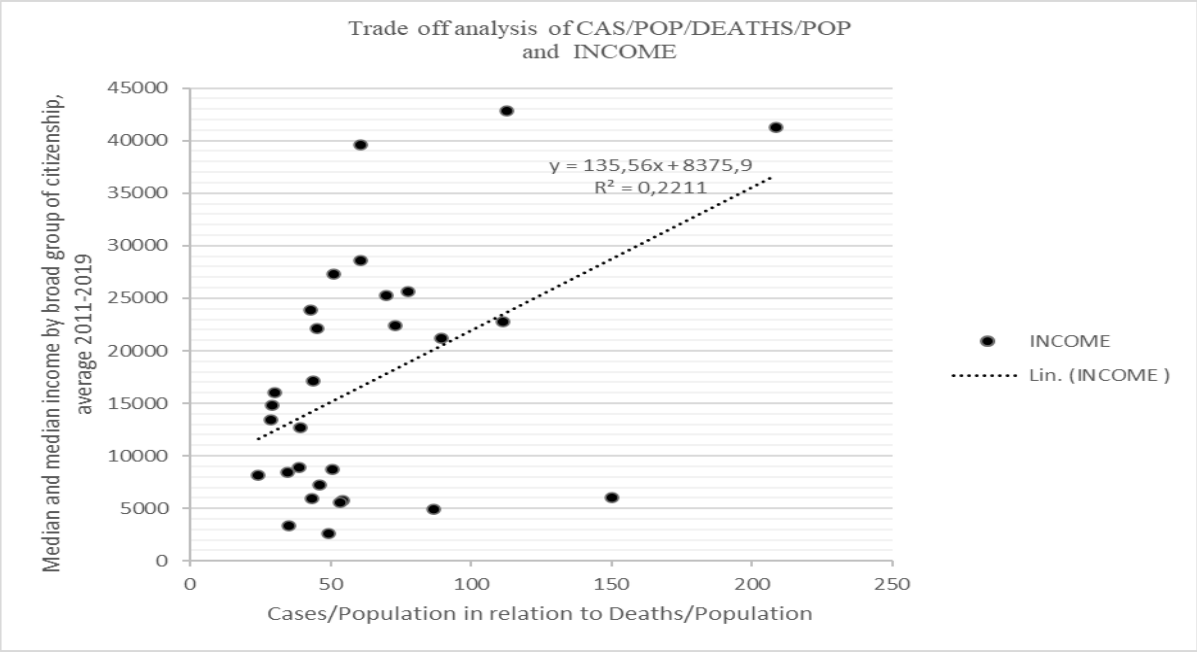

Fig. 11. Median income by a broad group of citizens, average in 2011-2019 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

A positive slope between these two variables, the average life expectancy by age and sex and Covid-19 Deaths/ Population, can be observed. (Fig. 12). In general, this observation means that in Europe, higher life expectancy by age increases, to some extent, the number of Covid-19 cases and deaths. National high life expectancy by age is a driver for a higher number of Covid-19 cases and deaths, too. Again, some out-layers can be observed in Fig. 12.

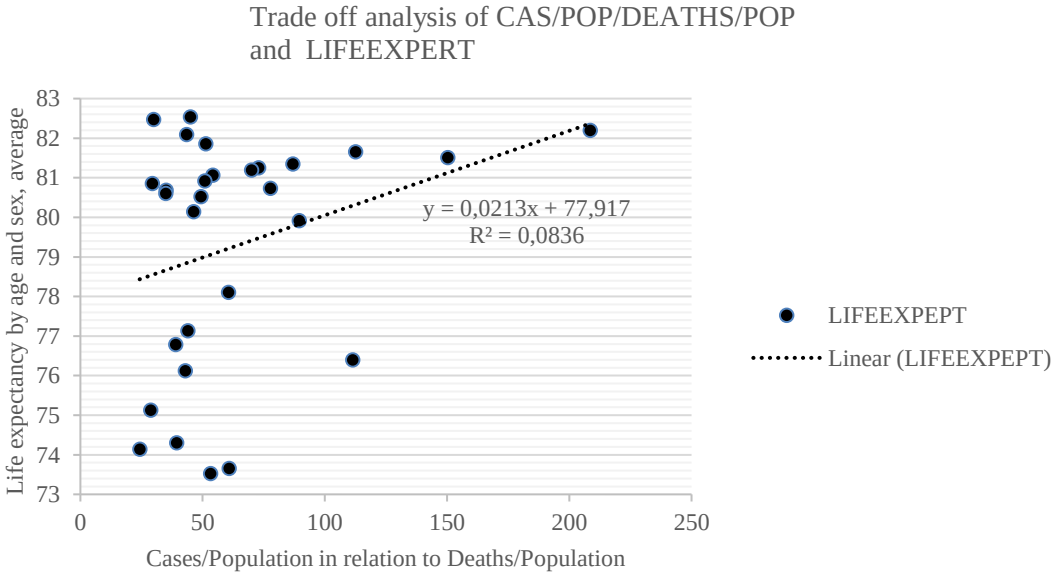

Fig. 12. Life expectancy by age and sex, average, and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

We can observe a stable slope between these two variables, the tax rate on low-wage earners – the unemployment trap, average, in 2005-2010, and the variable Cases/Population to Deaths/Population (see Fig. 13). In general, this observation means that in Europe, the high tax rate on low-wage earners does not have much positive or negative impact on the number of Covid-19 cases and deaths to population. The high tax rate on low-wage earners is a neutral driver for Covid-19 cases and deaths to the population. Again, we can observe some out-layers in Fig. 13.

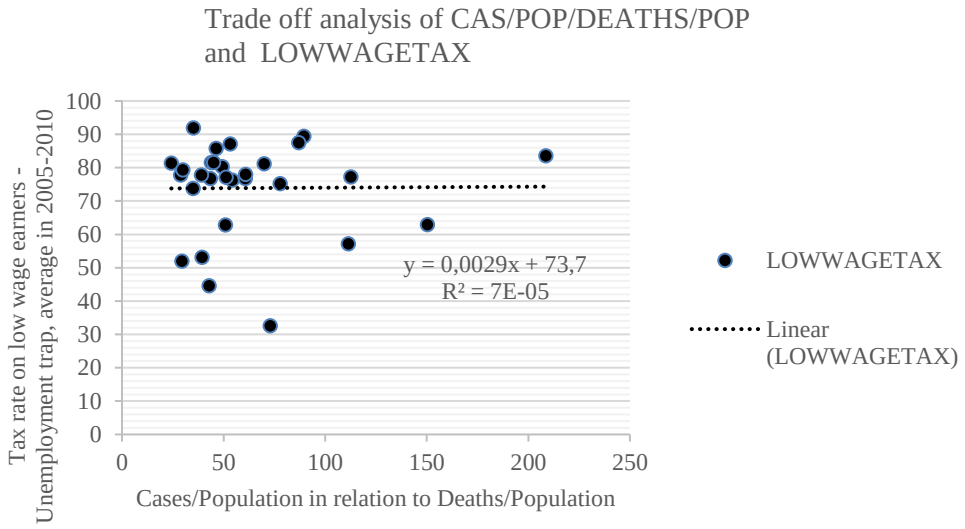

Fig. 13. The tax rate on low wage earners - unemployment trap, average, in 2005-2010 and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

A negative slope between the following two variables, severe housing deprivation rate by tenure status, average in 2005-2019, and the variable Cases/Population to Deaths/Population, can be observed (Fig. 14). In general, this observation means that the severe housing deprivation rate by tenure status in Europe decreases to some extent Covid-19 cases and deaths to population. Severe housing deprivation rate by tenure status is a negative trend driver for Covid-19 cases and deaths to the population. Again, some out-layers can be observed in Fig. 13. Statistically, this severe housing deprivation driver is not a very strong driver variable to Covid-19 deaths and cases.

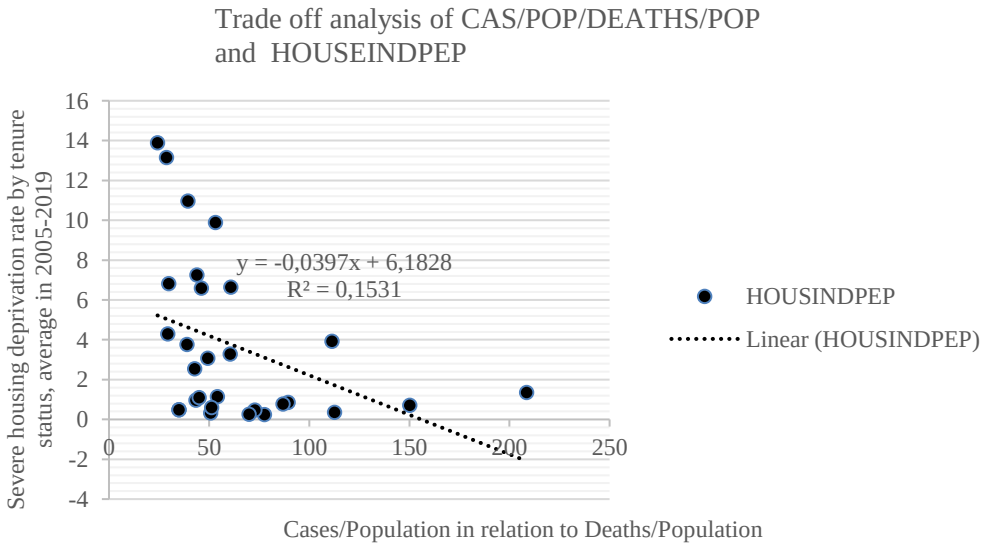

Fig. 14. Severe housing deprivation rate by tenure status, average, in 2005-2019, and Cases/Population to Deaths/Population (Source: Eurostat 2021 and ECDP 2021)

Section 5. Critical trade-offs: Poverty, social inclusion, material deprivation, and Covid-19 deaths/Population

A negative slope between these two variables, material deprivation rate by sex, average in 2011-2019, and the number of Covid-19 Cases/Population to Deaths/Population, can be observed (Fig. 15). In general, this empirical observation means that the material deprivation rate in Europe, to some extent, decreases the number of Covid-19 cases and deaths per population. High material deprivation rate is a negative driver for Covid-19 deaths/Population. Again, some out-layers can be observed in Fig. 15. Statistically, this severe housing deprivation driver is not a very strong trend driver. Again, some distant out-layers can be observed in Fig. 15.

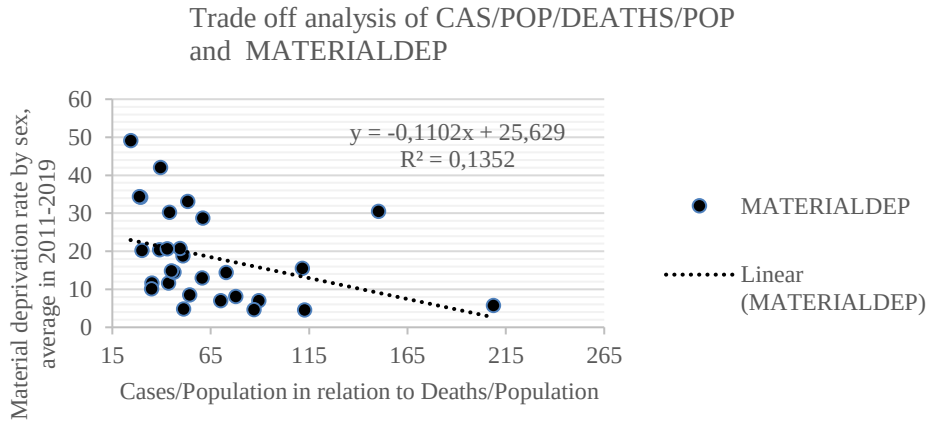

Fig. 15. Material deprivation rate by sex, average in 2011-2019 and Covid-19 Deaths/ Population (Source: Eurostat 2021 and ECDP 2021)

A negative slope between these two variables, persistent at-risk-of-poverty rate by age group, average in 2009-2019, and the variable Covid-19 Deaths/Population, can be observed (Fig. 16). In general, this observation means that in Europe, the persistent at-risk-of-poverty rate is negatively linked, to decreases in the number of Covid-19 cases and deaths per total population. Thus, the persistent at-risk-of-poverty rate is a negative driver for Covid-19 cases and deaths to the population. Again, some out-layers can be seen in Fig. 16. Statistically, this social inclusion driver is not a very strong trend driver.

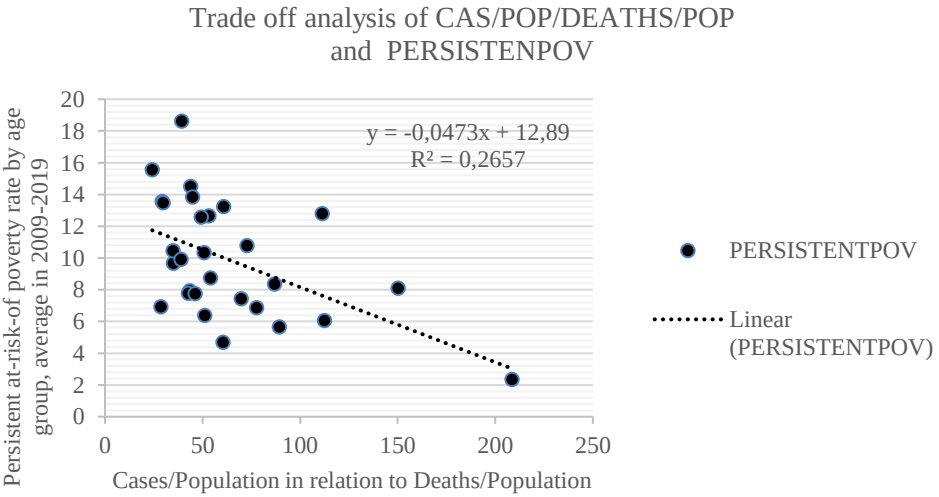

Fig 16. Persistent at-risk-of-poverty rate by age group, average in 2009-2019 and Covid-19 Deaths/ Population (Source: Eurostat 2021 and ECDP 2021)

A slightly positive slope between these two variables, at-risk-of-poverty rate by a broad group of citizens and Covid-19 Deaths/Population, can be observed (Fig. 17). In other words, this empirical observation means that in Europe, a low at-risk-of-poverty rate by a broad group of citizens, to some extent, decreases the number of Covid-19 cases and deaths to the population. Thus, a variable at-risk-of-poverty rate by a broad group of citizens is a negative driver for Covid-19 cases and deaths to the population (Fig. 17). Again, some out-layers can be observed in Fig. 17.

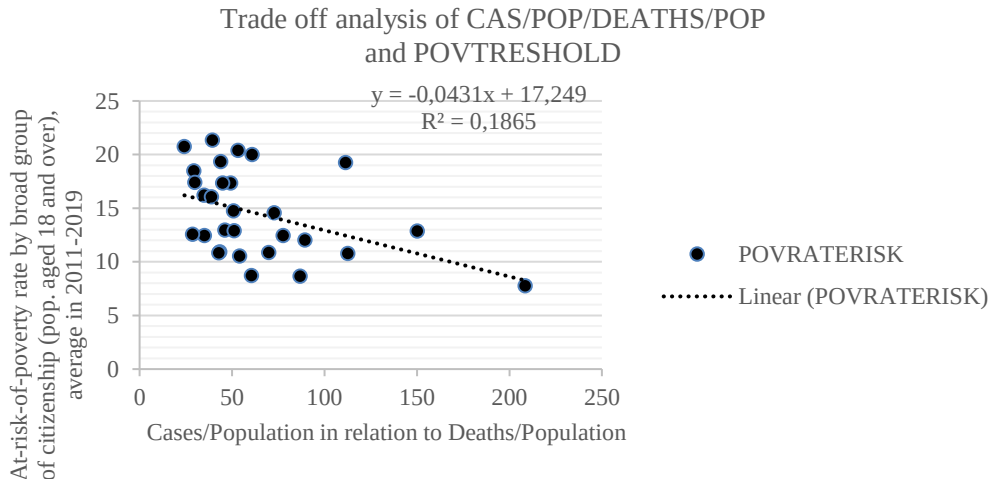

Fig. 17. At-risk-of-poverty rate by a broad group of citizens (pop. aged 18 and over), average in 2011-2019, and Covid-19 Deaths/ Population (Source: Eurostat 2021 and ECDP 2021)

In Fig. 18, a slightly positive slope between the following two variables, at-risk-of-poverty threshold, average in 2013-2019, and Covid-19 Deaths/Population, can be detected (Fig. 18). In general, this observation means that in Europe, the variable of at-risk-of-poverty threshold to some level increases the number of Covid-19 cases and deaths to population. Thus, a variable at-risk-of-poverty threshold is a positive driver for Covid-19 cases and deaths to the population. Again, some out-layers can be observed in Fig. 18.

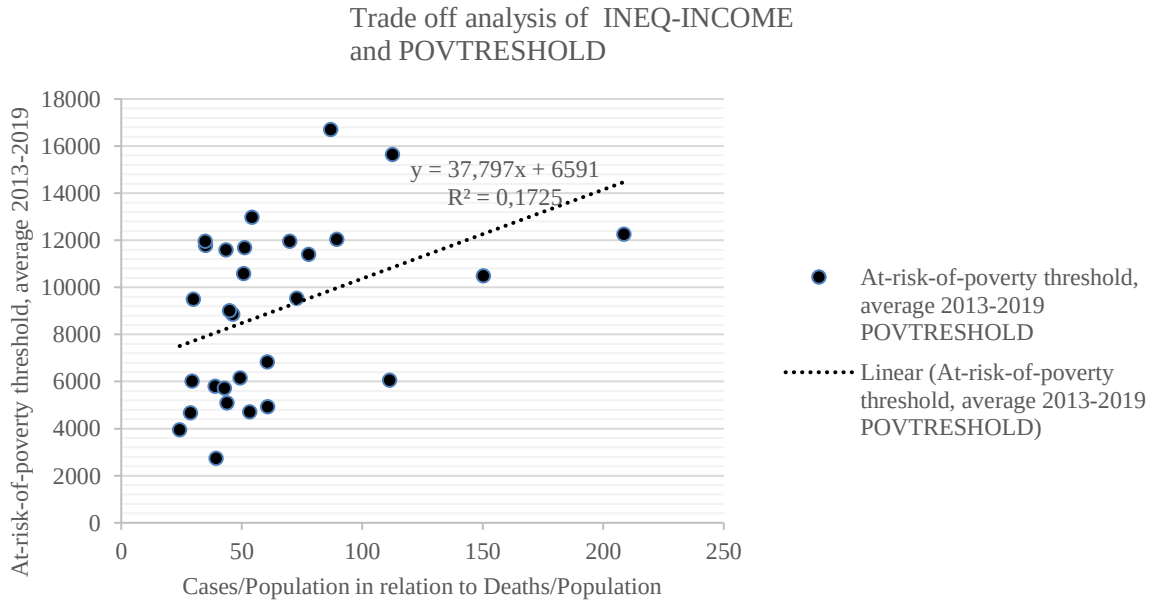

Fig. 18. At-risk-of-poverty threshold, average in 2013-2019 and Covid-19 deaths/ Population (Source: Eurostat 2021 and ECDP 2021)

In Fig. 19, a negative slope between two variables, at-risk-of-poverty rate of households with at least one dependent child by work intensity, average in 2009-2019, and Covid-19 Deaths/Population, can be observed. The linear relationship between the two variables is not very strong.

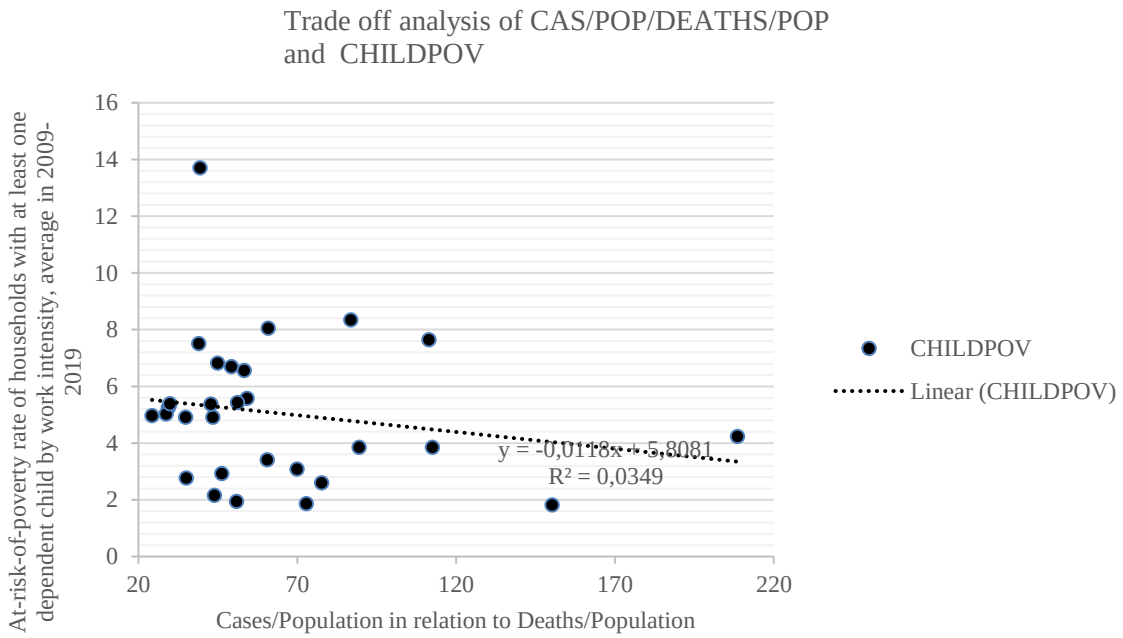

Fig. 19. At-risk-of-poverty rate of households with at least one dependent child by work intensity, average in 2009-2019 and Covid-19 Deaths/ Population (Source: Eurostat 2021 and ECDP 2021)

In Table 1, we report key results and findings of our drivers-driven trend study.

Table 1. Social inclusion and trade-off analysis with Covid-19 deaths. Potentiality of social inclusion drivers leading to Covid-19 Deaths/Population.

Social inclusion variables, Source Eurostat 2021 social inclusion variables	**The nature of social inclusion driver to Covid-19 Deaths/ Population**	**Power of driver**	**Out-layers**
1.Gini coefficient, average in 2009-2019 (Fig. 2)	Not the driver in any direction (Covid-19 cases and deaths). *Statistically not a significant relationship.*	Weak	Many
2. Inequality of income distribution, average in 2009-2019 (Fig. 3)	Less inequality of income distribution can lead to more Covid -19 cases and deaths to the population. *Statistically not a significant relationship.*	Average	Some
3.Employment rate of older workers, age group 55-64, average in 2005-2019 (Fig 4)	The employment rate of older workers leads to more Covid -19 cases and deaths to population. *Statistically not a significant relationship.*	Strong	Some
4. Youth unemployment rate by sex, average in 2005-2019 (Fig. 5)	The youth unemployment rate can decrease the number of Covid-19 cases and deaths to the population. The driver is not very strong. *Statistically significant social inclusion variable.*	Average	Some
5.Gender employment gap, average in 2005-2019 (Fig. 6)	The gender employment gap slightly increases the number of Covid-19 cases and deaths to the population. Not very strong trend driver. *Statistically not significant social inclusion variable.*	Weak	Quite many
6.Long-term unemployment rate by sex, average in 2005-2019 (Fig. 7)	The long-term unemployment rate can lead to more Covid-19 cases and death rate to population. The driver is quite strong. *Statistically significant social inclusion variable.*	Medium	Some

7.Adult participation in learning by sex, average in 2000-2019 (Fig. 8)	The long-term unemployment rate can increase the number of Covid-19 and cases of deaths to the population. The driver is quite strong. *Statistically significant social inclusion variable.*	Medium	Some
8.Percentage of the population with at least upper secondary educational attainment, age group 25-64 (Fig. 9)	Not a trend driver to negative or positive direction concerning Covid-19 cases and deaths. The driver is very weak. *Statistically not significant social inclusion variable.*	Weak	Many
9.Tertiary educational attainment, age group 30-34, average in 2005-2019 (Fig. 10)	The long-term unemployment rate can increase the number of Covid-19 cases and deaths into the population. Trend driver is quite strong. *Statistically significant social inclusion variable.*	Medium	Some
10.Median income by a broad group of citizens, average 2011-2019 (Fig. 11)	Median income can decrease the number of Covid-19 cases and deaths to population. Trend driver is quite strong. *Statistically significant social inclusion variable.*	Medium	Some
11. Life expectancy by age and sex, average (Fig. 12)	Life expectancy by age and sex can increase the number of Covid-19 cases and deaths to population. This trend driver is weak. *Statistically significant social inclusion variable.*	Weak	Some
11.Tax rate on low wage earners - unemployment trap, average in 2005-2010 (Fig. 13)	The tax rate on low-wage earners (unemployment trap) does not have a direct impact on the number of Covid-19 cases and deaths to the population. *Statistically not a significant variable.*	Weak	Some
12.Severe housing deprivation rate by tenure status, average in 2005-2019 (Fig. 14)	Severe housing deprivation rate by tenure status can decrease the number of Covid-19 cases and deaths to population. This trend driver is a strong but *statistically not significant social inclusion variable.* Requires more further investigations because this social inclusion variable plays a different role in different EU countries.	Medium	Many
13.Material deprivation rate by sex, average in 2011-2019 (Fig .15)	Lower material deprivation rate can decrease the number of Covid-19 cases and deaths to population. This trend driver is weak. *Statistically significant social inclusion variable.*	Weak	Many
14.Persistent at-risk-of-poverty rate by age group, average in 2009-2019 (Fig.16)	The persistent at-risk-of-poverty rate can decrease the number of Covid-19 cases and deaths to the population. This trend driver is weak. *Statistically significant social inclusion variable.*	Medium	Many
15.At-risk-of-poverty rate by a broad group of citizens (pop. aged 18 and over), average in 2011-2019 (Fig. 17)	At-risk-of-poverty rate by a broad group of citizens, to a minor extent, increases the number of Covid-19 cases and deaths to population. This trend driver is having a medium impact. *Statistically significant social inclusion variable.*	Medium	Many
16.At-risk-of-poverty threshold, average 2013-2019 (Fig. 18)	At-risk-of-poverty threshold variable can decrease the number of Covid-19 cases and deaths to population. This trend driver is quite strong. *Statistically significant social inclusion variable.*	Medium	Some
17.At-risk-of-poverty rate of households with at least one dependent child by work intensity, average in 2009-2019 (Fig. 19)	At-risk-of-poverty rate of households with at least one dependent child by work intensity can slightly increase Covid-19 death rate to population. This trend driver is weak. *Statistically not significant social inclusion variable.*	Weak	Many

We have also made a correlation analysis. In Table 2.a. and 2.b the Pearson correlation coefficients (PCC) are reported, also referred to as Pearson's r, the Pearson product-moment correlation coefficient (PPMCC), or the bivariate correlation. It is a measure of linear correlation between two sets of data (see Nummenmaa et al. 2017, chapter 8). Tables 2.a. and 2.b include key results of statistical bivariate

correlation analysis. It reveals key statistical correlation analysis results. We marked statistically significant variables with grey colour and not significant variables with no colour in Table 2a and Table 2b.

Table 2.a. Correlation analysis of key Covid-19 and social inclusion variables. Data of 29 European countries.

				PERSISTENTPOV	CHILDPOV	INCOME	LIFEEXPEPT	LOWWAG
		Cases		0,13	0,15	-0,19	0,30	0,17
Two-sided t-test		CAS						
One-sided t-test								
		Deaths		0,20	0,16	-0,22	0,27	0,16
Two-sided t-test		DEATHS						
One-sided t-test								
		Cases/Pop(Deaths/P		0,51	0,16	-0,45	-0,30	0,02
Two-sided t-test		**CAS/POP/DEATHS/POP**						
One-sided t-test				**HOUSINDPEP**	**EMPRATE**	**EMPOLDWORKERS**	**YOUTHUNEMP**	**GENDEREI**
		Cases		-0,12	-0,24	-0,18	0,30	0,17
Two-sided t-test		CAS						
One-sided t-test								
		Deaths		-0,03	-0,30	-0,21	0,32	0,21
Two-sided t-test		DEATHS						
One-sided t-test								
		Cases/Pop(Deaths/P		0,59	-0,67	-0,54	0,47	0,26
Two-sided t-test		**CAS/POP/DEATHS/POP**						
One-sided t-test				**LONGTERMEMP**	**TERTEMP**	**ADULTLEARNING**	**SECONDARYEDUCATION**	
		Cases		0,16	-0,16	-0,16	-0,21	
Two-sided t-test		CAS						
One-sided t-test								
		Deaths		0,19	-0,23	-0,21	-0,22	
Two-sided t-test		**DEATHS**						
One-sided t-test								
		Cases/Pop(Deaths/P		0,56	-0,54	-0,62	-0,06	
Two-sided t-test		**CAS/POP/DEATHS/POP**						
One-sided t-test								

Table 2.b. Correlation analysis of key Covid-19 and social inclusion variables. Data of 29 European countries.

				DEATHS	POP	CAS/POP	DEATHS/POP	CAS/POP/
		Cases		0,97	0,93	0,16	0,38	-0,38
Two-sided t-test		CAS	p-value					
One-sided t-test								
		Deaths			0,95	0,07	0,38	-0,40
Two-sided t-test		DEATHS	p-value					
One-sided t-test								
		Cases/Pop(Deaths/Pop			0,41	0,00	0,61	-0,82
Two-sided t-test		**CAS/POP/**	p-value					
One-sided t-test								
				GINI	**INEQ-INCOME**	**POVTRESHOLD**	**POVRATERISK**	**MATERIAL**
		Cases		0,16	0,14	0,07	0,04	-0,14
Two-sided t-test		CAS						
One-sided t-test								
		Deaths		0,20	0,18	0,05	0,11	-0,08
Two-sided t-test		DEATHS						
One-sided t-test								
		Cases/Pop(Deaths/P		0,36	0,41	-0,49	0,45	0,57
Two-sided t-test		**CAS/POP/DEATHS/POP**						
One-sided t-test								

In Table 3, we have reported statistical test information. We have tested the significance of correlation coefficients with a significance level of 5% (1-sided and 2-sided tests). The grey colour in Tables 2.a and 2.b. was used by this statistical test criterion of significance.

Table 3. Statistical test information

	Critical values / Sigficance level in 1-sided tests									
df	0.4	0.3	0.2	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
23	0.256	0.532	0.858	1.319	1.714	2.069	2.500	2.807	3.485	3.768
55	0.255	0.527	0.848	1.297	1.673	2.004	2.396	2.668	3.245	3.476
	Sigficance level in 2-sided tests									
df	0.8	0.6	0.4	0.2	0.1	0.05	0.02	0.01	0.002	0.001

Conclusions

This empirical study provides some insights into European socio-economic recovery policy after the COVID-19 crisis (so-called exit strategies). It is obvious that paying more attention to social inclusion is needed in the post-Covid-19 crisis era in the European Union. According to our analysis the following variables of social inclusion are in need of special attention in relation to the key variable "Cases/Population in relation to Deaths/Population": (1) Inequality of income distribution, average in 2009-2019, (2) At-risk-of-poverty threshold, average 2013-2019, (3) At-risk-of-poverty rate by broad group of citizens (pop. aged 18 and over), average in 2011-2019, (4) Material deprivation rate by sex, average in 2011-2019, (5) Persistent at-risk-of poverty rate by age group, average in 2009-2019, (6) Median income by broad group of citizens, average 2011-2019, (7) Unemployment trap, average in 2005-2010, (8) Average employment rate by sex, average in 2005-2019, (9) Employment rate of older workers, age group 55-64, average in 2005-2019, (10) Youth unemployment rate by sex, average in 2005-2019, (11) Long-term unemployment rate by sex, average in 2005-2019, (12) Tertiary educational attainment, age group 30-34, average in 2005-2019, and (13) Adult participation in learning by sex, average in 2000-2019. In general, the variables of social inclusion should be taken into account in the debate and decision-making on the COVID-19 issues in the European Commission and the European Parliament as improvements in social inclusion policy decrease vulnerability to pandemic risks.

In this study, we can generally conclude that the relationship between Covid-19 cases and corona-related deaths and social inclusion variables is a challenging research topic where we achieved some interesting findings. Our results are indicative of scientific nature, and more research will be needed if we want to develop more sophisticated statistical prediction models. Many poverty variables of social inclusion are contributing to the incidence of cases and Covid-19 deaths. We can conclude that education, labour market variables, and other welfare variables are statistically linked to the number of Covid-19 cases, and deaths, and also these variables are relevant topics of further investigations. In this study, we identified key social inclusion drivers for Covid-19 cases and deaths in the EU, 29 countries.

We did not find that other social inclusion variables could be strategically as important for COVID-19 phenomena, although they are not entirely meaningless. Of course, there can be indirect and complex relationships, which may have impacts on the COVID-19 phenomena. Correlation Tables 2a and 2b and all figures include more detailed statistical analyses and reveal that some social inclusion variables have a statistically significant relationship to the number of COVID-19 cases and deaths to population variables in the EU-29 region. Naturally, these social inclusion variables need more strategic attention in the social inclusion policy of the European Union, if COVID-19 cases and deaths or another COVID-19 type of pandemic deaths to be controlled in the future. The EU planners of national exit strategies of the COVID-19 crisis should be aware of the social inclusion effects. Decision-makers are aware of the potential and real effects of social inclusion factors on Covid-19 deaths and cases.

As usual, a reservation should be added to the results obtained that probably not all corona cases and deaths have been measured in an entirely consistent and scientifically accurate manner. In this study, we have relied on official statistical data sources of the European Union.

Acknowledgements

The project “Platforms of Big Data Foresight (PLATBIDAFO)” has received funding from European Regional Development Fund (project No 01.2.2-LMT-K-718-02-0019) under a grant agreement with the Research Council of Lithuania (LMTLT).

References

Arbolino, R. & Di Caro, P. (2021) Can the EU funds regional resilience at time of Covid-19? Insights from the Great Recession. Journal of Policy Modeling, 2021, Vol. 43, Issue 1, 109-126. 10.1016/j.jpolmod.2020.10.001

Cacioppo, J. T., & Cacioppo, S. (2014) Older adults reporting social isolation or loneliness show poorer cognitive function 4 years later. Evidence Based Nursing, 17(2), 59–60. https://doi.org/10.1136/eb-2013-101379

Cudjoe, T. K. M., Roth, D. L., Szanton, S. L., Wolff, J. L., Boyd, C. M., & Thorpe, R.J.J. (2020) The epidemiology of social isolation: National health and aging trends study. The Journals of Gerontology: Series B, 75(1), 107–113. https://doi.org/10.1093/geronb/gby037

Courtin, E., & Knapp, M. (2017) Social isolation, loneliness and health in old age: A scoping review. Health & Social Care in the Community, 25(3), 799–812. https://doi.org/10.1111/hsc.12311

Elgar, F.J., Stefaniak, A. & Wohl, M.A.A. (2020) The trouble with trust: Time-series analysis of social capital, income inequality, and COVID-19 deaths in 84 countries. Social Science & Medicine, Volume 263, October 2020, Article 113365. https://doi.org/10.1016/j.socscimed.2020.113365

European Centre for Disease Prevention (2021) Data on 14-day notification rate of new COVID-19 cases and deaths . Web: Publications & Data | European Centre for Disease Prevention and Control (europa.eu)

Eurostat (2021) Income and Living Conditions. Web: Overview - Income and living conditions - Eurostat (europa.eu)

Hayashi, T., Umegaki, H., Makino, T., Huang, C. H., Inoue, A., Shimada, H., & Kuzuya, M. (2020) Combined impact of physical frailty and social isolation on rate of falls in older adults. The Journal of Nutrition, Health & Aging, 24(3), 312–318. https://doi.org/10.1007/s12603-020-1316-5

Mendoza-del Villar, L., Oliva-Lopeza, E., Luis-Pineda, O., Benešová, A., Tupa, J & Garza-Reyes, J.A. (2020) Fostering economic growth, social inclusion & sustainability in Industry 4.0: a systemic approach. Procedia Manufacturing, Vol. 51, 1755-1762. https://doi.org/10.1016/j.promfg.2020.10.244

Nummenmaa, L, Holopainen, M. & Pulkkinen, P. (2017) The Foundations of Statistical Methods. Sanoma Pro. Helsinki. (In Finnish).

Ranjbari, M., Esfandabadi, Z.S., Zanetti, M.C., Scagnelli, D.S., Siebers, P.O., Aghbashlo, M., Peng, W., Quatraro, F. & Tabatabaei, M. (2021) Three pillars of sustainability in the wake of COVID-19: A systematic review and future research agenda for sustainable development. Journal of Cleaner Production, Vol. 297, Article 126660.https://doi.org/10.1016/j.jclepro.2021.126660.

Schoukens, P., De Becker, E. & Joris BekeSmets, J.B. (2015) Fighting social exclusion under the Europe 2020 strategy: Which legal nature for social inclusion recommendations? International Comparative Jurisprudence, Vol. 1, Issue 1,11-23. https://doi.org/10.1016/j.icj.2015.10.003

Xie, B., Charness , N., Fingerman , K.,Kaye, J., Kim, M.T. & Khurshid, A. (2020) When Going Digital Becomes a Necessity: Ensuring Older Adults’ Needs for Information, Services, and Social Inclusion During COVID-19, Journal of Aging & Social Policy, 32:4-5, 460-470. DOI: 10.1080/08959420.2020.1771237

Appendix 1

Covid-19-Variables and Social Inclusion Variables in the study

Deaths = DEATHS, Population = POP, Cases/Population = CAS/POP, Deaths/Population = DEATHS/POP, Cases/Population in relation to Deaths/Population = CAS/POP/DEATHS/POP, Gini coefficient, average 2009-2019 = GINI, Inequality of income distribution, average in 2009-2019 = INEQ-INCOME, At-risk-of-poverty threshold, average 2013-2019 = POVTRESHOLD, At-risk-of-poverty rate by broad group of citizenship (pop. aged 18 and over), average in 2011-2019 = POVRATERISK, Material deprivation rate by sex, average in 2011-2019 = MATERIALDEP, Persistent at-risk-of poverty rate by age group, average in 2009-2019 = PERSISTENTPOV, At-risk-of-poverty rate of households with at least one dependent child by work intensity, average in 2009-2019 = CHILDPOV, Median and median income by broad group of citizenship, average 2011-2019 = INCOME Life expectancy by age and sex, average = LIFEEXPEPT, Tax rate on low wage earners = LOWWAGETAX, Unemployment trap, average in 2005-2010 = EMPRATE Severe housing deprivation rate by tenure status, average in 2005-2019= HOUSINDPEP, Average employment rate by sex, average in 2005-2019 = EMPRATE, Employment rate of older workers, age group 55-64, average in 2005-2019 = EMPOLDWORKERS, Youth unemployment rate by sex, average in 2005-2019 = YOUTHUNEMP, Gender employment gap, average in 2005-2019= GENDEREMPGAP, Long-term unemployment rate by sex, average in 2005-2019 = LONGTERMEMP, Tertiary educational attainment, age group 30-34, average in 2005-2019= TERTEMP, Adult participation in learning by sex, average in 2000-2019 = ADULTLEARNING, Percentage of the population with at least upper secondary educational attainment, age group 25-64, average in 2005-2019 = SECONDARYEDUCATION.

ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0008

IDENTIFICATION OF LITHUANIAN INTERNATIONAL TRADE RISK IN BEVERAGES

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Abstract

Research purpose. The article aims to identify the risk groups arising in foreign trade in the four main groups of processed beverages at a national level.

Design / Methodology / Approach. Processed agricultural drinks do not fall into the category of essential food. The article examines four main drink groups: waters (including mineral waters and aerated waters, with additive), beer, wine, and other alcoholic (e.g., spirits, liqueurs, whiskies, rums, gins, vodkas, etc.) beverages. The case of Lithuania is presented. Analysis and assumption of scientific literature and TOPSIS method are used. The study does not aim to assess all risk factors but to identify the groups of risk factors and to rank them according to their importance for each processed beverage sectors supply chains.

Findings. Based on the scientific literature analysis, the eight risk groups were identified and were evaluated according to their importance for the beverages supply chain. Experts ranked risk groups taking into account their importance for international processed beverages trade for each product group. The results show that the most important is the Demand risks group for all processed beverages, and the least important is Political risk. The significance of other risk groups for a particular beverage supply chains differs. Supply risks were second in the 'water with add' group, while in the 'other alcohol' group, it is in fourth place. For the 'other alcohol' group, supply risks are less significant. Production risks are one of the most important in the wine trade. Financial risks are one of the most important in the 'other alcohol' group. Management and operational risks play an essential role in the beer supply chains. The least significant is three risk groups: Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Originality / Value / Practical implications. The identified risks groups in the four main groups of processed beverages can help shape the country's trade policy, mitigate trade risks, and effectively manage the agricultural trade beverage subsector. Research results can be practically used both for government or business decisions and for the public sector (trade associations).

Keywords: International trade; Beverages trade; Foreign trade risk; Risk identification; TOPSIS.

JEL codes: F1, F13, L66, N5, D81.

Introduction

International trade is one of the most common research subjects in various fields of study (economics, strategic management, logistics, etc.) and assessed at both micro and macro-economic levels. In addition, the analysis at the country level (meso-level) is the subject of research on the international trade activities of many countries. However, risk analysis is rare among all topics related to foreign trade, and even less frequent is the risk assessment. Risks have become relevant only in recent decades, as globalisation, technological development and changes in resource deployment have led to increased supply chains and their importance. As a result, food supply chains become longer, more complex and more vulnerable (Gervais, 2018). Most risk-related research is conducted to ensure the country's food security. The agri-food sector provides goods of first necessity, and it affects the quality of life. Most attention is given to international trade-related risks in the essential foodstuffs: grain, rice, corn trade. Cereals, milk, and meat sub-sectors are analysed most often (Khanal & Mishra, 2017;

Hoque & Alam, 2018). In recent years, risk studies have focused on raw and perishable foods (fruit, fish) (Prakash et al., 2017; El Hariri al., 2018). Due to climate-related factors (climate change fluctuations (drought, rainfall), climate change trends) and scarce resources (growing place, yields, etc.), risks are mainly analysed for primary food products. In comparison, the agricultural sector is analysed as a risky and sensitive sector (Novickyte, 2019). However, there is also a risk in trade in all other food products, including processed foods. Processed food has a longer life cycle, but it also has a higher risk of dissatisfaction with consumers' habits and expectations among different countries. Food is often treated as a commodity of necessity, as a source of pleasure, and lifestyle. Despite this, one should note that all business is risky, and international trade has more risks that are specific. International trade is more dangerous than domestic trade (Meral, 2018). Also, noticeable that the European food and drink industry is one of the world's leading manufacturing sectors but with a downward trend (Lodorfos et al., 2018). Although trade in beverages takes an important role in Lithuania and the turnovers are growing (compared to 2016, turnover increased by 269,8 million EUR (7.9 %) in 2020), the negative balance increased by 28,2 million (4,7 %), including the products with long traditions and favourable conditions for production in the country (beer, water with additives, other alcoholic beverages. There is an upward trend in imports (increased by 7.4 % in the period under consideration) (Statistics Lithuania, 2021).

Stable commodity flows reflect a stable position in those markets and, at the same time, regular income. That allows planning the profitable development of activities, business performance both at the company and at the national levels. International trade in beverages is a risky business for all food supply chains. Suppose the trade of water without additives and milk can be treated as first necessity products. The water with additives, beer, wine, and other alcoholic beverages are not related to the first necessity products. Many countries restrict their consumption through excise duties and appropriate education policies (healthy lifestyles programmes). It is noticeable that obesity and unhealthy food consumption in the current period is more significant than hunger risks in economically developed countries (Otero et al., 2018). Nevertheless, the consumption of these products is typical to many people, favoured and moderately consumed to increase life satisfaction. Due to the imprudent choice of restrictive measures, states lose part of their revenue to the black market. Balanced management of this sector would allow increasing the country's GDP by increasing exports, reducing imports, and considering benefits and risks. The trend of international trade in these beverage groups is growing (WB, 2018). Supply chain risks are analysed by many authors (Khanal et al., 2018; Nyamah et al., 2017; Ho et al., 2015; Bakumenko, 2019 etc.), but risks vary across supply chains and countries (Mital et al., 2018). Moreover, there is a lack of research on risks in the processed beverage supply chain. However, when it comes to agricultural trade, the processed beverage sector has its specific characteristics. Supply chains distinguish between fresh and processed food products (Chen and Voigt, 2020; Assefa et al., 2017; Naudé and Badenhorst-Weiss, 2020; Khan et al., 2019). Complex studies are needed to evaluate and analyse the distinctions between the different supply chain context and scope (Bak, 2018). Risk management decisions can be attributed to the strategic decision (Rathore et al., 2017) on which the competitiveness of companies and the country's trade success depends.

This work aims to identify the risk groups of foreign trade in four processed beverage groups: waters with additives (including mineral waters and aerated waters, with additives), beer, wine, and other alcoholic beverages (e.g., spirits, liqueurs, whiskies, rums, vodkas, and others) at a national level. Scientific literature analysis and systematisation, groups of risk factors were identified and ranked. TOPSIS method was used to evaluate the experts' opinions. The research limitations: (1) employed only risk groups, not the risk factors, (2) employed only the qualitative risk identification tool.

Literature Review

While international trade is widely explored worldwide, it does not address the risks (Gervais, 2018). The Global Risks Report'2019 (WEF, 2019) provides a detailed description of the risks that have and will have a significant impact on global development. This report grouped risks into economic, environmental, geopolitical, social and technological categories. All of them impact international

trade, given that the first three risks are linked to climate change, which is of great importance to agricultural production risks. The risk of production is identified as one of the highest in the farming sector (Hardaker, 2015). International trade of risky products is already dangerous in term of its origin. Production risks are essential for both the export and import of agricultural products. In addition, it is not the only source of risk in international trade. The food and beverage industry directly impacts the daily lives of the entire society and plays a vital role in both regional and global economies (Zhu et al., 2018). Supply chain risks are analysed by most scientists (Xu et al., 2020; Khanal, 2018; Cimprich et al., 2017; Kolotzek et al., 2018; 2018; Hyuha et al., 2017; Bakumenko, 2019; Baryannis et al., 2019). The structure of agri-food supply chains is becoming increasingly complex, making them more sensitive to different societal levels and risks. Therefore, there is a need to manage supply chain risks effectively and efficiently to improve performance.

Risk and uncertainty are the most common terms in supply chains analysis. They include studies on vulnerability and disturbance, disruption describing a supply chain affected by risk. In addition, some researchers analyse threats, crisis, and robustness effects. Risk in supply chain risk management (SCRM) literature have also been classified in different ways, depending on the scope and goals of the research. However, as a rule, three primary levels are considered (Baryannis et al., 2019): risks that are not related to the network (environmental risks); risks that are internal to the network but external to the local firm (network or industrial risks); risks within the undertaking referred to as organisational risk.

The food and drink industry faces strict rules, customer behaviour and service changes, increasing competition and low-profit margins. The Manufacturing Execution System (MES) is analysed as a manufacturing process to identify significant benefits, barriers, possible solutions, and future research areas of the MES implementation (Chen and Voigt, 2020). Two main components must be ensured: Safety and Traceability. For this purpose, integration of all actors and activities of the food supply chain from primary production, food processing, distribution, retailing, and consumer consumption is needed (ECSIP, 2016). One should note that different risk groups are affected by various risk factors. For example, digital technologies & data analytics and sustainable risk management in SFSC influence risk management (Zhu et al., 2018). Researches have shown that the created added value differs from one supply chain to another. The main reasons are the choice of plant variety, pesticide levels, product promotion and products adaptation to the retail sector, risk management strategies are diverse and interlinked with other business innovations. The prices of top-quality products are more stable than standard quality products (Assefa et al., 2017). It is noted that different drink groups use different supply chain network approaches. E.g. examining the parts of alcoholic beverage, the authors provide examples of leading companies in the sector: Heineken Baccardi-Martini, Diageo and Moët Hennessy. These companies have developed different models for supply chain risk management with various partners and affected supplier choices. Production seasonality, creativity, innovation and complexity of the item, customer order decoupling points and the internal organisation agreements between a company and an external party with reliability and open communications under a win-win climate were the main success factors for the trade (Dollet et al., 2011). Some authors seek to identify critical factors and barriers to success. While most studies are limited to major market players (Dollet et al., 2011), some research relates to SME of the food and beverages industry, like small and medium-sized enterprises (SME's) (Kowalska, 2020; Long et al., 2018). The most critical factors for success and sustainability are the following: collaboration, continual innovation, a straightforward narrative and vision, a sustainable foundation, profitability, and serendipitous external events emerge. Barriers (risks) include external events, principle-agent problems and a lack of support from wider actors and systems (Long et al., 2018). In addition, managers' risk perceptions vary among companies and between managing divisions (Sato et al., 2020).

Some researchers analyse unique supply chains. Halal food supply chain (HFSC) encounters different risks, but the most significant risk in these chains are "supply-related risks". Raw material integrity is a vital element in the Halal food supply chain (Khan et al., 2019). Research in SCRM applies different methodologies. Examining food supply chain risks management (FCRM), scientists distinguish various risk factors. The risk factors are numerous and diverse. They are grouped according to the

sources that cause the risk. Ho et al. (2015) grouped all risk factors into three main groups: Macro-risk, micro-risk (demand, production and supply risks) and infrastructural risk flows (information, transportation, financial risks). The categories or risk groups in the food supply chain differ. Supply risks refer to the shortage of food grains and unavailability of procurement centre, insufficient packaging and preservation, communication failure between different supply chain stages, risks related to natural disasters. Storage and transport risk is inadequate storage at warehouses, poor handling, preservation of the food grains, in-transit loss, unavailability of the vehicles, etc. Risk management decisions can be attributed to strategic decision. It is noted that the investigation has limitations: the risk framework is adapted to the Indian market but has not been tested for other markets (Rathore et al., 2017). All risk factors in any supply chain can be grouped according to their nature. However, one should note that specific risk factors may characterise different supply chains. Nyamah et al. (2017) grouped all risk factors into nine risk types: demand-related risk, supply-related risk, biological and environmental-related risk, weather-related risks, managerial and operation-related risks, logistics and infrastructure risks, public policies and related institutional risk, political-related risk, and financial-related risk. Zhao et al. (2020) identified 16 new AFSC risk factors. Rathore et al. (2017) applied another risk factor grouping. According to their nature, all risk factors may be divided into risk groups in different ways depending on the sub-sector under investigation. Our research covers the processed beverage sector. To summarise, a framework of eight supply chain risk groups was developed: supply risks, demand risks, production risks, management and operational risks, logistical and infrastructural risks, political risks, policy and regulatory risks and financial risks (see Fig. 1).

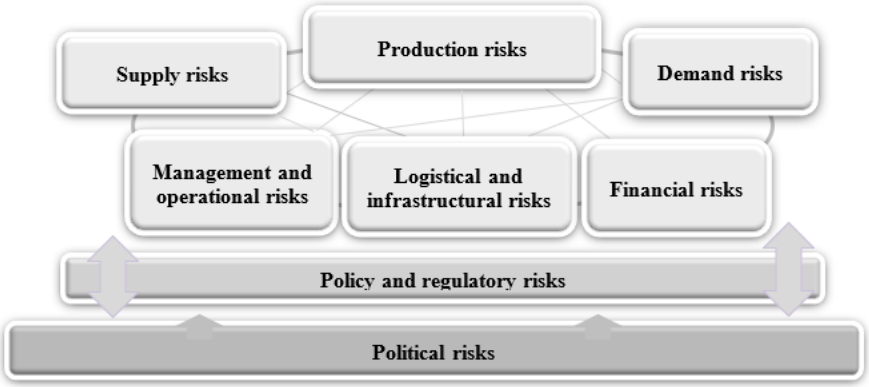

Fig. 1. Supply chain risk factor groups (adapted from Zhao et al., 2020; Nyamah et al., 2017; Ho et al., 2015)

All risk factors from the supplier's side, e.g. bankruptcy of a supplier, price fluctuations on upstream markets, capacity fluctuations/deficiencies in supply markets, availability of alternatives, insufficient exchange of information between supply partners, supplier's quality problems etc. are assigned to the supply risk group (Zhu et al., 2018, Behzadi et al. 2018; Rathore et al., 2017; Nyamah et al., 2017). The demand risk group is the potential for a loss due to a gap between forecast and actual demand, and the demand risks factors can also differ in every supply chain. The most frequently mentioned factors are the following: variability in demand, fluctuations in market prices or market price volatility, the uncertainty of the production of local suppliers (e.g. related to weather conditions), insufficient information from customers on demand for products, imbalances between supply and demand; dependence on production flows etc. (Zhu et al., 2020, Behzadi et al. 2018; Nyamah et al., 2017). Production risk group factors are linked to the production processes, the vulnerability of production (perishability), pollution (additives, diseases), availability of substitutes, technological backwardness, weather-related risks (periodic deficit/excess rainfall; extreme drought/ flooding/ wind/ cold etc. (Zhu et al., 2020, Behzadi et al. 2018; Nyamah et al., 2017). The logistical and infrastructure-related risk group includes poor infrastructure and services, unreliable transport, changes in transportation, the poor performance of logistics service providers, lack of good system integration, volatility in fuel price etc. (Zhu et al., 2020, Shen et al., 2020; Behzadi et al. 2018; Nyamah et al., 2017). Policy and

regulatory risk group describes the risk factors related to domestic governance: stricter food quality and safety standards, weak institutional capacity to implement regulatory mandates, animal welfare legislation negatively affecting the competitiveness, potential local restrictions on waste disposal etc. (Zhu et al., 2020, Behzadi et al. 2018). Financial risk group factors are uncertain trade/ market/ land/ tax policies, inadequate financial support, delays in payment and even possible non-payment, changes in the exchange rate, insufficient credits etc. (Bachev, 2017). Management and operational risk group incorporate soft management features. The following are distinguished: forecast and planning errors, poor management decisions on asset allocation, poor quality control management, poor collaboration, poor decision making in use of inputs, farm and firm equipment breakdowns, inability to adapt to changes in cash and labour flows, forecast and planning errors etc. (Zhu et al., 2020, Long et al., 2018; Shen et al., 2020; Behzadi et al. 2018).

Lavastre et al. (2012) highlighted three main aspects of the risk analysis: the number of losses, the size of the losses and the loss probability. Furthermore, the likelihood of failure is analysed from two different perspectives: supplier and consumer perspectives. Risks are mainly analysed at the macro or micro level. At the meso/country level, the most frequently addressed are food safety risks. The Covid-19 pandemic triggered more risk studies related to food supply chains (Laborde et al., 2020; Sharma et al., 2020; Aday & Aday, 2020; Jablonski et al., 2021). This pandemic demonstrated that different companies from different industries are closely connected worldwide (Aday & Aday, 2020). Advanced strategies and technologies are proposed for risk management, such as machine learning and big data (Ivanov et al., 2020; Baryannis et al., 2019). Burinskas (2020) analysed research papers in disruption cases. They provided three main drivers of risks sources at the micro-level: delays (unreliable supplier, operational performance, unreliable transport system, etc.), inaccurate forecast (lack of visibility in the supply chain, under-estimated demand due to shortage cases), and inventory problems (product obsolescence, damages, mismatch of physical and system stock, quality problems etc.).

Research Methodology

Scientific literature presents different qualitative and quantitative models. Qualitative methods are used more frequently for risk factor evaluation (Zhao et al., 2020; Nyamah et al., 2017; Angelo et al., 2017; Kara et al., 2018; Irani et al., 2018; Challinor et al., 2018). Some authors carried out detailed quantitative assessment models (Ho et al., 2015; Burinskas, 2020). Probability analysis presents processes under consideration that have the probability of being disturbed for different periods (Geng et al., 2021; Roccato et al., 2017). Various methodologies are used to evaluate the system's vulnerability, e.g. a less risky alternative (Ho et al., 2015; Sharma et al., 2020; Zhao and Zhu, 2018).

The risk of the country's international trade in processed beverages is analysed in two stages. In the first stage, a qualitative study, is carried out based on literature analysis to rank the main risk groups of the supply chain according to their importance. The second stage compares the results between different groups of beverages.

Lithuania has been selected for the research because of its size, geographical location and trade conditions. Lithuania is a small country (EU member since 2004); its trade takes place under all existing inter-lateral agreements and faces all risks inherent in a small open economy. The Lithuanian beverage industry is not the predominant industry in the country. A four-digit international Combined Nomenclature (CN) is applied. Four processed beverage groups at a national level are analysed:

- 2202 – water, including mineral waters and aerated waters, with additives (e.g., containing added sugar or other sweetening matter or flavoured). The abbreviation used below in this research is 2202 – ‘water with adds’;
- 2203 – beer;
- 2204 – wine;
- 2208 – other alcoholic beverages with undenatured ethyl alcohol of alcoholic strength by volume of less than 80 % vol. (e.g., spirits, liqueurs, whiskies, rums, gins, vodkas and other spirituous beverages). The abbreviation used below is 2208 – ‘other alcohol’.

A qualitative method is carried out based on scientific literature. The aim is to adjust the chosen types of risks groups according to their importance. In addition, an evaluation of the experts' opinions was carried out. According to Libby and Blashfield (1978), an optimal number of seven experts participated in each product group. All the experts represent the government, private or public sectors and have more than 5 years of experience. Information about the experts is presented in Table 1.

Table 1. Qualitative information about experts (Source: created by authors)

Expert No.	Experience in international trade in beverages group	Workplace sector (government/ private/public leader position)
E_1, E_2, E_3, E_4, E_5	all beverages	government sector
E_6, E_7, E_8, E_9	beer	private sector
E_{10}, E_{11}, E_{12}	wine	private sector
E_{13}, E_{14}	alcoholic beverages	private sector
E_{15}, E_{16}	all beverages	private sector
E_{17}, E_{18}	waters with additives	private sector
E_{19}	all beverages	public sector (scientific institute)
E_{20}	all beverages	public sector (association)

Experts were asked to complete a questionnaire for each beverage group and each risk group. The Lickert scale of three risk options was used (low risk, moderate risk and high risk). The survey results were processed using the TOPSIS Multicriteria decision support method. The main principle of this method is that the optimal dote should have the farthest point in the distance from the negative ideal solution point and the shortest line from the positive ideal solution (Dandage, 2018). The application of the TOPSIS method involves these steps: normalisation procedure, calculation of best and worst alternatives, calculation of the distance to the ideal solution and worst solution, prioritisation of risk groups according to the calculated values. The method TOPSIS uses vector normalisation (Podviezko & Podvezko, 2014):

$$\tilde{r}_{ij} = \frac{r_{ij}}{\sqrt{\sum_{j=1}^{n} r_{ij}^2}} \tag{1}$$

where:

r_{ij}: r - value of the i^{th} index for the j^{th} object;

$\tilde{r}_{ij}$: r - normalised value of the i^{th} index for the j^{th} object;

n: the number of criteria.

After the normalisation procedure, the best alternative V^+ and the worst alternative V^- need to be chosen. Then the distance $Dj+$ of every considered alternative to the ideal solution and its distance $Dj-$ to the worst solution of the method need to be calculated by (Podviezko & Podvezko, 2014):

$$D_j^+ = \sqrt{\sum_{i=1}^{m} (\omega_i \tilde{r}_{ij} - V_i^+)^2} \tag{2}$$

$$D_j^- = \sqrt{\sum_{i=1}^{m} (\omega_i \tilde{r}_{ij} - V_i^-)^2} \tag{3}$$

where:

$\tilde{r}_{ij}$: r normalised value of the i^{th} index for the j^{th} object;

m: the number of alternatives.

The main cumulative criterion C^*_j is calculated (Podviezko & Podvezko, 2014):

$$C_j^* = \frac{D_j^-}{D_j^* + D_j^-};\ \text{(j=1,2,..., n), o } \left(0 \le C_j^* \le 1\right) \tag{4}$$

Risk groups are arranged according to *Cj's* calculations. The closer the value of *Cj* is to 1, the more important the risk group is. After ranking each beverage group, a comparison between them was made.

Research Results

A qualitative study carried out to identify the riskiness of the trading in the beverage supply chain. Based on the scientific literature analysis, the eight risk groups were evaluated. In addition, all four processed beverage groups were evaluated. For the **2202 – 'water with adds'**, the results were calculated as follows: the best alternative *V+* and worst alternative *V-* according to the TOPSIS method are presented in Table 2, and the results of the rank assessment are presented in Table 3.

Table 2. The best alternative V^+ and the worst alternative V^- results for 'water with adds'

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V+	0,500	0,442	0,603	0,447	0,447	0,548	0,539
Worst alternative V-	0,167	0,147	0,302	0,224	0,224	0,183	0,180

According to our research, the significance of the risk groups according to their importance for "water with add' supply chains was as follows: Demand risks, Supply risks, Production risks, Management and operational risks, Financial risks, Policy and regulatory risks, Logistical and infrastructural risks, Political risks. Therefore, international trade in "water with add" should focus on controlling and mitigating demand risk groups.

Table 3. Results on the TOPSIS method valuation of risk groups for 'water with adds'

	D+j values	**D-j values**	**Ci value**	**Rang**
Supply risks	0,416	0,643	0,607	2
Demand risks	0,167	0,754	0,819	1
Production risks	0,396	0,603	0,604	3
Management and operational risks	0,550	0,428	0,437	4
Logistical and infrastructural risks	0,700	0,232	0,249	7
Political risks	0,807	0,000	0,000	8
Policy and regulatory risks	0,686	0,245	0,263	6
Financial risks	0,578	0,444	0,434	5

For the **2203 – beer** group of beverages, the results according to the TOPSIS method: the best alternative V+ and worst alternative V- are presented in Table 4, and the results of the rank assessment are presented in Table 5.

Table 4. The best alternative V^+ and the worst alternative V^- results for beer

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V+	0,535	0,485	0,603	0,447	0,485	0,567	0,539
Worst alternative V-	0,267	0,243	0,302	0,224	0,243	0,189	0,180

According to the research, the significance of the risk groups according to their importance for beer supply chains was as follows: Demand risks, Supply risks, Management and operational risks, Supply risks, Financial risks, Production risks, Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Table 5. Results on the TOPSIS method valuation of risk groups for beer

	D+j values	D-j values	Ci value	Rang
Supply risks	0,529	0,431	0,449	3
Demand risks	0,000	0,776	1,000	1
Production risks	0,668	0,302	0,311	5
Management and operational risks	0,561	0,465	0,453	2
Logistical and infrastructural risks	0,675	0,287	0,298	6
Political risks	0,776	0,000	0,000	8
Policy and regulatory risks	0,631	0,261	0,292	7
Financial risks	0,590	0,343	0,368	4

For the **2204 – wine** group of beverages, the results according to the TOPSIS method are presented in Table 6 and Table 7

Table 6. The best alternative V^+ and the worst alternative V^- results for wine

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V+	0,485	0,577	0,500	0,447	0,600	0,514	0,522
Worst alternative V-	0,243	0,192	0,167	0,224	0,200	0,171	0,174

According to our research, the significance of the risk groups according to their importance in wine supply chains were: Demand risks, Production risks, Supply risks, Financial risks, Management and operational risks, Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Table 7. Results on the TOPSIS method valuation of risk groups for wine

	D+j values	D-j values	Ci value	Rang
Supply risks	0,496	0,498	0,501	3
Demand risks	0,000	0,876	1,000	1
Production risks	0,357	0,620	0,635	2
Management and operational risks	0,652	0,384	0,370	5
Logistical and infrastructural risks	0,710	0,296	0,294	6
Political risks	0,876	0,000	0,000	8
Policy and regulatory risks	0,824	0,171	0,172	7
Financial risks	0,604	0,536	0,470	4

For the **2208 – 'other alcohol'** group of beverages, the results according to the TOPSIS method are presented in Table 8 and Table 9. For the 'other alcohol' beverages, the importance of risk groups from our research was as follows: Demand risks, Financial risks, Production risks, Supply risks, Management and operational risks, Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Table 8. The best alternative V^+ and the worst alternative V^- results for 'other alcohol'.

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V+	0,485	0,469	0,548	0,417	0,485	0,539	0,522
Worst alternative V-	0,243	0,156	0,183	0,209	0,243	0,180	0,174

Table 9. Results on the TOPSIS method valuation of risk groups for 'other alcohol'.

	D+j values	D-j values	Ci value	Rang
Supply risks	0,538	0,471	0,467	4
Demand risks	0,000	0,801	1,000	1
Production risks	0,393	0,544	0,580	3
Management and operational risks	0,655	0,316	0,326	5
Logistical and infrastructural risks	0,659	0,313	0,322	6
Political risks	0,801	0,000	0,000	8
Policy and regulatory risks	0,674	0,250	0,271	7
Financial risks	0,238	0,687	0,743	2

Summarised results of all analysed results are presented in Table 10. According to our research, the significance of the risk according to their importance among different processed beverages groups was uneven. However, according to all evaluations, the most crucial risk group is Demand risks, which should be at the centre of the management of supply chains. It could be linked to the fact that processed beverages have an extended life circle, require relatively simple storage, transport and production volumes depending mainly on consumer demand, i.e. how demand is created/shaped and managed across all supply chains.

Table 10. Results on the ranks according to TOPSIS method valuation of risk groups for different processed beverages

	'water with adds'	beer	wine	'other alcohol'
Supply risks	2	3	3	4
Demand risks	1	1	1	1
Production risks	3	5	2	3
Management and operational risks	4	2	5	5
Logistical and infrastructural risks	7	6	6	6
Political risks	8	8	8	8
Policy and regulatory risks	6	7	7	7
Financial risks	5	4	4	2

In addition, the lowest risk group for processed beverages is the Political risks. It could be explained by the fact that supply chains are mostly located in low political risks areas. Usually, the main trading partners of the analysed country are the EU and neighbouring countries, with which no political sanctions have been imposed in the trade-in processed beverages. Risk groups such as Production, Supply and Financial risks were recognised as necessary but had different importance in different beverage groups. Supply risks were second in the 'water with add' group according to the matter, while in the 'other alcohol' group, it is in fourth place. It may be due to factors related to consumption habits, and if the 'water with add' supply is impaired, consumers easily switch to other beverages (substitutability). For the 'other alcohol' group, supply risks are less significant because consumers are more often looking for their favourite drinks and have their safe stocks because they have a more extended validity period. It takes longer than they replace them with other beverages.

According to our research, Production risks are one of the most important in the wine trade. It could be explained by the fact that this group of beverages is most dependent on natural resources. Their production is hard to manage, whereas the output of the other analysed beverages is not so closely linked to natural resources conditions (place of raw plants production, climatic conditions). Financial risks are one of the most important in the 'other alcohol' group. It may lead to the fact that it is one of the most expensive drinks traded in large quantities, and trading partners are not always reliable.

Management and operational risks play an essential role in the beer supply chains. It contributes to Chen and Voigt (2020) research, showing that trades of these beverages are highly competitive, and management errors cause great damage. Our study identified that the least significant are three risk groups: Logistical and infrastructural risks, Policy and regulatory risks, Political risks. During the Covid-19 pandemic period, many supply chains collapsed/suffered due to logistics. However, it has little impact on the processed beverage sectors supply chains. Experts underestimated these risk groups as sufficiently risky. It could be caused by the products not being the first necessity, and they had not been subject to the new specific trade restrictions. In addition, the processed beverages have a long shelf life/ life period, which prevented the build-up of sufficient stocks, which allowed logistic delays to be contained. Summarising the results, the risk factors groups according to their importance for international processed beverages trade is Demand risks (highest risk). Therefore, the management of these risks must be at the forefront. The least significant for all processed products is the Political risk group. Other risk groups have different significance for different beverage supply chains.

Conclusions

Literature analysis helps identify the eight risk groups for processed beverages. Experts evaluated them in Lithuania according to their importance for every analysed beverage group, and the TOPSIS multi-criteria decision support method (MCDM) was employed to process the data. The most critical risk group in all processed beverage supply chains was the Demand risks group. Although risk factors are similar in all supply chains, their importance varies from beverage group to beverage group. For example, the investigation shows that trade in processed beverages differs from basic FSCRM. E.g. if, in the wine supply chains of Africa, the most critical risk factors are wine-making activities and financial risks (Naude et al., 2020), while in other countries, it can differ.

The ideas for further research stem from the limitations of this research. Only the qualitative tool has been employed, not all the risk factors have been identified, but only risk groups have been investigated. The study could be extended to a more detailed risk assessment of trade with selected countries. In addition, risk factors for each beverage group could be identified and included into risk groups in all processed beverages that are important for managing the country's trade in processed drinks. At the same time, risk assessment can employ several quantitative methods. In addition, a combination of qualitative and quantitative methods could help assess risks in the beverage sector.

The risks of foreign trade in processed beverages identified in this article can help shape the country's trade policy, mitigate trade risks, and effectively manage the agricultural trade beverage subsector.

References

Aday, S., and Aday, M. S. (2020). Impact of COVID-19 on the food supply chain. *Food Quality and Safety*, *4*(4), 167-180. https://doi.org/10.1093/fqsafe/fyaa024

Angelo, A. C. M., Saraiva, A. B., Clímaco, J. C. N., Infante, C. E., & Valle, R. (2017). Life Cycle Assessment and Multi-criteria Decision Analysis: Selection of a strategy for domestic food waste management in Rio de Janeiro. *Journal of cleaner production*, *143*, 744-756. https://doi.org/10.1016/j.jclepro.2016.12.049

Assefa, T. T., Meuwissen, M. P., & Lansink, A. G. O. (2017). Price risk perceptions and management strategies in selected European food supply chains: An exploratory approach. NJAS-Wageningen Journal of Life Sciences, 80, 15-26. http://dx.doi.org/10.1016/j.njas.2016.11.002

Bachev, H., Ivanov, B., Toteva, D., & Sokolova, E. (2017). Agrarian sustainability in Bulgaria–economic, social and ecological aspects. Bulgarian Journal of Agricultural Science, 23(4), 519-525. https://www.agrojournal.org/23/04-01.pdf

Bak, O. (2018). Supply chain risk management research agenda. Business Process Management Journal. DOI 10.1108/BPMJ-02-2017-0021

Bakumenko, O. (2019). Mechanism Of Export Oriented Import Substitution Management At A Regional Level, Conference: MTSDT 2019 - Modern Tools for Sustainable Development of Territories. Special Topic: Project Management in the Regions of Russia. .05.8 DOI: 10.15405/epsbs.2019.12

Baryannis, G., Validi, S., Dani, S., & Antoniou, G. (2019). Supply chain risk management and artificial intelligence: state of the art and future research directions. International Journal of Production Research, 57(7), 2179-2202. https://doi.org/10.1080/00207543.2018.1530476

Behzadi, G., O'Sullivan, M. J., Olsen, T. L., & Zhang, A. (2018). Agribusiness supply chain risk management: A review of quantitative decision models. Omega, 79, 21-42. https://doi.org/10.1016/j.omega.2017.07.005

Burinskas, A. (2020). A Review of Drugs Supply Disruption Risks and Effects that Lead to Shortage. *Athens Journal of Health and Medical Sciences*, 1. https://doi.org/10.30958/ajhms.7-1

Challinor, A. J., Müller, C., Asseng, S., Deva, C., Nicklin, K. J., Wallach, D., ... & Koehler, A. K. (2018). Improving the use of crop models for risk assessment and climate change adaptation. *Agricultural systems*, *159*, 296-306. https://doi.org/10.1016/j.agsy.2017.07.010

Chen, X., & Voigt, T. (2020). Implementation of the Manufacturing Execution System in the food and beverage industry. Journal of Food Engineering, 278, 109932. https://doi.org/10.1016/j.jfoodeng.2020.109932

Cimprich, A., Bach, V., Helbig, C., Thorenz, A., Schrijvers, D., Sonnemann, G., & Berger, M. (2019). Raw material criticality assessment as a complement to environmental life cycle assessment: Examining methods for product-level supply risk assessment. *Journal of Industrial Ecology*, 23(5), 1226-1236.https://doi.org/10.1111/jiec.12865

Dandage, R., Mantha, S. S., & Rane, S. B. (2018). Ranking the risk categories in international projects using the TOPSIS method. *International journal of managing projects in business*. https://doi.org/10.1108/IJMPB-06-2017-0070

Dollet, J. N., & Díaz, A. (2011). Supply Chain Orchestration for the Luxury Alcoholic Beverage Sector. IUP Journal of Supply Chain Management, 8(3).

ECSIP, 2016. The Competitive Position of the European Food and Drink Industry, Final Report. European Consortium for Sustainable Industrial Policy.

El Hariri, O., Bouchriti, N., & Bengueddour, R. (2018). Risk assessment of histamine in chilled, frozen, canned and semi-preserved fish in Morocco; implementation of risk ranger and recommendations to risk managers. *Foods*, 7(10), 157. https://doi.org/10.3390/foods7100157

Geng, Z., Liu, F., Shang, D., Han, Y., Shang, Y., & Chu, C. (2021). Early warning and control of food safety risk using an improved AHC-RBF neural network integrating AHP-EW. *Journal of Food Engineering*, 292, 110239. https://doi.org/10.1016/j.jfoodeng.2020.110239

Gervais, A. (2018). Uncertainty, risk aversion and international trade. *Journal of International Economics*, *115*, 145-158. https://doi.org/10.1016/j.jinteco.2018.09.001

Hardaker, J. B., Lien, G., Anderson, J. R., & Huirne, R. B. (2015). Coping with risk in agriculture: Applied decision analysis. CABI.

Ho, W., Zheng, T., Yildiz, H., Talluri, S. (2015) Supply chain risk management: a literature review. *International Journal of Production Research* 53(16): 5031-5069. https://doi.org/10.1080/00207543.2015.1030467

Hoque, M. Z., & Alam, M. (2018). What determines the purchase intention of liquid milk during a food security crisis? The role of perceived trust, knowledge, and risk. *Sustainability*, *10*(10), 3722. https://doi.org/10.3390/su10103722

Hyuha, T., William, E., & Grace, B. K. (2017). Determinants of import demand of rice in Uganda. Int. J. Appl. Pure Sci. Agric, 3, 75-81. DOI: 10.22623/IJAPSA.2017.3010.FKL6W

Irani, Z., Sharif, A. M., Lee, H., Aktas, E., Topaloğlu, Z., van't Wout, T., & Huda, S. (2018). Managing food security through food waste and loss: Small data to big data. *Computers & Operations Research*, *98*, 367-383. https://doi.org/10.1016/j.cor.2017.10.007

Ivanov, D. (2020). Predicting the impacts of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak (COVID-19/SARS-CoV-2) case. Transportation Research Part E: Logistics and Transportation Review, 136, 101922.

Jablonski, B. B., Casnovsky, J., Clark, J. K., Cleary, R., Feingold, B., Freedman, D., ... & Wentworth, C. (2021). Emergency food provision for children and families during the COVID-19 pandemic: Examples from five US cities. *Applied Economic Perspectives and Policy*, *43*(1), 169-184. https://doi.org/10.1002/aepp.13096

Kara, M., & Oktay Fırat, S. Ü. (2018). Supplier risk assessment based on best-worst method and K-means clustering: a case study. *Sustainability*, 10(4), 1066. https://doi.org/10.3390/su10041066

Khan, S., Khan, M. I., Haleem, A., & Jami, A. R. (2019). Prioritising the risks in Halal food supply chain: an MCDM approach. Journal of Islamic Marketing.

Khanal, A. R., & Mishra, A. K. (2017). Enhancing food security: Food crop portfolio choice in response to climatic risk in India. *Global food security*, *12*, 22-30. https://doi.org/10.1016/j.gfs.2016.12.003

Khanal, B., Lopez, R. A., & Azzam, A. (2018). Testing Local Bias in Food Consumption: The Case of Fluid Milk. *Available at SSRN 3269848*.

Kolotzek, C., Helbig, C., Thorenz, A., Reller, A., & Tuma, A. (2018). A company-oriented model for the assessment of raw material supply risks, environmental impact and social implications. Journal of Cleaner Production, 176, 566-580. https://doi.org/10.1016/j.jclepro.2017.12.162

Kowalska, M. (2020). SME Managers' Perceptions of Sustainable Marketing Mix in Different Socioeconomic Conditions—A Comparative Analysis of Sri Lanka and Poland. Sustainability, 12(24), 10659. https://doi.org/10.3390/su122410659

Laborde, D., Martin, W., Swinnen, J., & Vos, R. (2020). COVID-19 risks to global food security. *Science*, *369*(6503), 500-502. DOI: 10.1126/science.abc4765

Lavastre, O., Gunasekaran, A., Spalanzani, A. (2012) Supply chain risk management in French companies. *Decision Support Systems* 52(4): 828-838. https://doi.org/10.1016/j.dss.2011.11.017

Libby, R., Blashfield, R. K. (1978). Performance of a composite as a function of the number of judges. *Organisational Behavior and Human Performance* 21(2): 121–129. https://doi.org/10.1016/0030-5073(78)90044-2

Lodorfos, G., Konstantopoulou, A., Kostopoulos, I., Essien, E. (2018). Food and Drink Industry in Europe and Sustainability Issues. Sustainable Marketing Concept in European SMEs. Industrial Management &amp.121-140. https://doi.org/10.1108/978-1-78754-038-520180006

Long, T. B., Looijen, A., & Blok, V. (2018). Critical success factors for the transition to business models for sustainability in the food and beverage industry in the Netherlands. Journal of cleaner production, 175, 82-95. DOI 10.1016/j.jclepro.2017.11.067

Meral, Y. (2018). Documentary risk in international trade. In *Strategic Design and Innovative Thinking in Business Operations* (pp. 413-431). Springer, Cham. https://doi.org/10.1007/978-3-319-77622-4_21

Mital, M., Del Giudice, M., & Papa, A. (2018). Comparing supply chain risks for multiple product categories with cognitive mapping and Analytic Hierarchy Process. *Technological Forecasting and Social Change*, *131*, 159-170. https://doi.org/10.1016/j.techfore.2017.05.036

Naudé, R.T., Badenhorst-Weiss, J.A. (2020). The challenges behind producing a bottle of wine: Supply chain risks. Journal of Transport and Supply Chain Management, 14(1), 1-15. https://doi.org/10.4102/jtscm.v14i0.471

Novickytė, L. (2019). Risk in agriculture: An overview of the theoretical insights and recent development trends during last decade–A review. *Agricultural Economics*, 65(9), 435-444. https://doi.org/10.17221/11/2019-AGRICECON

Nyamah, E. Y., Jiang, Y., Feng, Y., & Enchill, E. (2017). Agri-food supply chain performance: an empirical impact of risk. *Management Decision*. https://doi.org/10.1108/MD-01-2016-0049

Otero, G., Gürcan, E. C., Pechlaner, G., & Liberman, G. (2018). Food security, obesity, and inequality: Measuring the risk of exposure to the neoliberal diet. *Journal of agrarian change*, *18*(3), 536-554. https://doi.org/10.1111/joac.12252

Podviezko, A., & Podvezko, V. (2014). Absolute and relative evaluation of socio-economic objects based on multiple criteria decision making methods. *Engineering Economics*, 25(5), 522-529. https://doi.org/10.5755/j01.ee.25.5.6624

Prakash, S., Soni, G., Rathore, A. P. S., & Singh, S. (2017). Risk analysis and mitigation for perishable food supply chain: a case of dairy industry. *Benchmarking: An International Journal*. https://doi.org/10.1108/BIJ-07-2015-0070

Rathore, R., Thakkar, J. J., & Jha, J. K. (2017). A quantitative risk assessment methodology and evaluation of food supply chain. The International Journal of Logistics Management. DOI 10.1108/IJLM-08-2016-0198

Roccato, A., Uyttendaele, M., & Membré, J. M. (2017). Analysis of domestic refrigerator temperatures and home storage time distributions for shelf-life studies and food safety risk assessment. *Food Research International*, *96*, 171-181. https://doi.org/10.1016/j.foodres.2017.02.017

Sato, Y., Tse, Y. K., & Tan, K. H. (2020). Managers' risk perception of supply chain uncertainties. Industrial Management & Data Systems. https://www.emerald.com/insight/0263-5577.htm

Sharma, R., Shishodia, A., Kamble, S., Gunasekaran, A., & Belhadi, A. (2020). Agriculture supply chain risks and COVID-19: mitigation strategies and implications for the practitioners. *International Journal of Logistics Research and Applications*, 1-27. https://doi.org/10.1080/13675567.2020.1830049

Statistics Lithuania (2021). Official Statistics Portal: Foreign trade. [Accessed 11.03.2021]. Available from Internet: https://osp.stat.gov.lt/uzsienio-prekyba1

Tran, T. H., Dobrovnik, M., & Kummer, S. (2018). Supply chain risk assessment: a content analysis-based literature review. International Journal of Logistics Systems and Management, 31(4), 562-591. https://doi.org/10.1504/IJLSM.2018.096088

WEF. (2018). The Global Risks Report 2018. The World Economic Forum in partnership with Marsh & McLennan Companies and Zurich Insurance Group. Geneve: WEF. [Accessed 04.04.2021]. Available from Internet: https://www.weforum.org/reports/the-global-risks-report-2018

Xu, S., Zhang, X., Feng, L., & Yang, W. (2020). Disruption risks in supply chain management: a literature review based on bibliometric analysis. *International Journal of Production Research*, *58*(11), 3508-3526. https://doi.org/10.1080/00207543.2020.1717011

Zhao, G., Liu, S., Lopez, C., Chen, H., Lu, H., Mangla, S. K., & Elgueta, S. (2020). Risk analysis of the agri-food supply chain: A multi-method approach. *International Journal of Production Research*, 1-26. https://doi.org/10.1080/00207543.2020.1725684

Zhu, Z., Chu, F., Dolgui, A., Chu, C., Zhou, W., & Piramuthu, S. (2018). Recent advances and opportunities in sustainable food supply chain: a model-oriented review. International Journal of Production Research, 56(17), 5700-5722. DOI: 10.1080/00207543.2018.1425014

ECONOMICS AND CULTURE 18(1), 2021

DOI: 10.2478/jec-2021-0009

A NEW SUSTAINABILITY MODEL – A FOUR ESSENTIAL QUADRANTS FRAMEWORK

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Abstract

Research purpose. This paper will present contemporary ideas on how, when, and where the four quadrants are vital to the sustainability of an organization and central to the future of the entity. There have long been suppositions and actual operational level models featuring three primary rudiments. Much of the prior research and modeling has centered on Economic, Social, and Environmental as the basis for sustainability within business models. This particular research brought new perspectives and addressed some deficiencies in the existing sustainability models.

Design / Methodology / Approach. A qualitative methodology aligned with an axiological philosophical assumption is evidenced throughout the explanatory review, and new open-ended interviews focused on values while discussing the nuances of sustainability. The methodology applied is a review of relevant literature on sustainability, critical thinking, CSR, and financial acumen that was utilized to augment the interviews.

Findings. This new and distinct perspective develops and puts forth four quadrants that are corollary to these three core elements. However, this version purports a more comprehensive and holistic framing with a focus on Financial Acumen, Critical Thinking, Creativity & Innovation, and Corporate Social Responsibility (CSR). Each of these "new model" fundamentals provides a broader application for sustainability within a business strategy as companies look to distinguish themselves in the markets served. There is no doubt that executives are faced with a myriad of complex and, in some sense, extraordinary demands on the business.

Originality / Value / Practical implications. This sustainability model captures four imperatives for sustaining and improving business performance and, in the end, a sophisticated and authentic approach providing engagement by and with all stakeholders. Financial acumen must be comprehensive and create value; Critical Thinking must be pervasive throughout the organization; Creativity & Innovation must drive systematic improvements throughout, and Corporate Social Responsibility should be a core business strategy for both employee engagement and creating external social influences. Though this last supposition can be argued such as Friedman put forth, there remains the awareness and recognition of the importance of CSR in a business model. This particular research will broaden the view of those involved with sustainability to now include critical thinking, creativity, and innovation.

Keywords: Sustainability; Social responsibility; Critical thinking; Financial acumen; Innovation.

JEL codes: M1, O4.

Introduction

So, let us start the dialogue regarding how and why organizations prosper in their respective sectors. Over time there have been several high-profile business failures and perhaps many more in the lower and middle markets, not to mention all of the small businesses that have unfortunately disappeared due to a myriad of reasons – both self-inflicted and market forces. As with any of the pre-work on this topic, there exists tension and differences in how businesses achieve sustainability. As McIntosh, Sheppy, and Zuliani (2017) put forth, “Sustainability, the capacity to endure, is not merely an add-on or an afterthought, but a central aspect of the future of business” (p. 309). Today's models have generally been based on social, economic, and environmental. The basic research question is whether organizations can improve sustainability by institutionalizing a model that assimilates financial acumen, corporate social responsibility, creativity and innovation, and critical thinking. Integrating the four quadrants model (see Figure 1) may very well provide a systematic and broader methodology to

daily business operations and thereby establishing an institutionalization of sustainability within the business. Bringing sustainability into all strategic discussions is sin qua non in today's business settings and has not been studied to any great degree in any prior literature.

The primary data capture in this article is based on one-on-one interviews with Chairman/CEO's who have been in their role for over 10 years. In addition, there was an extensive review of similar; topic-based literature is complementing the qualitative, explanatory research approach. As a basis of the interviews, today's top executives are faced with complex, dynamic, and fast-paced trends. In support, Whelan and Fink (2016) suggested "social, environmental, market, and technological trends. These require sophisticated, sustainability-based management" (p.1). The notion of critical thinking within the four-quadrant model mentioned earlier seemingly is intrinsic to this supposition. In addition to critical thinking, business sustainability, if embedded or institutionalized, will lead to improved business performance. A key point is the assurance that all stakeholders see the value of sustainability beyond "going green" and, by their engagement in the business, will realize continued strategic outcomes. Whelan and Fink (2016) discuss "adaptive strategies" – think using all of the four quadrants in harmony with the resultant intersections providing high-level performance in all aspects of the proposed model. The results of the research pointed to this a theme in today's business settings.

As companies build their marketplace presence, they must look at a sustainability model as a road map of success. The emerging need to conform to internationally recognized and accepted corporate governance is vital within. Transparency must holistically exist among all stakeholders, including government, employees, and society. Those firms that manage governance effectively and efficiently have been found to have increased enterprise value. Several of the interviewees reflected on how important it is to be transparent, authentic, and have clarity of purpose. Companies that are sought after by investors, those who are feared by competitors, or those in adjacent industries who wish to emulate a particular company – these are the ones that have a strategy that enhances a culture, driven to be the best. Companies and leaders must embrace and assimilate sustainability into the everyday business model, especially in this fast-changing global economy. It needs not be an objective, goal, or target. Rather, the focus needs to be seamless and simply a thread within the culture of excellence. As was discovered in the literature review and also found during the interviews, those companies that can move to sustainability at its core or, as McIntosh, Sheppy, and Zuliani (2017) purported, "…central aspect of the future of business" (p.309) will survive and thrive. This research article will demonstrate the importance of each quadrant on its own merit and in synchronization within a business sustainability model.

Literature Review

There is a plethora of literature that provides breadth and depth of extensive and relevant research. Camilleri (2016) discusses that companies are able to strike a balance between responsible actions and the need to meet expected profit returns. He lays out CSR 2.0 as a means to suggest a new focus on "creating shared value" and aligning with socially accepted behaviors. In addition, sustainability presents itself in a multidisciplinary way. Moving beyond shared value, Porter and Kramer (2016) purport CSR as "a source of opportunity, innovation, and competitive advantage". In this vein, sustainability, as also supported by Wheeler, Colebert, and Freeman (2003), is focused on the intertwined relationship of CSR, sustainable development, and stakeholder recognition. Closely related is an ethical responsibility that also is part of the sustainability model – CSR quadrant. The principles of ethics drive business relationships to achieve due care, authenticity, and transparency (Drucker, 1981; Singh, Garcia-De los Salmones, & Rodríguez-del-Bosque, 2008; Ferrell, Fraedich and Ferrell, 2011).

Shifting from simply being an objective to achieve and thinking more about embedding sustainability, CSR, and strategy in a holistic posture leans towards full assimilation into a business model and less on finding ways to use CSR as merely a sustainability measure. Camilleri (2016) alludes to creating "virtuous circles" amongst all contributors of positive effectors on the company. Active engagement in environmental, societal, and philanthropic initiatives eventually result in the formation of synergistic

worth across the enterprise, and thus, sustainability is achieved. CSR initiatives that are aimed at broad external context will increase and bond social and corporate goodwill (Kitchin, 2003).

In addition, innovation [and creativity], as was introduced earlier, is enabling companies to shift or pivot to remain sustainable. Kotter and Cohen (2012) discuss the heart of change shows the truth [of change] that influences others' frame of mind. New products (i.e., Dyson hairdryers) and impactful services (i.e., Uber Eats) provide new revenue pathways for firms. Hoffman (2018) suggests, "changing the way we do business is essential to addressing the [sustainability] challenge" (p. 35). Understanding the vital behaviors ultimately provides alignment as companies focus on measurement and reinforcement of innovation introductions. Whether it is changing the ways we do business, implement leading and lagging indicators to our measures, or use "unmatched powers of ideation" (Hoffman, 2018, p.35), each contributes to the improved position of the firm.

By integrating sustainability, firms can create what Porter and Kramer (2006) refer to as “creating shared value”. This output provides an opportunity to endear those that influence customer purchases and the user themselves while creating opportunities for all stakeholders. Fundamentally, behaviors are susceptible to bias created through social psychology and anthropology. As part of the creativity and innovation movement, leadership is all about leading change initiatives. In a sense, change is a contagion and can be seen as an enabler to sustainability by creating a cultural shift, influencing how the organization approaches problem-solving, and prioritization of the opportunities that will drive growth and create sustainable stakeholder value. A critical aspect of C&I is emotional intelligence. An aspect that Goleman (1995) suggests, emotional competence provides insight into an individual mastery of certain capacities within and also moves to expand to how people interact. I purport that C&I is ultimately "perfected" when collaboration and sharing of ideas provide for the prized outcome of an innovative idea that is brought to market and provides everlasting customer value.

A key element of creativity and innovation within a sustainability model centers on logic. In this sense, “how will it work”, in terms of differentiation and value creation. The innovation materializes to gain a competitive advantage and ultimately leads to sustainability in terms of marketplace presence, brand loyalty, and sales growth, to name a few. Some scholars have noted creativity and innovation as an information process system or an assemblance of intellectual and fixed assets. An alignment of these in an efficient and effective manner enables all stakeholders to do the work required to benefit the company and thus driving sustainability. Organizations that center on sustainability have certain organizational capabilities that are distinctive. One aspect focuses on ways to do the work and the other on how to influence the people for success. The end game is adopting or adapting for sustainability change - paying attention to information flow and application of the innovation, and companies can formulate winning strategies. Albert Einstein purported, "make everything as simple as possible, but not simpler" (n.d.).

Painting a picture of the future that does not exist yet is seen as a means to an end within sustainability. Developing behaviors, approaches, metrics, and executable objectives in a smart way can lead to sustainable competitive advantages and clear differentiation. Understanding that technological change is happening at “clock speed” and also exponentially is paramount. Being able to explain the cause and effects of the innovation will drive a clearer understanding and belief that sustainable outcomes will be a result. Focusing the innovation on top business imperatives that drive sustainability, such as growth, market dominance, technology leadership (incremental and disruptive), and organizational sustainment. Similarly, developing creative organizational capabilities is in true complement and, in fact, a necessity to ensure the innovation pipeline is full of value-creating products or services. Leadership must focus on areas of concern and areas of influence. By leveraging enablers, leaders can address the psychological side of creativity while influencing the changes required.

Focusing on past accomplishments, celebrate the bright spots, uncover past failures and associated lessons learned. All of these will lead to a stronger innovation storyline for explaining the “why” of how something is, or how it should be, in terms of an envisioned future. Breaking paradigms is an essential aspect of critical thinking. In a business setting, besides critical thinking, many companies are moving to a new approach - "group think". This is a methodology to bring several mentalities into

a discussion. In terms of sustainability, organizations are fundamentally needing to embrace all stakeholder inputs prior to making decisions. Engelberg (2021) discusses "new thinking", which applies to the assessment of innovation and organizational change. Another way to look at this is under the guise of scientific thinking. Sustainability involves an assessment of theories, cause & effect, hypotheses, and experimentation on the journey of discovering approaches, relationships, metrics, and solutions that provide the organization with a tool kit for success and sustainment.

Critical thinking is a piece of the conversation that is found in many research articles. For example, Dewey (1910) purported, “active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends” (p.6). Ennis (1964) put forth a definition: “critical thinking is reflective and reasonable thinking that is focused on deciding what to believe or do” (p. 555). Further, several researchers have suggested terms such as “conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication; evidential, conceptual, methodological, criteriological, or contextual considerations” (Scriven & Paul 1987; Facione, 1990). Simply put, critical thinking is an approach that is well-suited for contemporary businesses that are considering and moving to the assimilation of sustainability into their model. Effectively using this psychological mindset has been shown to enable greater application of clear thoughts and an objective-lead thinking approach to further assess and adopt methods to improve an organization’s performance in a way that balances the benefits to all of its stakeholders.

Furthering, Klein (2011) suggests, "…introspective aspect of metacognitive skills is beset with difficulties, although critical thinking skills require the reflective feedback as part of the learning cycle for improvement" (p. 212). The focus here is on assessing business alternatives, drawing conclusions from data, and making decisions within functional silos as well as across the organization that consider broad hypotheses and calculated risks. Going a bit further, Williams, et al. (2017) purport that “Systems thinking provides an antidote to such silos, as it offers a more holistic lens to examine the role of corporations within socio-ecological systems” (p.6). Similarly, through the application of systems thinking, sustainability management researchers may be able to “identify the points at which a system is capable of accepting positive change and the points where it is vulnerable” (Holling, 2001, p. 392). Driving a new way of thinking will undoubtedly yield different outcomes with a focus on exponential business improvement.

Within sustainability, critical thinking clearly has a role. Effectively utilizing this approach within sustainability modeling will provide the company with intuitive and “science-based” analysis in the execution of the required processes such as adaptive problem solving and business analytics. Critical thinking also enables a step-by-step business guide to assist companies in optimally guiding organizational choices. A way to look at sustainability strategy is as preservation of future flexibility while contemplating opportunities for success and the notion of understanding strategic uncertainties. Situational analysis is one such opportunity. Firms take the initiative to review varying situations and the effect on their business are employing a critical thinking approach. A key factor here is to ensure any biases that are inherent to the process must be mitigated to realize the full effect of the desired outcome.

Studying, looking for innovative solutions, designing the future state, and implementing the changes to improve sustainment are fundamental. Camilleri (2016) mentions “acquiring new knowledge” as a means to strengthen relationships which invariably will contribute to closer stakeholder interactions. (Morsing & Schultz, 2006). Sustainability is multifaceted, and as a result, the people component of the model is crucial. Alignment, common purpose, ethical practices, collaboration, and execution are all contributors to the soundness of the operating model. Socio-effectiveness and socio-efficiency (Dyllick & Hockerts, 2002) are intrinsic to critical thinking as it fits within a sustainability model and invariably coalesces with financial acumen as well. Driving for better decisions has been shown in the research to derive improved financial performance (Spence & Rutherfoord, 2001; Waddock & Graves, 1997) and also resulting in the sustainable economic value of the firm. (Camilleri, 2016). In corollary, Bazerman and Banaji (2004) argue that our "psychological tendencies" contribute to how we think

about certain rudiments of business, and this conceptually aligns critical thinking with financial acumen.

Haanaes (2016) put forth the notion of “knowing - doing gap” and the assimilation into sustainability. This simple statement resonates well with the fundamentals of critical thinking in terms of sustainability. We all have inherent biases, regardless of the genesis, and these influence critical thinking skills in our day-to-day business lives. Moreover, as we execute the behavior-based actions within the sustainability model, there should be a strong consideration for thinking about real problems. Ensuring relevancy and accuracy of these will drive clearer approaches to asking the "right" questions, decision assessment, sound reasoning, and execution, especially when it comes to the financial prowess of the firm.

Companies that understand the need to be balance-sheet healthy and driving profitability know well the importance of financial acumen as an integral component of success. Watts and Home (1999) discuss the commitment to economic development in balance with being ethically responsible. Within the ecosystem in which the company resides is also the inherent need to be responsible – socially, financially, ethically, and legally. (Bucholtz & Carroll, 2009). Moving to innovation management – developing plans, financial models, and the like will reinforce the focus on innovation within an organization. Overall business strategies and associated management disciplines – with a focus on financial acumen are progressively integrating sustainability development into their recognized operating assumptions and frameworks. The resultant outcomes are stimulating new and diverse approaches to improving business performance. There is a richness of satisfaction for all stakeholders as the organization moves to a height of innovation "management" as a process is identified, collaboration exists, and alignment on the innovation initiative(s) are set. Improving sustainability naturally harkens to change and closely associated is innovation – incremental or disruptive implementing innovation will result in improved [financial] performance outcomes and ultimately lead to business model sustainability and growth.

Research Methodology

This article has a philosophical stance as it looks to reality and researcher assumptions of how the [business] world consisting of people, organizations, and real situational contexts work together. Moreover, a “new’ Sustainability Model will be put forth and primary data captured through the lens of interviews that occurred during the research process. The axiological philosophical assumption is evidenced throughout the qualitative approach utilizing narrative captured during the open-ended, personal (one-on-one) interview settings, which focused on values while discussing the nuances of sustainability. The interview data were analyzed for themes centered on the keywords, selected based on the four quadrants and also included business ethics, corporate philanthropy, and design thinking. Also, a series of ten focused questions were posed to stimulate discussion on the broad topic of sustainability and if the new model being put forth was viable and, importantly, suitable for businesses to adopt.

The second approach in the research methodology was utilizing literature review as secondary data, the summary of which was also shared with the interviewees as the context prior of the sessions. The methodology applied is a review of relevant literature on sustainability and assessed gaps in existing sustainability models and any gaps in research as it pertains to critical thinking, creativity & innovation, CSR, and financial acumen. This step was constructed as an approach focused on educating the participants in various theories, keywords, and broad concepts to support the explanatory approach of this article - which attempts to connect ideas to understand cause and effect. The ability to ascertain the “rich descriptions” of the participants was accretive to the existing literature. In addition, the admittance of some bias was discovered, and the interpretations were the center of the participant interviews. Furthermore, a systematic manual computer-based search was also conducted based on the various sustainability fundamentals as outlined in this research. The research brings currency and relevancy to some of the legacy descriptions and suppositions of

sustainability within business models. Based on the research carried out, the four-quadrant model is yet to be fully introduced in business as put forth.

Research Results

Upon readiness for data analysis, the interview capture was compared and contrasted to the existing literature on the topic of sustainability. Moreover, the proposed new model (see Figure 1) was the basis of the interviews. There should not be an existence of a question if a sustainability model is warranted. As Hoffman (2018) put forth, “companies have sought to improve competitive positioning by sustainability and corporate strategy” (p. 36). Stating sustainability as a business performance influencer was also presented in the interviews. Of the interviewee group, 92% strongly or agreed with this supposition. One of the first steps in this marriage is clearly stating the company's vision and establishing core values that will act as a social and business-centric true north. Engaging all stakeholders is also essential as the baselines are established, and that will create the common-speak, the operational excellence objectives, marketplace presence sustainment such as new, innovative product [or services]. One key finding during the interviews is the lack of understanding of the interrelationships among the four quadrants. Top-level alignment on sustainability as a business imperative was also introduced. In this regard, over 93% of the Chairman/CEOs supported this notion. One participant commented, "Business can't work in a vacuum. People should be open to social and environmental issues and, at the same time, understand the key financial metrics. Additionally, the nuance of creativity and innovation, as well as critical thinking, is a new wrinkle that needs more educating". Of those interviewed, 50% strongly agreed that the four-quadrant model made sense, especially in today’s business world. Another 43% stated “agree” which draws a conclusion of importance to senior level executives.

Critical thinking provides for thoughtful, data-centered analyses. In the interviews, there was sufficient evidence of an established model that drove decision-making and supported the presence of acute financial acumen. The interview data captured when the next question was asked, “Does Sustainability involve critical thinking”. Of the respondents, 79% stated this is very likely, and 14% offered “likely critical". One interviewee comment stated, “high-performing firms exhibit critical thinking characteristics”. Each firm has different approaches, different cultures, and distinct intellectual capacity based on the customers served.

Turning to creativity and innovation, an interviewee offered, “Innovation is essential within business sustainability, even more so today. We must think critically and act swiftly to win with our new product offerings. Customers demand both speed and functionality at a competitive price”. Leadership must work tirelessly to draw all stakeholders into the learning process – inputs and outputs of sustainability. One such approach is drawing clear lines between the creation and applicability usefulness and financial soundness of the initiatives. All stakeholders need to share the purpose of the business to comprehend the nature of an integrated sustainability purpose. Organizations that engage and have a culture of innovation tend to transform more quickly and thus get to a higher-performing level of success. In addition, businesses that look at each quadrant as an opportunity seemingly move along the continuum at a brisker pace than those that “pick and choose” their way to sustainability. During the interviews, over 57% agreed that sustainability drives innovation and requires financial acumen.

Within the financial acumen (FA) quadrant, the interviewees seemed to clearly understand the quadrant on its own. However, in unison with sustainability, most of the narratives during the interviews focused on how and why each felt a need to align FA within the sustainability model. A specific question was posed, "Does FA drive sustainability or vice versa?". Over 58% of the interviewees mentioned a “great deal” in terms of financial acumen driving sustainability in terms of business case analysis. Only 14% stated "a moderate amount" of sustainability driving FA. This led to the conclusion that FA indeed can influence how firms integrate sustainability into a high-performing business model.

It is not whether sustainability has a corporate social responsibility relationship (CSR). The real question is the magnitude in which a firm relies on CSR to drive higher performance. A question was presented during the interviews, “Does Sustainability align with CSR?”. Surprisingly, 43% stated “strongly agree” and 36% “agree”. Several of the interviewees similarly suggested, “It should, but not in all organizations". This would indicate not all organizations view CSR as an enabler for improved performance – increased market share, greater employee engagement, or improved customer delight, to cite a few. Continuing, 21% actually were neutral on the topic, and this leads one to ponder if organizations are "missing out" on opportunities for enhanced sustainability.

Lastly, in the qualitative data acquisition step was a series of four questions that focused on the macro-levels of the sustainability four-quadrant model. The primary culture-based question was, “In the future can you foresee sustainability not as an objective – rather a thread throughout the business model?”. Of those interviewed, 79% agreed or strongly agreed with the notion of sustainability being woven throughout a firm’s operating model to drive performance. One of the interviewees stated, “as part of the DNA” and another stated, “sustainability must be a corporate goal and objective with improvement targets and metrics.” A supporting comment was, “it’s about awareness and building a brand identity – both internally and externally". These comments seem to get at the axiological philosophical assumptions initially put forth. Interestingly, 21% strongly disagreed with the initial assumption that being an objective is better suited and attainable. While one of the interviewees stated, “becoming a thread might take years, though in some firms it might be wrought with cultural dynamics not looking to be sustainable and more focused on short term gains”. An intriguing reflection point.

The follow-on question was based on a holistic lens – “Is sustainability simply good for business”? Over 70% of those in the process stated, “a great deal”. This finding aligned with much of the literature and also with today’s views. Mastering the elements of each of the quadrants seems to offer firms an opportunity to retain and attract customers. A follow-on supposition was explored – “Is sustainability more than “going green”? Over 85% strongly agreed with the balance agreeing - the conclusion here is that leadership is beginning to embrace sustainability as an enterprise-wide and all-inclusive approach to driving business performance.

The final interview query moved to understanding leadership role in sustainability. As Chairman/CEOs over 92% suggested they must lead the sustainability agenda. One interviewee stated, “It’s on me to set the tone and share the vision". Another put forth, "Strategy must start at the top, ingrain [sustainability] into the culture as a normal course of business". A conclusion here is that leaders do indeed recognize their role in building a sustainability culture. As such, key foundational traits are authenticity, vision, collaborator, and someone who can take each of the four quadrants and clearly articulate the importance of overall business success.

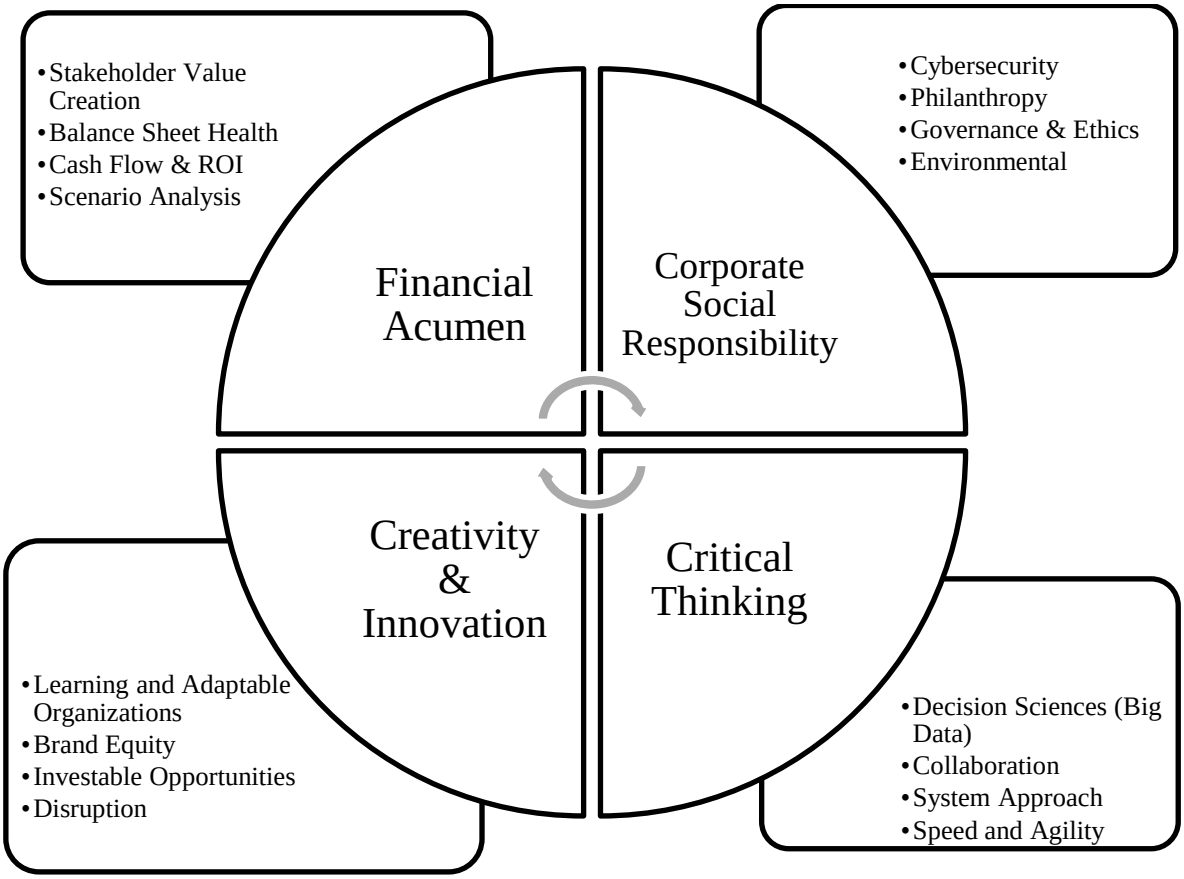

Fig. 1. A New Sustainability Model – Four Quadrants (Source: created by the author)

Conclusions

Hoffman (2018) suggests, "Real sustainability is a property of a system" (p.36). Moving from linear-based models to more flexible, "rotary" versions will provide improved management system performance. The term "rotary" depicts the interaction of multiple company functions moving in synchronization to achieve excellence and sustainability. A validating example of the new model is how focusing on financial acumen requires critical thinking to analyze business metrics effectively and efficiently. In light of so many demands on a business, there must be attention to balancing the weights of the stakeholder expectations in order to achieve and preserve the sustainability business model. A continuing commitment to sustainability invariably includes social perspectives that are aligned with the economic requirements of the business. Developing a conscientious business model that includes CSR, Financial acumen, Critical Thinking, and Creativity & Innovation seemingly sets up a path for success and more broadly addresses the deficiency of current models that focus on only environment, social and economic measures. The interviewees reported that they felt the time is now to embrace sustainability more than ever – it is not a choice of if, but rather when businesses engage and adopt the four-quadrant model. Business metrics to drive performance improvements – market transformation with creative and innovative methods and deliverables (products or services) are essential in the whole transformation process.

Think of a company that you are familiar with. Can the four-quadrant sustainability model be adapted to drive a "different" set of outcomes? Looking to each of the quadrants on their own, there is a wealth of opportunity to effect positive changes, and companies should explore the nuances and strategic fir to their business models. These could be manifested in several distinct scenarios. Developing a system

that includes the four quadrants is seemingly a result of a comprehensive strategic plan that is aimed at one thing – business sustainability. Not solely sustainment, but growth and learning across the organization. Many researchers have chosen to study and suppose the importance of value creation. Business sustainability moves to a focus on a value-driven mindset – a subtle blend of altruism and capitalism. Paying attention to the chosen marketplace(s) provides the firm with a platform to build a sustainability model. Being proficient at adapting, transforming, and measuring enables companies to achieve a balance of the "triple bottom line: people, plant and profit" (McIntosh, et. al, 2017). The prior research has shown in abundance that sustainable business must include strategic communication, ethical business practices, and paying attention to the environment. The basic aspect paradigm shift is that this new model adds the application of creativity & innovation as well as critical thinking. Within the critical thinking quadrant, which is not evidenced in early sustainability models, there is an imperative of work to stay clear of emotions in how decisions are arrived at in regard to sustainability. Focus on the end game – mitigate the egocentrism, biases, and social psychology effectors. Moving along the critical thinking continuum, learning to apply the process to how the business model can be enhanced will undoubtedly provide evidence of a stronger set of sustainment outcomes and substantiates the consideration of this new model framework.

As the results of the one-on-one interviews concluded that companies should strongly consider the adoption or adaptation of this new sustainability model as it adds several dimensions not inherent to early models discussed in the literature. By keenly deconstructing the four quadrants, each firm can evaluate the details of each and then frame the applicability and appropriateness to its specific operating model. As we deduced and concluded from the interview data, there is not a one-size-fits-all. Each quadrant has to be assessed, and then the business needs to reflect on its specific stakeholder base, financial situation, "maturity evolution", intellectual capacities, and current orientation with CSR. Thereafter, going “granular”, the leadership must choose to adopt the model as presented or make some alterations to ensure each quadrant can be institutionalized. In this way, the firm can optimize the depth and breath – both influencing and contributing to ultimate success. As mentioned, “maturity evolution” refers to the business existence timeline. Should a start-up business choose to adopt the four-quadrant sustainability model, there may indeed be some gaps to fill, and this lies at the root of the adoption of this framework. For instance, financial acumen in these companies generally is fairly fluid – so the key here is to start off with a sound business plan and sufficient funding that will position the firm for success. Alternatively, if the firm has been in existence for over 10 years, for instance, adopting will undoubtedly take some work if the culture has been established. As we learned, leadership must set the tone when looking to transform a current business model into a "new" one. One key in the process evaluation is to determine the inputs and outputs of each quadrant.

Viability in the systemization of the four quadrants seemingly prepares the business for improved performance. Value from each quadrant contribution is ever-present though it may seem "moot" herein. Integration is essential to gain the most from the model presented. Business complexity seemingly will create both opportunities and challenges - the business strategy will provide for both. On balance, the firm needs to look for natural cohesiveness amongst the quadrants as well as seek to mitigate any conflicts that might arise. For example, a new product idea is being brought forth for evaluation. The R&D and sales teams are claiming a marketplace need. However, once the business case is developed and reviewed per financial metrics, the idea does not meet the overall strategy of the organization. The takeaway is to develop approaches that are both complementary and supportive of the overall sustainability model. Of course, there will be healthy discussions to hear the voice of all stakeholders. However, in the end, a decision taken is crucial in the sustainability journey of the organization.

An essential recognition for companies is to choose thoughtful approaches to overarching strategies that drive high-performance. Embedded in this recognition is the intonation where sustainability transcends “simply being an objective” and instead is institutionalized as a core purpose of the business. In support, Chouinard (2011) offers that the next stage of sustainability is for it to evolve to the nature of the business. When this materializes, the four quadrants of the new sustainability model are more apt to provide opportunities for success. The base principles of sustainability as provided

herein are ever-present as companies strive to ensure all stakeholders are in the conversation, and the desired expectations of the business are realized – strong financials, creative and innovative practices, the use of critical thinking to drive sound decision making and corporate social responsibility that resonates with all in the organization's ecosystem.

Going to new depths of thinking provides the business with a greater chance of seeking out all alternatives, driving higher performance levels of stakeholder value creation. A real pinnacle is to have the intellectual courage to challenge the status quo, seek out new and trust the final decision. Driving this decision must be in lockstep with financial acumen, especially in the case of for-profit business – it is imperative. Then critical thinking and financial acumen quadrant are inherently linked by sound business models. Similarly, adopting Corporate Social Responsibility is a driver for innovation, competitiveness, and, therefore, economic and financial performance.

Sustainability clearly is "resident" in all four of the quadrants of this model. Research has shown those organizations that embrace the inclusion of sustainability are positioned for higher performance outcomes. In the end, firms must choose paths to take and initiatives to advance the sustainable competitive advantages and perhaps, using sustainability as a competitive advantage that distinguishes in the marketplace. Sustainability needs to be systemic and systematic. Ultimately, the monetization (in a for-profit situation) of the sustainability initiatives must be definable, measurable, and generate new business, customer loyalty, "good for business", socially and ethically respectful, and financially sound. Embracing sustainability is not an option in today's consumer-driven marketplace. Whether one is in product or service offerings, firms comprehend how their business model is influenced by and affects those they serve. Many of the most admired companies are leading the way in terms of what to do, when to do it, why do it, and where to do it in terms of demonstrating examples of sustainability. There is a research data point that stresses that over 60% of senior executives suggest the need for a sustainability strategy as the sine qua non to compete. Moreover, over 70% of those organizations that have an average employee age of 32 years old recognize the future growth of their business, and employee engagement hinges on sustainability in everything they do.

Within sustainability resides the need to create a balance of initiatives. Having a sustainable model and responsible behavior [ethical business practices] creates value for the firm and society. Active engagement in social, environmental, and financial endeavors rightfully provides for better performance and sustainability. Contemporary business strategies, as was captured during the interviews and associated public policies, are closely aligned and value-based in those firms revered as best in class. In fact, if done effectively and efficiently, value can be unlocked and separately create a fulfillment of stakeholder needs. Some noted improvements discovered during this research and addressed gaps in prior literature are: 1) higher quality 2) customer delight 3) greater market share 4) operational excellence 5) financial gains & stability, and 6) distinctive competitiveness. Analyzing performance, new opportunities, and overall commitment to excellence as contributors to a sustainable business enterprise is paramount. In the end, businesses are sustainable, especially on a global scale, if they are: value creators, innovation leaders, and marketplace and culturally savvy, and have exceptional financial acumen. Importantly, all quadrants need to be on balance. In this perspective, the organization is acutely aware of the interconnections as well as the "tensions". Being proficient at addressing and even leveraging the tensions can actually create significant gain in overall performance. In the end, a sustainable business model such as put forth herein requires commitment, acute focus and attention, collaboration with all stakeholders, and a cultural mindset that embraces the four quadrants.

References

Adams, R., Jeanrenaud, S., Bessant, J., Overy, P., & Denyer, D. (2012). Innovating for Sustainability: A Systematic Review of the Body of Knowledge Network for Business Sustainability: Ontario.

Bucholtz, A. & Carroll, A. (2009). *Business and Society: Ethics and Stakeholder Management*. Cengage Learning: Toronto.

Camilleri, M. (2016). The Corporate Sustainability and Responsibility Proposition: A Review and Appraisal. *CSR 2.0 and the New Era of Corporate Citizenship*. IGI Global, 1-19.

Chouinard, Y., Ellison, J., & Ridgeway, R. (2011). The sustainable economy. *Harvard Business Review, (89)*10, 52-62.

Dewey, J. (1910). *How We Think*, Boston: D.C. Heath.

Dyllick, T. & Hockerts, K. (2002). Beyond the Business Case for Corporate Sustainability. *Business Strategy and the Environment, 11*(2), 130-141.

Engelberg, S. (2021, February). Decision-making, Innovation and Organizational Change: The Need for New Paradigms. *Academic Letters*, 324. https:doi.org/10.20935/AL324.

Ennis, R. (1964). A Definition of Critical Thinking. *The Reading Teacher, 17*(8), 599-612. Retrieved February 15, 2021, from http://www.jstor.org/stable/20197828

Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E., & Barlow, C. (2017). Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models. *Business Strategy and the Environment (26)*, 597–608.

Facione, P. (1990)., *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*, Research Findings and Recommendations Prepared for the Committee on Pre-College Philosophy of the American Philosophical Association, ERIC Document ED315423.

Farrell, O., Fraedich, J. & Ferrell, L. (2011). Business Ethics: Ethical Decision Making and Cases (8th ed.). USA: South-Western Learning Cengage

Goleman, D. (2005). *Emotional Intelligence* (10th ed.). New York: Bantam Dell.

Haanaes, K. (2016). Why all Businesses Should Embrace Sustainability – Some Top Companies are Leading the Way. Retrieved from imd.org.

Hoffman, A. (Spring 2018). The Next Phase of Business Sustainability. *Stanford Social Innovation Review.* 35-39.

Holling, C. (2001). Understanding the complexity of economic, ecological, and social systems. *Ecosystems, 4*(5), 390–405.

Kitchin, T. (2003). Corporate social responsibility: a brand explanation. *The Journal of Brand Management, (10)*4, 321-326.

Klein. G. (2011) Critical thoughts about critical thinking. *Theoretical Issues in Ergonomics Science, 12*(3), 210-224.

Kotter, J. & Cohen, D. (2012). *The Heart of Change.* Boston: MA. Harvard Business Review Press.

Lockett, A., Moon, J. & Visser, W (2006). Corporate social responsibility in management research: focus, nature, salience and sources of influence. *Journal of Management Studies, 43*(1), 115-136.

Mcintosh, B., Sheppy, B. & Zuliani, J.D. (2017). The Emperors clothes – Corporate social responsibility creating shared value and sustainability. *Int. J. Business Performance Management, 18*(3), 307-326.

Morsing, M. & Schultz, M. (2006). Corporate social responsibility communication: stakeholder information, response and involvement strategies. *Business Ethics: A European Review, (15)*, 323-338.

Porter, M. & Kramer, M. (2016). Strategy and Society: The Link Between Competitive Advantage and Corporate Social Responsibility. *Harvard Business Review*, (January/February), 62-77.

Singh, J., Garcia-De los Salmones, M. & Rodríguez-del-Bosque, I. (2008). Understanding Corporate Social Responsibility and Product Perceptions in Consumer Markets: A Cross-cultural Evaluation. *Journal of Business Ethics. (80),* 597-611.

Spence, L. & Rutherfoord, R, (2001). Social responsibility, profit maximisation and the small from owner-manager. *Journal of Small Business and Enterprise Development, (8)*7, 126-139.

Waddock, S. & Graves, S. (1997). The corporate social performance financial performance link. *Strategic Management Journal, (18)*4, 303-319.

Watts, P. & Holme, R. (1999). *Meeting Changing Expectations.* Corporate Social Responsibility, World Business Council for Sustainable Development Conference Proceedings. Geneva.

Wheeler, D., Colebert, B., & Freeman, R. (2003). Focusing on value: reconciling corporate social responsibility, sustainability and a stakeholder approach in a networked world. *Journal of General Management, 28*(3), 203-210.

Whelan, T. & Fink, C. (2016, Oct 21). The Comprehensive Business Case for Sustainability. *Sustainability*, 1-11.

Winn M., & Kirchgeorg, M. (2005). The siesta is over: a rude awakening from sustainability myopia. Corporate Environmental Strategy and Competitive Advantage, , 232-258. Elgar: Northampton, MA.

Williams, A., Philipp, F., Kennedy, S. & Whiteman, G. (2017). Systems Thinking: A Review of Sustainability Management Research, *Journal of Cleaner Production.* doi: 10.1016/j.jclepro.2017.02.002