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ECONOMIC AND LEGAL ASPECTS OF EMPLOYEE VOICE AND PARTICIPATION: THE GREEK CASE

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ABSTRACT

Over the last years, changes in economic, political, technological and legal environment affected the Greek market. The launch of Covid-19 intensified these changes and affected the nature of labor relations. Employee voice and employee involvement and participation schemes have undergone significant transformations due to these changes. In this study, an attempt is made to analyze the economic and legal sides of employee voice and participation, and evaluate the new data created due to the changes. Besides, this study proposes methods for assessing the effectiveness of employee involvement and participation practices and explains how they could affect employee and organizational level outcomes. Special reference is made to European Works Councils as a form of employee participation and the relevant national and European legislation. This study is a precursor to empirical research that will follow examining the role of the Human Resources department in managing labor relations in multinational corporations located in Greece.

KEYWORDS

Labor relations, employee participation, employee voice, EWC, human resource management

JEL CLASSIFICATION CODES: M54, J50, K30

1. INTRODUCTION

Greece experienced a long period of crisis and austerity and economic adjusted programs tried with dubious results to stabilize the Greek economy. The fragile financial conditions that faced the Greek economy include liquidity crisis and increase in unemployment (Argitis and Koratzanis, 2018). The same conditions are still prevailing in Greece due to the coronavirus crisis that caused unprecedented consequences for the global economy. Quarantine measures, lockdowns, and restrictions imposed to control the rate of transmission of the Covid-19 affected most of economic activities and particularly those that involve physical interactions. The Covid-19 pandemic disrupted global supply chains, international trade, transportation services, tourism and hospitality due to restrictions and closures in international borders. Service sectors as retail, travel, leisure, restaurants and personal services that require direct contact between the consumer and the provider of the service are severely affected due to social distancing restrictions. The Covid-19 pandemic impact on employment has short-term, medium term and long-term effects as job losses, reduction in productivity, income inequality, social inequalities for vulnerable workers as minorities, older employees, young people and women. Some of the categories of working-hour losses noticed in the literature are: 1. fewer average weekly working hours, 2. employees being employed but not actually working, 3. rise in unemployment: being available for and seeking employment, 4. inactivity: removing from the labor force. Due to Covid-19 pandemic companies and organizations of private and public sectors have adopted teleworking, flexible forms of employment, remote services and digital transformations. Events have also been digitalized and employees are now posting photos and stories of virtual meetings and teleconferences in social media (Staboulis and Lazaridou, 2020). Covid-19 pandemic created economic, health, social crisis, and challenges that require measures and solutions. Strict lockdowns and restriction measures rise issues and conversations concerning the balance between public health, human rights and entrepreneurial freedom.

Multinationals from the beginning of the Covid-19 pandemic had to address the impact of Covid-19 and implement measures to reduce the transmission rate of the virus. From employee's side trade unions, collective bargaining actors, employee representatives, health and safety representative and board-level employee representatives had key roles to play in the information, consultation and negotiation procedures taking place. In the multinationals, the different institutions of employee

representation addressed different aspects of consequences. In European-scale companies European Works Councils and SE-Works Councils addressed the transnational dimensions of Covid-19 consequences.

Employee participation seen as the ability of employees to express individually or collectively their opinions and interests vis-à-vis management is affected due to Covid-19 pandemic. In Europe the European Participation Index (EPI) is a multi-dimensional measure of collective employee's voice strength through trade unions, collective bargaining and company boards in the European countries. A high index of participation is correlated with positive outcomes as a greater wage share for employees, higher employability and productivity and higher expenditure on R&D. In 2019, the EPI trend is downward and employee voice continues to weaken in Europe (Hoffmann, De, Lafuente & Vitols, 2020).

This study explores issues of economic and legal dimensions of employee involvement and participation and the impact of Covid-19 on employee participation. The added value of this paper is the analysis of employee involvement and participation combining the legal part and the management – economics research and theory strands.

2. EMPLOYEE INVOLVEMENT AND PARTICIPATION

As companies seek to internationalize their operations, they face competitive and uncertain market conditions. The renewed interest in employee participation in decision-making that appears in the management and employment relationship literature is part of a series of corporate organizational changes that respond to increasing competitive pressures (Butali and Njoroge, 2018). Employee involvement can be defined as the direct involvement of employees to help an Organization fulfill its mission and achieve its goals by applying its own ideas, expertise and problem-solving and decision-making efforts (Gill, 2009). It is a special form of delegation of responsibilities, in which subordinates gain more control and more freedom of choice (Noah, 2008). Employee involvement is a process that aims to enable employees to influence and, where appropriate, to participate in decision-making on issues that affect them (Delery and Shaw, 2002). The dimensions of participation include the ability of employees to achieve goals, seeking ideas among employees and assigning responsibilities to employees.

According to Aylott (2014), *employee involvement describes a wide range of practices and concentrates on individual employees and is designed to produce a committed workforce more likely to contribute to the efficient operation of an organization. Involvement practices aim to produce a committed and informed workforce, which identifies with the goals of the organization and is well-equipped to face the rapid pace of change. Its core methods are communication and consultation (Aylott, 2014; pp. 34). Participation is made up of a range of methods which enable and at times empower employees, directly or indirectly, to contribute to the decision-making of the firm. Whilst, employee voice implies an opportunity to speak, participation allows a more active role for employees, focusing on influencing change. Some definitions restrict participation to schemes of collective participation. The modern employment relationship provides scope for both collective participation and individual participation. Therefore, employee voice may include participation or involvement. Employee voice is the ability of employees to communicate their viewpoint, to be heard and to influence decision-making. At a fundamental level employee voice has a close relationship with procedural justice. The availability of voice to enable involvement in decision-making can influence employee engagement. Both aspects of employee voice are important if employees are to be engaged and productive.* (Aylott, 2014; pp. 35-37)

According to Longo (2005) employee involvement includes: information sharing (business plans and goals, overall operating results, performance feedback, etc.), power sharing (work teams, quality of worklife committees, employee participation groups (quality circles, etc.), knowledge and skill development (skills for understanding the business, quality/statistical analysis skills, etc.), reward systems (gain sharing, flexible benefits programs, etc.), communication (company bulletins/reports, team briefings, attitude surveys), participation (team meetings, suggestion schemes, employee recognition schemes), representation (collective bargaining, joint consultation, company/works council).

According to Kaler (1999), participation is divided in operational and financial participation. Operational participation gives employees a share in the actual running of the business and is further divided in delegatory participation (employees have decision-making power but they do not effect decisions in conjunction with employees, i.e. quality circles, self – managed work teams), informatory

participation (managers tell employees about decision, employees are sharing in the information), consultative participation (employees are asked their opinions before management makes a unilateral decision) and co-determinatory participation (joint decision making between management and employees). Financial participation gives a share in the organization’s financial proceeds and is divided in ownership participation and income participation.

According to Gennard, Judge, Bennett & Saundry (2016), *the term EIP captures a range of techniques ranging from direct communication with employees to indirect or representative participation through workplace committees or working with trade unions. Employee involvement is generally seen as directed at individual employees and based on management sharing information. EI can also involve task-based control of decision-making for employees at the individual job level of the organization. It encompasses the notions of job enlargement and job enrichment. EI initiatives can increase job satisfaction by reducing the routinisation of work and allowing greater autonomy. In contrast, employee participation concerns the extent to which employees play an active role within the decision-making of the Organization. This is generally achieved through indirect collective representation. These systems focus on collectively representative structures and the approach is often term power-based control as employees have a real say in the decision-making process across all levels of the organizations. It is also underpinned by legal rights and the bargaining power of labour. The context of employment relations and the balance of workplace relations will determine the extent to which EI and EP exist in an organization.* (Gennard, Judge, Bennett & Saundry, 2016; pp. 198). *Through the employee involvement initiatives, management seek to gain consent from their employees for their proposed actions on the basis of commitment rather than control. EIP cover a wide range of practices designed to increase employee information about the organization, and thereby to produce a committed workforce. Employee involvement mechanisms tend to involve employees engaging directly through communication mechanisms and task-centred initiatives. In contrast employee participation is indirect, typically through either union or non-union representatives. These are processes by which management and their representatives jointly discuss issues of mutual concern through consultation or negotiation with respect to decision-making at higher levels of the organizations* (Gennard, Judge, Bennett & Saundry, 2016; pp. 218).

Breath of EIP practices (Gennard, Judge, Bennett & Saundry, 2016; pp. 201-202):

- Direct downward communication (newsletters, email, intranet, noticeboards)
- Direct two-way communication (team briefings, workplace meetings, staff newsletters, cascading of information via the management team)
- Direct upward feedback (problem-solving groups, suggestion schemes, employee/staff attitude surveys)
- Direct financial participation (profit-related bonus schemes, deferred profit-sharing schemes, employee share ownership schemes)
- Indirect participation (employee representative structures, e.g. Works Councils, Joint Consultative Committees)

Depth of EIP (Cox, Zagelmeyer, & Marchington, 2006; pp. 265)

- Proportion of employees participating
- Amount of time
- Frequency
- Permanence over time

Advantages of good employee communications (Gennard, Judge, Bennett & Saundry, 2016; pp. 204):

- Improved organizational performance
- Improved management performance and decision-making
- Improved employee performance and commitment
- Greater trust
- Increased job satisfaction

Employee participation is based on the recognition that the success of any Organization is largely determined by the contribution of its employees. The intensity of participation varies depending on the political environment, the management philosophy of the company and the working environment in which it operates (Gill, 2009). Authoritarian firms adopt downward communications, while other firms place greater emphasis on direct involvement involving two-way communication flows. There are companies that choose to emphasize representative participation as a means of providing a collective

voice to their employees. Others can set up a complex participatory system to achieve better decision-making and improved corporate flexibility (Sako, 1998).

Modern Organizations tend to adopt a more open and collaborative working relationship management framework utilizes the talents of all employees. Employee participation in decision making creates a sense of "belonging" among employees as well as a pleasant environment in which management and employees voluntarily contribute to the creation of a smooth working relationship. Employee participation in decision-making should be encouraged in order to increase work commitment and create workplace where incentives are given to increase productivity and motivate behaviors that lead to positive work attitudes and productivity (Kuye and Sulaimon, 2011).

Labels and terms for employee participation have expanded and diversified over time, reflecting different scientific bases and scientific fields (labor relations, human resource management, psychology and political science), changing socio-economic contexts, competition and government and a variety of practices. This complexity has become problematic because not all terms are equivalent in their meaning and their different parameters are not always clearly defined. In modern times, two of the most commonly used terms for influencing employees in decision-making are "employee participation" and "employee voice" - from a more explicit point of view of Human Resources Management, such initiatives could be considered as "empowerment". Or "commitment" (Markey and Townsend, 2013).

The primary goal of researchers and HR professionals remains to determine whether "work participation" improves organizational efficiency and employee well-being as well as the processes by which various practices allow employees to have a legitimate say in organizational decisions that influence directly and indirectly employees. The central element of most definitions of "labor participation" is the ability to speak for employees, ie "employee voice".

Boxall et al. (2007: 215) note that management-guided forms of participation serve employers 'goals of improving productivity and flexibility, increasingly responding to employees' desire to participate in matters directly related to them. Markey, Ravenswood, Webber and Knudsen (2013) find strong links to other aspects of employee voice and well-being, most notably employees' feelings of appreciation from management, getting enough information, learning opportunities for new things, and the regulatory environment. Employee characteristics may also be important in this case, where age and length of service have been found to have an impact on employee participation. The degree of job participation can be high or low. The high degree of labor participation (deep participation) means that all categories of employees are involved in the planning process while the low degree of participation (shallow participation) means that only senior management is involved in the planning process. The deep involvement of employees in decision-making allows the influence of front-line employees in the planning process. These employees are the people who are closest to the customer and can facilitate the identification of new products and services, which is a central element of the business process. This means that employee involvement in the design process reveals opportunities for innovation that could facilitate the identification of opportunities throughout the organization (Kuye and Sulaimon, 2011).

According to Noah (2008: 36) for the employee participation process to be effective, there must be three things:

- Employees must have the power to participate in meaningful decisions
- Employees must have the appropriate decision-making skills
- There must be incentives to participate

According to Ahmed (2013: 22) the positive effects of employee participation are:

- The positive attitude towards the Organization
- Trust in the products / services of the organization
- The perception that the Organization facilitates the employee to perform well
- The employee's willingness to behave altruistically and to perform better as part of the team
- The understanding of the bigger picture and the willingness of employees to exceed the demands of the job

The existing theory and research on employee participation could be considered as a function of labor relations and Human Resource Management. The dimensions of work participation have a strong impact on organizational performance and employee behaviors. Research on employee participation, is divided into ten thematic categories that include (1) forms and practices of employee participation, (2) organizational performance (business performance, productivity, business success and competitive advantage), (3) linking employee participation to job satisfaction and (4) organizational commitment, (5) employee and management perceptions and attitudes towards employee participation, the relationship of employee participation to (6) change management, (7) working environment, (8) the staffing strategy and (9) the financial crisis and (10) the outcomes and effectiveness of employee participation (Triantafillidou, 2020). Employee participation practices aim to increase the effectiveness of the Organization and Human Resources Management practices.

Table 1. EIP Dimensions

I. Concept, forms, practices and determinants of EIP
II. EIP and organizational performance (firm performance, productivity, business success, competitive advantage)
III. EIP and job satisfaction
IV. EIP and organizational commitment
V. Perceptions and attitudes of employees and management towards EIP
VI. EIP and change management
VII. EIP and work environment
VIII. EIP and staffing strategy
IX. EIP and financial crisis
X. Review of EIP effectiveness

Source: Analysis of relevant Literature review (own compilation)

3. ECONOMIC SIDES OF EMPLOYEE VOICE AND PARTICIPATION

Employee participation is a broad concept that encompasses a wide range of practices (Arrigo and Casale, 2010). Basic theories of the participation logic are classified as humanistic or democratic and realistic or effective (Black and Gregersen, 1997, pp. 860-861). The latter can be further divided into rational and regulatory. The definition of participation covers a wide range of arrangements and practices. Lawler (1994) considers employee involvement to be equivalent to participation and distinguishes four elements: power, information, knowledge and rewards. Other authors include shared influence, participatory decision making, employee engagement, empowerment, consultation and other terms (Cotton et al., 1988). The logic of participatory systems has five additional dimensions identified by Black and Gregersen (1997, pp. 860-862). First, there is the participation structure, which ranges from a formal, rule-based and procedural structure or an informal structure, based on open issues and decisions. Second, the form of participation, which ranges from direct, with employees directly participating in decisions and influencing them or the form of representative participation or representative function given to others. The third dimension concerns decision-making issues, which include work and task planning, working conditions, strategy issues, and capital and investment issues. The fourth dimension is the degree of participation, which ranges from a lack of information to the provision of some information and from the acceptance of opinions and consultations to a veto and full decision-making by employees. The final dimension is the decision-making process and includes identifying problems, creating alternatives, selecting solutions, implementing and evaluating the design. In essence, the key elements of participation are the distribution of power and the scope of decision-making. Humanistic / democratic and realistic / effective theories of participation differ in the dimensions of structure, form and degree of involvement. The European participation systems are highly participatory through formal power-sharing and representative systems at board level. They have central authority, as the employee participation involves significant consultation embedded in complex social processes (Brewster, 1995). In contrast, realistic systems in other developed countries are project-oriented, ie they are mainly oriented towards workplace issues. Ideally, they are based on "flexible" informal structures and direct consultation with employees (Morgan and Zeffane 2003).

Employee Involvement (EI) strands in economic theories include (1) efficiency theories, (2) path dependence theories, (3) property and human capital theories, (4) human resource management theories and (5) behavioral economic theories (Hungler, 2014; Bruyn and Nicolaou-Smokovitis, 1979). Over the last twenty years, European Workers' Council research, which has been an indirect form of employee participation, has focused on (1) historical and legal analyzes of EWCs, (2) on EWC practices and (3) on the role played by different actors in the EWCs and in particular the trade unions, the workers' representatives and the administration. Regarding the nature of research, empirical research is based mainly on the analysis of printed material and case studies and less on quantitative analysis (Hann, Hauptmeier and Waddington, 2017). The EWC research could further be classified to a. implementation research dealing with the establishment and operation of EWCs b. compatibility studies investigating the interactions between national employment systems and EWCs and c.

Europeanization studies studying the contribution of EWCs to the development of a European labor relations system. A methodological classification includes: a. quantitative surveys, b. qualitative surveys, c. policy dispute surveys, d. institutional surveys and an enriched ranking classification includes: a. historical and legal approach, b. quantitative approach, c. qualitative approach, d. European human resources management approach, e. modern economic approaches (cost-benefit survey, added value of EWCs) (Koutroukis, 2004; Freeman and Lazear, 1994). A positive reciprocal relationship between management and employee representatives encourages consistent performance. In addition, the combination of the presence of trade unions and positive behavior generally produces a beneficial effect on the financial performance of companies (Addison and Teixeira, 2018).

4. LEGAL SIDES OF EMPLOYEE VOICE AND PARTICIPATION

Employee involvement and participation is part of the legal framework of International Conventions and European and national legislation. The international protection of collective labor rights of workers is regulated in ILO Convention No 135, the Universal Declaration on Human Rights, and International Covenant on Civil and Political Rights. ILO Convention No 135 protects employee representatives whether they trade union representatives or freely elected representatives by the workers of the undertaking in accordance with provisions of national laws or regulations or of collective agreements. ILO Contention No 135 is ratified by 83 countries and it is in force in Greece since 27 June of 1988. According to the article 23 of the Universal Declaration of Human Rights and to Article 22 of International Covenant on Civil and Political Rights “Everyone has the right to freedom of association, including the right to form and to join trade unions for the protection of his interests”. In Europe, labor rights protection and employee participation is an obligation for the EU countries derived from the European Convention on Human Rights, the Charter of Fundamental Rights of the European Union and the Revised European Social Charter and EU Directions concerning European Works Councils (Contrepois and Jefferys, 2010; Mantouvalou, 2012; Hungler, 2014).

According to Article 11 of the European Convention on Human Rights “Everyone has the right to freedom of peaceful assembly and to freedom of association with others, including the right to form and to join trade unions for the protection of his interests”. The Revised European Social Charter ensures the right to collective bargain (Article 6), and the right to information and consultation (Article 21). More specifically, the Revised Social Chapter ensures the effective exercise of the right of workers to be informed and consulted within the undertaking, enabling workers or their representatives to be informed regularly or at the appropriate time and in a comprehensible way about the economic and financial situation of the undertaking employing them and to be consulted in good time on proposed decisions which could substantially affect the interests of workers, particularly on those decisions which could have an important impact on the employment situation in the undertaking. Besides, Article 22 of the Revised Social Chapter ensures the right to take part in the determination and improvement of the working conditions and working environment, Article 28 the right of workers’ representatives to protection in the undertaking and facilities to be accorded to them, and Article 29 the right to information and consultation in collective redundancy procedures.

In the EU the first attempt to establish a European company committee or process in the EU Community-wide companies and groups of companies to inform and consult employees is made through the Directive 94/95/EC. This Directive was the first to establish the European Works Council. Later the Council Directive 2001/86/EC defined as participation the influence of the representative body of employees and / or their representatives in the affairs of a company through: a. the right to elect or appoint some of the members of the supervisory or administrative body of the company or the right to propose or reject the appointment of some or all members of the supervisory or administrative body of the company. Koutroukis (2007), examines employee participation in the European Company analyzing the results of the application of the 2001/86/EC in Greece. Following the Council Directive 2002/14/EC aimed at establishing a general framework setting out the minimum requirements for the right to information and consultation of employees of undertakings or establishments in the Community. In 2009, the EU Directives were re-examined and the Council Directive 2009/38/EC is established is to improve employees' right to information and consultation at Community-scale enterprises and groups of enterprises. According to the 2009/38/EC Directive a European Workers' Council is established or a procedure for informing and consulting employees is established in all undertakings and all Community-scale groups of undertakings for the purpose of informing and consulting employees. Arrangements for informing and consulting employees are defined and implemented in such a way as to ensure their effectiveness and facilitate the effective decision-making

of the company or group of companies. The role of EWC in the Greek context is examined theoretically and empirically (Koutroukis and Terzidis, 2010; Koutroukis and Jecchinis, 2010; Koutroukis, 2012; Koutroukis, 2015b; Koutroukis, 2017; Koutroukis, 2018; Koutroukis, 2019) and EWC create added value in the Greek subsidiaries and the advantages – benefits of EWC’s outweigh the disadvantages – costs (Koutroukis, 2015). The Greek national and European institutional framework for employee involvement and participation and European Works Councils (EWC) is presented below in chronological order (Table 2).

Table 2. Greek national and European Institutional framework for EIP and EWC’s

<ul style="list-style-type: none"> ▪ Ratification of the 135th International Labor Contract of 1971 with law 1767/1988: Employees 'councils and other labor provisions - (Greek Government Gazette A' 63 / 6.4.1988) & article 8 of law 2224 / 1994 (Greek Government Gazette A '112 / 6.7.1994)
<ul style="list-style-type: none"> ▪ Recommendation 92/443/EEC on the promotion of employee participation in business profits and results (EEL 245 / 26.8.1992)
<ul style="list-style-type: none"> ▪ 94 Directive 94/95/EC ratified by Presidential Decree 40/1997: Right of employees to information and consultation at Community level enterprises and groups of enterprises in compliance with Directive 94/45 / EC (Greek Government Gazette A '39 / 20.3.1997).
<ul style="list-style-type: none"> ▪ Presidential Decree 91/2006: On the role of employees in the European Company (Greek Government Gazette A '92 / 4.5.2006)
<ul style="list-style-type: none"> ▪ 2002 Directive 2002/14/EC ratified by Presidential Decree 240/2006: Establishing a general framework for informing and consulting employees in accordance with Directive 2002/14 / EC of 11.3.2002 of the European Parliament and of the Council (EEL 80 / 23.3.2002, (Government Gazette A '252 / 16.11.2006)
<ul style="list-style-type: none"> ▪ 2009 Directive 2009/38/EC establishing a European Council of Employees or a procedure in undertakings and groups of undertakings of Community level in order to inform employees and seek their opinion sanctioned by Law 4052/2012 articles 49 et seq (Greek Government Gazette A '41 / 1.3.2012); Right of employees to information and consultation at Community level companies and groups of companies in compliance with Directive 2009/38/EC/6.5.2009 & amendment by Law 4538/2018 article 3 (Greek Government Gazette A '53 / 5.4 .2018)

Source: Analysis of Institutional Framework (own compilation)

5. CONCLUSION

This study analyses legal and economic dimensions related to employee involvement and participation. The launch of Covid-19 in developed countries caused economic and social changes that affect employee participation. European Union policy seeks to promote employee participation in the Member States on the basis of the twin concepts of industrial democracy and economic competitiveness. Thus, Article 27 of the EU Charter of Fundamental Rights on the right of employees to information and consultation within the company provides that "employees or their representatives shall be provided, at appropriate levels, with timely information and consultation, where the conditions laid down by Community law and national laws and practices". Therefore, employees or their representatives must be at an appropriate level in a timely manner informed and consulted. The European Parliament and Council Directive of 11 March 2002 sets out a general framework for informing and consulting employees at national level. The directive provides for a process of general, permanent and effective information and consultation of employees on the recent and possible development of the activities and financial situation of a company, the structure of employment and decisions that may lead to substantial changes in the organization of work and contractual relationships (Addison and Teixeira, 2018). Increasing employee participation is a long-term process, which requires both management attention and initiative on the part of employees (Bhatti and Qureshi, 2007).

In the period of Covid-19 multinationals that operate in different countries have to address significant differences in the legislation of the different countries and in national labor law. EWCs are involved in restructuring concerning merger or acquisition, transfer of production, site or plant closure, the sale of part of the company, collective redundancies, change in MNC HR strategy (De Spiegelaere and Jagodzinski, 2019). EWC members are supposed to receive detailed and complete information, have the support of an expert, have an extra meeting and a meeting before the decision is taken, and plenary meetings that are effective to influence decisions. In the restructuring process during the pandemic, employee representatives have the right of information about the restructuring plans, the

measures concerning health and safety and the working conditions and the potential consequences of the measures. Covid-19 pandemic cannot mean a quarantine of employee's rights to information, participation and consultation. Essential role for the health and safety protection of employees play the representatives for workplace health and safety as they have tacit and direct knowledge concerning the risks and hazards of daily work (Müller-Jentsch, 1995). Employee participation is significant for the development of health and safety policies as the involvement of employees leads to better understanding and implementation of the health and safety policies. According to the ESENER (European Agency for Safety and Health at Work) 3 survey (2020), employee involvement and participation and the presence of EWC, trade union and health and safety committee has positive impact in the assessment of risk and in the development of better preventive health and safety policies (Hoffmann, De, Lafuente & Vitols, 2020).

Employee participation is also being affected by government interventions. The development of national policy must be part of a wider process of dialogue between governments, employers and workers' representatives. At the same time, researchers in the field of labor relations play an important role in the ongoing development of employee participation and should be more precise in their explanations of the phenomena we study (Markey and Townsend, 2013). The context is crucial and the development of theories to predict and explain experiences in the workplace will help the professional community in the field of Labor Relations and Human Resource Management shape their practices to the maximum benefit for all involved.

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ECONOMIC CRISIS EFFECTS ON INVESTMENT PLANS: THE CASE OF THE LEADER PROGRAM IN THE REGION OF WEST MACEDONIA, GREECE

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ABSTRACT

The Greek economy is still suffering from the consequences of the financial crisis and especially those caused by the austerity programs that were implemented during the 2010s. The consequences turned dramatically as they had a major impact in a variety of macroeconomic parameters such as declining GDP, rising unemployment, decreasing public and private consumption, corporate bankruptcies and diminishing deposits, the latter resulting in liquidity problems in the banking sector. On the other hand, certain macroeconomic parameters seemed to induce a positive environment for the investments and especially the constantly compressed interest rates, as well as the supportive programs that were funded by the EU and the Greek state. One of these programs is LEADER which has been implemented uninterruptedly since the 1990s. Based on the region of West Macedonia during the time period 2010-2019, the paper examines if investment projects approved for financing through the LEADER program were realized. Through this program, investments' costs are reduced from 50% to 100%. Main question of the study is whether the investment's cost is determinant to the decision of investing or the negative economic conjuncture and psychology have a determinant role? The results do indeed show difficulties on the implementation of investment projects due to the negative impact of the economic crisis and, on the other hand, public financial support is not enough to attract investments.

KEY WORDS

Economic crisis, Investments decision, LEADER program, Greece, West Macedonia Region

JEL CLASSIFICATION CODES

E22, G11, G38

1. INTRODUCTION

The economic crisis has multiple economic and social impacts such as declining production and consumption and rising unemployment. The crisis may affect investments since companies decide to revoke their investment plans for several reasons. Access to finance is one of them; the impact turns major in the case of small companies whose access to financial resources is significantly more challenging compared to big companies. Prospects of the economy and therefore prospects of viability may be another criterion for investing. The longer the crisis lasts, the more the problem intensifies and makes the decision to invest critical.

Contrary to the global financial crisis of 2007-2009 that ended quite soon, the Greek economy suffered for a longer period during the decade of 2010s. This is due to the multiple austerity programs that applied to the economy following the huge bailout the Greek state received from the European Union (EU) and the International Monetary Fund (IMF), (Bank of Greece, 2014).

Within this negative economic and social environment, Greek companies could receive substantial public financial help provided by the EU's and Greek state's investment support programs. One of these programs is LEADER, (Liaisons Entre Actions de Développement de l' Economie Rurale), initially implemented during the 1990s and running uninterruptedly since then. LEADER focuses on rural development based on a “bottom-up” strategy. The model implies that each Region determines the targets of the program and thus is decentralizing the structure of it.

One of the main beneficiaries is the Region of West Macedonia for which this study is conducted. The specific Region will benefit the next years following the “Fair transition program”, as activities

related to the exploitation of lignite as an energy source will gradually cease. The Region is the country's principal energy source through lignite processing. As a result of the “Fair transition program” substantial public financing of new investments is foreseen, (Ministry of the Environment and Energy, 2019). The main question of this study is whether investments using significant public financial assistance can be viable in a deterring surrounding environment. Answers to this study are therefore a guide for the next supporting programs. This hypothesis focuses on the Region of West Macedonia through the LEADER program, which applied for small companies and minor investment schemes. This is the first study, to our knowledge, discussing the hypothesis of investment's decision for SMEs considering that an important part of investment's cost is public financed through specific program. The results can show that during crisis period an investment decision may not depend on investment cost but on investment prospect.

After the introduction, the previous findings are presented in the second section of the study. The third section offers the methodology and hypothesis, whereas the fourth section presents the main aspects of LEADER program that is related to the study. The findings are analyzed in the fifth section, followed by conclusions.

2. PREVIOUS RESULTS

Investments can be affected from external and internal factors, as the growth opportunities, (Rousseau and Kim, 2008), certain financial constraints, either bank lending or own sources available for investments, see for example, Kasahara (2008), Zubair et al. (2020). Financial and economic crisis may have a negative effect on investment decisions. Several studies examined the decision of investment during the crisis period, in particular the recent financial crisis. Studies examined investment decision for small and large companies focusing on financial constraints.

Akbar et al. (2012), examined the effect of the financial crisis of 2007–2009 on the financing and investment policies of private companies in the United Kingdom. They concluded on the negative effect of credit contraction on investments of private firms. Firms paid attention to their cash balances increasing their cash reserves and cutting out on investments. Balduzzi et al. (2018), using a data linking over 5000 non-financial Italian firms to their bank, covering large number of small firms, found that higher banks' cost of funding led young and small companies to invest less. Zubair et al. (2020), based on the Netherlands case found that banking borrowing had a critical effect on investments of private SMEs during crisis of 2008-2009; banking lend was more determinant than internal finance of these firms. Vermoesen et al. (2013), investigated constraints on financing of SMEs during 2008 crisis in Belgium; they found that firms with large part of long-term debt maturing decided to drop their investments more compared to other firms. Farina and Prego (2013), used the balance sheet and financial statements data from the Central Balance Sheet since 2006 until 2011, in Portugal; they found that the burden of servicing debt, the cost of capital and the firm's indebtedness have a negative relationship with firm's investment rate. Duchin et al. (2010), examining the 2008 financial crisis on corporate investment concluded that corporate investments declined significantly; the decline is higher for firms with low cash reserves or high short-term debt. In the case of Finnish SMEs a study contacted by Confederation of Finnish Industries concluded that, due to crisis effects, the demand for short-term loans increased rapidly but long term investments were postponed in many SMEs, (Huovinen J., 2010). Perić and Đurkin, (2015), examined investment activities of small firms in Croatia during financial crisis. They found that half of firms invested in new fixed assets and their decision was motivated mostly on how they could survive from crisis preferring to replace the worn-out assets.

Studies focused especially to constraints for investments related to innovation. Archibugi et al. (2013), while accept that companies reduce investments during crisis they find that it is not true in all cases; they notice that new entrants and small enterprises can grow investments on innovation. Giebel and Kraft (2015), examined the impact of financial crisis on investment decision considering innovative and non-innovative firms; they found that innovative firms reduce their investment expenditure due to problems of acquisition of external capital more than non-innovative firms. Laperche et al. (2011), based on big firms, examining the case of eight industrial groups found that crisis incites the rationalization of R&D expenses over low cost strategies.

Karafolas et al. (2020), examined the growth of microbreweries in countries that received international financial help, Cyprus, Greece, Ireland and Portugal. These countries experienced a longer crisis during the decade of 2010's. They observed the creation and growth of new microbreweries in these countries despite the decline of macroeconomic parameters for a long time period. Karafolas (2021), examined the reasons for the development of microbrewery in Greece the decade of 2010's through a questionnaire addressed to microbreweries; he observed that public

financing that could reduce significantly the investment cost was not a main reason to create the microbrewery. Nevertheless, this study concerned established firms solely.

3. METHODOLOGY

The main question is how the decision for investments is affected during a period of economic downturn, assuming that financial constraints are not important. This happens as small firms can receive substantial public financial help which covers at least 50% of the investment. Is the financial assistance enough to attract investments or other reasons are more important in the particular economic conjuncture?

The decision to invest could be affected, therefore, from other parameters, such as the national and local economic situation. Thus, macroeconomic parameters for the Greek economy, like the evolution of gross domestic product (GDP), the consumption of households, the unemployment rates, the bank loans level and the gross capital formation are examined; on a local field, the evolution of GDP, the unemployment rates, the gross capital formation and the regional tourism indices are examined.

According to the main hypothesis, the research focused on a public financing program for investments of small companies. LEADER is an EU program aiming at promoting the development and the structural adaptation of the less developed regions in the EU. In Greece, it focused on the development of rural areas (Karafolas, 2013). Since its launch in 1991, LEADER has been considered a successful program due to its bottom-up philosophy, its decentralized implementation and its participatory processes of the local entities; the public financial support ranges from 50% to 100% of the total investment by offering immediate payment of the grant to the beneficiary investor. The LEADER program is launched in 13 regions of Greece. It is implemented by the Local Action Groups (LAG) in every region.

Within the region of West Macedonia, the LAG “Regional Development Agency of West Macedonia” (“ANKO”) was chosen. It is the most important LAG of the region representing the departments of Kozani and Grevena. “ANKO” is the second most important LAG in Greece considering two parameters: a) The interest of investors expressed by the ratio between the total amount of business plans submitted over the total of public expenses allocated to the same LAG; b) From the total of public expenses available in the LAG in relation to the percentage that was finally "compatible", that is, in other words, the investments that finally proceeded to implementation. “ANKO” has the second best ratios combined within all LAGs in Greece after the Heraklion Development Agency, table 1.

Table 1. Responses to invitation for investment from Local Action Groups in Greece: Four best LAGs, end 2020

Local Action Groups	Invitations responded (%)	Invitations proceeded (%)
Regional Agency of Local Development of Chios	82,90	20,51
Heraklion Development Agency	80,66	87,74
Employment & Training Center of Samos Prefecture	80,54	27,80
Regional Development Agency of West Macedonia (“ANKO”)	78,39	52,84

Source: General Secretariat for Agricultural Policy and Community Resource Management, 2021, (authors’ calculations)

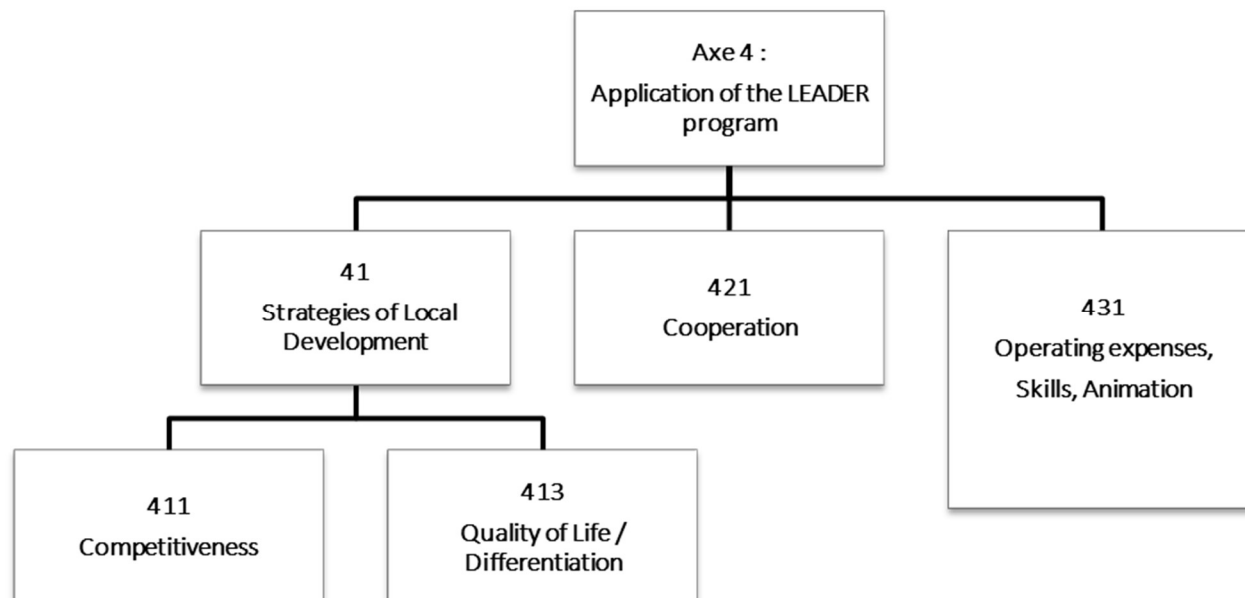
The surveyed period ranges from 2010 to 2018, during which Greece encountered a long period of economic decline due to the austerity programs that applied in the country following the terms of the country’s international bailout plan (Bank of Greece, 2014 and Karafolas et al., 2020). The 7-year period covers four public procurements of the program, namely in 2010, 2012, 2014 and 2015.

4. APPLICATION OF LOCAL LEADER

The local LEADER program, as part of the Axe 4 of the regional development program, is divided into measures, which in turn are divided into sub-measures, scheme 1. Measure 41, “Strategies of local development”, is the "core" of the program. It incorporates the local development strategies that have emerged from the consultation process between the stakeholders. It is divided into two major categories (sub-measures), which concern the strengthening of competitiveness (sub-measure 411) and the

improvement of the quality of life (sub-measure 413). Measure 421 specializes in establishing cooperation schemes between different rural development agencies. Measure 431 concerns exclusively the coverage of the operating costs of the LAG (technical support), as well as actions of raising public awareness and acquisition of skills of the population of the intervention area.

Scheme 1. Organization of LEADER program



Source: Regional Development Agency of West Macedonia, 2015.

The sub-measures result in procurements by the LAGs. There is a specific institutional framework for each action to undertake, which is basically a combination of the EU regulatory framework and the constraints of the national legislation. This framework can determine the eligibility of every investment project submitted for financing.

The investments in every procurement benefit from the public funding that covers a part of the investment cost as shown in table 2. Public support ranges from 50% to 100%.

Table 2. Sub measures and actions of Measure 41 “Strategies for the Local Development”

Sub measures and actions	Description of actions	Part of Public financial support on total investment
Sub measure 411		
Action L123	Increasing the value of agriculture and forest products	50%
Sub measure 413		
Action L311	Differentiation into non-agricultural activities related to rural tourism, craft units related to local products	50%
Action L312	Supporting the creation and development of very small businesses related to craft units, service companies, renewable energy sources, food production after raw processing	50%
Action L313	Encouragement of tourist activities on rural tourism	50%
Action L321	Basic services for the economy and the rural population supporting, small-scale infrastructure projects on culture and local heritage	50% to 100%
Action L322	Renovation and development of villages	50% to 100%

Action L323	Preservation and upgrading of the agricultural heritage	50% to 100%
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Source: Regional Development Agency of West Macedonia, 2015.

5. RESULTS

The examination was conducted at two levels. On a first level, the paper was interested in the number of the submitted projects, those that were eligible for financing and those not realized even though eligible. It also focused on the entrepreneurial sectors that the non-realized projects were classified. On a second level, the paper sought to explain the reluctance of investors, despite the significant financial assistance, by using macroeconomic parameters on the Greek economy and the regional economy.

The period was divided into four sub-periods in respect to the calls for submitting proposals (public procurements). During the examined period, 162 projects were submitted, most of them on the 2nd call in 2012, table 3. Out of these, 132 projects were eligible for financing; within them, on 2012, 19 projects did not proceed to the final step of financing because investors decided to withdraw their proposal. Regarding the remaining 113 proposals for financing, almost half out of them (45%), were not financed at all, as investors decided to withdraw from the investment plan, table 3. This number would be higher should it include the 19 projects withdrawn on the first step. Non-realized investments had an average budget of as much as 86.000 €; this rose up to 92.000 € after deducting both the lowest (8.552 €) and the highest (292.938 €) investments, in terms of realization costs, table 4.

Table 3. Number of projects submitted, approved and not realized through LEADER Initiative at LAG “ANKO”, 2010-2017, by period of call

Call (year)	Projects submitted	Projects approved	Projects eligible for financing (*)	Projects realized	Projects not realized	Part of non-realized to projects eligible for financing
(1)	(2)	(3)	(4)	(5)	(6)	(7): 6/4
1st (2010)	28	16	16	7	9	56%
2nd (2012)	104	90	71	41	30	42%
3d (2014)	20	19	19	11	8	42%
4th (2015)	10	7	7	3	4	57%
Total	162	132	113	62	51	45%

Source: Gerechte, Z., 2019, authors' calculations

(*) On the call of 2012, 19 projects were recalled by the investors on the call of 2012 although they had been approved for financing

Non-realized investments focused mainly on food and beverage, (33,3% of the projects and 54,1% of the total amount), related to the local products, table 4. Clothing related to local tradition, exploitation of wood, equipment supply and marbles are diversified manufacturing activities. Investments in tertiary sector focused on traditional restaurants and café with notably lower investment costs; this area included a project for the creation of a hotel that had the highest budget above all projects, almost 300.000 €.

All withdrawn projects would receive substantial financial help. Seven of them would be totally public financed and another one would be funded with 70% of its total investment cost as referred to infrastructure and cultural events. For the remaining 43 projects, public financing would cover 50% of the investment costs; the rest, covered exclusively by private investors, would not exceed 50.000 €, on average, in most of cases, table 4.

Table 4. Projects approved but not realized through LEADER program at LAG “ANKO”, 2010-2017, by activity (amounts in €)

Total number	Total amount	Average amount of	Part of total	Part of total	Public financial	Average amount
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			investmen t	number	amount	support on investmen ts Part of total	covered by the investor
Food	13	2.010.717	154.671	25,5%	45,8%	50%	77.335
Beverage	4	407.146	101.787	7,8%	9,3%	50%	50.893
Restaurants and leisure	7	362.986	51.855	13,7%	8,3%	50%	25.928
Hotel	1	292.938	292.938	2,0%	6,7%	50%	146.469
Wood	5	209.331	41.866	9,8%	4,8%	50%	20.933
Clothing	3	181.515	60.505	5,9%	4,1%	50%	30.253
Equipment supply	2	169.011	84.506	3,9%	3,8%	50%	42.253
Preservation and upgrade area	4	160.385	40.096	7,8%	3,7%	100%	0
Small scale infrastructure	2	145.880	72.940	3,9%	3,3%	100%	0
Marble	1	144.469	144.469	2,0%	3,3%	50%	72.235
Promotion material	1	134.122	134.122	2,0%	3,1%	100%	0
Car repair	1	107.215	107.215	2,0%	2,4%	50%	53.608
Café	5	43.812	8.762	9,8%	1,0%	50%	4.381
Restoration of building	1	15.762	15.762	2,0%	0,4%	50%	7.881
Cultural events	1	8.550	8.550	2,0%	0,2%	70%	2.565
Total	51	4.393.830	86.154	100%	100%		

Source: Gerechte, Z., 2019, authors' calculations

This evolution is related to the economic crisis that affected Greece, but also the Region of West Macedonia during the examined period. The unstable economy and the unfavorable prospects for investments' viability have had a catalytic effect, deterring investments, despite the significant financial assistance. The withdrawal of investments by the public sector as well, with 100% financing, shows that the imprint of the financial crisis during the implementation of the program was of approximately of the same weight, both for public and private projects.

Table 5 presents some macroeconomic parameters for Greece and the Region of West Macedonia. From 2009 and particularly from 2010, when the bailout Memorandum Of Understanding was signed between the Greek state and its lenders, all parameters show a rapid deterioration for the longest part of the period under consideration. This stands for Greece, yet for the region of West Macedonia as well. Greek GDP decreases continuously with the exception of the last two years of the examined period, 2017 and 2018 that is. On average, GDP dropped 2,9% during the examined period, but on the first five years it dropped 5,7%. In the region of West Macedonia, the GDP dropped 1,14% following a higher fluctuation compared to the national economy and certainly taking advantage of the activity of the country's largest public company, the Public Power Corporation (DEI), which is active in this Region.

On the contrary, the unemployment rate has been higher in the region, rising up to 34,4% in 2015, table 5. Evolution of gross capital formation, (expressing investments), has been negative during the examined period for both the national and regional economy, creating a negative investment climate for small businesses in particular. Banks were not able to alleviate the adverse economic conjuncture, since loans to the private sector of the economy declined continuously since 2011, with the exception of 2017, when a limited growth emerged. The deterioration of the economic climate is reflected in the declining consumption of the households; during the period 2010-2016 consumption was dropping each year; the annual average loss was 4,7%, table 5.

Table 5. Evolution of macroeconomic parameters, Greece and West Macedonia region, annual evolution in % (*)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Greece										
Gross domestic product, in current prices	-1,8	-5,6	-9,3	-7,3	-4,7	-1,3	-0,7	-1,1	1,7	1,5

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Annual unemployment, (in %)	9,6	12,7	17,9	24,4	27,5	26,5	24,9	23,5	21,5	19,3
Gross capital formation, at current prices	-14,3	-24,9	-25,1	-21,9	-7,3	-4,7	-1,1	1,1	8,2	-6,3
Loans to corporations	3,9	1,4	-1,8	-4,1	-4,8	-3,6	-0,9	-0,1	0,4	0,0
Final consumption expenditure of households, (current prices)	0,2	-7,0	-6,5	-7,2	-6,3	-3,1	-1,6	-1,2	2,2	2,0
West Macedonia										
Gross domestic product, in current prices	4,9	1,1	-2,2	7,3	-5,6	-2	-4,9	-8,4	-0,1	-4,5
Annual unemployment, (in %)	13,4	16,4	24,1	27,2	29,8	27,9	34,4	32,3	30,2	27,9
Gross capital formation, (current prices)	18,9	-49,9	-43,5	19,2	-6,8	13,1	-0,8	-1,0	-6,8	-18,1
Overnight stays			-11,9	-13,7	11,4	-2,6	-3,9	-6,6	2,6	-4,6

Source: Hellenic Statistical Authority, 2021 (authors' calculations)

Bank of Greece, 2021 (on “Loans to corporations), (authors' calculations)

Institute of the Association of Greek Tourism Enterprises (INSETE), 2021, (authors' calculations)

(*) The unemployment rate is annual and not the pace to the previous year

In almost all non-realized projects, the investors' explanations, used for resigning from the program, focused on liquidity problems that prevented the financing of their own participation and in particular on unfavorable prospects for their investment plans. The lack of liquidity is depicted in almost zero bank lending to corporations since 2011, table 5. Investments' prospect has been crucial for every decision. Apparently, the interest in investments is not only identified by various economic indicators, but also by the psychological state of the investors themselves, as this is expressed in a specific period of time. In particular, as the analysis of the data during the calls for proposal demonstrates, the investment psychology seems to fluctuate based on the improvement or the deterioration of the financial expectations. This behavior is obviously linked to the turbulent period during which all consumers and investment activity slumped. Furthermore, a special report should be made regarding the tourism related investments, for which the interest was particularly low; the higher cost investment, concerning the construction of a hotel, was withdrawn. The collapse of the domestic tourist demand as it appears in table 5 via the number of the overnight stays seems to severely affect the decision to invest in tourism in this Region.

6. CONCLUSIONS

Economic crisis affects the decision for investing mainly because of constraints on financial and economic expectations. Studies that focused on 2007 – 2009 crisis highlighted that financial problems affect critically the investment decisions. This study presented a differentiation, since it focused on the investment decision, given that the funding intensity, in the form of direct grant, would rise as much as 50% or even 100% from public resources; therefore, for the investor, the investment cost would be reduced by half, at least.

The study in particular focused on the LEADER program, funded by both the EU and the Greek state; it is addressed to SMEs and it is managed by Local Development Agencies. It offers the potential of funding at least half of the investment, with the other part being financed by the beneficiary investor, either with own capital or in combination with a bank loan. It focused on the Region of West Macedonia and the LAG of Regional Development Agency of West Macedonia, one of the major LAGs in Greece. The study was interested in this region because it is Greece's main energy source

provider based on lignite. With the withdrawal of lignite as an energy source, this area will suffer a significant economic downturn. For this reason the region is part of the “Fair transition program”. One of the elements of this program is the financing of investments with a significant intensity.

The question that arises with this study is whether a direct grant on the investment is enough to motivate an investor to proceed, during a period of economic uncertainty. The focus period is this of the major economic crisis in Greece, due to the consequences of the adjustment program and the MoUs between the country and its lenders, the decade of 2010.

The findings of this study are that the crisis had a crucial impact on the investment decisions. About half of the eligible investments for financing did not realize. This stands for all sectors of the industry, based either on the processing of local products and similar activities, either the tourism related ones.

On the other hand, constraints on financing didn't seem to affect the investment decisions, since even with a 100% funding intensity many proposals didn't realize as well. Investment psychology seems to be more determinable; which, in turn, was influenced by concrete negative macroeconomic parameters such as reduced GDP, shrunk consumption, reduced bank lending and sharp decline of regional tourism income and, on the contrary, increased unemployment.

These outcomes differentiate, at least partly, from previous conclusions of other cases that consider constraints in financing as the main factor for the postponement or even the cancellation of an investment. In regard to public investment policies, the study shows that public financial help is not enough to create investment in an unfavorable economic and even social environment. Results of this study could lead to further researches based on examples of other countries. Such researches could investigate if SMEs denied to proceed on planned investments during crisis, although the important public financial help, because of the unfavorable socio-economic environment.

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THE ROLE OF RURAL DEVELOPMENT FUNDS IN EU PRE-ACCESSION COUNTRIES: THE CASE OF IPARD II

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ABSTRACT

The European Union is a key strategic priority for the pre-accession countries in the Western Balkan and Turkey. The Instrument for Pre-Accession Assistance (IPA) assists countries aspiring for EU membership to prepare their institutional and administrative capacities for future compliance in all sectors including agriculture and rural development. Apart from the financing component, the role of IPARD is much broader in preparing the pre-accession countries for effective implementation of structural and rural development funds upon accession. This paper aims to provide a comparative cross-country analysis on the IPARD programme 2014-2020 (IPARD II) funding of the current beneficiaries (Albania, Montenegro, North Macedonia, Serbia and Turkey). The main derived indicators include the use of IPARD II funding, measures and absorption rates. IPARD II payments are effectuated in all candidate countries from 2019, while payments started earlier in 2017 in Turkey and in 2018 in North Macedonia. With the prolonged start of the IPARD II programme, significant amount of the available funds remains unused, and the number of implemented measures is still limited. There are noticeable country differences in terms of expenditure among measures, but overall, the largest share of used funds so far is dedicated to investments in physical assets in primary production and processing. All countries have established some form of institutional and administrative capacities for implementing the agricultural and rural development policies, especially for the IPARD funds. Still, there is a need for additional capacity building, due to numerous factors, among which the dynamic environment with many continuously changing aspects (CAP reform, accession methodology, climate change or issues arising from the ongoing Covid-19 pandemics). Further promoting the programme, strengthening the national institutions' set-up and capacity, aligning to the beneficiaries needs, and supporting them in preparing viable or sustainable projects are recommendations for better use of the current funds, as well as for the preparation of IPARD III cycle.

KEYWORDS

IPARD II, rural development and structural measures, Western Balkan, Turkey.

JEL CLASSIFICATION CODES

Q18, O13, F36

1. INTRODUCTION

Policy approximation towards the European Union (EU) policies and an appropriate institutional setting are two key milestones on the way to EU integration. EU pre-accession funds support the pre-accession countries in their structural and economic reforms by building their capacities throughout the enlargement process. The introduction of the Instrument for Pre-accession Assistance (IPA) in 2007, acting as a single umbrella instrument, combined the previously implemented EU financial

programmes (PHARE, [ISPA](#), SAPARD, CARDS and the financial instrument for Turkey) (EC-IPA, 2021). The utilization of these funds supports the beneficiaries, *i.e.* the candidate and the potential candidate countries, to prepare themselves for an efficient absorption of the EU funds once they become EU member countries. The IPA programme sets out the priorities for EU financial assistance of the beneficiaries on their accession path during the programming period, in order to increase the good governance and capacity building, but also to support the socio-economic development in line with the EU goals for smart, sustainable and inclusive growth (EU, 2015). Subsequently, the IPA 2014-2020 programme (as a continuation of the previous IPA 2007-2013) represents a sound investment in the following components: (i) public-administration reform, (ii) rule of law, (iii) sustainable economy, (iv) people, and (v) agriculture and rural development (EC, 2016).

In respect to the Western Balkan (WB) countries and Turkey, the EU perspective remains a vital driver to transformation, fostering stability and promoting EU values and standards. Each pre-accession country is in different stage of its accession pathway; accession negotiations are underway with Turkey (since 2005, though currently in a standstill), Montenegro (since 2012), Serbia (since 2014), and, as of March 2020, accession negotiations were also opened for Albania and North Macedonia. Bosnia and Herzegovina and Kosovo* are potential candidate countries. In all these countries, agriculture is one of the most important economic sectors, with significant share in the national economy and in total employment. The share of agricultural gross value added into all national activities participates from 6.6% in Turkey to 21.4% in Albania, while the share of people engaged in agriculture ranges from 7.7% in Montenegro up to 37.3% in Albania in the period 2017-2019 (WBC&TR StatDatabases, 2020).

Accession to the EU implies adoption of the *acquis communautaire* and adherence to its policy, which in the domain of agriculture and rural development is represented by the EU Common Agricultural Policy (CAP). The EU supports the necessary reforms in the process of joining the EU through the IPA component focusing on rural areas and the agri-food sectors, *i.e.* the Instrument for Pre-accession Assistance for Rural Development (IPARD). The current IPARD programme for the period 2014-2020 (IPARD II) provides the beneficiary countries with financial and technical help in order to support sustainability of the agricultural sectors and rural areas in these countries and assists them in the process of alignment to the EU CAP. The IPARD II programme total indicative budget for the period 2014-2020 amounts 1.1 billion EUR from the EU budget. In addition, each country also contributes through national public funding and the final beneficiaries in most cases co-fund a share of the project (EU-IPARD, 2021).

Apart from its core financing component and supporting projects for the final beneficiaries, the role of the IPARD programme is much broader; it contributes to better overall performance in the agricultural sector and increasing its competitiveness, while in parallel assisting the organizational and institutional set-up for administering payments. Evidence from the previous programming period suggest various wide-ranging effects; for instance, an analysis of the use of IPARD funds (2007-2013) and its effects on the exports of agricultural products in three countries (Croatia, Turkey and North Macedonia) found positive correlation, *i.e.* the export of agricultural products to Turkey significantly increased during the period 2007-2014 due to the revealed progress in the utilization of the IPARD funds, while a steady upward trend was likewise demonstrated in North Macedonia and Croatia (Šestović et al., 2017). Additionally, an impact analysis of the use of IPARD funds over the survival and performance of agricultural companies in Croatia, in a five-year stretch after receiving the grant, found out a positive effect in reference to the entities' turnover, value added, total assets, as well as a significant growth in employment, labour productivity, and capital input throughout all five years (Kukoč et al., 2020).

Having this in mind, the paper aims to provide a comparative cross-country analysis on the IPARD II funding of the current beneficiaries, by assessing the level of IPARD II funding in each country and the use of different measures across the study countries. Apart from providing a snapshot of the current state of the IPARD II programme in the pre-accession countries, the findings from this study can also contribute to the on-going preparation of the IPARD III (2021-2027) programme. So far, to our knowledge, this kind of comparative analysis regarding IPARD funds has not been conducted with such approach, and therefore fills an existing gap in the literature.

The cross-country analysis includes the current IPARD II beneficiaries: Albania (AL), Montenegro (ME), North Macedonia (MK), Serbia (RS) and Turkey (TR). The analysis covers both qualitative aspects (background, administrative and institutional set up, and beneficiaries' perspectives) and quantitative aspects (total budget, rate of absorption, and use of different measures). The study is based

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

on secondary sources, mostly collected through the official documents of the national IPARD authorities, reports on funds allocations, as well as personal communications with representatives from the IPARD authorities.

2. PARD II ACROSS EU PRE-ACCESSION COUNTRIES

2.1 Figures and tables

The pre-accession countries have accessed the IPARD programme at a different pace. The programme in each beneficiary country was developed within a targeted strategic framework, based on country specific socio-economic analysis, sub-sectoral characteristics and SWOT analysis, proposing measures to distribute the available funds. Accreditation and implementation of measures is a long process that requires adequate human capacities, which will eventually be able to manage by the EU rules upon accession. Therefore, besides the specific measures and sector beneficiaries, one of the key IPARD contributions is the development of institutional infrastructure, competence and administrative capacities in the country, as an important prerequisite for fulfilment of the EU accession requirements.

Albania had two periods of financing: pre-IPARD (2015-2017, in the form of IPARD-like measures) and IPARD-II (2018-2020). The IPARD II Programme was adopted by the Government of Albania and approved by the European Commission in July 2015 and subsequently ratified by the Albanian Parliament in March 2016. At this stage, the IPARD operating structure (Managing Authority) and the Agricultural and Rural Development Agency (Paying Agency) was accredited and currently is operating under the monitoring of DG Agri. The structure has been undergoing gradual expansion since 2016 and the workload was revised accordingly, noting progress in the administrative set up; however, the pace of legal adoption on regards to the establishment of the Integrated Administration and Control System (IACS) has been slow. The progress is stalled by weak information systems and statistics in agriculture, non-functioning farm register and animal register, and slow preparation of the Land Parcel Identification System (LPIS) (EC, 2018). Moreover, policy monitoring has been weakened due to slow progress of statistical activities, lack of economic analysis unit and scarce resources placed for ex-ante and ex-post evaluation, including the use of the Farm Accountancy Data Framework (FADN). The animal register has also not been updated properly, limiting traceability, endangering food safety and implementing livestock farming management policies. Currently, an Italian cooperation project is supporting the Paying Agency in strengthening the administrative capacity of the line Ministry and the Paying Agency with a particular focus on the farm register and the LPIS, as a step towards establishing the IACS.

In Montenegro, the operational structure for IPARD II consists of Managing Authority - Directorate for Rural Development and IPARD Agency - Directorate for IPARD Payments, both within and under the direct management of the Ministry of Agriculture and Rural Development (MARD). The Managing Authority is responsible for preparation and implementation of the IPARD II programme. The IPARD Agency provides the Managing Authority with control and verification of the IPARD II programme measures, drafts public calls and publishes eligibility conditions and criteria, selects the projects to be implemented, etc. The Managing Authority and the IPARD II Monitoring Committee monitor the effectiveness, efficiency and quality of the implementation of the IPARD II programme and report to the IPA II Monitoring Committee and the Commission on the progress of the measures implementation. The first IPARD II public calls in Montenegro were published in early 2018.

In North Macedonia, the IPARD II programme started with the first call in 2017. The Managing Authority is within the line Ministry of Agriculture, Forestry and Water Economy (MAFWE). The Agency for Financial Support in Agriculture and Rural Development (AFSARD) was established in 2007, fulfilling the role of national Paying Agency. The efficiency and quality of the IPARD II programme implementation are monitored by the IPARD Monitoring committee, composed by representatives of the key governmental and nongovernmental stakeholders, meeting regularly on bi-annual basis. Given the large number of farmers in the country and the complex array of measures and criteria, strong management and control systems are required. The development of IACS, Farm Register and LPIS is an on-going process, but due to insufficient resources to maintain and operate them, these systems are still lacking in terms of data quality and relevance (EC, 2019). AFSARD requires continuous strengthening of its capacities in order to ensure an efficient implementation of the increasing volume of both national and IPARD measures. Lessons learnt from IPARD I have contributed to gradual improvements and higher absorption of the IPARD II funds, in terms of simplifying some procedures and making them more understandable and approachable for the

applicants, faster resolution of the calls, more visible communication of the programme to potential applicants, etc.

In Serbia, the implementation of the IPARD II programme began at the end of 2017, while the official accreditation came into force in June 2018 with signing of the Financing Agreement between the Government of the Republic of Serbia and the European Commission. The Managing Authority as well as the Paying Agency are established within the Ministry of Agriculture, Forestry and Water Management (MAFWM).

Following the implementation of IPARD I, Turkey adopted the IPARD II program in 2016. The Managing Authority is the General Directorate of Agricultural Reform, within the Ministry of Agriculture and Forestry (MAF), while specifically the IPARD Program is governed by the Directorate of European Union Structural Harmonization Management Authority, assigned within the General Directorate of Agricultural Reform. This authority is responsible for managing and monitoring the program in accordance with the financial management principles. The authorized and accredited institution that implements the IPARD Program is the Agriculture and Rural Development Support Institution (ARDSI). Currently, there are different organisations affiliated with MAF which are responsible for implementing the agricultural policy in Turkey. However, there is no officially defined authorized Paying Agency for agriculture policy implementation as in the case of the EU member countries.

2.2 Programme use and measures

The measures implemented under the IPARD II programme differ across countries. The current IPARD II operational measures in the study countries are presented in Table 1.

Table. 1 Current IPARD II operational measures in the EU pre-accession countries.

	AL	ME	MK	RS	TR
M1: "Investments in physical assets of agricultural holdings"	+	+	+	+	+
M3: "Investments in physical assets concerning processing and marketing of agricultural and fishery products"	+	+	+	+	+
M4: "Agri-environment, climate and organic farming (pilot on soil erosion)"					+
M5: "Implementation of local development strategies – LEADER approach"					+
M7: "Farm diversification and business development"	+		+		+
M9: "Technical assistance"			+		+

In Albania, IPARD II was launched in the budgetary year 2018-19. In addition to the previous IPARD-like programme valid from 2015, when only Measure 1 and Measure 3 were implemented, further resources were allocated to Measure 7. In addition to this, Measure 9 as a technical assistance is undergoing the first phase applications during 2021. Further efforts are being made, with the help of GIZ Sustainable Rural Development Project, to adopt other measures such as Measure 4, Measure 5 and Measure 10. Considering the importance of forests and pastures in the country, additional measure is being prepared for addressing the constraints in the forestry sector (Measure 11 on Establishment and protection of forests).

In Montenegro, currently operational are Measure 1 and Measure 3. Regarding the continuation of accreditation of measures within the IPARD II programme, Montenegro officially submitted a request to the EC for implementation of the budget for Measure 7. With receiving the official certificate, Montenegro will start to implement this measure as well. The country has also sent an official letter to the EC requesting an extension of the IPARD II deadline, including an Action Plan for 2020 and outlining the activities for implementing the public calls and contracting investments in due time (MARD, 2020). Additionally, the Ministry of Agriculture and Rural Development is enhancing favourable financial environment for agricultural producers, both through loans provided by the Investment and Development Fund and by commercial banks.

The objectives of IPARD II are addressed by eleven measures in North Macedonia, but the implementation started with three accredited measures: Measure 1, Measure 3 and Measure 7. The first two measures mostly refer to investments in machinery and equipment for specialized production and processing activities. In reference to Measure 7, the interest prevails for construction and reconstruction of facilities, and for improvement of the existing infrastructure of the applicants (MAFWE/IPARD,

2019). In addition, the horizontal measure on Technical assistance (Measure 9) supports the successful implementation of the entire programme. The measure Investment in rural public infrastructure (Measure 6) is in the process of accreditation, whereas the remaining measures are planned to be introduced at a later stage (according to the programme rationale, this postponement is mostly due to the need for additional preparation and institutional capacity building).

There are six programmed IPARD II measures in Serbia, though the current implementation is carried out mostly through Measure 1 and Measure 3. Measure 7 and Measure 9 are also in the process of implementation, while the procedural framework for accreditation of Measure 4 and Measure 5 is under preparation.

In addition to the sectors already included within the IPARD I Programme in Turkey, IPARD II additionally supports local action initiatives and environmentally friendly measures in rural areas. It includes investments that were not included in the IPARD I, such as water buffalo milk, goose, egg poultry, mushrooms and micelles, machinery parks and renewable energy. However, prolonging the accreditation process has affected the use of funds and delayed the implementation of IPARD II. The LEADER approach represented through Measure 5 was introduced during the seventh application call. The agri-environment actions (Measure 4), were included in the fourth announcement call for the sector.

The total indicative budget of the IPARD II programme for the period 2014-2020 is 1.1 billion EUR from the EU budget, on top of which each country contributes through national public funding (with 25% in the total allocation). Around 70% of the indicative EU budget are planned for Turkey, followed by 15% for Serbia, 6% for Albania, 5% for North Macedonia, and 3% for Montenegro (Table 2). The rate of funds for approved projects (taking into consideration the latest data available from the individual countries), so far ranges from 48% for both Montenegro and Turkey to just over 53% for both Albania and North Macedonia. If compared to the IPARD I realization, the general impression is that there are lessons learnt, and consequently the implementation rates are substantially increasing. For instance, in North Macedonia, a recent *ex-post* evaluation of IPARD programme 2007-2013 calculated the financial effectiveness of the programme at 21.1% when the original planned budget is considered, *i.e.*, at 85.9% in relation to the later amended financial plan (PPM, 2020).

Table 2. IPARD II funding (approved projects), mill. EUR.

	AL	ME	MK	RS	TR
EU part	37.26	18.62	32.32	35.51	381.10
National contribution	12.42	6.21	10.77	11.84	127.03
Total funds	49.68	24.83	43.09	47.35	508.14
<i>EU indicated amounts</i>	<i>71.00</i>	<i>39.00</i>	<i>60.00</i>	<i>175.00</i>	<i>801.00</i>
<i>Funds approved, in %</i>	<i>52.48</i>	<i>47.74</i>	<i>53.86</i>	<i>20.29</i>	<i>47.58</i>

Note: Data available until 28.02.2020 (AL), 23.03.2021 (ME), 31.10.2020 (MK), 10.12.2020 (RS), 31.10.2020 (TR). Source: National paying agency authorities, own calculation.

IPARD II payments are effectuated in all candidate countries in 2019 and 2020, while in North Macedonia payments started in 2018 and in Turkey in 2017. In terms of funding structure, there are differences across the countries in the number and value of beneficiaries/projects (Table 3 and Figure 1). In most countries, the funds requested significantly exceed the approved funding. The acceptance rate of projects (approved versus received applications) varies between the countries, from approximately every fourth application approved in Turkey and Albania, to half of the applied projects approved in Montenegro.

Table 3. Number and value of IPARD II applications (EU part).

IPARD II measures	AL		ME		MK		RS		TR	
	<i>Number</i>	<i>mill.</i>	<i>Numbe</i>	<i>mill.</i>	<i>Numbe</i>	<i>mill.</i>	<i>Numbe</i>	<i>mill.</i>	<i>Number</i>	<i>mill.</i>
		EUR	<i>r</i>	EUR	<i>r</i>	EUR	<i>r</i>	EUR		EUR

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RECEIVED APPLICATIONS										
M1	643	72	569	19.3 9	3251	57.31	1235	87.20	3886	n.a.
M3	220	70	97	20.8 5	183	45.10	202	40.88	700	n.a.
M4	/	/	/	/	/	/	/	/	93	n.a.
M7	194	25	/	/	448	85.16	311	34.41	1182	n.a.
M9	1	0.05	/	/	8	0.14	/	/	37	n.a.
All measures	1,058	167	666	40.2 4	3890	187.7 1	1748	162.4 9	1654 3	n.a.
APPROVED APPLICATIONS										
M1	175	13	321	9.24	1485	14.21	560	23.58	1241	165.8 9
M3	62	18	46	9.38	85	13.52	59	11.93	665	121.9 2
M4	/	/	/	/	/	/	/	/	92	1.81
M7	53	7	/	/	44	4.45	/	/	2720	90.78
M9	/	/	/	/	8	0.14	/	/	32	0.71
All measures	290	37.2 6	367	18.6 2	1622	32.32	619	35.51	4750	381.1 0
REALISED/PAID APPLICATIONS										
M1	116	7	172	3.54	1020	6.51	203	6.97	901	123.0 7
M3	25	6	6	1.41	53	5.84	26	3.04	591	99.61
M4	/	/	/	/	/	/	/	/	92	1.81
M7	10	1	/	/	12	0.64	/	/	2394	70.62
M9	/	/	/	/	7	0.01	/	/	32	0.71
All measures	151	14	178	4.95	1092	13.00	229	10.01	4010	295.8 1
Approved vs. received rate (%)	22.3	55.1	46.2	41.7	17.22	35.4	21.85	28.71	n.a.	
	27.41	2	1	7	0	1				
Paid vs. approved rate (%)	37.9	48.5	26.5	67.3	40.23	37.0	28.19	84.42	77.62	
	52.07	4	0	8	2	0				

Note: Data available until 28.02.2020 (AL), 23.03.2021 (ME), 31.10.2020 (MK), 10.12.2020 (RS), 31.10.2020 (TR).

“/”: measures not available; “n.a.”: data not available. Source: National paying agency authorities, own calculation.

The largest number of approved applications occurs for Measure 1 (ranging from 60% in Albania, to 92% in North Macedonia), except for Turkey, where over half of the applied projects so far relate to Measure 7 (Figure 1). In terms of allocated funds, physical investments at primary and processing level dominate (Measure 1 and Measure 3), whereas the farm diversification and business development (Measure 7) gradually increases its share in those countries that have already implemented this measure. Specifically, in Albania, almost half of the IPARD II payments are approved for Measure 3, 35% for Measure 1 and 18% for Measure 7. During the year 2021, pre-paid instalment was implemented to relax investments contracted to Albanian operators. In Montenegro, the approved funds are equally distributed between the two operational measures for investments in physical assets. In the case of North Macedonia, similar budget is approved for Measure 1 (44%) and Measure 3 (42%), while Measure 7 has a share of 14% and the allocated funds for Measure 9 are modest. In Serbia, Measure 1 absorbs two-thirds of the funds (66%), while the remaining amount is allocated to approved projects in Measure 3. Payments in Turkey are most evenly spread among the measures; still, Measure 1 has the largest share (44%), followed by Measure 3 (32%) and Measure 7 (24%).

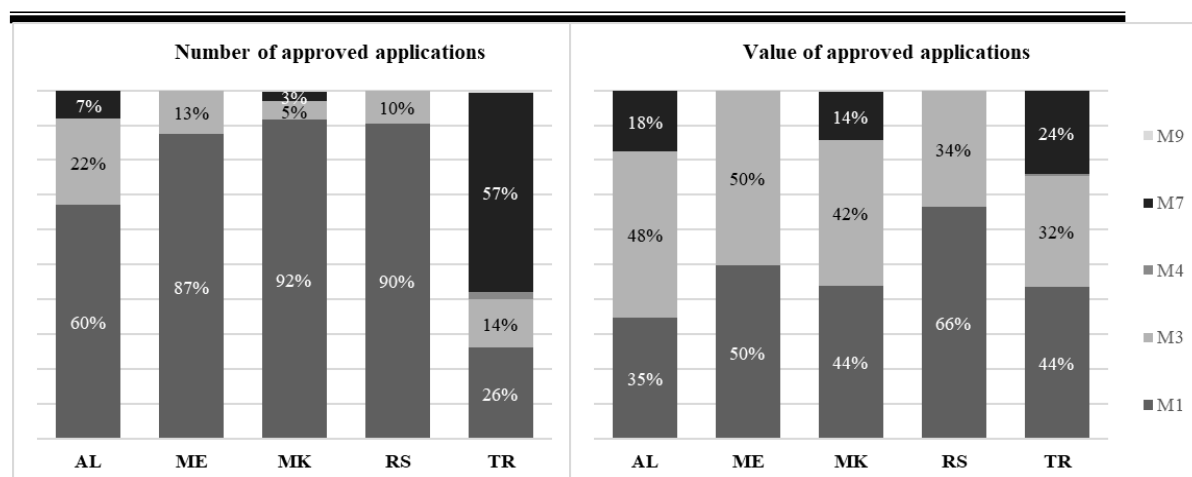


Figure 1. Number and value of approved applications, shares in %

2.3 Beneficiaries' perspective

In most of the countries, farmers as the largest group of potential beneficiaries encounter difficulties to comply with the eligibility criteria provided under IPARD, compared to national programs. For instance, in Albania, fulfilling the requirements regarding the certification of ownership and development rights on land and other immovable assets is problematic due to vast absence of certificates of ownership and slow process in providing development rights (FAO, 2020).

Farmers in Montenegro still do not sufficiently utilize modern technologies and face competitiveness issues. The need to maximize the use of resources, raise product quality, build brand and geographical origin in the field of agriculture requires introduction of new production, processing and packaging technologies. The problems of irrigation systems, very expensive animal feeds, high energy consumption, lack of traceability of products in the absence of modern technologies and the like, are especially emphasized.

In North Macedonia, the main reason for rejecting the funding requests from all measures is the incompleteness of the applications. A long delay during the processing of cases is also often caused by the slow response by the Bureau of Judicial Expertise in the process of determining costs justifications. The response of companies contacted for referential market price research was very low for the first IPARD II calls, mainly due to the Covid-19 virus pandemic. The large number of applications received and the insufficient number of employees in the Paying Agency remain the key bottlenecks in the application processing procedure (MAFWE/IPARD, 2020).

The lack of beneficiary's knowledge and information is assessed as key factor affecting the programme utilisation in Serbia, with large share of ineligible applications and some missing documents in almost all applications. Secondly, the eligibility criteria with minimal investment threshold of 5.000 EUR for Measure 1 and 10.000 EUR for Measure 2, along with the demanding procedure, affect potential beneficiaries with small projects, which are not suitable for the IPARD programme due to encountering high costs. In addition, the large number of small applications causes delays in applications administration.

In Turkey, the general criticisms on the programme implementation is that it is intended for beneficiaries with good financial status. The programme mostly appeals to capital owners outside the agricultural sector. The rules and procedures to be followed during investment (such as a certificate of origin, tender rules, etc.) increase the prices in the market where the purchase is made. This situation directs the beneficiaries to lower budget investments with their own resources and discourages them from applying. Difficulties in the application process and excessive procedural workload also discourage application of potential beneficiaries. Insufficient advisory and consultancy support is affecting projects preparation. The fact that the exchange rate difference between the contract period and the investment purchase period is too high causes the investment to be abandoned. In general, economic uncertainties affect investment decisions, causing the investment to be abandoned after the contract.

In general, the lack of capacities in the paying agencies often causes long administration periods and uncertainty for beneficiaries across the IPARD II beneficiary countries. In addition, the lack of beneficiaries' knowledge coupled with the limited capacity and outreach of the extension services

affect the preparation of viable projects, application and realisation rates. In most cases, inter- and intra-institutional communication is not always efficient and the relevant institutions are not connected to most databases, causing time-consuming procedures for obtaining the necessary cross-compliance data. The still lacking establishment and/or full functionality of Integrated and Administration Control System (IACS), Land Parcel Identification System (LPIS) and Farm Accountancy Data Network (FADN), hinders better adaption and use of these important administrative data sources in the pre-accession countries.

The most important factors influencing the deviation of the IPARD II programme implementation from the plan are related to the delays in accreditation of planned measures; longer application processing period at all stages; uncertainty of applicants regarding exercising of the rights to IPARD II assets; lack of opportunities to for co-financing IPARD projects; the submission procedure in terms of the need for three offers. Most common reasons for rejection of the applications in the countries are related to incomplete applications and insufficient information of beneficiaries.

3. CONCLUSION

Increasingly important allocations are flowing through the IPARD II programme for the period 2014-2020. It assists countries aspiring for EU membership to prepare themselves for future accession in the agriculture and rural development sectors.

IPARD II currently is implemented in all EU candidate countries. Two measures are operational across all countries: Measure 1 (Investments in physical assets of agricultural holdings) and Measure 3 (Investments in physical assets concerning processing and marketing of agricultural and fishery products). The Measure 7 (Farm diversification and business development) is currently operational in Albania, North Macedonia and Turkey, while Measure 9 (Technical assistance) in North Macedonia and Turkey. Turkey has also implemented Measure 4 (Agri-environment, climate and organic farming) with a pilot on soil erosion in 2019 and Measure 5 (Implementation of local development strategies – LEADER approach) since 2020.

The preparation, accreditation and implementation of a new measure is a time-consuming process which requires additional efforts and resources for widening the number of operative measures in all countries, especially in the case of the Western Balkan beneficiaries. This is particularly important considering the forthcoming IPARD III programme for the period 2021-2027, where the measures Agri-environment, climate and organic farming and Implementation of local development strategies – LEADER approach are lacking, or need to be expanded in the case of Turkey. For the next cycle, it is also important to include implementation of measures such as advisory services, improvement of training, improvement and development of rural infrastructure, and establishment and protection of forests.

Still, apart from the financing component, the role of the IPARD programmes is much broader in preparing the pre-accession countries for effective administration and implementation of structural and rural development funds upon accession. The approximation to the CAP requires strong management and control systems. Therefore, particular emphasis is put on the institutional set-up and capacity of the administration in terms of policy formulation, implementation, support payment, control, as well as analysis. Subsequently, all candidate countries have established a form of institutional and administrative capacities for implementing the agricultural policy, and especially for utilizing the IPARD funds. Nevertheless, there is still a need for strengthening the capacity, due to many factors, among which the dynamic environment with many continuously changing factors (CAP reforms, accession methodology, climate change or issues arising from the ongoing Covid-19 pandemics). The strengthened capacity should also contribute to the future compliance in the agriculture and rural development sectors. The role of functioning governing management systems such as a paying agency along with a functional integrated administration and control system are an important prerequisite in terms of capacity needed to implement agricultural and rural development actions. The IPARD programme, through its two phases, significantly contributes to the countries' better preparation for this function.

Besides the general recommendations, there are country specific circumstances reflected in the programme implementation. The policy environment in Albania is still limited in terms of institutional preparation since, despite the setting up a professional and accredited paying agency (already established Agriculture and Rural Development Agency – ARDA), it is lacking a management and control systems such as IACS (not achieved currently). The line ministry should continue to make

strong efforts for alignment with the EU *acquis* in Chapter 11, especially towards accomplishing the legal base for LAG development. More efforts have to be done to include the IPARD components for LAG capacity building. These reforms should be accompanied with preparation of formal definition for rural areas and areas with natural constraints, as well as a strong awareness campaign and intensive capacity building. In addition, IACS elements should be a priority, implying a functioning farm register, animal register, LPIS, as well as a market information system and FADN to be prepared as soon as possible. Interventions should be closely coordinated with the donor community to improve legal and institutional base. Extra efforts should be made on inter-institutional coordination with the inclusion of academia and civil society.

The IPARD programme in Montenegro recognizes larger farms that are operating profitably and are market-oriented. Necessary animal welfare standards, environmental impacts and work safety depending on the investment represent an additional burden for users during the implementation of the investment. The small market and dependency on supply of goods and services from abroad represents a bottleneck when it comes to the speed of investment. Pre-financing of the investments is often an obstacle, which can be facilitated by the establishment of a guarantee fund. Administrative procedures when it comes to the IPARD II programme (state and local level) need to be further accelerated, and it can be beneficial to form a list of consultants who are ranked according to the success of the submitted requests/documentation.

In North Macedonia, improving the institutional and legal conditions is very important for better utilization of the IPARD funds, for instance, adopting detailed plans in the municipalities or prioritising the documentation for projects involving construction activities and legalization requirements. Communication and connection between relevant institutions, databases and registries related to IPARD and continuous improvement of the capacity of the institutions is crucial for the efficient implementation of the programme. Further interventions can be made in additional simplifying of the application procedures and necessary documentation; enhancing the applications administration; introducing specific focus to some calls on certain issues related to the programme objectives. Accessible advisory support and continuous training can certainly contribute to more successful and appropriate use of the funds.

In order to improve the implementation of IPARD II programme in Serbia, it is recommended to increase the minimum investment threshold for all measures and to redirect small applicants to national measures. Regarding the Paying Agency, separating it from the line ministry could improve its efficient functioning. Additional transparency can be achieved by providing lists of approved beneficiaries, information on consultants that worked on the application, providing direct access for the IPARD Agency to the Cadastre data, the Register of approved facilities maintained at the Veterinary Administration, the database of the Tax Administration and local self-governments. Regarding the IPARD Technical Bodies, the recommendations are related to public disclosure of unpublished checklists, continuous training, development of practical instructions and guides, enabling access for technical bodies to databases relevant for operation, improvements in the system for complaints resolving, implementation of the LPIS system. Extension's role should be shifted from working on small number of IPARD applications, to assessment of eligibility to apply for all beneficiaries, with a software solution that could enable extension officers to quickly evaluate beneficiaries in terms of compliance with specific criteria for the IPARD programme. Recommendations to local governments and ministries in charge of construction and local self-government are related to implementation of a set of activities aimed at harmonizing the criteria for issuing permits and approvals in the agricultural sector, through establishment of continuous training and guidance related to permits and approvals in the agricultural sector, through the creation of an inter-ministerial working group from relevant ministries that would continuously work to inform local self-governments, and harmonize and facilitate the issuing of permits and approvals in the agricultural sector.

In the case of Turkey, supporting all sectors in all provinces and in all call periods negatively affects the sustainability of local businesses in some regions and even causes them to be closed. Regional and local planning of the sectors supported under the programme should be better done. Instead of supporting each sector in each province, the sectors to be supported should be determined according to the local potential. Furthermore, the support provided to rural areas within the programme scope is generally appropriate, but measures should be taken to ensure that it spreads to the local base, and supports should be diversified according to the local demands. If there is a potential inadequacy in the programme that causes low efficiency and performance in using the funds in some provinces, other provinces should be included instead.

Overall, increased use of the funds needs to be further enhanced in all countries by promoting the programme more effectively, strengthening the national institutions' set-up and capacity, additionally aligning the programmes to the beneficiaries needs, while also supporting the applicants in preparing

viable and sustainable projects. The findings, recommendations and lessons learnt may serve for the on-going process of preparation of the next programming cycle for the period 2021-2027 (IPARD III). Last but not least, studies as this one should be more frequently conducted to support the evidence-based approach and provide valuable insights, especially to policy makers.

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CROWDFUNDING RESEARCH TRENDS

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ABSTRACT

The objective is to analyze the publication trend in the crowdfunding topic in the Web of Science. To get to know the most interested journals on the area, the research areas, most prolific authors among others to collaborate and help other researchers find potential gaps in literature. We apply a bibliometric analysis on the 2019 and January 2020 and get 320 publications on the field of crowdfunding. The total publications on the field account 1,477 since 2011 that was the first one. For the period analysed, the Technological Forecasting and Social Change published 14 papers on the topic, and Sustainability published 10 papers. The countries with most publications are USA (73), China (54) and England (30). The agency National Natural Science Foundation of China has financed 20 publications. And the most common document type is the article (269 out of 320). Authors can see the potential of the crowdfunding research for the future research. As a growing number of documents are being published in journals with high impact factor. It offers a review on 320 documents of crowdfunding that are indexed in the Web of Science database. Authors can see target journals, possible collaborators on the field or countries where to focus on in the development of a research.

KEYWORDS

Crowdfunding, Bibliometric, Review

JEL CLASSIFICATION CODES

D26, O36

1. INTRODUCTION

Crowdfunding (CF) is an innovative element since it allows users to obtain financing to carry out business projects, as well as it means for investors a way to diversify their investments by distributing the capital among different population segments (Vismara, 2019; Brem, Bilgram & Marchuk, 2019; Yang, Li, Calic & Shevchenko, 2020; Zubair, Kabir & Huang, 2020).

Crowdfunding has been studied as an element to promote the development of ideas, also as a driver of the democratization of capital, and favoring the dissemination of knowledge Bagheri, A., Chitsazan, H., & Ebrahimi, A. (2019) (Huang, 2020).

Currently, numerous studies are focusing on the role of crowdfunding in the social and economic development of countries (Petruzzelli, Natalicchio, Panniello, & Roma, 2019; Seddighi & Mathew, 2020; Saunila, 2020; Dabbous & Tarhini, 2020). In the Web of Science there is a growing trend in the publication of articles on this subject (Dwekat, Seguí-Mas & Tormo-Carbó, 2020). So, we can see the great interest that high impact scientific journals have in knowing the reality that is being experienced in the new forms of financing (Martínez-Climent, Costa-Climent & Oghazi, 2019). The CF is providing a second opportunity to entrepreneurs with limited resources, it is also demonstrating how effective online communication is and the importance of business strategy to attract new clients among investors (Mai et al., 2019; Zeeshan et al, 2019; Omri, 2020; Sahasranamam & Nandakumar, 2020).

During 2019 and the first month of 2020, 320 documents on crowdfunding have been published. In this article we will proceed to analyze the document types, organizations-enhanced, most prolific authors, the source titles, the countries/regions, languages of the publications and research areas.

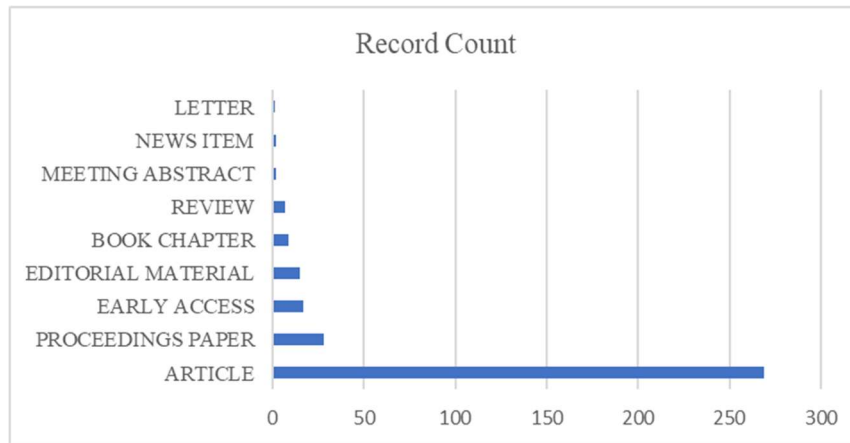
2. BIBLIOMETRIC ANALYSIS ON CROWDFUNDING 2019-2020

The biometric analysis is carried out to find out the current trends on a particular subject. We can observe the gaps that currently exist in the literature and design strategies to produce publications that have a high impact as it is of interest to academia (Baier-Fuentes, Merigó, Amorós & Gaviria-Marín, 2019; Martínez-Climent, Zorio-Grima & Ribeiro-Soriano, 2018; Guijarro-García, Carrilero-Castillo & Gallego-Nicholls, 2019).

2.1 Document type

The most common type of research in the field of crowdfunding in the WOS for the 2019 and the first month of 2020 is the article (269), due to the 84% of the total documents are papers. On figure 1 is also showed that Proceedings Paper are also a growing number, accounting for 28 documents that were presented in conferences, whose proceedings are indexed in the WOS.

Fig. 1: Most common type of crowdfunding research in 2019 & 2020

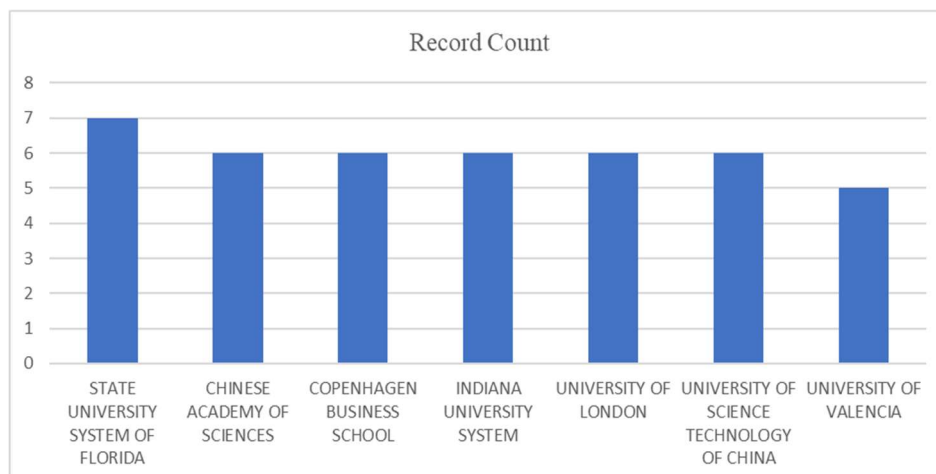


Source: Own elaboration

2.2 Organizations-Enhanced

As showed in figure 2, the organization State University System of Florida published 7 documents, followed by 6 documents from the Chinese Academy of Sciences, Copenhagen Business School, Indiana University System, University of London, University of Science Technology of China and the University of Valencia published 5 documents.

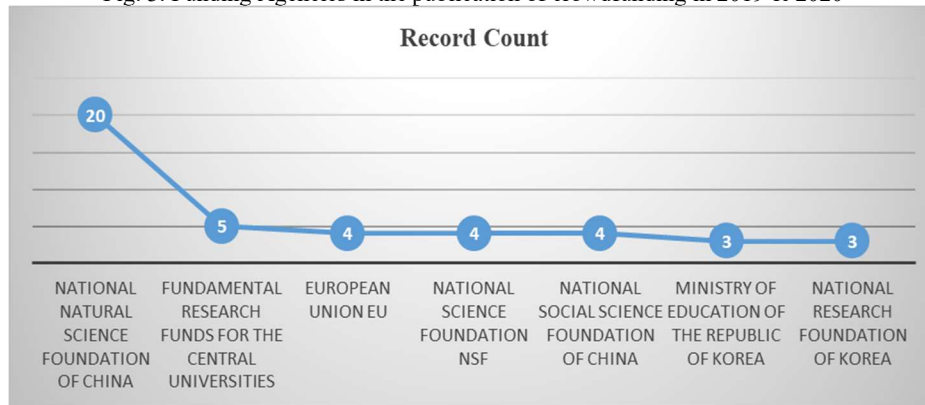
Fig. 2: Organizations-Enhanced in the publication of crowdfunding in 2019 & 2020



2.3 Funding Agencies

China shows great interest as the National Natural Science Foundation of China has found 20 documents. Followed by Fundamental Research Funds For The Central Universities (5), European Union EU (4), National Science Foundation NSF (4) And National Social Science Foundation of China (4).

Fig. 3: Funding Agencies in the publication of crowdfunding in 2019 & 2020



2.4 Prolific authors

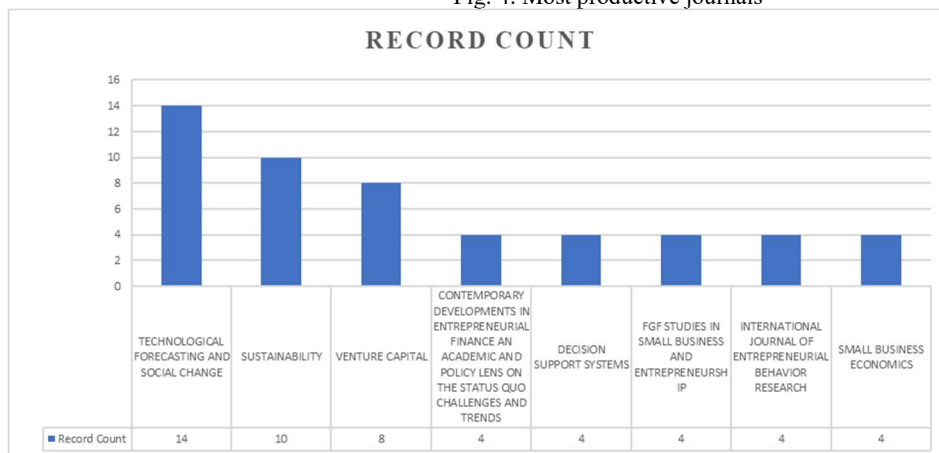
Kraus, Sascha is enrolled to Durham University, England, he has an H-index of 25 and the total sum of times cited is 1,964. Benlian A, has an H-index of 16 and he is affiliated to Darmstadt University of Technology, a German institution. Bi, Gongbing, is from the University of Science & Technology of China and has an H-index of 12. Fanea-Ivanovici, Mina is from the Bucharest University of Economic Studies. Lee, Chang Heon is from the United Arab Emirates University. Snyder, Jeremy is enrolled to Simon Fraser University, Canada. Vismara, Silvio is from the University of Bergamo, Italy and has an H-index of 19. Zhao, Hong is from the Hunan University, China, H-index of 8. Zheng, Haichao is affiliated to the Southwestern University of Finance & Economics, China, H-index of 8.

Table 1: Most prolific authors in the publication of crowdfunding in 2019 & 2020

Field: Authors	Record Count
KRAUS S	3
BI GB	3
FANEA-IVANOVICI M	3
BENLIAN A	3
LEE CH	3
SNYDER J	3
VISMARA S	3
ZHAO HK	3
ZHENG HC	3

2.5 Productive journals

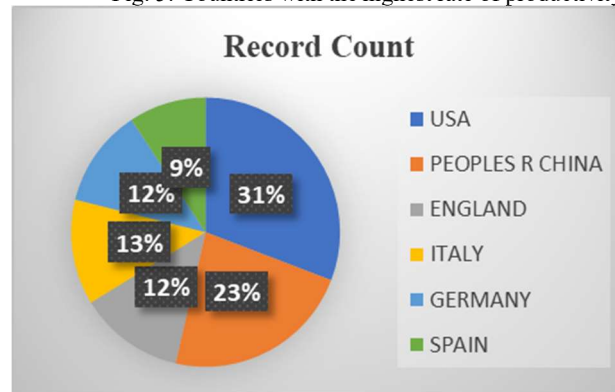
Fig. 4: Most productive journals



In the figure 4 we can observe that the journal with most publications is Technological Forecasting and Social Change (14), whose Editor-in-Chief is Fred Phillips and as described in their website it is “A major forum for those wishing to deal directly with the methodology and practice of technological forecasting and future studies as planning tools as they interrelate social, environmental and technological factors”. Sustainability published 10 documents, the journal is described itself as “an international, cross-disciplinary, scholarly, peer-reviewed and open access journal of environmental, cultural, economic, and social sustainability of human beings. Sustainability provides an advanced forum for studies related to sustainability and sustainable development, and is published semi-monthly online by MDPI”.

2.6 Countries

Fig. 5: Countries with the highest rate of productivity



USA published 73 documents accounting for almost 1/3 of total publications. It is followed by China (54), England (30), Italy (30), Germany (28) and Spain (22).

2.7 Research Areas

Crowdfunding is an interdisciplinary concept, as can be seen due to the different research areas that embrace the publications. In the field of Business Economics, 159 publications were developed. Computer Science also shows interest with 46 documents published in the WOS. Engineering area documents account for 30. Information Science Library Science represent 23 out of the 320 analyzed in this paper. Environmental Sciences Ecology and Science Technology Other Topics published 21 documents each one.

3. CONCLUSION

The study of crowdfunding is gaining relevance among the academia as a growing number of publications are being developed. It reflects the global panorama, due to individuals and firms are using the new form of financing to avoid intermediaries as banks and contributing to the distribution of capital. We have observed that the articles are the main source of research, as 269 were published in the period 2019 and January 2020. That the State University System of Florida is the organization enhanced counting with 7 publications of CF. The agency National Natural Science Foundation of China has financed 20 documents. Sascha Kraus is the most prolific author on CF for the period analyzed. The Technological Forecasting and Social Change published 14 documents on crowdfunding. USA is the country with most publications (73). And the research area of Business Economics is the most common with 159 documents.

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SAMPLING ISSUES AND ECO-NETWORKS ON INNOVATION MANAGEMENT, QUANTITATIVE RESEARCH STUDIES CHALLENGES

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ABSTRACT

The study examines the implications of Statistical Analysis when used for analyzing complex systems and ecosystems, such as the ones that represent networks of innovation and entrepreneurship. There is a serious concern regarding the effectiveness of using Quantitative Research Tools when analyzing the behavior, decisions, motives and outcomes of special target groups, such as innovators and entrepreneurs, and of course there are critical differences between them as well. Quantitative research depends on a large degree to acceptance of a number of key hypotheses, such as linear relationships, or population distribution in preselected categories, e.g. Gaussian type Curves. More specifically critical decisions related to sample choice, selection of statistical tools and methods which will be used for further analysis and conclusion may lead to less accurate estimations, regarding the population. On the other hand, innovation as a concept, ecosystems of innovation and individual entrepreneurs appear to have certain characteristics that makes it a bit questionable whether their population can actually meet several key criteria or further evidence and further analysis (Theory of Networks and Graph Theory) indicates that a new set of methodologies can provide more accurate results and highlight different aspects of business reality, compared to findings derived from traditional quantitative methods. Therefore the study examines several sampling and methodology questions affecting the results of the traditional quantitative research and hypothesis testing formation and to examine evidence that may question traditional quantitative research methods and their findings in the area of innovation management. Findings will provide researchers, policy makers and members of the innovation ecosystem useful insights for further research and a basis for further decisions and policy formation.

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KEYWORDS

Start-Ups, Entrepreneurship, Sampling, Statistical Analysis

JEL CLASSIFICATION CODES

M13, O30, O31

1. INTRODUCTION

The research on innovation and entrepreneurship networks, especially when population consist of startups and their representative founders is not easy to implement due to the heterogeneity of the definition of basic concepts, including, first of all, the definition of a “start-up”. Researchers undertaking startup issues in their research and analysis are based on the well-known definition of Steve Blank, according to which a startup is a “temporary organization searching for a repeatable and scalable business model” [1]. Past research also highlights issues related to start-up definitions, impact on the economy, stage of development, as well as founder’s perceptions [2], [3], [4], success factors [5], business model innovation [6], founder’s experience, education, team sizes and taking into account the way founders had to face the challenges required to scale up their ventures [7]. A large part of entrepreneurial research still focuses on Correlation Coefficient, examining (and assuming) the existence of linear relationships within the data. Ideally the key variables examined address the needs of a theoretical model, and – when statistical analysis is involved – quantitative data are usually collected with the use of (structured) questionnaires.

2. SAMPLING DESIGN AND STATISTICAL THEORY

2.1 Key Problems regarding Sampling Design for Quantitative Research using Questionnaire

Past academic studies suggest [8], [9], [10], [11], [12] that the basic and most important thing in a survey (design) is to define the (target) population with absolute accuracy. This is valid for any survey: the classical survey and even the graphos ones, as it is e.g. web-surveys. The slightest mistake in defining the target population can lead to mistaken and even to ridiculous results. The second step is to find and adopt some sampling framework(s), so that the sampling can take place correctly. Such sampling frames are folders, files, catalogs and all kinds of recording media that contain exactly all the individuals or elements of the Population. Then useful information about the population is collected, regarding its various parameters like size, number of strata and their sizes. First of all the size of the population is determined. Sometimes the size determination is not an easy thing. So we have:

(a) If the population is registered in any recording medium, then one counting procedure is enough especially for not very big sizes.

(b) If the registration takes its place in more than one recording media all the sizes of the subpopulations in the individual media are listed and added (summarization).

(c) For the (more) complicated situations we have to use the appropriate procedure for the case. A very common procedure for complicated kinds of population (e.g. the web or any network but not only) is the one called “capture recapture” (symbol: c/r) procedure. We give an example. *Example:* We try to count the “start up” enterprises of the region Central Macedonia, Greece (CM-Gr). For this we think for an official folder of all start enterprises of the area and say that the number of the included start up enterprises is the unknown $N^{(c/r)}$. Also $N_1=240$ are the start up enterprises in the municipality of Thessaloniki, the capital of the region. A pilot sample of size $N_2=140$ start up enterprises from all over the region of CM-Gr is taken. Inside the sample $m=105$ start up enterprises are in Thessaloniki. Then the number of all the start up enterprises of the whole area is given by $N^{(c/r)} = N_1 * N_2 / m = 240 * 140 / 105 = 320$ start up enterprises. So the population of the startup enterprises in CM-G includes 320 of them.

After the (good) definition of the population a serial number is given to any element of the population. In order to select the sample, a draw is made between the individuals of the population with the help of the serial number of individuals. The serial numbers of the selected elements are drawn by the use of a random number table (RNT) or by the use of some computer program called pseudorandom number generator (PrNG). If the individuals of the population are selected for the sample by the whole population in a uniform manner, then we have simple random sampling (SRS). If selected from different strata of the population we have Stratified Sampling (StS) with its variations. In general there are many techniques and methods of sampling in the literature. Four groups of such methods are roughly distinguished. Each such group has many variations. The four basic groups are see, Cochran (1977), Farmakis (2009, 2015 and 2016):

- Simple random sampling (SRS)
- Stratified sampling (StS)
- Systematic sampling (SyS) and
- Cluster sampling (CluS) with many-many variants.

Determining the sample size is also a very important thing, see Farmakis (2006, 2009, 2015 and 2016), Cochran (1977). For the SRS and if the studied random variables are quantitative ones, then the size of the designed sample depends on:

- The size of the population N (Ascending function of...)
- Squared accuracy d^2 of the estimation of the parameter (Descending function of...)
- Variance of the random variable s^2 (Ascending function of...)
- Significance level α (Descending function of...)

The minimum sufficiently large sample size n_0 is given by the next relation:

$$n_0 = \frac{N}{1 + \left(\frac{d}{s z_{\alpha/2}} \right)^2} + 1 = \frac{N}{1 + \frac{d^2}{s^2 z_{\alpha/2}^2}} + 1, \quad z = \frac{z_{\alpha/2}}{d}$$

where $[x]$ is the integral part of x , the maximum integer that does not exceed x .

For the stratified sampling techniques all the above (about the size of the sample) are valid if instead of the variance s^2 the mean variance over all strata is taken, Farmakis (2006, 2009, 2015 and 2016). For the other methods and techniques the decision on the sample size depends on the ever

situation and the researcher's opinion. Sometimes a low budget sampling method is applied based on Systematic Sampling. That low budget sampling procedures are non-probability sampling procedures and are in the most of cases based on some kind of additional parallel and independent information, Farmakis (2009,2015 and 2016). In surveys with questionnaire the population is a set with elements people and a questionnaire is prepared to be distributed to the people in the sample. This people will answer to the questionnaire questions with the utmost honesty. Also in many cases pairs of co-submitted questions are used in order to get answers to some "difficult" questions, e.g. "Did you make an honest tax return?", etc. In any sampling survey the problem of bias arises. This is also a major problem in questionnaire surveys. So in any sample survey with a questionnaire, an attempt is made to avoid any kind of bias through the questionnaire. It is noted that even a low percentage of those surveyed and responding to the respective survey is a factor of bias. Investigators' attention is always focused on the risk of bias.

All the above answers will be the data of the survey to be analyzed by the statistician researchers in order to get any output founding. Some statistical (analyzing) packages may be also used. This Statistical Analysis begins with Descriptive Statistics procedures and then various tests are performed to compare means, dispersions, indices, etc. In the next stage, cross-sections and X-square tests are used to reveal dependencies or not between the various random variables involved in the problem we face. The next (third) stage may include very specific Data Analyzes and corresponding conclusions, (ANOVA, Correlation, Regression, etc.). All the founding will be the content of the discussion text and conclusions. This part of the research is usually called "deliverable". The conclusions will be made public, as they will be the subject of any publication. Sometimes the results and the conclusions of the research are not published but remain at the disposal of the client (financier) of the research.

- Relevance of a person to provide an answer – it has to be verifies that the person who fill in a questionnaire expresses the company view; however it may not be uncommon different people in the management or founder's team to have different personal views regarding key areas. This can be even more important in cases with different focus or background of the founders.
- Non- Linearity of relationships – this can be proved a key issue, and statistical tools such as Regression Analysis, Pearson & Spearman Coefficient can be used to identify only linear relationships between variables.
- Sample focuses on the edges of the Gaussian Curve – it is reasonable to assume that entrepreneurs and innovators belong to the extreme parts of a Gaussian Curve, if any; as a result it becomes questionable whether statistical tools designed to analyze context within an Gaussian Curve (and therefore are tools that suggest the existence of a Gaussian Curve and linear relationships) suitable for the task?
- Differences between sample members – do all members of the sample they actually belong to the same Gaussian Curve? E.g. Some entrepreneurs maybe market experts, product design champions or technology experts – it is likely to have different skills, background and education and as a result different tasks within an organization (regardless whether the organization is start-up or not), and as a result, have different priorities and different point of view regarding key variables and metrics that are critical for the organization's performance. A great marketing person may be a bad technical director (e.g. Steve Jobs and Ellon Musk are both innovators, but with a much different focus and approach: as Gates describes: Jobs was a great marketing person and orchestrator with a strong focus on product design, while Musk focuses on product performance and product excellence)
- Past studies [11] highlighted the tendency to avoid to provide information, especially in cases of failure; researchers tend to consider that especially in cases of established companies, companies and managers were particular reluctant in revealing information which may were critical reasons for failure. More recently, start-uppers appeared to be more willing to share their experiences, including their failures, and provide valuable information, however some bias may still exist regarding the extend and the value of information provided.
- Most importantly, Cognitive issues may also be applied; Success of a business venture (and failure as well) is a result which depends on many factors (variables) each one with different significance and impact; since there are actual differences between been able to actually identify some factors; successful start-uppers may attribute their successes to some factors that are not necessarily the ones that led to success or the ones that actually contributed to the success of their venture (and start-uppers who failed may also lack the knowledge of the real reasons of their failure); the best that a researcher can assume is that they respond based on their best of their understanding and as honestly as possible.

2.2 Data and relevant Theory come First, Statistical Theory and Tools Follow

A measure of correlation [12] is a random variable that is used in situations where the data consist of pairs of numbers, such in bivariate data. Suppose a bivariate random sample of size n is represented by $(X_1, Y_1), (X_2, Y_2), \dots, (X_n, Y_n)$. It can be used (X, Y) when referring to the (X_i, Y_i) in general. That is, the (X_i, Y_i) for $i=1, 2, \dots, n$ have identical bivariate distributions, the same bivariate distribution as (X, Y) has. Examples of bivariate random variables include one where X_i represents the age of a i th individual and Y_i represents the weight of him, or where X_i represents a test score of a i th individual and Y_i represents her total amount of score. By tradition, a measure of correlation between X and Y should satisfy the following requirements in order to be acceptable. First of all, the measure of correlation should assume only values between -1 and $+1$. Then, it should be positive and close to $+1.0$ when the larger values of X and the larger values of Y tend to be paired, and the smaller values of X and Y tend to be paired together too. This tendency is strong and is called a positive correlation between X and Y . Respectively, this measure of correlation should be negative and close to -1.0 when the larger values of X and the smaller values of Y tend to be paired, and vice versa. This tendency is strong too and we can say that X and Y are negatively correlated. On the other hand, if the values of X appear to be randomly paired with the values of Y , the measure of correlation should be enough close to zero. This is the case when X and Y are independent, and possibly some cases where X and Y are not independent. We then say that X and Y are uncorrelated, or have no correlation, or have correlation zero. Pearson's correlation coefficient is the most commonly used measure of correlation. It is denoted by r and also is defined as $r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2 \sum_{i=1}^n (Y_i - \bar{Y})^2}}$. Pearson's r measures the strength of the linear association

between X and Y . The meaning of the strength linear association lies in the fact that if a plot of Y versus X gives the points (X, Y) all lie on, or close to, 1.0 then the line is sloping upward, and -1.0 the line is sloping downward. We have [12] also to check the sources of bias if we want to compute a bivariate correlation coefficient. It will be reported the two most important ones: linearity and normality. A researcher must check the relationship between variables. If it is not linear then this model is invalid and he might need to transform the data or use another type of correlation coefficient.

Past studies [11] highlight the importance to look at the data in a graph and after running any other analysis on them. To start a correlation analysis, it should be to look at some scatterplots of variables that the researchers have measured about them. A scatterplot [13] shows the relationship between two quantitative variables measured for the same individuals. The values of one variable appear on the horizontal axis and the values of the other variable appear on the vertical axis. Each individual in the data appears as a point on the graph. As in any graph of data, the researchers have to look for the overall pattern and for striking departures from that pattern. First of all, the direction, form and strength of a relationship can describe this overall pattern of a scatterplot. Direction: The purpose of a scatterplot is to provide a general illustration of the relationship between the two variables. Two variables have a positive association when above-average values of one tend to accompany above-average values of the other, and when below-average values also tend to occur together. Two variables have a negative association when above-average values of one tend to accompany below-average values of the other. Form: A relationship is linear if one variable increases by approximately the same rate as the other variables changes by one unit. In other words, the points on the scatterplot closely resemble a straight line. Other form of relationship between the two variables can be eg. curvilinear, which it is not like a straight line but it has the form of a curve. This is due to the fact that one variable does not increase at a constant rate and may even start decreasing after a certain point. Strength of the relationship: The slope provides information on the strength of the relationship. The slope is 1 when we have the strongest linear relationship. This means that when one variable increases by one, the other variable also increases by the same amount. This line is at a 45 degree angle. In addition, great importance must be given to the strength of the relationship between two variables because is a crucial piece of information. A researcher should not rely on the interpretation only because it is too subjective. More precise evidence is needed, and this evidence is obtained by computing a coefficient that measures the strength of the relationship under investigation. The next thing that is should be under concern is an important kind of departure, the outlier. An outlier is an individual value that falls outside the overall pattern of the relationship.

The measure of correlation [12] may be used with any numeric data and there are no requirements about the scale of measurement or the type of underlying distribution, although it is difficult to define unless the scale of measurement is at least interval. It meets the necessary requirements of an acceptable measure of correlation. However, r is a random variable and, as such, r has a distribution function. Unfortunately, the distribution function of r depends on the bivariate distribution function of

(X,Y). Therefore, r has no value as a test statistic in nonparametric tests or for forming confidence intervals unless, of course, the distribution of (X,Y) is known. In addition to this widely accepted r , many other measures of correlation have been invented that satisfy the preceding requirements for acceptability. Some measures of correlation possess distribution functions that do not depend on the bivariate distribution function of (X,Y) if X and Y are independent and, therefore, they may be used as test statistics in nonparametric tests of independence. The measures of correlation selected for presentation here are functions of only the ranks assigned to the observations. They possess (X,Y) if X and Y are independent and continuous. They may even be used as measures of correlation on certain types of nonnumeric data, if the data meet the ordinal scale of measurement.

When the sample [11] is reasonably large, e.g. 100 observations, it is also possibly large enough for the central limit theorem and the researchers should have not any concerns about normality. However, it would be advisable to use bootstrap function to get robust confidence intervals. The researchers might also consider and use a rank-based method so that they compute the correlation coefficient itself. Spearman's correlation coefficient ρ (rho) [11] is a non-parametric statistic based on ranked data and the researcher can minimize the effects of extreme scores or the effects of violations of the assumptions so it can be useful. Spearman's test works by first ranking the data and then applying Pearson's equation to those ranks. The data [12] may consist of a bivariate random sample of size n , $\{(X_1, Y_1), (X_2, Y_2), \dots, (X_n, Y_n)\}$. Let $R(X_i)$ be the rank of X_i as compared with the other X values, for $i = 1, 2, \dots, n$. That is, $R(X_i) = 1$ if X_i is the smallest of X_1, X_2, \dots, X_n , $R(X_i) = 2$ if X_i is the second smallest, and so on, with rank n being assigned to the largest of the X . Similarly, let $R(Y_i)$ equal $1, 2, \dots, n$, depending on the relative magnitude of Y_i , as compared with Y_1, Y_2, \dots, Y_n , for each

Kendall's tau, τ , [11] is another non-parametric correlation and it should be used rather than Spearman's coefficient because it is useful with small data set with a large number of tied ranks. If the researcher has to rank all of the scores and many scores have the same rank, then Kendall's tau should be used. Although Spearman's statistic is the more popular of the two coefficients, it is sometimes suggested that Kendall's statistic is actually a better estimate of the correlation in the population. More generally, when using correlations as effect sizes the researcher should have in mind either when he reports his own analysis or he interprets others that the choice of correlation coefficient can make a substantial difference to the apparent size of the effect.

Correlation coefficients [13] have a probability (p-value) that shows the probability that the relationship between the two variables is equal to zero (null hypotheses; no relationship). Low p-values may have the strong correlations because the probability that they have no relationship is very low. In addition, in social sciences when p-value is lower than 0.05, correlations are typically considered statistically significant, but the researcher has the liberty to decide the p-value for which he or she will consider the relationship to be significant. It is important to be reported the alpha level, the value of p for which a correlation will be considered statistically significant.

It's important [11] to remember that correlation coefficients give no indication of the direction of causality. There are two problems:

- The third-variable problem or tertium quid: To recap, in any correlation, causality between two variables cannot be assumed because there may be other measured or unmeasured variables affecting the results.
- Direction of causality: Correlation coefficients say nothing about which variable causes the other to change. Even if we could ignore the third-variable problem, and we could assume that the two correlated variables were the only important ones, the correlation coefficient doesn't indicate in which direction causality operates. Therefore, correlation coefficients provide evidence of association, not causation.

2.3 Use of Statistical Theory

Pearson Correlation Coefficient appears to be a widely used statistical method for entrepreneurship research, at least for quantitative research. [13] Correlation analysis provides "a quantitative methodology used to determine whether, and to what degree, a relationship exists between two or more variables within a population (or a sample)." [14] Correlation is used in order to investigate the possibility of a linear relationship between two (or more) variables examined.

Further studies [15] examine the effectiveness of Bayesian approach when examining financing markets: "the Bayesian theory has been subjected to both internal and external critiques that have brought substantial revisions of its original formulation. Critics have stressed the paradoxes and anomalies which violate the Bayesian rule of the revision of probability with new information"

Summarizing the conclusions of past research within the Bayesian theory, is highly varied: situations characterized by probabilities with partial ordering; non additive probabilities; intervals of probability; situations of ambiguity of the information à la Ellsberg; elements of arbitrariness,

judgements characterised by "vacillation", "indecision", "surprise"; indeterminacy represented by notions of "unreliable", vague and imprecise probabilities. The author concludes that "The original notion of Bayesian rationality in itself was inadequate to explain the actual working of financial markets as it was based on a notion of rationality as internal coherence of the individual. Today as the Bayesian theory is gradually divested of meaning and filled with paradoxes and anomalies, its notion of rationality appears even less enlightening."

Further studies [16] highlight the importance of establishing inclusion and exclusion criteria for sample selection in a quantitative study. "A goal for all researchers regardless of discipline is to yield data findings in support of the predicted correlations or causal relationships as stated in the hypotheses." [17] This means that researchers on the fields of entrepreneurship and e-commerce use specific models and theory to state research hypotheses, then proceed to the actual research phase and – when quantitative research is required, proceed to sample selection, and methods of statistical analysis.

3. CONCLUSION

Application of statistical analysis in Entrepreneurship research sets a number of challenges for the researchers. These challenges have to do with population definition and sampling, as well as the use of traditional statistical methods that require linear relationships (e.g. Correlation Analysis with Pearson Coefficient). A suggestion is the use of several techniques to check for linearity as well as to apply a variety of different, non-linear statistical tools and methodologies.

It is important to refer that correlation requires that both variables be quantitative and describes linear relationships. It does not describe curve relationships, no matter how strong the relationship is. In addition to, correlation is not resistant. Pearson's correlation coefficient is strongly affected by outliers. It is based on means and standard deviations, so it is not robust to outliers; it is strongly affected by extreme observations. These individuals are sometimes referred to as influential observations because they have a strong impact on the correlation coefficient. For these reasons, when describing the relationship between two variables, correlations are just one piece of the puzzle. This information is necessary, but not sufficient. Other analyses should also be conducted to provide more information, such as parametric tests for example t-test and analysis of variance (Anova) and non-parametrics for example X-square test, Mann-Whitney and Kruskal Wallis.

Recent research [18] highlights different statistical findings, using the exact same datasets when using different statistical tools (e.g. graph and network theory tools), and recommend use of a combination of Statistical tools in order for safer statistical findings and related conclusions to be drawn. This is because each combination of Statistical tools acts as a cross-checking mechanism.

It is also a good idea to examine quantitative characteristics in the form of qualitative characteristics to aid in the respective tests, e.g. the X square test for the independence. Thus, the scaling of quantitative characteristics can also be entered from the questionnaire, such as the age with scaling "young", "middle-aged", "elderly". This must be done in accordance with the age limits. Of course, this escalation can also be done at the stage of Statistical processing and analysis, turning the Statistical analysis into a kind of qualitative analysis. It is noted here that the X-square test is a non-parametric (statistical) procedure, free from assumptions about normality, etc.

4. LIMITATIONS OF THE RESEARCH

As the title suggest, the scope of the present paper was to create and establish a reasonable doubt regarding the dependence on statistics on several aspects of the actual world, and more specifically on economic and entrepreneurship fields. More specifically, to highlight areas of the entrepreneurship and economic world where statistical findings and their respective interpretation may lead to misleading conclusions for reasons related to the sample, the phenomenon studied, and the statistical tools used.

There are several reasonable reasons to consider whether quantitative research methods can be used; after there is a closer examination of qualitative variables. Furthermore, use of specific statistical methods and tools may sometimes lead to less reliable conclusions than the ones a researcher would have hoped for.

From this point of view, limitations of the present paper will become evident once scientific research becomes more concerned with the best practices proposed and the conclusions of the present paper, producing more accurate statistical findings and reaching more accurate conclusions.

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THE PERFORMANCE OF UNIVERSITIES IN THE WEST BALKANS IN THE HEALTH SECTOR WITHIN THE HORIZON2020 PROGRAM

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STUDY GENERAL OBJECTIVE:

Analyze the absorption capacity and performance by universities in the Associated Countries of the Western Balkan area of the Horizon 2020 program in the Health / Demographic Change / Wellbeing sector in the period 2014-2020 and the transition to the new Horizon Europe program.

ABSTRACT

Studies published by Qorraj and Ajdarpašić (2018) and documents of the European Commission describe the attention paid to the role of European Funds as essential pillars for achieving economic cohesion and the growth of competitiveness of the Union and pre-accession EU countries. Especially regarding those countries with limited financial capabilities, it is important to take into consideration the Horizon 2020 program, definitely the biggest program on research and innovation with the specific aim to support their economic growth in a sustainable and inclusive way. The objective of the study is in fact to analyze the performance and success difficulties of universities in the Western Balkan countries (with particular emphasis on Albania, Bosnia and Herzegovina, Macedonia, Serbia, Montenegro) within the Horizon 2020 program in the period 2014-2020, the hypothesis related to the impact on the Health, Demographic Change and Wellbeing sector and the transition to the new Horizon Europe program, running from 2021 to 2027. The research methodology concerned the literature review on EU programs and additional material, such as analysis reports and evaluations published both in the academic literature and in EU databases and official commission documents on Horizon 2020 and Horizon Europe. To achieve its ambitious scientific, societal and economic objectives, and to maximize the impact of the financial investment, the program must attract the best researchers and the most innovative companies. In a highly competitive environment, this needs easy access, fair and transparent selection processes, and smooth grant management. To this end the Commission has cut unnecessary red tape, building on simplifications in the current program, so that taking part in EU research and innovation will become easier than ever before. In conclusion, the study shows that, despite the difficulties encountered, the universities of the Western Balkan countries have shown greater capacity for success, compared to the universities of the same sector in the European countries: Romania, Bulgaria, Greece, Slovakia, Hungary.

KEYWORDS

European Funds, absorption and measurement, management of EU funds, Horizon2020, HorizonEurope.

1. INTRODUCTION

The Horizon 2020 as the biggest EU program, it is crucial to be analyzed for the different reasons. First, as the current framework program is finalized and new framework is beginning respectively Horizon Europe 2021-2027. Second, this program has not only supported the beneficiary countries but also evaluated their performance with regard to research and innovation activities, which for the case of the Western Balkans it was challenging process, considering their limited capabilities. Third, this program was functioning under the challenging process of the EU such as Brexit and Covid 19, therefore research and teaching activities were transformed at online system.

The EU programs related to innovation and research it started as 7th Framework Programme to continue with Horizon 2020 and the current framework Horizon EUROPE for the period (2021-2027). Compare to other EU programs the Horizon 2020, and Horizon Europe also, is tackling research and innovation at the highest-level while, other EU programs such as Tempus, Erasmus, mainly supported cooperation and capacity building of the beneficiaries mostly at the Universities at the Western Balkan countries.

The study addressed the following questions:

- a) Is there sufficient results performed by higher education institutions of the Western Balkans with regard to benefits from Horizon 2020, considering the institutional challenges and limitations of these countries?
- b) Did the EU Programmes respectively Horizon 2020 ensured better educational environment in the Western Balkans respectively at Higher Educational Institutions in these countries?

Therefore, the present paper is structured with a first introduction part followed by a theoretical context. In addition, there will be research questions and empirical research, followed by the main findings and the final conclusions.

2. AN OVERVIEW HORIZON 2020

Horizon 2020 is the EU Framework Programme for the Research and Innovation (2014 – 2020) therefore it represents a very effective way to enhance the research and innovation in participating countries. Horizon 2020 program is a very useful tool that intends to support research, innovation, knowledge and growth in a very sustainable and inclusive way, for this reason it is considered the biggest program on research and innovation that truly can support the economic growth of countries with limited capabilities.

Availing of this program, the European Union can:

- encourage international cooperation between parties (such as students, academics, and researchers) as well as well-organized cooperation between HES and public authorities in several countries;
- Cooperate in national and international programs in order to develop new opportunities for people in HEIs by promoting the innovation and value-added products.
- drive economic growth and create jobs in Europe by investing in excellent science, industrial leadership and societal challenges, with a dedicated budget of more than EUR 77 billion over the years.

In addition, the main approach of the Programme was Europe 2020, respectively Union based on research and innovation which supports and addresses:

- Economic crises by identifying sectors, which could support economic growth;
- Addresses people, security and their economic wealth;
- Advance EU position on global level in relation with research and innovation.

Additionally, the PROGRAMME Horizon 2020 has different characteristics such as:

- Innovative approach, respectively from research to innovation;
- Competitive approach, economy, respectively from Innovation to value added (product or creative services);
- Flexible approach to crises or new trends, respectively, Economic crises and need for training and adaption;
- Brain gain, respectively, motivation of world class experts and professors supported by financial schemes to work for the EU projects.

This Program is significant also for the Western Balkan countries as according to Ajdarpašić, S. and Qorraj G (2019) the international cooperation, research and innovation is realized through financial support from various international organizations, in particular EU programs such as CARDS, TEMPUS, ERASMUS+, HORIZON 2020, as well as other relevant frameworks in the field of education.

As the Western Balkans will join the European Union, it is crucial for these countries to increase their participation on Erasmus, Horizon 2020 and other EU programs because these programs can improve their education system, promote and exchange staff and experiences between EU and Western Balkan Universities, but also increase the opportunities and partnership between SME sector and Higher Educational Institutions (Qorraj, 2018).

At the same time and compared to the other EU programs, Horizon 2020 can be considered an additional challenge for those countries since it embraces all existing EU research and innovation funding, including the Framework Programme for Research (FP7), the innovation-related activities of the Competitiveness and Innovation Framework Programme (CIP) and the EIT (UK Higher Education International Unit, 2012).

Apart from Horizon 2020, the EU respectively EU Commission proposed for a € 100 billion research and innovation funding program for seven years (2021-2027) to strengthen the EU's scientific and technological bases; to boost Europe's innovation capacity, competitiveness and jobs; to deliver on

citizens' priorities and sustain our socioeconomic model and values according to Peter Härtwich 2019, EU Commission.

3. METHODOLOGY

The methodology used in the elaboration of this study was mainly based on the bibliographic review of primary and secondary sources with the help of the main databases used in scientific research. The study is also based on the analysis of the European Commission sources and reports. This technique, according to Sierra (2003), enjoys greater scientific prestige in the field of documentary observation because it allows the objective, systematic and quantitative description of the content in order to interpret it.

In this sense, the bibliographic analysis that addresses the subject of measurement and absorption of European funds lays the theoretical foundations on which to support our study.

In the EU framework, the emphasis will be on programs directly funded by the European Commission and the analysis of the literature dedicated to the main objective of the study. As a thematic focus, it has been decided to focus on the report of the Capacity Building in Higher Education (CBHE) program made by EACEA (Education Audiovisual and Culture Executive Agency). The report considers the 5 calls for proposals from 2015-2019, and was an important contribution to analyze access to the program in the Western Balkan region.

4. ANALYSIS: FROM HORIZON 2020 TO HORIZON EUROPE IN WESTERN BALKAN REGION - FOCUS ON HEALTH

Currently, all Western Balkans countries - except Kosovo - have been participating in Horizon 2020 involving HES with 1.527 eligible proposals which consists in the 57% of the total number of applications 1.782 - (Figure.1 and Figure.2), and almost each one has benefited at a different level of utilization. Even if, statistics show that not all Western Balkan countries have had satisfactory results following EU funding programs.

In fact, according to Data provided by EU Commission, from 2014 to 2017 results that Serbia is the most advanced in the region with Albania in the other end of the scale (Figure.1 and Figure.3a).

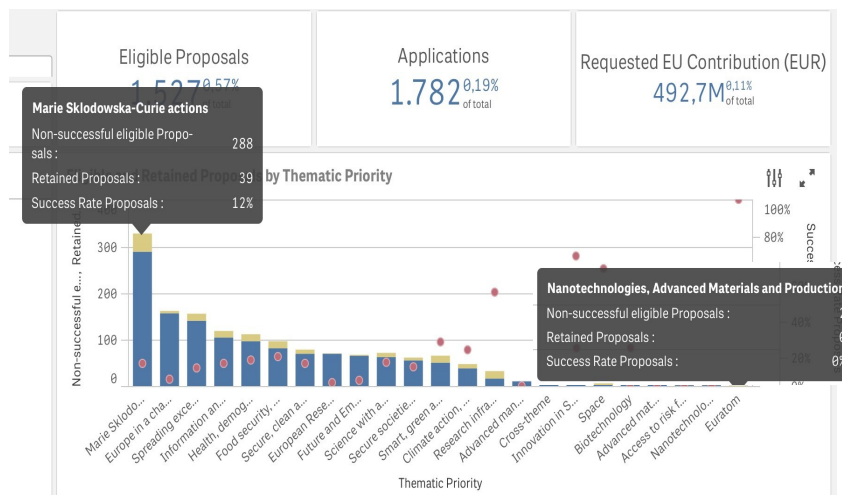
Under the Horizon 2020 program for the period 2014-2017 Albania has the lowest number of projects. This means that Albanian researchers need significant financial support in order to be qualified and to participate in deep exchange of experiences between regional and European scientific researchers.

Figure 1 - Eligible Proposals in Balkan Region, total up-to-date (organization type HES)

Country Name	Eligible Proposals	Retained Proposals	Requested EU Contribution (EUR)	Applications
Totals	1.527	192	492.729.368 €	1.782
Serbia	1.052	134	345.667.638 €	1.112
North Macedonia	229	28	58.007.124 €	240
Bosnia and Herzegovina	198	29	45.935.065 €	214
Montenegro	90	16	21.978.918 €	90
Albania	116	6	21.140.623 €	126

Source: <https://webgate.ec.europa.eu> - Eu Commission research data platform

Figure. 2 - Eligible Proposals in Balkan Region thematic priority, total up-to-date (organization type HES)



Source: <https://webgate.ec.europa.eu> - Eu Commission research data platform

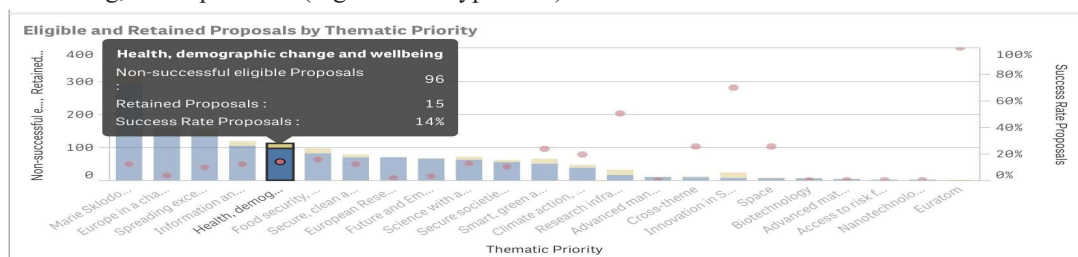
The majority of Western Balkan eligible proposals focused on Marie Skłodowska-Curie Actions (Figure.2), programs that ensure excellent and innovative research training and attractive career and knowledge exchange opportunities through cross-border cooperation and intersectoral mobility of researchers. While Figure.3b shows that the proposals related to Health, Demographic Change and Wellbeing have been totally 15 with a success rate of 14%, which is very important compared to other EU Regions participating at the programme such as Romania, Bulgaria, Greece, Slovakia and Hungary.

TAB. 3a - Eligible Proposals in Balkan Region thematic topic Health, Demographic Change and Wellbeing, total up-to-date (organization type HES)

Country Name	Q	Eligible Proposals	Retained Proposals	Requested EU Contribution (EUR)	Applications
Totals		111	15	35.951.820 €	125
Serbia		83	11	26.587.717 €	86
North Macedonia		15	1	3.193.992 €	15
Albania		8	0	2.223.954 €	8
Bosnia and Herzegovina		10	2	2.088.949 €	10
Montenegro		6	2	1.857.209 €	6

Source: <https://webgate.ec.europa.eu> - Eu Commission research data platform

TAB. 3b - Eligible Proposals in Balkan Region thematic topic Health, Demographic Change and Wellbeing, total up-to-date (organization type HES)

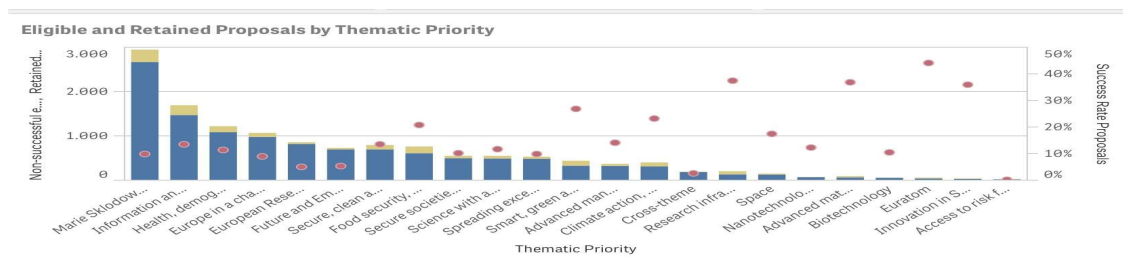


Source: <https://webgate.ec.europa.eu> - Eu Commission research data platform

From Figure.4 it emerges that in the same period (2014-2017) the eligible proposals in Romania, Bulgaria, Greece, Slovakia and Hungary have been significantly higher in number than the countries of the West Balkan area (13.567 compared to 1.527). With regards the theme of Health, Demographic Change and Wellbeing, total number of eligible proposals has been 133 with a success rate of the 11% (Figure.5).

Figure.4 - Comparison Eligible Proposals in Romania, Bulgaria, Greece, Slovakia and Hungary, total up-to-date (organization type HES)

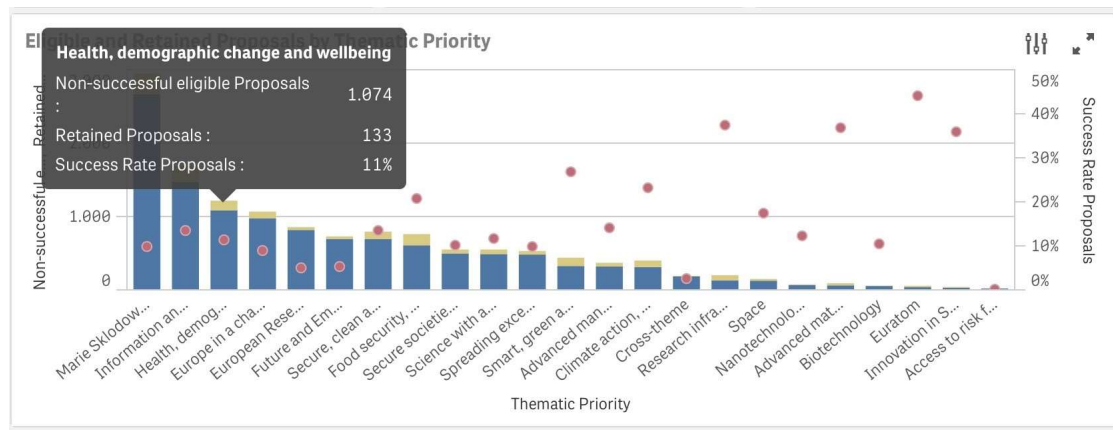
Country Name	Q	Eligible Proposals	Retained Proposals	Requested EU Contribution (EUR)	Applications
Totals		13.567	1.650	6.574.868.982 €	16.153
Greece		8.025	1.038	3.773.949.675 €	8.931
Hungary		2.315	318	1.076.142.353 €	2.424
Romania		2.406	225	945.108.297 €	2.562
Slovakia		1.213	143	463.376.207 €	1.264
Bulgaria		886	120	316.292.449 €	972



Source: <https://webgate.ec.europa.eu> - Eu Commission research data platform

Figure.5 - Comparison Eligible Proposals in ROMANIA, BULGARIA, GRECIA, SLOVACCHIA, UNGHERIA thematic topic Health, Demographic Change And Wellbeing, total up-to-date (organization type HES)

Country Name	Eligible Proposals	Retained Proposals	Requested EU Contribution (EUR)	Applications
Totals	1.207	133	620.305.531 €	1.521
Greece	720	83	376.778.851 €	850
Romania	245	25	101.488.453 €	261
Hungary	212	32	83.721.623 €	234
Slovakia	99	10	39.251.078 €	112
Bulgaria	63	8	19.065.527 €	64



Source: <https://webgate.ec.europa.eu> - Eu Commission research data platform

The difference in the number of eligible proposals in these two zones of Europe is to be found in the access performance by the HES in the reference area and related to bureaucratic formalities related to the program Horizon 2020 which are supposed to improve with Horizon Europe, the new EU program for research and innovation, running from 2021 to 2027.

To achieve its ambitious scientific, societal and economic objectives, and to maximize the impact of the financial investment, the new program aims to cut unnecessary red tape, building on simplifications in the current program, so that taking part in EU research and innovation will become easier than ever before. The proposal made for Horizon Europe based on its impact assessment (European Commission, 2018) is expected to:

- enhance the excellence and impact of the program, allowing EU participants to collaborate with the best minds in the world for increased excellence and competitiveness, for effectively tackling global challenges and for implementing global commitments;
- give to the EU a higher influence in shaping global R&I systems. It would enhance the EU's leading role in setting the policy agenda, in particular for addressing common challenges and for achieving the Sustainable Development Goals.
- be an effective instrument in Europe's efforts to harness globalization by removing barriers to innovation and by establishing fairer framework conditions with international partners.

5. CONCLUSIONS

The results of this study, conducted in order to analyze the performance and success difficulties of universities in the Western Balkan countries, led to the conclusion that the access performance of the HES has been less substantial than those of many other countries and that, consequentially, there is a clear relationship between the obtainance of Horizon 2020 projects and the universities performances.

Surely, Horizon 2020 can be considered a useful tool to support knowledge and growth. However, even the European Court of Auditors in the Special report No 28/2018 called “*The majority of simplification measures brought into Horizon 2020 have made life easier for beneficiaries, but opportunities to improve still exist*”, confirmed that to increase the impact of Horizon 2020 it would have been necessary to further reduce the related administrative burdens.

For this reason, we can conclude by saying that the new Horizon Europe program could be a valuable opportunity for growth and development for HES, as well as a process of continuous

interaction with the research theme and the actors involved. Thanks to the new participation rules aimed at further simplification and a stronger open access regime, the HES of the Western Balkans area will be able not only to submit a major number of proposals but they will have more chances of eligibility and higher success rate.

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BORROWER-SPECIFIC AND OTHER FACTORS AFFECTING NON-PERFORMING LOANS: EVIDENCE FROM CYPRUS

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ABSTRACT

At present, non-performing loans (NPLs) represent one of the main challenges for the banking system in Cyprus. This paper empirically investigates the determinants of NPLs in the Cypriot banking system using both Pearson's correlation analysis and Generalized Method of Moments (GMM) estimations. The analysis is based on a sample of 200 NPLs of physical persons granted by a banking institution, in the period from 2013 to 2019. The research encompasses both macroeconomic and borrower-specific factors and a number of important conclusions are derived. The results show that there are significant statistical associations between profile characteristics of the borrowers, such as gender, age, level of education, professional, and financial standing and place of residence, with data regarding the actual loan, like purpose and type of collateral, but also with the state of the NPL, and its rescheduling. In addition, other important conclusions are drawn, such as on the process and on the potential development of advances into NPLs due to a series of macro and micro economic factors. The results further indicate that lower economic growth, higher inflation, and higher interest rates are associated with higher NPLs. Additionally, NPLs are affected by borrower-specific variables such as return on assets and growth of loans. Our findings may help management to take corrective actions and offer important policy implications for regulatory authorities that could be helpful when designing prudent economic policies regarding NPLs. In addition, the study provides insight to potential investors to consider the findings while selecting better investment opportunity. The current study is the first of its kind focusing on the link among borrower-specific factors, macroeconomic variables, and NPLs within the specific context of the Cypriot economy.

KEYWORDS

Non-performing loans, Macroeconomic determinants, Bank-specific determinants, Borrower-specific determinants, Generalized Method of Moments

JEL CLASSIFICATION CODES

C23, C51, G21

1. INTRODUCTION

The recent financial crisis has hit the banking system significantly, both internationally and domestically. In these circumstances, more widespread concepts such as non-performing loans (NPLs) became more widespread. According to the European Central Bank (ECB), NPLs are defined as either significant exposures with a delay of more than 90 days or exposures for which it is not considered likely that the debtor will be able to fulfil his/her credit obligations without the liquidation of collateral, irrespective of the existence of non-delayed amount or the number of days of delay. Consequently, the concept of NPL includes both the criteria of 'delay' and 'uncertain recovery'. In addition, NPLs include loans restructured twice within two years or loans restructured over a two-year period with delays of more than 30 days (ECB, 2018).

Loans can also be classified as 'problematic' when they exhibit or may exhibit in the future repayment problems, regardless of whether they are serviced or not. Similarly, they are classified as 'doubtful loans', when there are clear indications of future non-repayment, partial or total. According to criteria set by the banks, bad debts can be considered to be irrecoverable, in which case they must be written off, so that the balance sheet of the banking institution reflects the actual value of the claims.

For this reason, banks should thoroughly check their total loan portfolio and adequately recognize impairment. Such loans are called “impaired loans.”

Literature shows that a rapid build-up of NPLs is one of the basic causes of banking crises (Amin et al. 2019; Ashraf and Butt 2019; Khan et al. 2020). In line with the argument, this paper aims to investigate the factors that may lead to NPLs, with an emphasis on those relating to the borrower’s initial background (profile). NPLs are a possible outcome of incorrect initial assessment of the borrower by the bank that granted the loan, or due to unforeseen events and circumstances that have a negative impact on the borrower’s financial position and prevent the normal repayment of his obligations to the bank. In any case, it is sufficient to delay the repayment only one day to activate the default scheme, whereas in order to qualify the loan as an NPL it must be delayed for more than 90 days, according to the definition of the European Union (Balgova, et al., 2016; Anastasiou, et al., 2016; European Commission, 2016; ECB Banking Supervision, 2018).

The remainder of the paper is organized as follows. Section 2 sets the theoretical framework for the research through a literature review and Section 3 describes the methodology used. Section 4 reports and analyzes the results and finally, discussion and conclusions are presented in Section 5.

2. LITERATURE REVIEW

A number of studies examines the impact of NPLs in different banking systems or are trying to explain the determinants of this kind of loans. Accordingly, there are two main categories of factors that affect NPLs and contribute to their increase (Ashraf and Butt 2019). The first category refers to causes related to the macroeconomic environment, while the second refers to factors relating to the bank-specific factors. The main challenge and motivation of this paper is due to lack of sufficient research in understanding how borrower-specific factors influence NPLs. It is the first of its kind focusing on the link among borrower-specific factors, macroeconomic variables, and NPLs within the specific context of the Cypriot economy.

2.1.1. Macroeconomic Factors

The various macroeconomic factors that affect the size of NPLs have been the subject of extensive research (Ahmed, et al, 2021; Christodoulou-Volos C. and Hadjixenophontos A., 2017; Chavan & Gambacorta, 2016; Ahmad & Ariff, 2007; Anastasiou, et al., 2016; Kauko, 2012; Khan, et al., 2020; Makri, et al., 2014; Rinaldi & Sanchis-Arellano, 2006; Louzis, et al., 2011; Radivojevic & Jovicic, 2017; Beck, et al., 2013; Mileris, 2013; Teodor, et al., 2020).

The first factor relates to the rate of economic growth that is inversely related to the number of NPLs. It is obvious that in times of stagnant or negative growth rates, the macroeconomic environment becomes less favorable, with a reduction in supply and demand, an increase in unemployment, a fall in real estate values, including mortgage collateral, while credit institutions apply stricter lending criteria. In these circumstances, it is significantly more difficult to repay borrowers’ credit obligations. Interest rates are another important factor that affects NPLs, since an increase in lending rates tends to contribute to an increase in the number of non-performing loans. The rise in interest rates negatively affects the ability of the borrowers to meet their obligations as they now have to pay higher instalments, given the remaining characteristics of loans that remain stable (capital, duration, balance, etc.). The third factor concerns the level of realty prices, which in times of economic recession exhibit downward trends, due to the deterioration of the remaining macroeconomic indicators, since the decline in household and business incomes leads to a decrease in consumption and a decrease in demand for real estate. When the decrease in property prices is significant, then borrowers often devalue the mortgage properties they own and cease to have as their main priority the regular repayment of linked loans, resulting in an increase in the corresponding NPLs. Unemployment is driven by other macroeconomic factors, and any increase leads to a reduction in available incomes, limiting the ability to meet borrowers’ credit obligations, inevitably leading to an increase in the number of NPLs.

Existing research finds that analyzing the effects of inflation on the growth rate of NPLs is more complex than in the case of other factors. In conditions of hyperinflation with unchanged interest rates, borrowers often benefit from a decrease in the real value of their loans which helps to improve their repayment capacity and helps to reduce the number of NPLs. On the other hand, if credit institutions raise interest rates in response to losses due to inflation, then real incomes and wages fall, with negative effects on the size of NPLs. Finally, one factor affecting certain categories of lending is exchange rates, which are negatively correlated with the ability to service loans in foreign currency.

2.1.2. Bank-specific Factors

The various bank-specific factors that affect the number of NPLs have also been the subject of research (Ahmed, et al, 2021; Christodoulou-Volos C. & Hadjixenophontos A., 2017; Ahmad & Ariff, 2007; Anastasiou, et al., 2016; Baudino & Yun, 2017; Louzis, et. al., 2011; Chavan & Gambacorta, 2016; Khan, et al., 2020; Makri, et al., 2014; Anastasiou, et al., 2016; Messai & Jouini, 2013; Radivojevic & Jovovic, 2017).

Increased lending, which usually occurs in times of rapid economic growth, tends to be positively correlated with an increase in the number and amount of NPLs. In fact, in conditions of dramatic growth, with the aim of maximizing their profitability, credit institutions are increasing their loan portfolio in a short period of time, taking on higher non-legitimate credit risks through the relaxation of lending criteria. As a result, the chances of higher NPLs are increased accordingly. Adequate capitalization of credit institutions usually makes them less prone to high credit risk decisions, reducing the chances of high rates of NPLs subsequently occurring. The composition of the loan portfolio is a crucial factor which, with the appropriate strategic options, can reduce the growth rates of NPLs by limiting exposure to credit risks by diversifying both the categories of loans granted (consumer, business, etc.) and the sectors of the economy to which they are addressed (building, tourism, education, shipping, etc.). Staffing management positions and other key posts in the bank with persons that possess appropriate knowledge, training, skills, experience and efficiency may help to reduce the credit risks assumed by the credit institution concerned, as well as to manage crisis situations by recognizing early indications of problem loans and thus taking appropriate action. On the contrary, the inadequacy of executives can lead to uncontrolled credit risks as well as moral hazards, resulting in a further increase in NPLs.

The existence of a clear and strict regulatory framework for the operation of credit institutions and supervision by independent authorities is equally important and can make a positive contribution to reducing the number and/or percentage of NPLs, since it acts proactively against reckless lending and increased assumption of non-legitimate credit risks by credit institutions. Intense competition within the financial system can lead to strategic decisions by credit institutions with increased credit risk, such as the relaxation of lending criteria and the granting of loans with insufficient or zero collateral, which obviously often lead to an increase in NPLs. Innovation in the financial sector can work both positively and negatively in the effort to prevent and tackle the problem of NPLs. Portfolio diversification can make a positive contribution, but actions such as the creation of new mortgage-based investment products can lead to excessive and unmanageable credit risks that can lead to a significant increase in NPLs. The profile of borrowers, which includes their demographic characteristics and financial status, as well as their future prospects, has an equally significant impact both on their access to bank credit and on loans they receive turning into NPLs. As Kosen (2011) notes, the demographic profile can be an indication of the levels of risk involved in each customer's lending. For example, older, unemployed, lower-income individuals, not owning their home, are much less likely to have access to bank loans but even if they do, they are less likely to service them. Even a borrower's place of residence can affect his/her access to lending (Chong, et al., 2010).

2.2. The Effects of an Increase in NPLs

The consequences of NPLs are multidimensional, and concern not only borrowers and credit institutions, but the whole economy and society. From the borrower's viewpoint, an NPL commits valuable collateral and any outstanding debt obligations makes it difficult to obtain new financing and make investments. In the case of natural persons, the consequences are not only economic, but also have psychological and social implications. A borrower with a so-called “red loan” due to financial weakness, develops negative psychology, low self-esteem, feelings of failure, even stigmatization or marginalization from his/her social environment (Balgova, et al., 2016; Cucinelli, 2015; Nyong'O, 2014). On the other hand, from the viewpoint of the lender, an NPL creates direct and indirect costs, both for its management, such as the costs involved in taking legal action, etc. and through capital shortfall which limits the possibility of new credit, which is a source of revenue for credit institutions. In fact, high NPLs place a significant burden on the financial statements of credit institutions and constitute an obstacle to their profitability. NPLs shrink the supply of credit and distort its distribution, adversely affecting the market climate and slowing down economic growth (Balgova, et al., 2016; Cucinelli, 2015; Nyong, 2014). As a result, high rates of NPLs are becoming a scourge for the entire economy of a country or a set of countries such as the Eurozone. The analysis of the impact of NPLs and their increase on the national economy is more complex, precisely because of the two-way relationship between them, since the prevailing conditions in the country's economy expressed through key macroeconomic aggregates are determining factors for the course of the NPLs. However, some of the consequences include lower bank lending due to the lower profitability for the banking institutions, resulting in the depletion of financial resources in terms of capital and labor in sectors with low

productivity, the slowdown in economic and credit growth, as well as the lack of confidence of consumers and businesses in the financial system (Balgova, et al., 2016; Cucinelli, 2015; Nyong’O, 2014; Islam, et al., 2008).

2.3. Management of NPLs

Before analyzing NPL management policies, it is worth mentioning certain issues that need to be addressed by the competent authorities. Firstly, attempts to solve the problem of NPLs, when it is the result of a banking crisis, take place at national level. Even if the banking crisis concerns more than one country, attempts to solve the problem still take place at national level, since state support is a national decision and difficult to coordinate between more countries. However, in cases of associations of states, such as the Eurozone, regional solutions may also be possible. In addition, response policies can only be applied to domestic credit institutions or local branches of foreign banks. At the same time, it should be noted that the longer it takes to deal with the problem of NPLs, the higher the costs of solving it. To effectively manage and resolve the problem of NPLs, authorities should have a clear idea of its size, through on-the-spot checks at credit institutions, Asset Quality Reviews (AQRs) and stress tests, as well as tests of capital adequacy and loss absorption forecasts by credit institutions. On the other hand, where losses have annihilated banks’ capital adequacy, the extent to which the public sector can participate in dealing with NPLs depends significantly on the available budget, which is subject to national and supranational constraints. It is therefore necessary and more effective to take state and private initiatives in combination. In addition, any strategy to tackle the problem of NPLs must be compatible with the prevailing legal and regulatory framework (Baudino & Yun, 2017).

The strategic tools for resolving NPLs focus either on debtors or on credit institutions. The first concerns debt restructuring through judicial and out-of-court settlement procedures and can make a significant contribution to the recovery of the value of the bank’s assets, provided that debt restructuring is truly feasible and not a means of postponing the resolution of the problem. The second includes the write-offs and write-down of debt in the financial statements of credit institutions, the direct sale of NPLs on specialized markets, their securitization and resale in specialized markets, and schemes to protect the assets of banks with a State guarantee and insurance against losses due to NPLs or the acquisition of the "bad" assets of the troubled banks by centralized asset management companies. In addition, options for solving the problem of NPLs must be adapted to the characteristics of the country concerned to maximize the effectiveness of the strategy to be followed, and often include necessary reforms and other policies related to improving the country’s macroeconomic climate (Baudino & Yun, 2017). Another type of classification in the measures dealing with NPLs relates to the distinction between short-term and long-term measures. Short-term measures include exclusive interest payments, reduced instalments, application of a grace period - suspension of payments and capitalization of arrears – interest. Long-term measures include reduction of the loan interest rate, the extension of the duration and maturity of the loan, the additional collateral, the consensual sale based on an agreement (assisted sale), the rescheduling of payments, the conversion of the loan currency and/or other terms – clauses of the loan agreement, the additional credit facilities, the consolidation of debt in the case of multiple NPLs and the partial or total debt write-off (Baudino & Yun, 2017).

The regulatory and supervisory framework designed and implemented by competent national and international institutions, such as central banks, the European Central Bank, the European Banking Authority, etc., and the corresponding organizations in other countries and continents, which are, *inter alia*, responsible for integrating the experience of the latest financial and banking crises with a view to effectively preventing the future recurrence of similar phenomena. At the same time, at political level, it is necessary to design and take concrete measures to limit the impact of NPLs and restart the crisis affected economies. Such measures include the strengthening of access to sources of finance through the strengthening of bank balance sheets, removing barriers to growth by establishing alternative sources of business financing by integrating capital markets in associations of countries such as the Euro Zone. Measures are also taken to address shortcomings in national supervisory and regulatory frameworks and for improving corporate governance in credit institutions and managing specific risks that are related to credit exposure to foreign currencies and reducing housing market imbalances caused by the uncontrolled growth rate of private debt (European Commission, 2016; Yang, 2017).

Finally, it is equally important to implement risk management systems in credit institutions, with a view to regularly monitoring borrowers’ data and the repayment progress of loans, for the early diagnosis, prevention, and treatment of problem loans, before they are converted into NPLs. Risk management includes the procedures for identifying, evaluating, measuring, monitoring, and controlling all risks inherent in the banking system. The basic principles governing risk management that can be applied in any financial institution, regardless of size and complexity, are summarized below: (Hanief, et al., 2012):

1. The overall responsibility for risk management lies with the board of directors of the bank concerned, which shall design the risk management strategy and clearly define its policies and procedures for its implementation.
2. The bank’s individual business units should also be held accountable for the risk they assume.
3. Wherever and whenever possible, risks shall be quantified and reported.
4. The risk review function shall be independent of those who undertake it.
5. Financial institutions shall have contingency plans in place for any scenarios of abnormal or worst-case scenarios.
6. Depending on the type of risk (credit, operational, ethical, liquidity, market) individual principles and procedures are followed for its optimal management.

It is obvious, therefore, that in several cases of banking crises and uncontrolled spread of NPLs, responsibility lies to a significant extent in the inadequacy or failure to apply the above risk management principles.

2.4. NPLS IN CYPRUS

In the years following the crisis of 2013-2015 and after the completion of the troika support scheme in 2016, Cyprus has shown steady signs of recovery, accelerating GDP growth rates, rising inflation, falling unemployment, falling public deficit and public debt, but also falling current account deficit, thanks to increased exports and excellent progress made in the tourism sector. Regarding the banking sector, household and business loans are falling due to the implementation of debt-to-asset swaps, sale of loans and debt write-offs as part of the restructuring of NPLs. Consequently, there has also been a decrease of NPLs. In recent years, there have been increasing trends in demand for loans, without a corresponding increase in loan supply, as lending procedures have become far more stringent. (Lyddon, 2018; PWC Cyprus, 2018).

3. EMPIRICAL RESEARCH

This study is an empirical research that was carried out using a sample of household NPLs at a specific credit institution, on the original profile of NPL borrowers. The focus is on the relationship between the profile characteristics of the borrower and the possibility of a negative loan outcome resulting in an NPL. The research questions that were examine are the following:

1. What factors affect the current state of a loan and its evolution into an NPL?
2. What are the characteristics of the borrower’s profile that may affect the development of a loan into an NPL and in what way?
3. What is the relationship between collateral and possible development of a loan into an NPL?
4. What are the characteristics of the loans that affect the attempt to regulate the NPLs and the number of arrangements made by the borrower?

As a starting point, this paper uses a case study approach, by conducting correlation analysis using unpublished data for a particular banking institution in Cyprus. Given the unique characteristics of the data set - short time period, unpublished and published data set - the paper estimates a Generalized Method of Moments (GMM) model that also deals with the so-called dynamic panel bias. The GMM estimation provides consistent and unbiased results.

The Pearson correlation coefficient, also referred to as the Pearson product-moment correlation coefficient, is a measure of linear correlation between two sets of data. It involves a product moment, that is, the mean (the first moment about the origin) of the product of the mean-adjusted random variables.

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} \quad (1)$$

where n is sample size; x_i, y_i are the individual sample points indexed with i ; $\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$ and $\bar{y} = \frac{1}{n} \sum_{i=1}^n y_i$ are the sample means of x and y , respectively.

Radivojević et al. (2019), Louzis et al. (2012), Makris et al. (2014), confirmed that the GMM estimation is the appropriate to be used, introduced by Arellano and Bond (1991). The model specification is (eq. 2)

$$y_{i,t} = \gamma y_{i,t-1} + \beta x_{i,t} + \alpha_i + \varepsilon_{i,t} \quad (2)$$

where y is the dependent variable, x is the vector of regressors, α is the fixed individual effect and ε is the identically and independently distributed (iid) error term, the subscripts i and t denote the cross-sectional and time dimension of the panel, respectively, and where $y_{i,t} = (NPL)$, and x_{it} is the vector of macroeconomic variables and bank-specific variables other than the lagged NPL, that is, $x_{i,t} = (\text{Growth, Inflation, Interest rate, Unemployment rate, Exchange rate, Return on assets})$, α and β are the vector of coefficients to be estimated.

Judson and Owen (1999) proposed the use of the difference GMM (DGMM) when performing an analysis of unbalanced panel data with less than 20 periods of time, because the lagged dependent variable will be correlated with the fixed effects term (eq. 3). The application of the DGMM model has two advantages. It eliminates the problems of endogeneity and autocorrelation between variables. This is done by both treating lags as instruments and removing the individual fixed effects as well as its associated omitted-variable bias. The result is the following estimated model (eq. 4):

$$\text{Cov}(y_{i,t-1}, \alpha_i) \neq 0 \quad (3)$$

$$\Delta y_{i,t} = \gamma \Delta y_{i,t-1} + \beta \Delta x_{i,t} + \Delta \varepsilon_{i,t} \quad (4)$$

The unbiased GMM estimator can be derived by minimizing the following objective function (eq. 4) and choosing a weighting matrix ‘W’ that converges to its long-term covariance matrix ‘p’ (eq. 6)

$$\left(\begin{matrix} \bar{G} \\ \bar{W} \end{matrix} \right) = N \bar{g} \left(\begin{matrix} \bar{G} \\ \bar{W} \end{matrix} \right) \bar{g} \left(\begin{matrix} \bar{G} \\ \bar{W} \end{matrix} \right) \quad (5)$$

$$p \lim W = \bar{W} \quad (6)$$

In the above specification, \bar{g} is the sample moment condition based on a sample of size n and \bar{W} is a $p \times p$ weighting matrix of population moment conditions.

4. RESEARCH RESULTS

4.1 Demographic Characteristics

Regarding the sample, the NPL population amounts to 40,000 physical borrowers. The aim was to complete 40 questionnaires for each town, so the total sample amounts to 200 borrowers. The sample was selected randomly by customers of the credit institution under study. In a total of 200 individuals, the least numerous age group is the 18-25 with 8.50%, followed by the 26-35 group with 16%. The highest percentages are observed in the ages of 36-45 (20%) and 46-55 (21.5%). Finally, the two oldest age groups, 56-65 and over 65, show the same percentages, 17% each. This age distribution is consistent with the fact that access to lending is usually easier in the middle age groups of 36-45 and 46-55 in which natural persons tend to be in their most productive phase, with a professional and economic profile that enhances their creditworthiness and a wider range of needs for which they would resort to lending (Kosen, 2011). 61.5% of the sample consist of male borrowers, as compared to 38.5% of female borrowers. This difference is consistent with the ratio of male vs female borrowers. According to literature, access to lending by women is much harder than it is for men, especially in countries where gender discrimination is more evident (Galli & Rossi, 2015; Ongena & Popov, 2015; Gubbins & Totolo, 2018; Agostinho, 2016; Kosen, 2011). Yet, in Cyprus the gap in access to borrowing between the two genders is relatively small (EBRD, 2015). Therefore, the gender difference noted in the sample is probably also the result of other factors related to borrower behavior after obtaining the loan.

Regarding place of residence, 62% resided in a municipality and 38% outside a municipality. According to the literature, the shorter the distance of the candidate borrowers’ place of residence from the sponsoring bank, the greater the number of loans granted (Chong, et al., 2010). The respective percentages of the individual provinces of the last updated borrower’s place of residence fluctuate, with the capital Nicosia having 22.5%, followed by Larnaca with 20%, Limassol and Paphos with 18% each and last Famagusta with 14%. One of the most interesting findings is the increase in the percentage of borrowers who now reside outside the Cyprus geographical boundaries to 7.5% from 0.5%. Of particular interest is the distribution of borrowers according to their educational level. The vast majority are secondary and higher education graduates, with 36% and 37.5%, respectively. This is followed by a significant proportion of people who have completed only primary education, equal to 15.5%, while holders of a professional, postgraduate and doctoral degree constitute a total of 11% of

the sample. These results are consistent with the literature that borrowers with a higher level of education tend to receive loans more easily and/or more frequently, as banks consider them more conciliatory and cooperative, but also more able to understand the processes and documents of increased complexity included in lending (Nguyen, 2007).

In relation to the employment condition of the respondents, the majority declare employees (36.5%) and self-employed and retired people follow with 16.5% and 12.5% respectively. 7% of the sample are entrepreneurs, while smaller percentages relate to groups that do not have access to credit facilities like the unemployed (6%) and part-time workers (4.5%), beneficiaries of financial assistance (4.5%) and the bankrupts or restored bankrupts (5%), but also dead borrowers (5.5%) and those who declared ‘Other’ (2%). These percentages are consistent with those found in literature, according to which individuals without a steady job or sufficient income are less likely to be granted a loan as they have a bigger chance to be unable to meet the debt obligations. (Kosen, 2011; Chong, et al., 2010). Finally, as regards the employment sector of borrowers who had declared themselves employed, out of a total of 138 natural persons, 29.7% work in the public sector and the rest in the private sector, with equal to 23.2% in the service sector, 17.4% in the tourism sector, 12.3% in the construction sector, 12.3% in the retail and trade sector and 5.1% in agriculture. It is noted that the distribution of the sample largely follows the distribution of the total employed population of Cyprus.

4.2 Responses by NPL Borrowers on Loan Issues

Of the total sample of 200 NPL borrowers, 66.5% had personal lending, 15% shared lending and only 2% corporate lending. The small percentage of corporate lending is reasonable as most corporate loans are issued to legal entities. 4.5% of borrowers have all three types of lending, 9.5% maintain personal and joint lending, 1.5% personal and corporate lending and 1% corporate and joint lending. Regarding the purpose of lending, 27% of the cases related to consumer loans, 13% residential loans, 12.5% student loans, 11% professional loans, 4% business loans, 5.5% farming loans, 5% investment loans, while 1.5% related to other purposes. Finally, 20.5% of borrowers reported multiple purposes, most commonly “consumer-residential” or “consumer-residential-student,” but also “business-investment” or “business-investment-residential.” It is of interest to note that 60.5% of NPL borrowers stated that since 2013 their lending had never been the subject of a restructuring, compared with 39.5% who had been the subject of restructuring at least once. Of the 79 borrowers whose loans had been restructured, 49.4% reported one restructuring, 27.8% two, 15.2% three and 7.6% at least four. 44% of participants borrowing is in arrears, while 33% is in a state of termination and 21.5% under a court order. Finally, 0.5% and 1% of borrowings are referred to interchangeable as ‘days in arrears and terminations’ and ‘termination and court order’, without a clear indication as to whether they were referring to the same or different lending.

As for the type of loan collateral, 38.5% report personal guarantees, 30.5% tangible security, 22.5% a combination of both, while only 8.5% stated that their lending has no collateral. Of the 122 borrowers with personal guarantees, half of these guarantees came, as expected, from the family environment, 30.3% from the workplace environment, 13.1% from friends, and the rest from other sources (2.5%) or a combination of the previous ones, i.e., family and workplace (1.6%), friends and family (1.6%) and friends and workplace (0.8%). In the case of 106 loans with collateral, 33% relate to a fixed charge on the main residence of the borrower, 29.2% on land property, 7.5% to another residence, 6.6% to an office building, 1.9% to another type of property and 21.7% to a combination of the above. In the same context, for 51.9% of loans with collateral the loan balance has exceeded the Forced sale value of the fixed charge while 48.1% continues to be fully covered. The fact that more than half of the loans have exceeded the forced sale value of the collateral does not mean that when the loan was initially granted it was not fully covered. The main reasons identified for the problem of insufficient collateral lie in the capitalization of interest on loans in arrears and the reduction in the market value of collateral. It must also be noted that the loan balance refers to the current outstanding balance from the customer prior to any impairment or provision for impairment. Of the total number of participating borrowers, 60.5% reported that any repayment arrears did not start to occur in the first year of the loan, while 39.5% reported the occurrences in the first year. The very percentage of arrears starting in the first year is clear evidence of very bad practices in place, before the 2013 crisis and mainly because the assessments of loan applications focused on the value of collateral rather than the borrower’s ability to repay. Finally, regarding the main cause of loans falling into arrears, 21.5% reported the decrease in their incomes, 19% loss of work resulting in a reduction in incomes, 21% other causes such as unexpected increase in family expenses and other family problems, 5% health problems, 5% death, 4.5% disagreement with the terms of the loan, 2.5% divorce, while 21.5% some combination of the above that led to the decrease in incomes.

4.3 Analysis of Factors that Contribute towards Loans Developing into NPLs

In this section, the factors that may affect the course of a loan and its potential development into NPL are explored by calculating bivariate correlations (for the complete set of the correlation analysis see Appendix). For interpretation purposes, we only report Spearman correlation coefficients that are significantly different from zero (i.e., statistically significant correlations for which p-value is less than $\alpha=5\%$ or even $\alpha=1\%$). Table 1 shows the Pearson’s correlation coefficients between the variables that contribute towards loan developing into NPL.

Age shows a relatively weak positive correlation with the amount of borrowing (Spearman’s rho (ρ) = 0.223, p-value = 0.021 $<\alpha=0.05$) but also with the occurrence of arrears in the first year of the loan (ρ = 0.174, p-value = 0.014 $<\alpha=0.05$). The first relationship suggests that as the borrower’s age increases, the NPL is more likely to exceed 100%, while according to the second, younger borrowers tend to start repayment delays in the first year more often than older ones. Gender has a relatively weak negative correlation with the type of borrowing collateral (ρ = -0.166, p-value = 0.018 $<\alpha=0.05$), but due to the non-operative nature of the two variables, no practical interpretation is given to the statistically significant relationship. A relatively weak negative correlation is also observed between the educational level and the possibility of arrears in the first year of the loan (ρ = -0.166, p-value = 0.019 $<\alpha=0.05$), which may mean that borrowers with less education tend to fall in arrears on their loan obligations later than higher-educated borrowers. A similar relationship is found between the last updated place of residence and the possibility of arrears in the first year (ρ = -0.192, p-value = 0.006 $<\alpha=0.05$). However, the non-orderly nature of the two variables does not allow for any practical interpretation.

Table 1. Correlation coefficients of the variables that contribute towards loan developing into NPL

Variables	Gender	Age	Amount of borrowing	Arrear	Education	Place of residence	Sector of employment	Financial and professional profile	State of borrowing	Loan restructurings	Type of collateral
Gender	1.00										
Age		1.00									
Amount of borrowing		0.223 (0.021)	1.00								
Arrear		0.174 (0.014)		1.00							
Education				-0.166 (0.019)	1.00						
Place of residence				-0.192 (0.006)		1.00					
Sector of employment				-0.339 (0.000)			1.00				
Financial and professional profile								1.00			
State of borrowing							0.324 (0.000)	0.295 (0.000)	1.00		
Loan restructurings								0.248 (0.027)		1.00	
Type of collateral	-0.166 (0.018)						-0.503 (0.000)	-0.342 (0.000)			1.00

Notes: Only statistically significant correlations at the 1 and 5 percent levels, are reported.

The current financial and professional profile of the borrower shows a statistically very significant positive correlation with the current state of borrowing (ρ = 0.295, p-value = 0.000 $<\alpha=0.01$), as well as a statistically significant positive correlation with the number of restructurings since 2013 (ρ = 0.248, p-value = 0.027 $<\alpha=0.05$), but also statistically very significant negative correlation with the origins of personal collateral (ρ = -0.342, p-value = 0.000 $<\alpha=0.01$). However, in this case too, apart from the existence of the possible relationship between the variables, due to their nature, it is not possible to further analyze it. Finally, the sector of employment of borrowers appears to have a statistically very significant positive correlation with the current situation of lending (ρ = 0.324, p-value = 0.000 $<\alpha=0.01$) and statistically very significant negative correlation with the origins of personal collateral (ρ = -0.503, p-value = 0.000 $<\alpha=0.01$) and the possibility of arrears from the first year of borrowing (ρ = -0.339, p-value = 0.000 $<\alpha=0.01$), with no possibility of additional extensions.

In conclusion, the following findings arise:

1. Age may affect the amount of borrowing accessible to prospective borrowers in relation to the amount of collateral available, which confirms the findings that very young or very old people have lower access to credit, but as age moves closer to middle range the chances of having

collateral that can ensure higher borrowing increase. On the other hand, younger people are more likely to find themselves unable to service their borrowing, as they usually have lower disposable income and more limited savings.

2. Gender, in addition to its effect on access to borrowing, may also affect the type of collateral available, which can be attributed to the wider gender differences and discrimination in income and assets owned.
3. Borrowers with higher education more frequently show arrears in the first year of borrowing than borrowers with a lower level of education, and this may also be due to more frequent borrowing to the former.
4. The most recent place of residence appears to affect the incidence of repayment delays from the first year of borrowing, but this relationship does not reveal any further useful information.
5. The current financial and employment profile of the borrower affects the current state of borrowing since people with stable work and higher incomes will be less likely to delay the repayment of their loans. It is reasonable to expect the same characteristics to affect borrowers' ability to reach restructuring agreements in the case of NPLs. Finally, it is obvious that the financial and professional profile will also affect the origins of personal collateral.

4.4 Analysis of the Factors that Relate to Borrowing

In this section, the factors that may affect the course of a loan and its potential development into NPL are explored by calculating bivariate correlations. Again, for interpretation purposes, we only report Spearman correlation coefficients that are significantly different from zero (i.e., statistically significant correlations for which p-value is less than $\alpha=5\%$ or even $\alpha=1\%$). Table 2 shows the correlation coefficients between the variables that relate to lending.

Table 2. Correlation coefficients between the variables that relate to borrowing

Variables	Type of borrowing	Purpose of borrowing	Main cause of delays	Delays 1 st year of borrowing	State of borrowing	Loan restructurings	Origin of personal collateral	Type of collateral
Type of borrowing	1.00							
Purpose of borrowing	0.562 (0.000)	1.00						
Main cause of delays	0.147 (0.037)	0.233 (0.001)	1.00					
Delays 1 st year of borrowing				1.00				
State of borrowing	-0.154 (0.027)	-0.152 (0.032)	0.166 (0.019)	-0.319 (0.000)	1.00			
Loan restructurings		0.222 (0.049)	0.183 (0.009)	-0.172 (0.015)	0.563 (0.000)	1.00		
Origin of personal collateral		0.247 (0.007)					1.00	
Type of collateral	-0.387 (0.000)	0.262 (0.000)			0.358 (0.000)	0.241 (0.013)		1.00

Notes: Only statistically significant correlations at the 1 and 5 percent levels, are reported.

The type of borrowing shows a statistically very significant positive correlation with the purpose of borrowing ($\rho = 0.562$, p-value = $0.000 < \alpha = 0.01$) and the type of collateral ($\rho = 0.387$, p-value = $0.000 < \alpha = 0.01$), as well as a statistically significant positive correlation with the cause of the delays ($\rho = 0.147$, p-value = $0.037 < \alpha = 0.05$) and statistically significant negative correlation with the current borrowing situation ($\rho = -0.154$, p-value = $0.027 < \alpha = 0.05$). The purpose of borrowing has a statistically very significant positive correlation with the cause of the start of delays ($\rho = 0.233$, p-value = $0.001 < \alpha = 0.01$), the type of collateral ($\rho = 0.262$, p-value = $0.000 < \alpha = 0.01$) and the origin of personal collateral ($\rho = 0.247$, p-value = $0.007 < \alpha = 0.01$), and has a statistically significant positive correlation with the number of loan restructurings since 2013 ($\rho = 0.222$, p-value = $0.049 < \alpha = 0.05$) and statistically significant negative correlation with the current state of borrowing ($\rho = -0.152$, p-value = $0.032 < \alpha = 0.05$).

Loan restructuring since 2013 is positively and very significantly correlated with the current state of borrowing ($\rho = 0.563$, p-value = $0.000 < \alpha = 0.01$), the type of collateral ($\rho = 0.358$, p-value = $0.000 < \alpha = 0.01$) and the main cause of the start of delays ($\rho = 0.183$, p-value = $0.009 < \alpha = 0.01$). It also shows a statistically significant positive correlation with the type of collateral ($\rho = 0.241$, p-value = $0.013 < \alpha = 0.05$) and statistically significant negative correlation with the possibility of delays from the first year of borrowing ($\rho = -0.172$, p-value = $0.015 < \alpha = 0.05$). In contrast, the number of loan restructurings since 2013 has a statistically significant negative correlation with the type of collateral ($\rho = -0.324$, p-value = $0.021 < \alpha = 0.05$). Finally, the current state of borrowing shows a statistically very significant positive correlation with the type of collateral ($\rho = 0.172$, p-value = $0.005 < \alpha = 0.01$) and the origin of personal collateral ($\rho = 0.353$, p-value = $0.000 < \alpha = 0.01$), and has a statistically significant

positive correlation with the main cause of the delays ($\rho = 0.166$, $p\text{-value} = 0.019 < \alpha = 0.05$) and statistically very significant negative correlation with the possibility of delays from the first year of borrowing ($\rho = -0.319$, $p\text{-value} = 0.000 < \alpha = 0.01$).

In summary, the following conclusions are drawn:

1. The type of borrowing relates to the purpose of borrowing and the type of collateral. This is almost self-evident, since loans granted for residential, student or consumer purposes usually relate to personal lending, whereas in the case of business or investment purposes it is more common to grant corporate lending.
2. The type of collateral shall depend both on the type and amount and on the purpose of the loan. For example, personal residential loans almost always require at least one collateral that is the house itself, while personal or business loans often require personal guarantees or a combination of the two. Small personal consumer loans or corporate lending in the form of limited working capital lending often require no collateral.
3. The type and purpose of borrowing is also related to the cause of the start of the delays, but also to the current state of borrowing. Similarly, personal loans may be easier and/or more likely to be terminated with or without a court order, compared to corporate loans, which involve more complex procedures and, due to their amount, banking institutions often make stronger efforts to find a viable solution. In the same context and with the same logic, it can be justified that the purpose of the loan is also related to the number of restructurings to which the borrower has been subject since 2013.
4. Loan restructuring since 2013 is related to the main cause of the start of delays, the current state of borrowing, the possibility of delays from the first year of borrowing, but also the type and amount of collateral, which also affects the number of restructurings. Obviously, if the cause of the delays relates to health problems or death, it may be more difficult for the borrower to try to be subject to some restructuring, whereas if the delays began due to a loss of income which was subsequently reduced, the borrower would be more likely to have joined a restructuring scheme. On the other hand, it is reasonable to expect that NPL cases involving strategic defaulters do not have a high probability of joining a restructuring scheme. If the delays occur from the first year of borrowing, then they will either involve strategic defaulters who will not be interested in being restructured, or borrowers who have encountered a sudden or very serious problem. In such cases, the possibility of a restructuring depends on the subsequent state of their demographic profile. Finally, regarding the type and origin of collateral (personal or tangible collateral), the existence of such collateral may limit the chances of restructuring if there are alternative sources of repayment of the loan.
5. The current state of borrowing relates to the main cause of the start of repayment delays and the possibility of such delays from the first year of borrowing, as well as the type and amount of collateral, which is attributed to the same reasons as the conclusion above.

4.5 Generalized method of moments (GMM) results

Table 3 displays the results of the GMM estimation. The results indicate that most of the explanatory variables show statistically significant coefficients and are able to explain the NPLs. Overall, the coefficients presented in the table show that NPLs loans are influenced by both macroeconomic and bank-specific factors.

Table 3. Results of the GMM Estimations - Determinants of NPL

Explanatory variables	Dependent variable: NPLs
Constant	1.322*** (0.501)
NPL (t-1)	0.112** (0.046)
Economic growth	-0.164** (0.068)
Inflation	0.388** (0.171)
Interest rate	0.314* (0.178)
Unemployment	0.168*** (0.0601)
Exchange rate	0.002 (0.047)
Loans growth	-0.003 (0.007)

Return on assets	- 0.267 (0.705)
Hansen test (p-value)	0.301
Sargan test (p-value)	0.129
AR1 (p-value)	0.822
AR2 (p-value)	0.498

Robust standard errors in parentheses.

Notes: ***, ** and * indicate significance at the 1, 5, and 10 percent levels, respectively.

In order to check the fitness of GMM specification, we apply three tests. First, we perform the Hansen test which checks for the potential misspecification of the model. Based on the (difference) Hansen J statistic, with a p-value of 0.301, the null hypothesis is not rejected, so the variables utilized are appropriate. Second, the over-identifying restrictions test via Sargan specification to check the validity of the instruments used as the moment conditions. According to Sargan test, the instrumental variables used in the estimation are valid since there is no correlation between the instruments and errors. Third, we test the fundamental assumption of serial uncorrelated error. The tests confirm that there is no first-order (AR1) or second-order (AR2) serial correlation.

With exception of the non-statistically significant variables, all other coefficients have expected sign. As in the most studies, GDP growth explains, to a large extent, NPLs. The economic conditions determine a borrower's ability to repay the loans. There is negative relationship between the variables. The results indicate that there is a positive and statistically significant effect of the one period lagged NPL, which confirms the hypothesis that past year's NPLs values positively affect subsequent years. They also indicate a positive and statistically significant effect of inflation on NPLs at the 5 percent level. It shows that an increase in inflation decreases purchasing power of income and the upward adjusted interest rate makes it more difficult for the borrower to repay the loan. As expected, there is positive correlation between the interest rate and NPLs. Thus, the increase in the interest rate makes additional burden for debtors with variable rate loan contract. There is supportive evidence that there is positive relationship between unemployment and NPLs. Therefore, if people suddenly become unemployed their ability to repay loans is adversely affected and NPLs are raised. The results also show small but statistically insignificant negative effect of loans growth on the NPLs. This finding was expected, and it confirms that an increase in the number and amount of loans leads to a decrease in the NPLs. Finally, the indicator of past performance as measured by return on asset, has a negative sign but does not significantly influence the NPLs according to the results.

5. CONCLUSIONS

This study carried out a thorough analysis of the characteristics and role of loans in the financial system, the procedure and conditions for granting loans and their possible evolution into NPLs, due to a number of macroeconomic and banking-specific factors that contribute to the increase in NPLs.

The results show that there are statistically significant correlations between characteristics of the borrower's profile such as age, gender, educational level, occupational and financial situation and the area of residence with data relating generally to the taking of loans (type and purpose of borrowing, type and origin of collateral), but also to the state of problem lending, the timing of the start of the problems of delays in the servicing of loan obligations, and the inclusion in a regime of restructuring to try to address them.

A statistically significant correlation between gender and type of lending collateral has been identified but the nature of this relationship cannot be clarified. A similar relationship without a specific practical interpretation was found between the last updated province of residence and the possibility of delays in the first year of borrowing. The current professional/financial situation of the borrower is related both to the current situation of the loan and to the number of restructurings since 2013, but also to the origin of personal collateral. However, due to the non-orderly nature of the variables it is not possible to further analyze these correlations. Finally, similar correlations with no possibility of further clarification were found between the sector of employment of borrowers and the current situation of lending, the origin of personal guarantees and the possible delays from the first year of lending.

Existing literature demonstrates that the existence of a private residence, the loan-available income ratio, the age of the borrower, the number of repaid and repayable instalments, the number of years of residence in the current residence, the total monthly income and the number of years of work in the

current employer are critical factors that affect the late repayment of loans. There are similar correlations in this study, in particular as regards the characteristics of the borrower's profile and the occurrence of repayment delays. In addition, statistically significant correlations are observed between the various variables directly related to lending and its possible evolution into NPL. The type of lending is related both to the purpose of lending and the type of collateral, as well as to the cause of the start of the delays and the current state of lending. On the other hand, correlations were recorded between the purpose of lending and the cause of the start of delays, the type of collateral, the origin of personal collateral, and the number of restructurings since 2013 and the current state of lending. At the same time, the inclusion in loan restructurings from 2013 onwards and the number of such loans is, as expected, linked to the current state of lending, the LTV of collateral and the main cause of the start of the delays, as well as to the type of real estate collateral and the possibility of delays from the first year of lending. Finally, the current state of lending is related to the type of collateral, the LTV of collateral and the type of real estate collateral, the main cause of the start of delays and the possibility of delays from the first year of lending.

These results are consistent with the existing literature on the factors contributing to the increase in NPLs related to credit institutions. In particular, the correlation of the characteristics of the borrower's profile with data relating to both the granting of loans and their development into NPLs confirms the fact that credit institutions that relax lending criteria and do not strictly apply the provisions of the current regulatory framework for the use of risk prevention and management mechanisms are more exposed to credit risk. In a large part of the sample under study, it appears that the initial assessment of lending was largely based on securing it rather than on the borrower's ability to repay, which contrasts with the CBC's directives and, by extension, the ECB's lending directives. However, taking into account that a large proportion of the loans under study started repayment delays within the first year after their disbursement, it confirms the bad and/or incorrect management practices in relation to the lending policy of the bank.

The GMM results showed that lower economic growth, higher inflation, higher interest rate and higher unemployment rate are associated with higher non-performing loans. Additionally, NPLs are affected by bank-specific variables such as last year's NPL, return on assets (performance) and loans' growth.

Our findings may help management to take corrective actions and offer important policy implications for regulatory authorities that could be helpful when designing prudent economic policies regarding NPLs. In addition, this empirical study provides insight to potential investors to consider the findings while selecting better investment opportunity.

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Appendix: Correlation Coefficients

		Correlations																				
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* Correlation is significant at the 0.05 level (2-tailed).
 ** Correlation is significant at the 0.01 level (2-tailed).

THE EFFECT OF THE WORLD SPREAD OF COVID-19 PANDEMIC ON FRESH FOOD

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ABSTRACT

The COVID-19 pandemic spread at an inconceivable rate all over the world. The terrifying speed of contagion forced governments to resort to the introduction of restrictive measures, in order to reduce the spread of the virus and to curb the death rate, in the absence of suitable medical treatments and vaccines (till the last days of 2020) against the virus. The spread of the pandemic, in combination with the measures, had a serious impact on almost all aspects of the economy. It cannot be denied that the pandemic has changed consumers' psychology and behavior, which affected their preferences, differentiating them in various ways. This study approaches and examines the effects of COVID-19 on fresh products and their trade, which were significantly affected by the pandemic. It should be noted that these products are produced in Greece and exported to a significant extent. This study makes a comparative study of the available data collected from previous trading periods, including the views obtained through a qualitative survey of people who play an important role in the production and marketing of this product, in order to clarify all aspects of the impact on the marketing of asparagus, grapes and kiwi. The findings show significant economic damage, mainly through falling prices, loss of markets, redistribution of the quality grades finally preferred by the markets, unsold quantities at the markets and the general uncertainty caused by the unprecedented conditions that have prevailed.

KEYWORDS

Fruits, COVID-19, production, quality-control

JEL CLASSIFICATION CODES

Q10, Q13, Q17, Q18

1. INTRODUCTION

As things stand today, a health crisis has affected the global economy after it took on the dimensions of a pandemic, according to the announcement of the World Health Organization on 11/03/2020. This crisis has killed thousands of people and left its impact on all sectors of the global economy, making it one of the world's worst health crises. Given the interconnectedness of almost all the economies of the world, and the complete globalization of the world's economy in recent years, it was inevitable that the Coronavirus pandemic, COVID-19, would cause a myriad of effects on the global economy. Starting from China in December 2019, and with terrifying speed, the virus locked down entire economies with the implementation of social distancing.

Over time, food production and agriculture, in their broadest sense, have become two key sectors of the economy affecting all other productive sectors on a local, regional and national scale (Markopoulos, 2019). It is also widely accepted that the food sector is essentially affecting the economy, income and employment levels (Konstadinos Mattas & Shrestha, 1989). In fact, the relevant multipliers, which determine the extent of the impact on other sectors of the economy, are highly significant (Konstantinos Mattas et al., 1999). Thus, based on the above scientific views, it is obvious that every impact on the food production and agriculture sectors will have a strong parallel impact simultaneously on almost all other sectors of the economy. It is also indisputable that important exogenous factors affect the global consumption of food; hence, this effect may have a significant duration. Typical examples that can be cited in the area outside the European Union are the events of the war in the former Yugoslavia two decades ago, and the prolonged economic crisis in Greece within the European Union (Brankov et al., 2019).

The effects of this rapid development of events as a result of the pandemic have affected all sectors of the economy. At any rate, however, it is not easy to assess the extent of the effects in each sector as the extent and spread of the COVID-19 pandemic and its global repercussions have no precedent in the modern context in contemporary times. The present work studies the effects of the COVID-19 pandemic on fresh food produced in Greece, namely the cultivation of asparagus and kiwi in the lowlands of the Municipality of Nestos and grapes in the hills of the Municipality of Paggaion in the Prefecture of Kavala (Greece). Asparagus, kiwi and grapes cultivations are dynamic, intensive crops with many investments and an exclusively export direction, to EU and other countries. It is worth noting that, apart from the material investments made in the production sector, producers and exporters (mainly collective bodies such as Producers' Organizations, as well as entrepreneurs) have also made significant investments in the processing facilities required for the products, and have implemented integrated systems of cultivation and production in order to ensure that the final products possess the special qualities desired by the final consumers of the product (Papadopoulos & Markopoulos, 2015). It should also be noted that only a part of these fresh foods are consumed in the area where they are produced. On the contrary, they are exported globally, mainly to countries such as Germany, Poland, Spain, France, Romania etc and members of EU and to countries as UK, Switzerland, USA, Ukraine and other countries, no-members of EU.

The production and marketing period of asparagus begins every year in February and finishes in the end of May or the first days of June. The "arrival" of the COVID-19 pandemic - and its related effects - in Europe, as well as in Greece, during the period of the production and marketing of asparagus exerted pressure in this sector at a crucial point. In this way, its impact can be determined more precisely. This cannot be suggested with the same urgency for crops or productive sectors which were either outside their vegetation period, or for those products whose production and marketing season takes place much earlier or much later than the time the pandemic struck, e.g. in a different season of the year. The production and marketing period of kiwi begins every year in October and finishes at April, while kiwi can be stored in suitable refrigeration conditions for long periods successfully to extend its marketing period. The "arrival" of the COVID-19 pandemic - and its related effects - in Europe, as well as in Greece, during the period of marketing of kiwi exerted pressure in this sector. The production and marketing period of grapes begins every year in mid-July and finishes at first days of November. The related effects of the COVID-19 pandemic outside the period of the production and marketing of grapes exerted some pressure also.

It should be noted, of course, that even at this time, it is not possible to accurately assess the evolution of this pandemic worldwide in the future, as it is still undefined and unclear despite the implementation of vaccination programs worldwide. The World Health Organization (WHO) and individual countries' Public Health Offices have, officially, stated that *"based on the scientific data available so far, there is no evidence to suggest that food is a source or transmission of the new virus. Scientists and authorities around the world, who are monitoring the spread of the virus, have not reported cases of the virus being transmitted through food"* (EUROPEAN COMMISSION, 2020). However, although the virus that causes the disease is not transmitted through food, consumer preferences have changed under the new conditions, due to the spread of the pandemic and the restrictive measures taken. Moreover, the results of the restrictive measures against the COVID-19 pandemic are clearly contributing directly to the restriction of food consumption, firstly as a consequence of the suspension of the operations of catering and leisure businesses, hotels, etc, and the heavy restrictions on travel, and secondly the bans, lockdowns and social distancing being enforced, as part of the measures being taken to prevent the spread of the virus. Such actions have had a sudden effect, among other things, on consumer behavior, resulting in reduced activities in the fresh market, which requires more frequent visits to stores, compared to processed foods, which are easier to store and preserve in most households.

The extremely sudden nature of the pandemic spread and unprecedented experience adds an added value to this study, which seeks to provide scientific answers to what kind of effects occurred on fresh foods. It can be said that the effects of the pandemic should be added to the main factors affecting food production, such as population growth and climate change.

2. LITERATURE REVIEW

Scientific research has often focused on the relationship between consumer preferences and the food choices which are actually made. Different food preferences have been attributed to different reasons through a complex web, which may affect our food preferences due to biological, physiological,

psychological and social factors (Vabø & Hansen, 2014). Furthermore, preferences seem to depend on the context experienced by consumers, so cultural differences are evident in consumer preferences as a function of different eating habits and experiences, given the wide variety of different cultures around the world (Prescott & Bell, 1995). Other scientific research on food choices made by consumers focuses on physiological issues and psychological factors that are considered to be determinant as well as secondary to other issues, such as cultural, historical, social and demographic parameters (Nestle et al., 2009).

Food preferences do not remain stable at all ages; differences are also observed between men and women (Wansink et al., 2003). Scientific research has shown that socio-demographic characteristics influence consumer behavior in food selection, both directly and indirectly, in relation to the available time limits, as well as in terms of the ease of meal preparation and subsequent cleanliness (Botonaki & Tsakiridou, 2004). Consumers' interest in the safety and quality of fresh produce has for years revealed to be a promising research field, especially for fresh food which has adequately met the relevant labelling requirements, such as origin, certification and traceability (Papadopoulos et al., 2019). Sensitization levels in the awareness of healthy eating and socioeconomic characteristics are cited as the most important factors influencing consumers' willingness to pay a higher price for food which has these characteristics (Tsakiridou et al., 2011). Measuring food security, however, is also approached in a rather vague way, which in practice remains difficult to pinpoint precisely (Barrett, 2010). In general, however, from a plethora of research studies, scientists have shown that it is extremely difficult to predict consumer behavior in terms of food in real life situations. Although the use of multiple variables before testing may improve predictability, much of the variability in preference, satisfaction or consumption continues to remain unclear, in the sense that it cannot be predicted (Cardello et al., 2000).

An additional role is played by the various food logos, especially in the case of children. Scientific texts have suggested the view that, although many children are familiar with the logos of the products commonly presented, brand recognition does not appear to significantly affect the consumption of "bad food" among children (Kopelman et al., 2007), although this view is not generally agreed upon among the scientific community (Boyland et al., 2014).

Moreover, scientific research has shown that increased stress and pressure affects people's dietary choices, and it is interesting to note that the variety of foods selected by consumers decreases under conditions of stress (Kandiah et al., 2006). Another scientific study found that dietary changes caused by stress can lead to weight gain and obesity as the availability of fresh food becomes restricted and the consumption of sweets increases (Sinha & Jastreboff, 2013). In the initial phase of the COVID-19 epidemic in China, a recent study found that more than half of those surveyed in the context of research studies assessed the psychological impact as moderate to severe, while about one third reported moderate to severe anxiety (Wang et al., 2020).

The Directorate-General for Agriculture of the European Commission pointed out that the COVID-19 health crisis did not turn into a food crisis as supplies have been plentiful, stocks are high and prices have so far been only moderately affected, while restrictions on trade flows are limited. Thus, as claimed, the EU food system must be proud of itself in this context. In order to assess the importance of the EU food system, it must be taken into account that the food system and access to it before the outbreak of the COVID-19 crisis, on a global level, was determined by factors such as drought, climate change, shifts and conflicts (Burrows & Kinney, 2016; Raleigh et al., 2015). Recently, scientists have also referred to the role of the combination of risks with reference to food on a global level (Mason & Lang, 2017), as well as the entry of humanity into an "unknown period" with many levels of uncertainty from which new crisis risks emerge (Dury et al., 2019). In Australia, which is "under pressure" due to climate change and reduced water supplies, scientists predict a reduction in production, for example in the case of asparagus, as a result of the reduction of their cultivation areas, as well as for other vegetables, thus highlighting the restructuring of fresh food production due to other contemporary reasons (Xia & Westwood, 2020).

At the European level, another scientific study (Petetin, 2020) introduces the term "food democracy" and describes the COVID-19 pandemic as an opportunity to diversify the approach to food production and consumption. The notion of "food democracy" is said to provide a decentralized framework for food systems, offering an opportunity to redesign food supply chains so that they may focus to a greater degree on sustainability, local and regional production, by building stronger bonds between retailers and local farms. However, it is stated that it is not guaranteed that these positive changes will be maintained even after the pandemic, and further steps are needed to strengthen "food democracy", even proposing changes to the EU's Common Agricultural Policy.

Regarding Canada, Larue (2020) reports that in addition to the closure of restaurants and schools, the COVID-19 pandemic also caused an increase in unemployment. This has resulted in social

exclusion, leading to a reduction in the demand for certain foods. The difficulty in securing workers – usually foreign labour – for a specific period of time, to work in agriculture and food production is also mentioned as an added but significant problem. In addition, under the current circumstances, it seems that protective trade policies are becoming more popular, perhaps due to concerns about food security, while domestic and foreign companies choose to export fewer products.

Regarding the situation in Spain, the Bank of Spain's report on "Macroeconomic scenarios for the Spanish economy after the COVID-19 pandemic" (de España, 2020, p. 19) states, among other things, that the prohibition measures taken to curb the spread of COVID-19 have led to significant restrictions on entire sectors of economic activity, such as some of the most labor-intensive industrial services, housing and food-related activities, as well as a significant part of the retail trade.

A recent scientific publication in the USA (Kolodinsky et al., 2020) states that the pandemic threatens not only human health but also the health of both small and large businesses, as it leads to a change in the business model for farmers as well as changes in consumer behavior. Under the measures, with restaurants and schools remaining shut, consumers eat at home, which means more food in the home environment. At the same time, a greater volatility is detected in the market, but there is also an opportunity to increase the demand for food produced locally in the form of a "Farm Food Fresh Box". Another scientific publication from the USA, entitled "Pandemic & Food Safety" (Zurayk, 2020), concludes that it is now the right time for people to realize the importance of local food systems and the need to support small farmers and agriculture near cities, while also mentioning the importance of fresh fruits and vegetables, which are essential for health and nutrition.

Another publication (Long & Khoi, 2020) refers to the perception of the risk for consumers: the stronger it becomes, the more consumers are encouraged to buy food with the intention of creating a personal or family "stock". This highlights the possibility that the perception of the risks associated with the COVID-19 pandemic may cause the intention to increase goods purchases without following the current logic so far. Mattioli et al (2020) state that, due to the perceived stress concerning food shortages, it makes sense for people to prefer packaged and long-lasting foods instead of fresh food (Mattioli & Ballerini Puviani, 2020).

According to the chief economist of FAO (Torero, 2020), the pandemic has highlighted how our world is interconnected and emphasizes the use of modern technologies in order to improve food production while recording typical examples of the pandemic, such as the recent ban on quarterly grain exports decided by Russia, or feeding cows in India with strawberries which could not be transported and consumed in cities, not to mention the dumping in landfills of tons of white cocoa which would normally be consumed in restaurants and hotels, but which was not possible due to their being closed. All this shows how much the COVID-19 pandemic has affected food security around the world. Another scientific publication estimates that the risks of a stronger and more prolonged decline in global growth is high, especially if restrictive measures due to the virus are prolonged, or if new periods with restrictive measures follow before the scientific community can provide effective drugs or vaccines in the treatment of the pandemic (Gern et al., 2020).

3. APPLIED RESEARCH METHODS

The present study aims to investigate the effect of the spread of the COVID-19 pandemic, as well as the measures taken to curb its spread, as typical examples of fresh food, those of asparagus, kiwis and grapes, produced in the Prefecture of Kavala, which bore the brunt of the related effects of the pandemic, given these were, more or less, at the peak of production or marketing period when the pandemic struck, and they were exported in its entirety under clear quality standards, in order to be consumed in the markets of other countries. For the purposes of the above-mentioned goals and to assess the possible effects on the specific product and their extent, the following took place:

1. The level of exports in 2020, in relation to the production of the specific products and their prices in the field, over a period of 5 years.
2. The elaboration of a series of views by people who play an important role in the production and export processes, in order to assess the overall impact, interpret the data collected and shed light on all relative aspects.
3. The production, prices and exports which were taken place in the heart of the pandemic period.

Regarding the assessment of the results of the production, prices and exports, the data used were provided to us by the competent public service of the Directorate of Agricultural Economy & Veterinary Medicine which supervises exports, together with supplementary data provided by the

exporting bodies. It should be noted that all data was used without naming, in any case, the export companies in the interests of protecting business confidentiality and sensitive information concerning their operation.

Where comparisons were required, these took place in relation to the previous years. Every effort was made in order to have high relative certainty. The opinions were gathered through qualitative interviews, i.e. through question and answer sessions, which followed a specific structure, as described in Table 1, below. In qualitative research, there are no predetermined answers from which respondents can choose in order to quantify the given responses and consequently to draw conclusions. Qualitative research can be used to shed light on aspects of various issues as well as to make correlations that emerge during the study (Bisogni et al., 2012; Patton & Patton, 1990). Thus, qualitative research was selected in order to investigate the subject of the present work, to contribute to its clarification, taking into account both the character of the pandemic, which evolved and took over the whole world, as well as the measures taken, which have affected many sectors of the economy, including the production and consumption of certain food categories. During the discussion, in the context of the interviews, the development of the topics was always directed from the more general or major issues to the more specific or less important ones, while encouraging spontaneous responses, including the expansion of the discussion to other issues besides the predetermined ones (Grudens-Schuck et al., 2004). Quantitative research is consistent with very small samples as well as with the use of open-ended questions, without emphasis on numerical data, and the need for flexibility in order to obtain a holistic and in-depth understanding of the subject and to identify the concepts, any opposing views of the participants, and any new aspects that were not initially identified in the subject under consideration.

Table 1. Topics included in the research

No	Unit	Individual issues
A.	Issues concerning production	Mainly harvest issues, Human resource management issues, Pricing issues
B.	Issues concerning processing	Human resource management issues, Pricing issues
C.	Issues related to the trajectory of the exports	Product absorption, Price issues, Feedback from markets, Transportation issues
D.	Financial results	Concerning the producers, Concerning the exporting entity, Concerning the wider region
E.	Effects on further production planning	Planning for new investments, Intention to integrate young people into the production process, Development issues in the form of standardization, packaging, certification and market promotion

4. RESULTS AND DISCUSSION

From the data kept by the competent service which oversees exports and the data kept by the export companies, it is clear that there was a decrease in the quantities exported during this year's “export year”. From the data kept by the export companies and their comparison with previous years, a significant reduction in the product prices is apparent during the same period. Upon examination of the available data of quality controls, it appears that there is also a significant differentiation in the quality grades of products exported in relation to those that apply each year, in terms of the exported quality categories and product grades.

It should be noted that, based on available estimations and a general picture of the expected cultivation and production levels of asparagus, 2020 was expected to be one of the most successful years, in terms of production volume, quality features and prices all being above average, if, of course, the production and export trajectory evolved as expected, i.e. without the sudden emergence of a pandemic. Thus, while the export season for the asparagus started without any problems, after the arrival of the COVID-19 pandemic, a number of problems concerning exports were noted. Hence, based on data up to 31/3/2020, in the heart of the pandemic, it appears that the main exporting entities have recorded changes in the volume of products they exported in relation to the average of the last five years, as noted in Table 2 below.

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Table 2. Percentage differences in the asparagus exports of the major exporters as at 31/3/2020. (It should be noted that for the purposes of maintaining data protection, each export company is denoted by a coded number).

Exporter	C.1	C.2	C.3	C.4	C.5	C.6	C.7	C.8
Percentage of exported quantity (change)	-40.75%	-26.46%	-24.91%	-23.76%	-20.47%	+2.65 %	+21.26%	+52.79%

From this very different picture, it can be concluded that the impact on the markets of the countries that import asparagus from this region has not been uniform. The impact on the export companies was also different, as they don't all target the same markets, the same countries, the same customers, and therefore the same consumers, so they were not all affected in the same way. This results in an unequal reaction on exporters under the prevailing conditions due to the pandemic, despite the fact that it is clear that most of them are recording a reduction in exported quantities. In terms of the data it maintains, the competent service also records that a number of countries, such as France, Spain, Switzerland and the United Kingdom, have not absorbed any products at all this year. It turns out, therefore, that some of the stable annual markets did not absorb significant or even any quantities of the product, while in the markets of other countries, there were significant differences, as shown in the recorded percentages in Table 2, despite the fact that the expected product quantities did in fact exist in order to cover the needs of all the markets.

In addition, it should be noted that in the countries that did actually absorb some of the production, there was a difference between the places where the products were ultimately directed this year for all these three kinds of fresh food. Evidence from some exporters suggests that supermarket chains absorbed products but this did not also happen for other retail stores which are supplied with products through other networks. In fact, unlike supermarket chains, these networks are not limited to absorption and marketing in the consumer markets, but only in the case of higher quality products, and they also absorb products of other quality grades and classes.

Regarding the prices that were achieved, based on data from exporters, a significant drop in prices was noted, which ranged from 17.4% to 53.3%, average 21.05%, using the approach that was previously described. However, based on the same data, the decline in the value of exports amounted to percentages starting at 30%, even exceeding 50% to 70% of the value of the products that were finally exported.

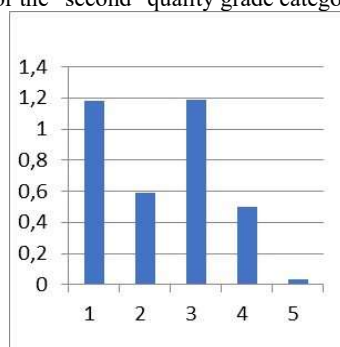
Another factor that should be noted is that in case of asparagus which do not fall into the so called first-grade quality category, based on diameter, etc., remained undistributed among the markets in many cases after the arrival of the pandemic and were eventually destroyed, while the producers, in their vast majority, collected absolutely no revenues for the exported product. If the pandemic had not occurred, these products would have been absorbed by the markets, according to the image presented by the annual exports of previous years.

According to the market practices, the first four quality grades comprise the first (called: top) quality categories awhile the rest constitute the secondary (sometimes called: other) quality categories. It is worth noting that they are also available in the market, and they are also preferred by consumers. Based on comparable data from exporters, the prices of these secondary quality grades fell sharply to zero after the outbreak of the pandemic. Thus, they remained undistributed, and were subsequently destroyed.

Table 3. Annual evolution of prices for the “second” quality grade category of exported asparagus (indicative).

	Year	Price (€/Kgr)
1	2016	1.18
2	2017	0.59
3	2018	1.19
4	2019	0.50
5	2020	0.03

Fig. 1. Annual evolution of prices for the “second” quality grade category of exported asparagus (indicative).



The vertical drop in prices is worth noting as it led to the cessation of exports among these quality categories and their subsequent destruction, increasing the extent of the damage incurred, since the percentages in the declining selling prices, as illustrated in Fig. 1 and Table 3 concern, the quantities that were eventually exported.

It is quite clear that the drop in quantities and prices ranges at such a level that it is indubitable that the economic damage to the product, as well as the region, is inevitable and at a very significant level. The percentages in the drop in value of the above-mentioned exports most characteristically describe the magnitude of the economic damage caused to this year’s asparagus exports by the pandemic.

The marketing of grapes and kiwis seems to present a similar attitude to that of asparagus. Gathering the data of these three products, at the end of their marketing year, we analyzed three important factors for the last five years, in order to have a more complete picture and comparative results. The trinity of these factors consists of the variation of production, the variation of exports and the variation of prices. Each variation is compared to the corresponding one of the previous year.

Table 4. Variation of the production, exports and prices of asparagus in the last 4 years

ASPARAGUS	2017	2018	2019	2020
Variation of Production (%)	-10.83	-31.96	-11.13	33.46
Variation of Exports (%)	12.37	-4.61	-3.09	-23.09
Variation of Prices (%)	-2.86	5.88	5.56	-21.05

According to Table 4, the production of asparagus increased in 2020 by 33.46% compared to 2019, due to the good weather conditions that prevailed and mentioned above, while at the same time, the exports decreased by 23.09% and the prices decreased by 21.05%, also.

After the production of asparagus ended at the end of May, the production of grapes began in mid-July 2020. Although the pandemic was in recession and the measures that prevailed around the world were not so strict, the marketing of grapes suffered similar consequences.

Table 5. Variation of the production, exports and prices of grapes in the last 4 years

GRAPES	2017	2018	2019	2020
Variation of Production (%)	7.28	-31.53	-11.92	34.43
Variation of Exports (%)	13.35	-11.72	-12.39	-7.74
Variation of Prices (%)	-1.89	5.77	-9.09	-20.00

More specifically, the production in 2020 increased by 34.43%, compared to 2019, as the production of good and quality grapes was favored by the good weather conditions. Nevertheless, exports received a significant decrease of 7.74%, while the average prices of grapes decreased by 20%. The decrease in exports is considered significant if it is related to the increase in production. This means that a fairly large part of the production was abandoned in the vineyards, while a fairly significant part was sold at a much lower price (Table 5).

In the autumn of 2020, the production and marketing of kiwis started. After the initial optimism, the adverse effects of the pandemic also affected kiwis, as a new lockdown began in the first ten days of November 2020.

Table 6. Variation of the production, exports and prices of kiwis in the last 4 years

KIWI	2017	2018	2019	2020
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Variation of Production (%)	-5.39	13.96	23.20	8.56
Variation of Exports (%)	-2.31	-2.56	21.22	-3.73
Variation of Prices (%)	0.00	1.61	3.17	-7.69

According to the analysis in Table 6, the production of kiwi increased by 8.56%, while exports decreased by 3.73% compared to 2019 and also, the average price decreased by 7.69%.

According to the results, asparagus seems to have the greatest impact of the pandemic, perhaps because their production and marketing coincided with the outbreak of the pandemic. Grapes and kiwis have similar negative effects, but not to such an extent.

Regarding the qualitative research, it is worth mentioning that despite the fact that the answers given to each question were not identical, after the processing and coding of these responses, those points where the views of the participants converged were more easily identified, showing where the research interest and conclusions should be focused. At the same time, the fact that the qualitative research has provided a general approach to the production and trade processes proves the accuracy of its selection. In conclusion, it should be noted that the qualitative research responded well to the expectations of the survey, which were the investigation and clarification of all the effects of the COVID-19 pandemic and the measures adopted to counteract its effects by the governments.

The answers showed that no significant problems were identified in the first two sections, i.e. "Issues concerning production" and "Issues concerning processing". This is probably due to the fact that the search for labour/staff took place before the "arrival" of the pandemic to Greece, and the taking of measures by the Greek state. To be more precise, in the section concerning processing issues, there were reports of some problems due to the movement restrictions within the context of the measures taken, so that some of the people working in the processing units who were living in neighboring areas were unable to come to work; hence, there was a need to find new employees, but this problem has not been highlighted as a major one by the participants of the qualitative research. After all, the majority of employees were from the area or nearby places and the method of employment obviously does not favor contact between employees. However, more problems were identified with regard to "Issues related to the trajectory of the exports", which were even emphasized, being the common focus of attention among the respondents. Among them, it was reported that while initially the export season started normally, there was a sudden "hold" in the markets, i.e. the traditional markets, which had been buying asparagus from the region for decades, when they suddenly stopped buying for the time being. Thus, some markets did not procure products while others continued to absorb products at lower quantities as well as lower prices. This constituted a sudden change, as sudden as the arrival of the pandemic from China to Europe. In addition, while the markets are supplied with products that fall into a wide range of product quality grades, a change was noticed this year, in which the market absorbed only the quality grades of the first category, whereas, in reference to the other grades, the prices achieved in them fell vertically, and eventually the quantities of products in these quality grades were destroyed since they were, in fact, excluded from the market. A drop in prices was also noted, as described above based on the data recorded. Reference was also made to the reduction in the exported quantity. Moreover, the negative climate of general uncertainty and instability that has prevailed over the product's trajectory during this year's export season in the markets with the arrival of the pandemic should be emphasised, which has raised concerns about a possible collapse of exports. This event has been avoided, but according to some respondents, this uncertainty has caused a blow to any issue that requires some form of negotiation, and also constitutes an obstacle in the planning efforts of the next export season, since the traders of the product, i.e. the exporters, were taken by surprise, now finding themselves in a more unfavorable position.

With regard to the transportation section, an increase in transport costs was observed, especially in asparagus and grapes, since transport restrictions and the surprise attack on the markets, together with the conditions pertaining to the restrictive measures, caused an unpredictable situation where, in many cases, freight trucks transporting the product returned many times from their destinations without transporting new cargo on the way back, with obvious repercussions on the transport costs and the financial outcomes of the exports concerning this product for this year.

Regarding the "Financial results" in relation to both producers and producer organizations, that in their majority play the role of exporters that take on the commercial risk, the views expressed are consistent with the numerical data illustrated above. Taking into account that the final assessment of the year always takes place at the end of the annual export period, it should be noted that the growing season without the expected economic results could lead to conditions of economic "asphyxia" among producers with the obvious consequences of financial inability to continue production in the following year(s).

The collective base of Producers' Organizations reported that it could also extend the effects of economic asphyxia among exporters in the region, given that, after the recent decade-long economic crisis, there are not enough funding methods for the primary sector in Greece, which includes the production of fresh food and agriculture. It was also pointed out almost unanimously that with regard to the wider region, a possible situation of economic asphyxia in one of the most dynamic production processes involved in fresh produce may have consequences for the local economy of the region, which is dominated by the agricultural sector due to its fertile plain. This could potentially cause chain-reaction effects, such as a reduction in the number of workers it absorbs and the number of daily wages it provides, while at the same time the benefits to the local economy and other activities, such as the production of packaging materials, the purchase of equipment, etc. would also disappear. We must then add the effects of a wider cycle, such as the withdrawal of consumer spending from the region's market by producers as well as workers in each relevant sector of the production process. Finally, the effects also extend to the finances of the Greek state since this too, in such unfavorable circumstances, would incur losses from the various taxes and duties collected, such as VAT and workers' income taxes in each sector related to the production of the product concerned.

Concerning the "Effects on further production planning", similar views prevail. Respondents stated that under these conditions, young people are discouraged from getting involved in the production of this product or in planning new investments or implementing planned investments. Finally, efforts should be made to introduce new or innovative elements in the areas of standardization, packaging, certification and promotion in the markets, always in line with the trends of the evolving demands of the end consumers who have various idiosyncrasies and preferences from those of the producers, given that the specific product concerned is exported and consumed in its entirety in foreign countries, and not in the country where it is produced.

A summary of the above information is presented in Table 7, where the conclusions are summarized with an attempt to prioritize them in terms of their significance among the respondents.

Table 7. The main opinions that emerged from the qualitative research in the feedback noted among the answers.

Unit	Conclusion (Outcome)	Resonance
Trajectory of the exports	Reduction in prices Limitations in the exported products «Closure» of some markets which were no longer procuring asparagus Uncertainty or instability of the market Differentiation in the grades of quality control	High High High High Medium
Financial consequences	Danger of economic collapse of the local market/economy Danger of weak financing possibilities in the production process in the near future	High High
Transportation	Increase in costs	High
Further planning	Difficulty in making new investments and in finding new workers/staff	High
Production	Problems in the employment of staff due to the measures	Low

5. CONCLUSION

In all the above discussions, the most important question that must be answered in the present study is whether the COVID-19 pandemic has affected (or not) the consumption and therefore the marketing of fresh food. In this regard, if we consider that the products being investigated – asparagus, grapes and kiwis –are representative, then the answer to the question must be positive; for the specific products in question, and possibly other similar products, especially those which the pandemic "succeeded" in striking down with its arrival if they were in their peak export period, the answer is yes. In this case, the COVID-19 pandemic affected the marketing of a typical fresh product, striking it down during its production and export trajectory, which had initially started smoothly. Here it should be reiterated that the affirmative answer does not rely on the existence of COVID-19 outbreaks in the region, since this was not the case. It also has nothing to do with the problems caused in the production because such difficult issues were not identified and the availability of the product was a given. The effect was exerted through changes in consumer and purchase behavior, due to the spread of the pandemic in the areas where the product is exported and consumed. The literature also includes references to such behavioral changes and these have been reported in the relevant section of the present study.

It should be emphasized that the added value of this study has to do with the scientific effort to draw useful conclusions and fill the gap, which consists of the lack of scientific data describing the effects of COVID-19 on fresh foods. It is obvious that there are not enough studies, especially for Greek fresh

food, which could provide information either to producers and exporters or to researchers and policy makers for food production and trade. Due to the lack of experience on the situation developed by the pandemic, in addition, it is difficult for all authorities and companies to formulate their strategy for the coming years. Thus, the present study focuses on this direction and this makes it achieve some added value.

It should be clarified at this point that the simultaneous and sudden start of the pandemic, together with the health risks it entailed and the measures taken to limit it, and the concern it caused among consumers, who in turn modified some of their consumption and dietary habits, caused these market differences. Reference must also be made here to the novel conditions that were formed in the sector of food consumption, with the closure of restaurants and hotels, and the suspension of travel for tourism and/or other reasons. This temporal coincidence, with its effects on the availability of the product, also proves the existing correlation between the pandemic as a cause, and the effects on the specific fresh products as a result. Further confirmation for the above, and for the study itself, is the complete verification of the two parts of the work, i.e. the numerical data used, and the qualitative research, which agrees with the data and simultaneously confirms the above-mentioned cause and effect relationship.

The effect can therefore be summarised in two concepts: market uncertainty, which occurred suddenly and which fortunately did not continue to evolve to the same extent as the economic damage, which includes both price reductions and downturns, limiting the quantities exported to some countries, as well as other factors such as the exclusion of quality grades from consumption and the increase in transport costs. In spite of all the above negative factors, transportation of these vulnerable products did not stop despite an increase in transportation costs. So it cannot be claimed that exports were impossible due to the inability to transport the product. On the contrary, it is concluded that the conditions of the pandemic caused the effects.

Moreover, an important finding is the redistribution of the exports that did take place, as some countries did not purchase any asparagus at all until 31/3/2020, while in the markets where the product was finally exported, differences were found in the quality grades of the product that was finally absorbed. It should be noted here that the prevailing assessment by those involved in the production and marketing of the product is that the situation will be restored if the issue that caused it ceases to exist, or at the very least, if this situation does not recur in the future.

The speed of the spread of the COVID-19 pandemic and the effects it caused, which were recorded in the context of the present work on fresh food, have shown that, under the prevailing conditions in today's markets, there are no tightly sealed areas or productive processes which can be considered to be inviolably protected from the pandemic. On the contrary, the pandemic revealed that when a parameter acquires global dimensions, as in the case of the pandemic, then the effects may also have an economic or financial nature in terms of food production processes and supply chains. In fact, the effects of the pandemic have shown that even specialized supply chains are not excluded, not even those with a clear export direction to markets of countries with high standards of living, whose products are characterized by high quality and responsiveness to consumer demands, simultaneously having all the necessary certifications concerning production methods and designation of origin of the products, as in the present study. In essence, it can be concluded that the present work shows that fresh food supply chains appear to be even more sensitive to such evolving factors as pandemics, with conversely reduced resilience.

The effects of the COVID-19 pandemic on fresh food have had an unexpectedly high rate of spread around the world, which has also been accompanied by a high rate of information transmission not only to consumers, who then modify their consumer behavior, but also to export companies and other businesses involved in the fresh food trade. It was also previously stated that the way in which the economic damage occurred was through the consumers themselves, and the change in their consumption patterns, and not through the direct impact of the pandemic on the production process. At any rate, consumers are regarded as the factor which shapes the course of each production process with their preferences (Tsakiridou et al., 2011).

The SWOT analysis in Table 8 below records the strengths, weaknesses, opportunities and threats that arise in the case of fresh food for business entities which also include exporters that in most cases, as previously stated, are Producers' Organizations operating in the specific area in the specific region. The SWOT analysis conveys a picture of the capabilities and prospects of these agents to continue to perform their work and to avoid similar disorders in the future.

Table 8. Summary of the strengths, weaknesses, opportunities and threats of the present study regarding companies involved in the production and marketing of fresh food (Producers' Organizations) based on the conclusions arising from the COVID-19 pandemic.

<p>Strengths</p> <ol style="list-style-type: none"> 1. Product Quality 2. Utilization of regional conditions (soil and climatic conditions) 3. Certification of quality and origin 4. Responding to consumer demands 	<p>Weaknesses</p> <ol style="list-style-type: none"> 1. Difficulties involved in scheduling/planning under the given crisis conditions 2. Difficulties in negotiations under the given crisis conditions 3. Limitations in financial liquidity 4. Difficulties in responding to long-term financial obligations
<p>Opportunities</p> <ol style="list-style-type: none"> 1. Need to maximize flexibility 2. Investigation into new markets 3. Utilization of opportunities provided by the EU 	<p>Threats</p> <ol style="list-style-type: none"> 1. Unforeseen developments – Inability to predict developments in such conditions 2. Market instability 3. Increase in size of the undertaken risk

From the above, it appears that it is extremely difficult to manage a threat such as that of the COVID-19 pandemic, which was characterized by its unpredictable development, lack of precedent and the instability it caused to the markets. Concerning the strengths, as previously mentioned, they are already being met and the possibility of further maximizing them, where possible, should be considered.

It is also important to note that, among the total financial losses recorded by the impact of the COVID-19 pandemic and its consequences, it is possible that the local economy and the funding of the production process in the coming years will be affected, especially if some form of financial or compensatory aid is not launched.

In this context, with regard to markets and consumers, one of the priorities of the EU should be to restore a sense of consumer safety throughout Europe so that consumers can return to their ‘old’ spending habits, thereby avoiding the prevailing climate of uncertainty in the markets. Moreover, a framework of European policies should be explored, designed and implemented, mainly of policies which create a climate of security and confidence in the production sector, with increased liquidity for producers and businesses in order to facilitate their undertaking of the increased risks. Therefore, in the context of the Common Agricultural Policy, the possibility of taking action in this direction has to be explored.

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GREECE’S FISCAL MEASURES IN RESPONSE TO COVID-19 PANDEMIC

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ABSTRACT

COVID - 19 was first detected in December 2019 in China. The virus soon spread around the world and its impact, in addition to health, is significant on the economy. Many companies have been hit hard not only by declining turnover but also by the uncertainty in the economic and social environment. Greece could not be an exception to all of the above. The long duration of the pandemic, 11 months now, the reduction of consumption and the uncertainty of the buying public created problems in the normal operation of the companies. Overall, in the period January to September 2020, the GDP declined by 8.5%, after 4 years of continuous growth, and the labor market deteriorated due to the recession, as total employment fell by 1.0% in the first nine months of 2020. For this reason, the Greek Government from March 2020 till now announced business support measures from the Ministries of Finance, Development and Investment, and, finally, Labor and Social Affairs, which by the end of 2020 exceeded 24 billion euros. In most countries of the world, the end of the pandemic is expected to occur by the end of 2021, after a significant part of the population has been vaccinated. The same is estimated to happen in Greece, which performance in protecting the population from the coronavirus has achieved significantly better results compared to most developed countries worldwide. But this must be combined with the rapid recovery of the economy, at least, to pre-COVID-19 levels so that the country can recover from the new crisis in which it finds itself. In this paper we focus on Greece and study the extent to which the Greek economy was affected by the COVID-19 pandemic. Preliminary results indicated that the debt-to-GDP ratio of Greece in 2020 increased to 224% from 176,6% in 2019. We analyze the measures taken by the Greek Government, from a fiscal policy point of view. Especially in matters concerning taxation, labor, social security, development and investments, since monetary measures depend on the EE, in order to confront the health crisis that has risen in the last year, on top of the economic crisis Greece has faced since 2010 due to the memorandums, so that the economy of Greece can survive and grow. With the analysis of these measures we see the directions towards the policy of the Greek government moved and whether these directions affected positively the Greek economy. In addition, we are referring to the effects of the pandemic on capital companies which recorded a turnover decrease of 7.8% in December 2020 compared to December 2019. At the same time we investigate and quote the impact of these policies to the prices of the Greek stock market.

KEYWORDS

COVID-19, Greece, Fiscal Measures

JEL codes

E00, G30, E62

1. INTRODUCTION

COVID - 19 was first detected in December 2019 in China. The virus soon spread around the world and by March 2020 all EU member states reported cases of COVID - 19. The first case of coronavirus in the European Union was reported in France on January 24, 2020 while in Greece the first case was recorded on February 26, 2020 in the city of Thessaloniki. Since then, the number of cases has been constantly increasing. At the end of March 2021 (Worldometer, 2020) the cases worldwide had exceeded 126 million and the victims were over 2.77 million. Clark (2016) stated that a pandemic is a serial killer that can have devastating consequences on humans and the global economy. For instance, the Spanish flu in 1918 killed 50 million people worldwide. In addition to fatalities, a pandemic can lead to economic and health crises. The World Health Organization, the European Union and the Governments of the Member States are trying to take measures, to deal with the outbreak of the pandemic, to help fight it but also to strengthen the economy.

The International Monetary Fund (IMF)'s initial forecasts for the path of the economy in 2020, indicated a significant major recession in the world economy and a small degree of recovery in 2021. Along with the recession, was estimated a significant increase in budget deficits as Global support measures were initially estimated at more than 10 trillion dollars. The consequence of that, would be an even more explosive increase in public debt globally, exceeding for the first time 100% of GDP. Especially for Greece, (Stravelakis, 2021) mentions that the data for the Greek economy are even worse than the above general estimates since they raise the deficit to 27 billion euros and public debt at 223% of GDP compared to 176.60% (Trading Economics, 2020) at the end of 2019.

2. THE PROBLEMS CREATED IN THE ECONOMY BY COVID - 19

The impact of COVID - 19, in addition to health, is significant for the economy. Maliszewska et al. (2020) claimed that the pandemic affects the economy through the following channels: (1) the direct effect of a reduction in employment; (2) the increase in international transaction costs; (3) the sharp decline in travel, and (4) the decline in demand for services requiring proximity between people. Many companies have been hit hard not only by declining turnover but also by the uncertainty in the economic and social environment. (YELP, 2020) A study of companies operating in the United States is indicative of the magnitude of the problem. According to it, from March 1, 2020 until August 31 of the same year, 97,966 businesses were permanently closed in the United States, while 65,769 companies were temporarily closed.

The same study states that 19.4% of these businesses relate to food and 12.5% relate to clothing and gift shops. The situation is similar in Great Britain. According to (BBC, 2020) in 2020, about 180,000 retail jobs were lost, a number that is 25% higher than in 2019. At the same time, the decline in retail and food market turnover fell by 0.3% in 2020 compared to 2019 and this is the worst performance since 1995. Consumption in the retail sector in the countries of the European Union is moving in the same direction. According to (Eurostat, 2021) in December 2020, consumption reached only 71.9% of consumption in February of the same year. The construction industry seems to be more resilient as in November 2020 the drop in turnover reached 2.5% compared to February 2020. On the contrary, the data for the tourism and food sector are very bad as the drop in turnover between February and September 2020 exceeds 30%.

Dimson et al. (2020) in their study published in the beginning of the second wave of the pandemic, which involved more than 2,200 small and medium-sized enterprises in the five largest European countries - France, Germany, Italy, Spain and the United Kingdom - show how hard their well-being has been affected by the COVID-19 crisis. About 70% claimed their income had fallen as a result of the pandemic, while 20% said they were worried there might be problems repaying their loans but also faced the risk of dismissals. Overall, more than half thought their businesses might not survive more than 12 months - despite the fact that 20% of the respondents had already benefited from various forms of government assistance designed to reduce their financial hardship, such as tax breaks or staff payments. Therefore, it seems that the effects of the coronavirus on European businesses are significant if not catastrophic. The problem is exacerbated as SMEs employ more than two-thirds of Europe's workforce and make a significant contribution to the European economy. As a result of the pandemic, one-fifth of the businesses surveyed now expect to go bankrupt and dismiss part or all of their staff if revenue remains steadily low, with 55% likely to close by September 2021, up from 77% if revenue deteriorates.

Greece could not be an exception to all the above. In Greece, the first case of COVID - 19 was reported at the end of February 2020, while in March 2020 the Greek government decided the first major lockdown in order to avoid the first wave of the pandemic. The country remained "closed" for more than two months, resulting in a significantly smaller number of cases and deaths from COVID - 19 compared to other EU member states. However, the long duration of the pandemic, the reduction in consumption and production, the uncertainty of the buying public created problems for the smooth operation of businesses. The COVID-19 pandemic had a significant negative impact on Greek economic activity (Financial Stability Report, Bank of Greece, 2020). The temporary suspension of the activity of many companies from mid-March to May 2020 and the great decline in tourism, led to a large decline in GDP in the second and third quarters of 2020 by 14.2% and 11.7% respectively (at constant prices 2015, seasonally adjusted data). Overall, in the nine months of January-September 2020, Greek GDP fell by 8.5%, after 4 years of continuous growth. The labor market has deteriorated due to the recession, as total employment fell by 1.0% in the first nine months of 2020 and the rate of decline in the unemployment rate slowed down. Employment in the private sector was particularly

affected, as, according to the data of the ERGANI information system, in 2020 the balance of new jobs was less than 34,000 jobs compared to 2019. The tourism services sector suffered the biggest blow, falling by 8.7% in the first nine months of 2020.

3. THE NEED OF FISCAL MEASURES

3.1 The case of EU

Like all countries at the global level, the Member States of the European Union have been obliged to take measures to improve the business environment in which companies operate the last year. According to European Union figures, micro, small and medium-sized enterprises account for 99% of all businesses in the EU. In 2015, about 23 million SMEs generated € 3.9 trillion in added value and employed 90 million people, a vital source of entrepreneurship and innovation, elements that are essential to the competitiveness of EU companies.

Fiscal policy can effectively protect people, stabilize demand, and facilitate recovery across economies during the on-going pandemic as well as in the aftermath of this event. Considering the continuity of lockdowns across economies, fiscal policies should be accommodated to health care services to provide emergency life lines to protect people (Chakraborty and Thomas, 2020).

The European Union since the spring of 2020 has announced significant measures to boost the liquidity of the Member States in order to cope with the economic crisis created by COVID - 19. More specifically, in March 2020, a package of measures was adopted envisaging five types of aid aimed at ensuring that companies retain the means to continue operating or to temporarily freeze operations.

These measures concerned:

- direct grants (or tax benefits),
- subsidized government guarantees for bank loans,
- public and private loans with subsidized interest rates,
- additional flexibility to enable the provision of short-term export credit insurance by the state where needed.

In April 2020, the Commission set up the Short-Term Program (SURE) to support employment to protect jobs and workers affected by the pandemic. By the end of 2020, a total of € 90.3 billion in financial support had been approved to help 18 Member States using the SURE program. At its sitting of 16 December 2020, the European Parliament recorded the current situation and proposed to the European Council Structural Challenges for overcoming the COVID - 19 crisis. In particular reminded the Member States and the Commission, that there is an urgent need to restore the liquidity of SMEs in order to ensure their basic functionality and expressed its deep concern at the fact that sectors such as tourism, hospitality and culture have been hit hardest by the COVID-19 crisis.

On 28 January 2021 (Eurostat, 2021), the Commission decided to extend until 31 December 2021 the Provisional State Aid Framework approved in March 2020, to support the economy in the context of the coronavirus epidemic.

3.2 The case of Greece

In the last 10 years Greece is facing a significant economic crisis which has caused survival problems in many companies. The Hellenic Statistical Authority (HSA) indicates that between the years 2008 - 2016 there was a decrease in the number of companies by 9.4% while in the period 2008 - 2018 a decrease of 16.81% was recorded in the level of employment. During the second quarter of 2008 the number of employees was 4.64 million while in the same period but ten years later, the number of employees decreased to 3.86 million. The above difficult situation for Greek companies continued in 2020 and in fact significantly affected by the COVID - 19 pandemic.

Imegsevee (2019) indicates that the vast majority of businesses in Greece (over 60%) are individual while over 80% of the businesses are family owned according to a study by the Athens Chamber of Commerce and Industry. As a result, the course of these companies directly affects, mainly the daily life of households, but also the economy of the country. The impact on the economy with the outbreak of the virus and the restrictive measures decided by the government was great. Companies with a large number of employees suspended their operation also, those that continued their operation, the majority recorded a decrease in their turnover. According to HSA data announced on 16-4-2020, 14.6% of the companies, ie 205,984 companies with over one million employees in them, were suspended from operation for at least 3 months in the spring of 2020, while many of those active in the tourism and food industry are still closed till March 2021.

A Grant Thornton's report (Grant Thornton, 2020) states that companies that represent 69% of the total turnover of Greek companies were directly affected by the COVID - 19 pandemic as a result of

the reduction or even cessation of their operation. At the same time, companies that generate a turnover of € 32.9 billion (11% of total turnover) and employ about 1.1 million employees (25% of the total) have ceased operations due to the pandemic. The sectors that were hit, mostly are the accommodation and catering services and entertainment. According to estimates by the same company, the turnover of the accommodation services sector for 2020 is expected to fall by 52% compared to 2019, while the catering and entertainment sectors are expected to experience a 40% drop in turnover between years 2019 and 2020.

The effects of the pandemic on capital companies also seem to be significant. According to a press release of HSA (2021) published on 17/02/2021 for all businesses in the economy with the obligation to keep double entry books (the majority of which are capital companies), the turnover in December 2020 amounted to 21.9 billion euros, recording a decrease of 7.8% compared to December 2019, which had reached 23.7 billion euros (table 1). In particular, the largest increase in turnover by 14.0% in December 2020 compared to December 2019 was presented by companies with activities related to human health and social care, followed by companies operating in the education sector which recorded an increase by 13% in December 2020 compared to the corresponding period of 2019. The largest decrease in turnover by 78.5%, for the same period, was presented by companies operating in the fields of arts and entertainment and followed by a decrease of 52.1% in the companies operating in the tourism and catering sectors.

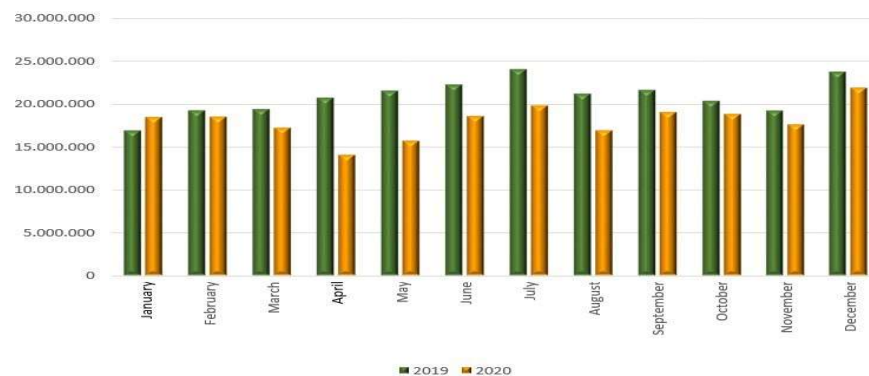
Table 1. Turnover for December 2019 and 2020 (in thousand €) of Greek enterprises with the obligation to keep double entry books

Economic Sector	Turnover (in thousand €)		
	December 2019	December 2020	Change (%)
Agriculture, Forestry, Fishery	227.229	220.761	-2,8
Mining and Quarries	89.750	90.243	0,5
Processing Industries	5.413.526	5.024.505	-7,2
Electricity, Gas, Steam and Air Conditioning	1.490.219	1.499.164	0,6
Water Supply, Sewage Treatment, Waste Management and Remediation Activities	189.775	191.005	0,6
Constructions	1.214.978	1.173.540	-3,4
Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	8.927.293	8.226.926	-7,8
Transport and Storage	1.028.907	930.398	-9,6
Activities of Accommodation Services and Catering Services	276.593	132.493	-52,1
Information and Communication	1.221.627	1.209.679	-1,0
Financial and Insurance Activities	1.116.033	1.170.640	4,9
Real estate management	336.762	226.408	-32,8
Professional, Scientific and Technical Activities	903.607	925.825	2,5
Administrative and Support Activities	513.785	433.992	-15,5
Public Administration and Defense, Compulsory Social Security	38.880	36.786	-5,4
Education	48.021	54.274	13,0
Activities Related to Human Health and Social Welfare	167.508	191.022	14,0
Arts, Entertainment and Recreation	487.381	104.684	-78,5
Other Service Activities	58.991	58.858	-0,2
Unknown Activity	5.358	4.093	-23,6
Grand Total	23.756.223	21.905.296	-7,8

Hellenic Statistical Authority, (2021), Development of business turnover in suspension of operation due to the pandemic of COVID disease December 2019 and 4th quarter 2020, Annual Data 2019 and 2020, pp.6.

At the same time, the same press release depicts diagrammatically the monthly comparison of the turnover of the enterprises of the economy with the obligation to keep double entry books. Figure 1 shows that in all months of 2020 except January there is a decrease compared to the same period in 2019 with the largest decrease observed in the months of the 1st lockdown (April and May), while the last three months of the year in which the country was found in the 2nd wave of the pandemic the decrease ranged to smaller levels.

Figure 1. Monthly turnover (in thousand €) of Greek enterprises with the obligation to keep double entry books



Hellenic Statistical Authority, (2021), Development of business turnover in suspension of operation due to the pandemic of COVID disease December 2019 and 4th quarter 2020, Annual Data 2019 and 2020, pp.12.

The Greek government in cooperation with the European Union has taken decisions and measures to strengthen companies and employees in order to face the crisis created by the coronavirus. The measures are moving in all directions (taxation, employment etc.). At the same time, from the beginning of the pandemic, some pecuniary amounts were given as subsidies.

In mid-March 2020, the 1st package of business support measures was announced by the Ministries of Finance, Development and Investment, and finally, Labor and Social Affairs. In the following months, until today, these measures were either extended or updated so as to support the country's economy. According to a press release (Greek Ministry of Finance, 2020), the measures of the Greek government to face the coronavirus till December 2020 exceeded 24 billion euros.

3.2.1 Business support measures in taxation and VAT by the Greek Ministry of Finance

- The first measure concerning taxation was the 25% discount on the March and April tax debts that were repaid on time. This measure concerned non-overdue debts and settlement installments which would be repaid on time in full by 30 April 2020.
- VAT was reduced to 6%, from 24%, to products that are necessary for protection against the coronavirus such as gloves, masks, antiseptic wipes and solutions, soaps, etc.
- The revision of the objective values of the real estate was suspended. The taxation of property (ENFIA) for the year 2020 will be based on the current regime and the new objective values will apply from next year (2021).
- The reduction in the tax advance for the year 2019 from 30-100% was voted and implemented, depending on the fall in the turnover that each company had in the first half of 2020 compared to the same period in 2019.
- The Ministry of Finance proceeded to the immediate repayment of all overdue liabilities of the State to the companies, returning the amounts of all cases under control, amounting to up to 30,000 euros.

3.2.2 Business support measures by the Greek Ministry of Labor and Social Affairs

- Adopted the possibility of a special purpose permit given to working parents who have children under 15 years old due to non-operation of schools, for workers with health problems, etc. The cost of the leave is shared between the State, the company and the employee.
- Flexible working hours or through distance working (teleworking) was legislated, in order to ensure public health.
- Prohibited from 18 March 2020 onwards the dismissal of employees in companies whose operation has been suspended following a state order. In case the company makes a dismissal, it is considered as invalid.
- A program for the creation of 100,000 new jobs has been voted and is being implemented since October 2020, with the subsidy of all insurance contributions (employers-employees), for six months, to companies - employers of the private sector, regardless of sector and business.
- From June 2020 until October of the same year the "Cooperation" program was in force, according to which, the employer could reduce up to 50% the working hours of full-time employees. The inclusion in the program was done without the consent of the employees and the right to participate in the "Cooperation" program had all the companies, which showed a reduction of turnover by at least 20% as well as the companies, which were operating for the first time.
- It was possible to suspend for at least three months the payment of current insurance liabilities regulated or even regulated in companies that were closed by state order (such as retail stores, restaurants, tourism, etc.) or are affected by the pandemic.
- A 25% discount was given on the insurance contributions of entrepreneurs for the months February - May 2020.
- The insurance cost of full-time employees was reduced by 0.9% from June 1, 2020. Also, from January 1, 2021, the insurance cost of all employees was further reduced by 3%. Now the cost of insurance for a full-time employee is 36.66% of gross earnings. Of this amount, 14.12% concerns the deductions of the employee and 22.54% concerns the employer's deductions.

3.2.3 Business support measures by the Greek Ministry of Development and Investments

- A one-time financial aid of 800 euros was given in the companies that were affected or had been closed by state order for the period 15 March - 30 April 2020.
- Businesses were financed with a grant called “refundable deposit” with over than 6 billion euros, in total. The “refundable deposit” was given in 6 rounds, the last of which was given to

the companies in the beginning of March 2021. For the financing of each company, it is taken into account the reduction of its turnover, usually in a percentage of more than 20% in relation to the turnovers of previous periods. A basic condition for a company to receive a “refundable deposit” is to retain its staff for at least 6 months. The first three rounds required the full amount to be reimbursed in 48 monthly installments with the first installment being in January 2022. The three last rounds required the half amount to be reimbursed in 48 monthly installments with the first installment being in January 2022.

- A Guarantee Fund was established as an independent financial unit within the Hellenic Development Bank in order to support the economy through the maximum utilization of financial instruments to meet increased liquidity needs of companies. Through the Guarantee Fund, banks grant new working capital loans guaranteed up to 80% of the amount of each loan with a subsidized guarantee fee, for 40% of the volume of business loans granted by each bank to SMEs or 30% for corporate portfolios, while in addition the state subsidizes the supply of guarantee.
- The rates of up-to-date business loans for 3 months were subsidized for the sectors of the economy that are directly affected by the coronavirus.
- The payment of business loans was suspended by the banks from March 2020 to September 2020.
- Within the first four months of 2021, a decision is expected to be made which will cover with state subsidy business loans in their entirety (interest and capital). The percentage of the state subsidy will be higher for the green business loans while for the red loans it will be a necessary condition to reach an agreement with the bank for the regulation of the loan.
- The companies that cease their activity by state order due to the coronavirus, pay 60% of the rent of the commercial property, in case they rent it, for those months that are closed by until December 31, 2020. For the months of January, February and March 2021 these companies do not pay rent. The owner of the property will be paid from the state for the rest of the rent.
- The companies that are significantly affected by the coronavirus, paid 60% of the rent of the commercial property, in case they rent it, for the months of March, April, November and December 2020 and January, February and March 2021.
- The thirteen Regions of Greece provided aid in the form of a non-refundable deposit to companies that recorded a decrease in their turnover between 2020 and 2019 in order to subsidize their operating expenses.
- A National Strategic Reference Framework (NSRF) program was announced which subsidizes the construction or improvement of online stores (e-shops) to more than 16,000 retail companies.
- An NSRF program was announced which subsidizes the purchase of radiators for outdoor use to companies in tourism and food sectors.
- A legislation has been voted since the beginning of the pandemic, which suspended until the 31st of December 2020, the deadlines for expiration, appearance and payment of overdue checks by 75 days from the indicated date of each check, for the companies whose activity has been suspended due to or have been severely affected by the pandemic. This measure is expected to apply in 2021.

3.2.4 The path of the Greek Stock Market during the COVID-19 period

The pandemic and the fiscal measures taken by the Greek Government, affected, among other things, the path of the stock market. We have calculated and depict (figure 2) the evolution of the general price index from 26/02/2020, when the first case of COVID-19 appeared in Greece, until 26/02/2021, ie one year later.

Figure 2. Greek Stock Market general price index between 26/02/2020 and 26/02/2021



Throughout this period, the Greek stock market seemed to maintain its momentum as the general price index fell by only 2%. The lowest price of the index during this period was recorded on 16/03/2020 which was the first working day after the announcement of the first lockdown on 13/03/2020. On that day, general price index lost 12.25% of its price. A few days later and specifically on 23/03/2020, there was again a significant drop of 7.58%, possibly as a reaction to the 1st COVID-19 response package announced in those days. The last significant drop (5.08%) of the index occurred on 29/10/2020 just a few days before the country officially passed the border of the second wave of the pandemic. However, apart from the extreme negative percentage changes of the general price index, there were also corresponding positive ones, which basically occurred in the period 03/03/2020 - 06/04/2020. There was an increase by 6.38% on 03/03/2020, by 7.78% on 19/03/2020 and by 8.46% on 06/04/2020. This can be seen from the chart above, as in that period the index presents significant positive and negative fluctuations. Significant positive changes (increase by 11.46% on 09/11/2020 and by 5.44% on 16/11/2020), but to a lesser extent, were also recorded in the first 15 days of November in which the index after the significant drop which preceded the end of October, regained its lost ground immediately.

We have calculated (table 2) the variation in the closing prices of shares, by sector, between 26/02/2020 and 26/02/2021. As the table shows, the biggest negative changes are presented by the banking and food retail sectors, while on the contrary, the biggest positive changes are presented by the pharmaceutical, software, household and personal goods sectors.

Table 2. Greek Stock Market Sectors price variation between 26/02/2020 and 26/02/2021

Greek Stock Market Sectors	Price Variation (%)
Banks	-33,43
Capital Goods	32,42
Commercial & Professional Services	-8,40
Consumer Durables & Apparel	23,09
Consumer Services	-21,21
Diversified Financials	-15,57
Energy	-5,86
Food & Staples Retailing	-34,92
Food, Beverage & Tobacco	-4,11
Health Care Equipment & Services	-9,31
Household & Personal Products	34,76
Insurance	3,96
Materials	30,02
Media & Entertainment	16,16
Pharmaceuticals, Biotechnology & Life Sciences	69,63
Real Estate	12,51
Retailing	-10,90

Shipbuilding	0,00
Software & Services	57,36
Technology Hardware & Equipment	27,86
Telecommunication Services	1,16
Transportation	-11,33
Utilities	35,05

As can be seen from the variation of the stock prices in the Greek stock market during the last year, but also from the press release of HSA, that presented above, regarding the effects of the pandemic on all businesses in the economy with the obligation to double entry bookkeeping, the sectors most affected by COVID-19 are those of catering and food, tourism and culture.

4. THE IMMEDIATE FUTURE OF BUSINESSSES

According to the annual report Financial Stability Report, Bank of Greece (2020), the growth rate of the Greek economy in 2020 was estimated to slow down significantly because of the effects of the spread of the coronavirus. These effects have already been seen, as mentioned above, as the pandemic is underway. In particular, according to the basic scenario of the Bank of Greece, the rate of change of GDP was estimated to be zero in 2020, instead of 2.4% which was the initial forecast after the integration of the National Accounts data for the fourth quarter of 2019. The downward revision of the growth rate forecast by an additional 2.4 percentage points was due to the incorporation of the effects of the coronavirus spread. The first estimates (March 2020) for the evolution of the pandemic, were that there would be a significant negative impact on the economy in the first two quarters of 2020, which will be partially offset in the last two quarters. However, these estimates were not verified as the coronavirus significantly affected the country's economy.

In most countries of the world the end of the pandemic is expected to occur by the end of 2021, after a significant part of the population has been vaccinated. The same is estimated to happen in Greece, which in terms of its performance in protecting the population from the coronavirus has achieved significantly better performance compared to most developed countries worldwide. Gountas and al.(2020) stated that if Greece had not implemented social distancing interventions, the healthcare system would have been overwhelmed between March 30 and April 4 2020. The combined social distancing interventions and the increase in ICU beds averted 4360 (95% credible interval: 3050, 5700) deaths and prevented the healthcare system from collapsing.

But this must be combined with the rapid recovery of the economy, at least, to pre-COVID-19 levels so that the country can recover from the new crisis in which it finds itself. Teleworking, flexible forms of employment and the rapid integration of technology into the daily lives of companies (mainly in transactions with the State) increase productive time and help increase productivity. This is reflected in KPMG (2020) press release on the challenges and priorities of Greek CEOs.

The findings include the following:

- A percentage of 67% of Greek CEOs show confidence in the development prospects of the country.
- A percentage of 27% of them declare that they are uncertain about the growth prospects of the global economy.
- Almost all Greek CEOs believe that the pandemic has accelerated the digital transformation, with the greatest developments being recorded in the creation of a digital experience for the customer. Also they believe that working remotely has created significant changes in the policies of cultivating a new culture.
- A percentage of 87% of them report that communication with the company's employees improved during the crisis.

From the above analysis or presentation it seems that in this difficult period when the economies of all countries are affected by COVID-19, there is hope for recovery of companies, if they handle the emergency situation properly and take advantage of opportunities that may arise in the future. In this way they will be able to partially offset the problems that have been created all this time in order to continue their operation and their evolution. Padhana and Prabheeshb (2021) report that as the COVID-19 is associated with lower inflation in advanced economies, expansionary monetary policy could

facilitate higher economic growth and higher investment in the productive sector. The costs of such countervailing measures will be higher for more unequal countries, which are often characterized by harder budget and financial constraints (as we have shown for the European context). For these economies, resorting to indebtedness would mean increasing financial and political fragility, besides needing to implement future austerity measures, which would further frustrate growth prospects and increase inequality (Perugini and Vladisavljevic, 2020).

However, the monetary policies of advanced and emerging economies are not independent of each other. The global monetary policy and its shocks play a dominant role in determining domestic macroeconomic conditions and monetary policy. According to the European Union's winter economic forecasts for 2021 (Eurostat, 2021) economic growth is expected to return with the easing of restraining measures and the eurozone economy is expected to grow by 3.8% in 2021 and 2022.

5. CONCLUSION

The years 2020 and 2021 were and will be a very difficult period for all the economies of the world. The COVID-19 health crisis has accelerated the need for businesses to take advantage of new data such as the use of technology and flexibility in employment and the opportunities that will arise to survive this difficult economic situation.

Governments around the world have taken measures to reduce income and job losses, but the year 2020 has shown that even companies with a dominant position in their market can lose market share and turnover if they do not modernize and update their services and products. On the way back to growth, the Greek economy today faces parallel challenges (Papazoglou, 2021) that it must confront and these are none other than the further digitization of public administration, the digital technology revolution and the creation of an investor-friendly environment in order to attract investments and utilize the most valuable asset at its disposal, namely human capital.

As a conclusion, Greek companies should try harder to overcome the backwash of COVID-19 as, in addition to last year's crisis due to the pandemic, there is also the on-going economic crisis of the last decade that has hit the country's economy hard. After the end of the pandemic, the vast majority of Greek companies will have to manage: 1) the significantly reduced turnover, 2) the reduction of employment and 3) the debt either from the state, through “refundable deposit”, or from the banks. That means that they will have to make a significant effort to return at least to the levels before the COVID-19.

Supporting Greek entrepreneurship is the key to mitigating the effects of the crisis. Measures to support Greek companies in the post-covid era, either by the Greek state or by banks, should move in this direction. The recording of the measures taken in the first year of COVID-19 sets the stage for how the Greek government wants to manage the new crisis that has hit the country, but it is perhaps a precursor to the way in which it will continue to support the Greek economy in the future.

Sectors such as accommodation and food and tourism more broadly, which have been significantly affected, are the ones that have a large share of the country's GDP, so they are extremely important for the Greek economy. So maybe it's time to reconsider the productive model of the country. The mix of economic activity should be diversified, so as to avoid dependence on specific sectors. The government's efforts should be focused in strengthening sectors, such as agriculture and farming, industry and manufacturing, and to highlight others, in which our country, based on geographical location and climate can excel, so that it can gain a comparative advantage in fields like the agri-food sector, the technology and the energy sector.

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DIGITAL PAYMENTS IN THE POST CAPITAL CONTROL ERA

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ABSTRACT

Over the last two decades, the Greek economy has undergone significant changes. From 2000 to 2007 the country had an average growth rate of 4.1% and one of the three fastest rates in the Eurozone. But beneath what seemed to be a prosperous economy lurked fundamental structural deficiencies that led to the debt crisis of 2010. Overall, the Greek crisis lasted eight years and involved three economic adjustment programs, another three rounds of bank recapitalisation, and some major debt restructuring. All of the above created an environment of economic insecurity and intense policy uncertainty. A particularly critical point was the imposition of capital controls in June 2015 in order to preserve the stability of the financial system and the banking sector. By preventing capital flight abroad and massive deposit outflows the banking system's liquidity improved but the economy returned to recession. The purpose of the present paper is to provide an overview of the significant changes in the transaction behavior of the public after the implementation of capital controls. It seems that although Greek citizens have developed a deep-rooted trust in paper and coins which resulted in what could be described as a cash economy, especially during uncertain times, the imposition of capital controls was a turning point that triggered the adoption of different payment technology. The capital restrictions brought a significant increase in both e-banking transactions and the use of plastic money. In order to bypass the withdrawal limit, consumers were led mainly to the use of debit cards and online payments. On the positive side, we should point to the increase in tax revenue and the reduction of branch transactions despite the fact that the level of electronic payments remained lower than the European average. On the other hand, their increasing use entails heightened fraud risks, thus promoting the need for tighter security operations in banking transactions. The study also focuses on the implications of the Covid-19 pandemic regarding the use of e-payments. Early data indicated that banking applications doubled in Greece almost a month after the country imposed its first lockdown in March 2020. These findings enrich the literature on digital payments and their future capabilities.

KEYWORDS

Digital, e-payments, cashless transactions, capital controls, Greece, COVID-19

JEL CLASSIFICATION CODES

O33, L86, E42

1. INTRODUCTION

The global payment industry experienced significant growth over the last decade. What a few years ago seemed as progressive or even revolutionary now seems commonplace. The world is changing, and so is the way we make payments. Driven by digital revolution and consumer demands, the payments landscape has undergone radical changes. Shopping online nowadays seems the norm for European citizens and the latest issue to be explored is their buying habits not just from their residence, but on the go through their mobile devices. Data showed that in 2019, in Europe, 45 billion transactions were processed by retail payment systems worth €35 trillion, while the total number of non-cash payments increased by 8.1% to 98.0 billion (compared with the previous year). The total value was €162.1 trillion. At the same time card payments accounted for 48% of the total number of non-cash payments, credit transfers for 23% and direct debits for 22%. The number of payment cards issued increased by 5.5% to 572 million (1.7 payment cards per inhabitant). The shift from cash to electronic payments is generally considered to be safer and more efficient nowadays. Electronic means of payment can also reduce costs for organizations and increase transparency for governments (ECB, 2019; 2020).

The European payment landscape is not a unitary and homogeneous entity. There are crucial differences in the payment habits of European citizens deriving from cultural and behavioural factors such as monetary history, social customs, religious norms or even credit aversion. Another vital element is a country's economic maturity and e-commerce status, which is undeniably the main reason consumers adopt digital payments. The traditional banking infrastructure (such as brick-and-mortar branches or ATMs) also plays an important role. A strong indicator for the reduction of cash-based

services in Europe is the falling numbers of bank branches and ATMs. In 2019, branches were reduced by 5.6% and at the same time ATMs by 1.15%. In general, some countries prefer cash, while others choose credit cards, debit cards or even pre-loaded e-wallets. More specifically, Iceland, Denmark, Finland, Norway, and Sweden are among the most advanced e-payment markets in the world with the latest leading towards a cashless society (EPA.EU, 2020). The results from a 2019 survey showed that the citizens of the United Kingdom and the five Nordic countries were the least (out of 38 countries) likely to use cash for their transactions. In addition, in 2017, 98% of adults in Sweden owned a debit card, while the same figure for Portugal was 83% (Statista, 2021). But that was not the case for the South-Eastern Europe. In Romania, for example, 97% of all transactions (in 2019) were still conducted using cash (EPA.EU, 2020). It should also be pointed that after the outbreak of the pandemic the differences between countries (and even between age groups) eroded (McKinsey, 2020).

Although Europe’s payment market is fragmented, cash remains the most popular form of payment. Nonetheless, its role is diminishing. The share of point-of-sale and person-to-person transactions in cash has declined. In more detail, between 2016 and 2019 the volume of total transactions in cash fell from 79% to 73%, and in terms of value declined from 54% to 48% (ECB, 2020).

The dream for a cashless economy does not apply for Greece. Greek citizens have developed a deep-rooted trust in paper and coins which resulted to what could be described as a cash economy especially during uncertain times. But the imposition of capital controls in 2015 was a key point that triggered the adoption of a different payment technology. In 2019, for example, the three countries using mostly cash to make payments (such as rent, mortgage, electricity or phone bills) were Malta, Cyprus and Greece (ECB, 2020b).

The study aims to provide an overview of the use of e-payments in Greece. It adds to the existing literature on digital payments by combining data and assessing the progress of electronic payments in Greece. A basic analysis of the concept and types of electronic payments is presented. This is followed by a description of the key drivers that triggered the surge in the use of e-payments and its consequences on the country’s economy. The final section contains the concluding remarks.

2. ELECTRONIC PAYMENTS AND THE END OF CASH

The digitalization of money and payment services started many years ago and has already revolutionised the banking industry. The development in the sector, which was the main driving force behind many innovations, had several phases some of which went unnoticed by consumers. The first stages included the process of interbank payments, followed by changes in the way customers interacted with their banks with the most notable being ATMs, e-banking, card payments, and remote banking services. In a way, what started as a cost-saving and efficiency-improving goal was turned into a revolution (ECB, 2005). As stated by Scott (2018), the emerging of a “cashless” society is proposed from four economic and social players: banks, network payment processors companies, fintech companies, and governments.

According to the electronic Payment Systems Observatory (ePSO), an ‘electronic payment’ or ‘e-payment’ is the transfer of an electronic means of payment from the payer to the payee through the use of an electronic payment instrument (Institute for Prospective Technological Studies, 2002). In general, the term electronic payment refers to a financial exchange that allows customers to pay for products or services purchased on the Internet. It is facilitated by means of electronic communications and requires a technology system that provides all the necessary tools for payments to be carried electronically. These web-based user interfaces allow customers to access and manage their bank accounts remotely (Weir et al., 2006; Lim, 2008).

In the field of e-commerce exchanging money in an electronic form has been an integral part of the procedure and a key pillar for its development (Abrazhevich, 2004). Although e-payments emulate the payment framework of the physical currency transactions, while schematizing alternative ways to carry out payments, adopting them vastly depends on the issues of trusting both the reliability and security of the system, cost and time (Tsiakis & Stephanides, 2005). Ahmed et al. (2019) proposed that the requirements of a functional e-payment system should be security, anonymity, cost, acceptability, convenience, control and traceability.

As previously stated E-payments around the world were not immune to Covid-19 as nearly all aspects of daily life. The pandemic and the global health crisis have had an impact on e-commerce, digital payments (including contactless), instant payments, and caused a greater displacement of cash. A shift was observed from card payments at POS systems to contactless digital wallets, both in-store and online. Notable, however, are not only the changes that occurred but also the speed. A

development that may have lasted a decade now happened in a year (Anderton et al., 2020; McKinsey, 2020).

3. CATEGORIES OF E-PAYMENTS

The four basic categories of electronic payment instruments are the following:

a. Payment cards

Debit, credit, prepaid and other types of cards are the most popular payment method for online purchases. Regarding their differences, a debit card enables its holder to make direct purchases that immediately charged to the account that is linked to. What distinguishes it from a credit card is that purchases are charged directly to the funds on the cardholder's bank account in full, so there is no option to pay the amount by the end of a certain period or to be settled in part like in the credit ones. Prepaid cards, on the other hand, are not linked to a bank account. The owner can spend only the amount of money that has previously been placed on the card (IOBE, 2018).

On a global scale, in 2018, cards remained the most popular online payment method (37%), with preference to Europe and America mainly due to the protection features offered. For the same year, it was calculated that 6.3 billion cards were in circulation, a figure that was estimated to reach 11.7 billion in 2023 (Europeanpaymentscouncil, 2019). In 2019, 69% of Europeans and 82% of Americans preferred debit or credit cards for their online purchases. The same does not apply for India and China that despite their e-commerce expansion record low penetration of debit and credit cards (Statista, 2021).

b. E-wallets, mobile wallets and in-app payment methods

The evolution in digital payments and smartphone penetration, have resulted in the emergence of e-wallets (also known as digital wallets). E-wallets are considered one of the fastest-growing on-line paying methods in the world and are estimated to account for 50% of worldwide e-commerce by 2022. In some regions, like the Asia-Pacific, they reached a share of almost 60% of electronic transactions in 2019. One of the main reasons for their development in the emerging economies (and in rural regions) is that they provide consumers the ability to connect to the global financial system without the need for a bank account, a visit to a physical company or bank branch. It should also be noted that besides being the most numerous, consumers in those regions, are also the most active ones (Europeanpaymentscouncil, 2019).

When first using an e-wallet the customers' personal data, bank account details, and funds are stored, so they do not have to be entered every time the customer makes a purchase thus providing speed and efficiency. From the checkout, he is redirected to the e-wallet's page where he completes the transaction. The most popular digital wallets globally are PayPal (Western world), Alipay (Asia-pacific), WeChat Pay, GooglePay, and Venmo. It was estimated that in 2019 approximately 2.1 billion consumers worldwide were using e-wallets (Europeanpaymentscouncil, 2019).

The evolution of mobile phones also brought a tremendous rise in mobile payment applications that are used by millions of Europeans. Mobile Pay, for example, has over 4 million users in Denmark (69,3% of the population), Swish has over 6,7 million users in Sweden (67,3% of the population), and Vipps has over 3 million users in Norway (57,1% of the population). Other popular global mobile applications are Apple Pay, Google Pay, and Samsung Pay. One of the most important drawback is the issue of trust in the security of mobile payments is one of the major barriers (Europeanpaymentscouncil, 2019).

c. E-banking payments

Bank transfers are considered a secure and reliable payment option as the customer is paying from his bank account using his own funds. In order for the process to proceed, authentication is required through his bank. More specifically, at checkout the customer is directed to the banking portal of his choice where he needs to authorise the transaction. Users seem to choose this method due to its convenience, speed and the lower costs for the merchants. In 2019, they accounted for 9% of the e-commerce transaction volumes (IOBE, 2018b; Europeanpaymentscouncil, 2019).

d. Other transactions

This category includes other types of electronic payment such as gift cards, e-vouchers, electronic checks, and cryptocurrencies. Although cryptocurrencies seem to be on the rise they are not yet considered among the world's e-payment leading trends (Europeanpaymentscouncil, 2019).

4. FACTORS AFFECTING E-PAYMENTS IN GREECE

4.1 Greece and capital controls

Over the last two decades the Greek economy has undergone significant changes. From 2000 to 2007 the country had an average growth rate of 4.1% and one of the three fastest rates in the Eurozone. But beneath what seemed to be a prosperous economy lurked deep rooted structural deficiencies that led to the dept crisis of 2010. Overall, the Greek crisis lasted eight years and involved three economic adjustment programs, another three rounds of bank recapitalisation and some major debt restructuring. All of the above created an environment of economic insecurity and intense policy uncertainty. A particularly critical point was the imposition of capital controls in June 2015 in order to preserve the stability of the financial system and the banking sector. By preventing capital flight abroad and massive deposit outflows the banking system's liquidity improved but the economy returned to recession. In the four years that lasted (2015-2019), twenty five legislative decisions on capital stocks were issued (Liargovas et al., 2019)

The measures included restrictions on both cash withdrawal and on outflows of funds. Regarding cash withdrawals, there was a gradual relaxation on restrictions that began almost after the end of the three-week bank holiday in July 2015. In more detail, the first cash withdrawal limit per bank account was €60 per day. A month later it was increased to €420 per week, to €840 per fortnight in July 2016. One year later it was set at €1800 per month, €2300 per month in March 2018, and €5000 per month in May 2018. The restrictions on cash withdrawals were lifted in October 2018 and on funds abroad on September 2019 (Danchev et al., 2020).

4.2 Macroeconomic factors and policy measures

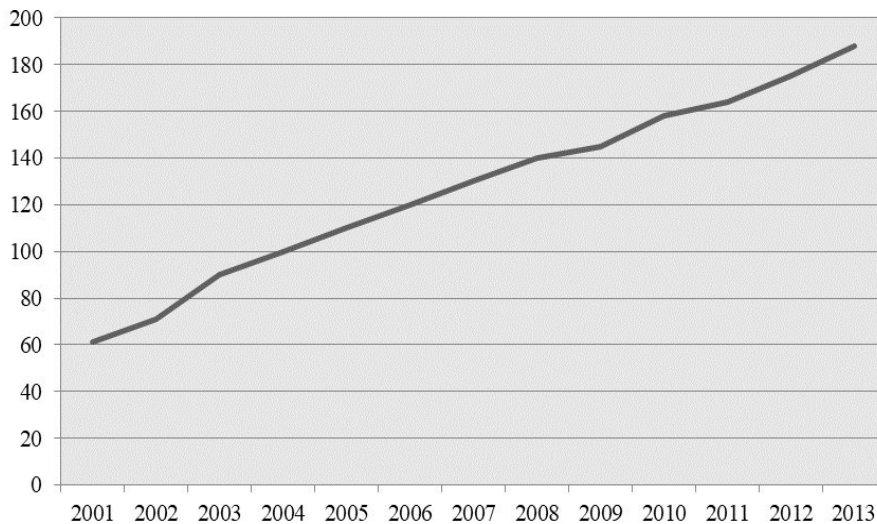
In an attempt to promote e-payments the government issued the Law no. 4446/2016 which had a dual purpose as to provide disincentives on the use of cash and incentives on the use of electronic payments. At the same time, it was directed towards consumers, businesses and the public administration. On the consumer (demand) side, the previous obligation to collect paper receipts was replaced with digital payments and an income tax surcharge in case of low EMP. They imposed a minimum threshold of expenditure growing progressively with annual taxable income ranging from 10% to 30% (10% for annual income up to €10.000, 15% for income between €10.000 - €30.000, and 20% for income exceeding €30.000) and placing a limit at €30.000. The implementation began in 2017. Late the same year, they introduced a lottery. Each card payments generated lots that automatically entered the monthly draws and every month, 1.000 lots earned €1.000 each. On the merchants side (supply) the most important measure was the legislation of mandatory acceptance of electronic modes of payment for certain professions and economic sectors. Another policy measure was that the transaction cash limit was decreased from €1500 to €500 With Law no. 4646/2019 the required amount of EMP expenditure for each year was increased at 30% of taxable income (maximum of € 20.000) (Danchev et al., 2020).

Other macroeconomic factors that influence the progress of digital payments include the course of a country's GDP, the households' consumption, the unemployment rate, consumer prices and consumer confidence indicator. Although the influence of these factors is considered very important, their further analysis is not the subject of the present study.

5. THE LANDSCAPE OF E-PAYMENTS IN GREECE

Over the last twenty years, evolution has occurred in Greece towards the integration of electronic payments as the level of use is significantly higher than in 2001. Both the number and the value of all electronic transactions increased remarkably during 2001-2013. More specifically, the number of transactions was tripled from 61 million euros in 2001 to 188 million euros in 2013, marking an increase of 208%. Within this period, the upward trend was affected by the financial crisis of 2008, which weakened the compounded annual growth rate (CAGR) to 4,9% (2009-2013) from 12,8% in the previous years. In more detail, from 2008 to 2013 the number of transactions increased annually by only 1,6% on average with the largest growth rate (5,5%) to be recorded in 2013 (Figure 1).

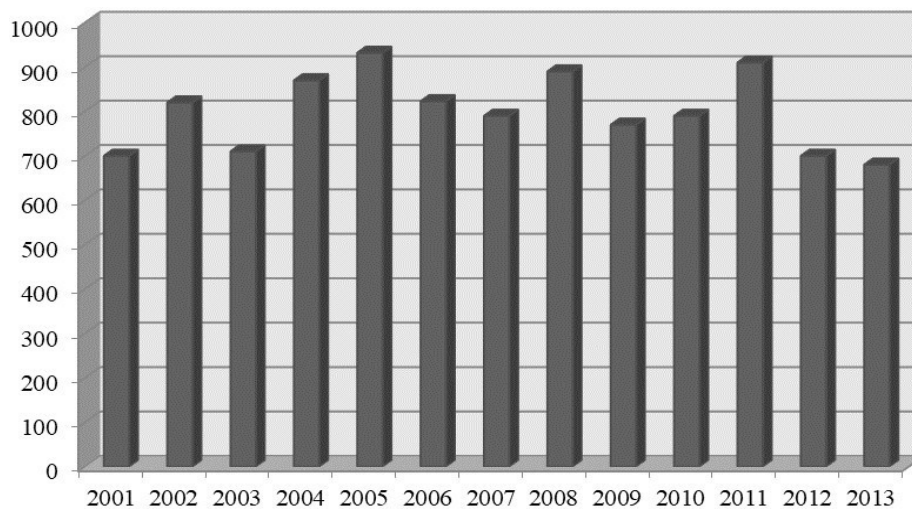
Figure 1: Number of digital transactions in Greece (2001-2013*)



Source: IOBE (2015) *million €

During this period (2001-2013), the value of transactions was close to 795 billion euros noting the highest percentage in 2005 (932 billion euros). Nevertheless, the negative impact of the 2008 crisis was also observed in the value of transactions that followed a downward trend and shrank to their 2003 level in 2012 and 2013 (Figure 2). It is noteworthy that prior to the economic crisis, the value of electronic transactions (except for credit transfers) was rapidly growing, with the 2007 value being almost four times higher than in 2001 (IOBE, 2015).

Figure 2: Value of digital transactions in Greece (2001-2013**)



Source: IOBE (2015) ** Billions €

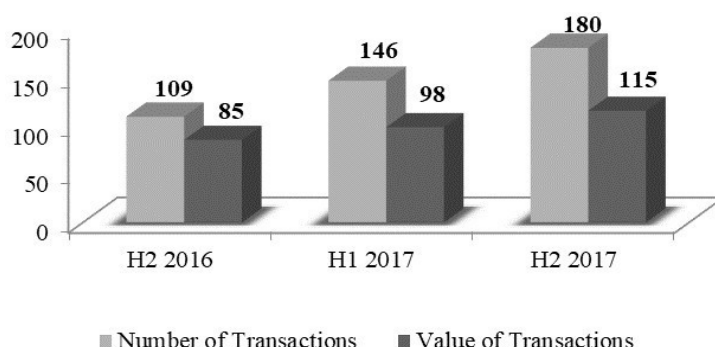
Despite the remarkable increase, the use of electronic payments in Greece was extremely limited and the country still remained at very low levels compared to other European countries. In 2010, approximately 97% of all transactions were conducted with cash which brought the country in the first place of the respective ranking among the rest European countries. It was followed by Bulgaria and Romania with 95% and 93% respectively. At the same time Luxembourg was ranked last, even below the Scandinavian countries and the Netherlands, where cash use did not exceed 40% of the transactions. In 2013, on the number of digital payments per inhabitant Greece occupied the last position in the ranking (IOBE, 2015). According to a research study by the Athens University of Economics and Business –AUEB in 2014 regarding the preferred ways of paying when purchasing online, the most popular method was cash on delivery (82%). This was followed by credit cards (67%), debit cards (62%), and PayPal (61%). Almost half chose bank deposits (49%) (Antoniadis et al, 2017).

Data showed that Greece appeared hesitant in adopting electronic payment methods, despite the government’s efforts to develop mechanisms for their diffusion. On the citizens’ side, consumer preferences reflect their perceptions of the security issues that are also associated with a lack of familiarity with online shopping and a general insecurity regarding e-commerce and electronic transaction systems in general (Antoniadis et al., 2017). Zoyros and Spinthiropoulos (2014) also pointed the importance of trust and perceived usefulness on the users of e-banking services. The paradox is that their insecurity does not arise from objective statistics, since the number of fraud cases with payments cards in Greece is low compared to the EU average. Other barriers include the low adoption of internet technology by Greek households and the notable reduction of their disposable income as a result of the economic crisis. Meanwhile, despite the high number of POS terminals per inhabitant in the country, there are a considerable number of self-employed, small retail companies, and other professionals that tend to make unrecorded transactions thus contributing to tax evasion and also act as a deterrent to the development of digital payments (IOBE, 2015).

The scene seems to be differentiated from the imposition of capital controls in 2015. Digital payments were accepted by consumers as an alternative to cash although this change was not voluntarily. Businesses and consumers appeared more familiarized with electronic transactions, while an increase was noted in the number of active users of e-banking and mobile platforms (Antoniadis et al., 2017). In order to cope with these unusual conditions citizens carried out their transactions using mostly payment cards and direct debits. As a result, the number of payment cards in the second half of 2015 rose by 11,26% and by 440 thousand (+3%) in the first half of 2016 (compared to the previous semester) therefore reaching 14,6 million. The trend continued for the rest of 2016. The increase was mainly recorded in debit cards since 385.000 (+3%) cards were issued (compared to the second half of 2015). As for the types, at the end of the first half of 2016 the percentages of debit (81%) and credit cards (19%) in total active cards in circulation remained at the levels of the previous year. Debit cards could be considered as the leading substitute for cash. Nonetheless, in 2016 the total number of card transactions remained at the same level (as in the second half of 2015), and the total value decreased by 7%. More specifically, the volume of transactions reached 233 million transactions while the corresponding value accounted for 26,2 billion €. The evolution was attributed to the growing familiarisation of consumers with payment cards, the tax reforms (the tax-free threshold had to be achieved exclusively on the basis of electronic transactions), the further decline in the disposable income, and the lower value of tax liabilities (Bank of Greece, 2017).

In the following year, both the number and value of card transactions increased (Figure 3), with the higher increase still being recorded in debit card transactions. A significant penetration of e-banking and mobile banking was also noted. It should be noted that the level of card use converged with the EU28 average, with the fastest rate being recorded in 2017. Nevertheless, it remained relatively low and heterogeneous between sectors and geographical areas. A positive and statistically significant effect of card use on tax revenue was marked combined with a positive effect of Law 4446/2016 on VAT revenues (IOBE, 2018).

Figure 3: Annual change in payment card use, compared to annual change in the 1st year of capital controls *

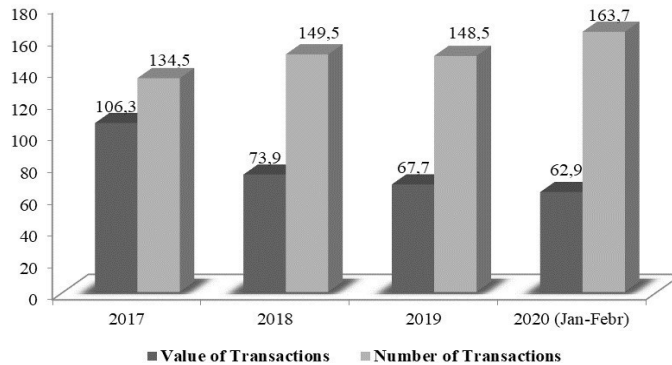


Source: IOBE (2018) * Prepaid cards are not included

For the next four years (until the first two months of 2020) a slight increase in the number of transactions was recorded (compared to 2016) while the annual increase in the value of transactions slowed down (Figure 4). At the same time, the impact of the Law 4446/2016 was found positive on

card use, but not statistically significant on other electronic means of payment (EMP). Indications of mildly positive impact of Law 4646/2019 on card use were also noted (IOBE, 2021).

Figure 4: Annual change in card usage*, compared to the annual change in the 1st year of the capital restrictions (Index = 100)



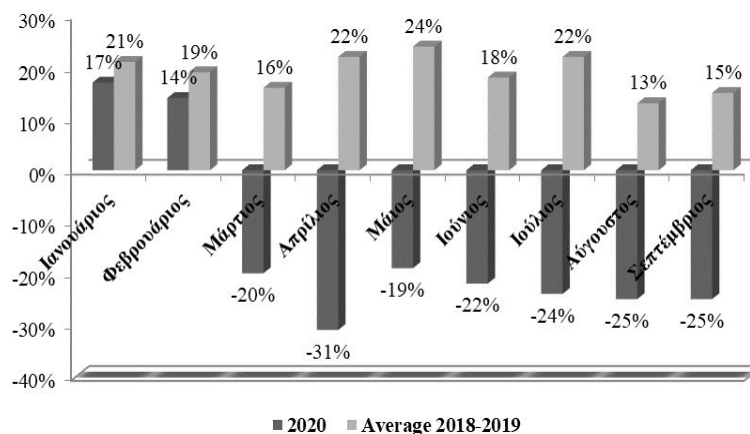
Source: IOBE, 2021

*Prepaid and online card payments are not included

In more detail, the total number of payment cards in circulation showed a slight increase in the first half of 2020 by 189.000 (+1%), compared to the second half of 2019, and amounted to 18,2 million cards. The increase resulted from the issuance of new credit cards 133.000 cards (+5%), while debit cards remained at the same level (in relation to the second half of 2019) as an additional 56.000 were issued (+0,3%). Regarding the types of cards at end of the first half of 2020 recorded a debit card participation of 85% and credit card of 15% compared to the previous six months (Bank of Greece, 2021). Another interesting fact was the positive effect that banking reward programs had on the perceived usefulness of electronic payments by consumers. The main programs encountered in Greece include cash refund, collecting reward points, programs of collecting air miles that can be exchanged for other travel offers and coupon programs where the consumers receive discounts for purchases in participating retail stores (Bank of Greece, 2021).

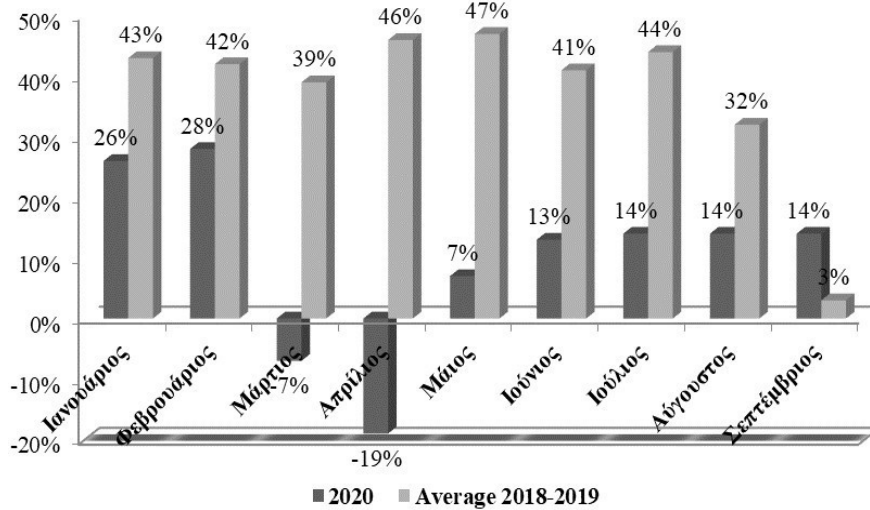
But in 2020, the pandemic created an environment of extreme uncertainty and the use of payment cards did not remain immune. Data showed (Figures 5 and 6) that although the number of card transactions increased, the value of card transactions decreased (IOBE, 2021). Research also pointed that during the COVID-19 pandemic consumers preferred digital platforms and mobile channels instead of bank branches in order to carry out transactions. More specifically, in April 2020 (one month after the country imposed its first lockdown) banking app downloads doubled in Greece and the use of e-banking remained consistently high (Spglobal.com, 2020).

Figure 5: Use of payment cards before and during the pandemic of Covid-19 (Value of card transactions annual change %)



Source: IOBE, 2021

Figure 6: Use of payment cards before and during the pandemic of Covid-19
 (Number of card transactions annual change %)



Source: IOBE, 2021

6. CONCLUSION

It is obvious that this shift in consumer behavior creates opportunities and challenges for all parties involved: banks, consumers, organizations and policy-makers. Results showed that the use of payment cards in Greece increased after the imposition of capital controls (2015-2019) but the upward trend was interrupted by the pandemic in March 2020. Overall, card transactions constituted the largest percentage of the total number of electronic transactions in the country with debit cards leading the way. During the pandemic, the frequency of e-payments increased but the value of transactions was lower. The level of card usage gradually converged to the EU average but remained significantly lower. The value of card transactions as a percentage of private consumption for 2019 in Greece was 21,1% while the European average was 39,5%. Another side effect of the imposed capital controls was the increase of e-banking and mobile apps users. It should also be noted that the impact of Law no. 4446/2016 and Law no. 4646/2019 were found positive on card use. Although Greece upgraded its position there is still room for improvement and therefore more measures and incentives should be adopted as it is certain that digitalization will further change the way payments are going to be made in the years to come. The study adds to the existing literature on digital payments by combining data and assessing the progress of electronic payments in Greece and the impact of two turning points: capital controls and Covid-19.

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DIFFERENCES OF RESOURCE CONSUMPTION BETWEEN STANDARD SURGICAL PATHWAY AND COVID-19 SURGICAL PATHWAY OF AN ORTHOPAEDIC PROCEDURE. AN ITALIAN CASE- STUDY

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ABSTRACT

Operating rooms (ORs) are one of the key areas of a hospital, contributing to both the workload and the cost (Divatia & Ranganathan, 2015). Surgeries represent the largest share of the total hospital budget because of the involvement of direct and indirect costly resources (Agnoletti et al., 2013). Since March 2020, the COVID-19 pandemic has challenged society and healthcare systems leading to an inevitable reorganization of health resources and activities, prioritizing intensive care units and COVID-19 patients (Randelli & Compagnoni, 2020). Within ORs, the surgical pathway has changed, and different treatment strategies have been implemented to avoid staff and patient infection. OR management has been fundamental for the reorganization of surgical pathways. In Italy, the Emilia Romagna Regional Council Deliberation no. 404 of 27/04/2020 provided the guidelines for surgeries of COVID-19 patients establishing two different surgical pathways: one for patients with negative swabs and another one for those tested positive to COVID-19 to guarantee the safety of patients and healthcare professionals. This case study focuses on the differences in resource consumption measured as the average times of single process steps of the surgical pathway and as workforce and equipment used. The comparison is made between the two surgical pathways for orthopaedic patients at the Rizzoli Orthopaedic Institute of Bologna, from 1 March 2020 until 1 March 2021. The population analysed includes 485 patients with confirmed fracture of the femur in need of surgery, 474 with negative swabs and 11 with positive swabs. Data show that the largest difference is in the average time of preparation of surgery that is 01h 34m 48s for a COVID-19 patient, and 00h 23m 28s for a standard patient. This analysis is calculated over a subpopulation represented only by the first cases of the day to have a common starting time (07:00 A.M.) for both surgical pathways. This difference of more than one hour is explained by the time for dressing and for the preparation of the material to protect healthcare workers against COVID-19. On the other hand, the average times of the single steps of the surgical pathways do not show important differences. The workforce needed differs between the two surgical pathways. The COVID-19 surgical pathway requires one additional nurse and the work of an external cleaning agency after every case. Also, more personal protective equipment is necessary in the COVID-19 surgical pathway to guarantee the safety of clinicians and patients. Consequently, surgeries of COVID-19 patients are more expensive than those of standard patients. The additional resource consumption required in the COVID-19 surgical pathway affects the hospital expenditure. In addition, the increase in the preparation time for the intervention and for cleaning has the indirect effect of reducing the number of possible cases operated in one day. The longer preparation time delays the actual start of the surgery and the additional, deeper, cleaning has an impact on the time of preparation of the OR for the next patient. All these factors have to be taken into consideration when comparing the two surgical pathways.

KEYWORDS

COVID-19, Surgical pathway, Operating room, Orthopaedics

JEL CLASSIFICATION CODES

1. INTRODUCTION

In 2020, the world has been hit hard by a severe respiratory virus called COVID-19. The outbreak started in China in the city of Wuhan in December 2019 disseminating worldwide rapidly. On 11 March 2020, the World Health Organisation declared COVID-19 a global pandemic (Cucinotta & Vanelli, 2020). One year after, in March 2021, WHO counted 113,820,168 confirmed total cases and 2,527,891 deaths overall.

Italy has been the first European country to be affected by the COVID-19 pandemic in March 2020. In the following months, the whole world had to cope with unexpected surges of demand and test their preparedness. Countries imposed lockdown measures to flatten the curve of new cases and reduce the number of patients in intensive care units (ICUs).

In Italy, the first case was reported on 29 January 2020 and the first two deaths on 23 February 2020. On 9 March 2020, hospitalized patients were 4,316 and people in ICUs were 733. These numbers more than doubled the week after (Bobini et al., 2020). Then, the epidemic curve increased dramatically, reaching extensive numbers. WHO data show that on 2 March 2021, the number of confirmed cases was 2,925,265 and the number of deaths was 97,699 in Italy (WHO, 2021).

The Italian hospital network has been significantly affected by the emergency. A reorganization of the activities was necessary to guarantee the needs of citizens (Meschi et al., 2020) and to respond to the increasing demand for hospitalizations and ICUs (Andreatta et al., 2020). In these unprecedented circumstances, the NHS had to maintain the safety of clinicians and patients while ensuring the care to COVID-19 and standard patients (Chui et al., 2020).

As one of the first measures, on 1 March 2020, the Ministry of Health mandated the increase of 50% of ICU beds and 100% of beds in pneumology departments. From 16 March 2020, all postponable health activities were suspended.

Hospitals' managers had to organize the set up of additional intensive and semi-intensive pulmonary beds. At the same time, they had to create different pathways for COVID-19 patients in order to keep clean areas within the hospital, also to guarantee the continuity of care to already hospitalized patients. Furthermore, hospitals had to deal with a shortage of ventilators and personal protective equipment (PPE) (Bobini et al., 2020).

Despite the orthopaedic discipline is not directly related to COVID-19, it has been strongly affected. Most of the elective orthopaedic interventions (those that if delayed do not have a negative impact on the patient neither in the short term nor in the long term), except for oncologic treatments, have been suspended to ensure the greatest number of resources available (equipment, staff and beds) to tackle the virus. Several other prevention measures were introduced; for instance, patients' relatives' visits were totally forbidden, and staff had to be minimized in order to reduce as much as possible physical contacts. Furthermore, the use of telemedicine was introduced or strengthened so that patients could be monitored by clinicians in the post-operative phase (Placella et al., 2020).

Since in surgeries clinicians and patients work in close contact, the risk of contagion is extremely high (Ambrosio et al., 2020). Thus, COVID-19 or suspected COVID-19 patients must be treated in operating rooms designed to contain the infection, by avoiding contacts with unnecessary tools and personnel. Doctors and healthcare personnel must follow the protocols to operate safely with the instructions for dressing, undressing and positioning the patient. Consequently, the whole surgical pathway of COVID-19 patients has been subject to changes with respect to the one dedicated to non-COVID-19 patients. This paper aims to compare the two different surgical pathways highlighting the factors that influence the COVID-19 pathway the most by analysing the additional resources required by the COVID-19 pathway. In this way, hospital managers are able to estimate additional resource consumption of treated COVID-19 patients, can focus on main consumption drivers, and improve planning activities.

1.1 Rizzoli Orthopaedic Institute response to COVID-19

The Rizzoli Orthopaedic Institute of Bologna (ROI) was founded at the end of the XIX century and nowadays it is considered one of the main Italian institutes in the field of orthopaedics and traumatology. In 1981, it was granted the status of “Scientific research hospital”. Here, the hospitalization and the clinical activity are divided into 30 operational units. The main areas of intervention are total hip arthroplasty (primary and revision), treatment of degenerative and traumatic lesions of the limbs, arthroplasty, treatment of knee, ankle and foot diseases. In addition to orthopaedic interventions, ROI treats musculoskeletal tumours, paediatric diseases, spine diseases, sports diseases

and degenerative hip and knee joint diseases. ROI counts 324 beds with a staff of 1,400 people and it examines around 150,000 cases and operates 20,000 patients every year from all over the world (IOR, 2018).

ROI was not assigned to be a COVID-19 hospital. However, it had to adopt strategies in order to contain the contagion. According to Grassi et al. (2020), as a first move, the hospital instructed health operators to recognize possible positive patients and provided them with the necessary PPE to guarantee their safety. After the first infected patients were found, all the elective surgeries were suspended so that it could host patients with fractures from other hospitals.

The Emilia Romagna Regional Council Deliberation no. 404 officialised that hospitals could take in charge only patients with non-postponable surgical interventions and it established two different surgical pathways: one for patients with negative swabs and another one for those that tested positive to COVID-19, to guarantee the safety of patients and healthcare workers. ROI established specific pathways for the operating rooms (ORs), ICU, emergency department and surgical wards with specific safety guidelines for COVID-19 or suspected COVID-19 patients.

Following the directive, only trauma surgeries, oncologic and urgent cases were allowed. Sport trauma, arthroscopy, joint replacement and spine deformity, which are the principal activities of the hospital, were cancelled. A separate ward, which was previously dedicated to elective surgeries was reorganized to host trauma and oncologic patients positive to COVID-19. In addition, an isolated ICU area was dedicated only to COVID-19 patients.

In order to limit the interactions among healthcare workers, the hospital organised two different teams of clinicians to guarantee a periodic alternation among them in the management of trauma surgeries. One of the OR (room A) was reorganized to treat patients with suspected or confirmed COVID-19. Inside this operating theatre, a clean and a dirty area were created with the aim to maintain safety during the dressing and undressing of clinicians (Grassi et al., 2020).

1.2 The surgical pathway

Operating rooms are one of the key areas of a hospital, contributing to both the workload and the cost. Surgeries represent the largest share of the total hospital budget because of the involvement of direct and indirect costly resources (Divatia & Ranganathan, 2015).

Since the Italian healthcare system was one of the most affected by the economic and financial crisis of the last twenty years, a lot of efforts were directed to reduce operating room costs. Health managers are currently working on developing efficient operating tools while ensuring patient safety (Agnoletti et al., 2013). As a matter of fact, a more efficient organization of surgical procedures and management of resources would result in lower costs and in better performance, for instance by reducing waiting times and increasing patient satisfaction. Operating room management is seen as a tool to identify inefficiencies and address them to achieve the goals of efficiency and safety. The right allocation time, reductions in turnover time, and the avoidance of cancellations are at the basis of a well-managed operating room (Macario, 2006). Operating room management has been fundamental for the reorganization of surgical pathways.

The surgical pathway is made of several activities carried out in different logistic spaces and by a heterogeneous staff.

The agreement developed by the permanent conference for relations between the State, the regions and the autonomous provinces of Trento and Bolzano of 09/07/2020 established the guidelines for the management of the planned surgical pathway. Table 1, analyses the 15 events of the surgical pathway from the exit to the return in the ward.

Table 1. The 15 events of the surgical pathway

N°	Events	Acronyms	Definition
1	Exit from the ward	OutR	When the transport operator takes charge of the patient
2	Patient available to the filter	InF	Entry of the patient in the filter and verification of his identity
3	Entry in the operating room block (ORB)	InORB	When the operating block nurse takes charge of the patient
4	Entry in the induction room	InSI	Patient entrance into induction room

5	Start of induction of anaesthesia	StAnest	Moment when anaesthetic is injected for general anaesthesia or injection into the skin for regional anaesthesia
6	Patient positioned and ready	PzPr	Patient ready for surgery, after anaesthesiology phase and positioning
7	Entry in the operating room	InSo	Patient's entrance into the operating room
8	Beginning of the intervention	StCh	Beginning of the incision
9	End of the intervention	EndCh	Last point of suture
10	Exit from the operating room	OutSO	Patient leaving the operating room
11	Entry in the recovery room	InRR	Patient's entrance into the recovery room
12	Exit from the recovery room	OutRR	Patient leaving the recovery room
13	Entry in ICU	InUTI	Patient's entrance into the ICU
14	Exit from the operating room block (ORB)	OutOrb	Patient leaving the ORB
15	Return to the ward	InR	When the ward nurse takes back the patient

Source: Conferenza permanente per i rapporti tra lo Stato, le Regioni e le Province autonome di Trento e Bolzano (2020)

The complexity mentioned above has been exacerbated by the arrival of COVID-19. In this context, the pandemic highlighted the need for a well-managed planification of the patient surgical pathway. The surgical pathway has changed and different strategies have been implemented to avoid staff and patient infection.

This case study focuses on the differences in resource consumption measured as the average time spent, workforce and equipment used, between the COVID-19 and standard surgical pathways for orthopaedic patients at the ROI of Bologna. The analysis of these differences allows us to understand the additional resources needed in a COVID-19 surgical pathway and how these might have a critical impact on the economy and organization of hospitals. Understanding how to best deal with surgeries for COVID-19 will help hospital's managers to organize and schedule interventions in the most efficient way.

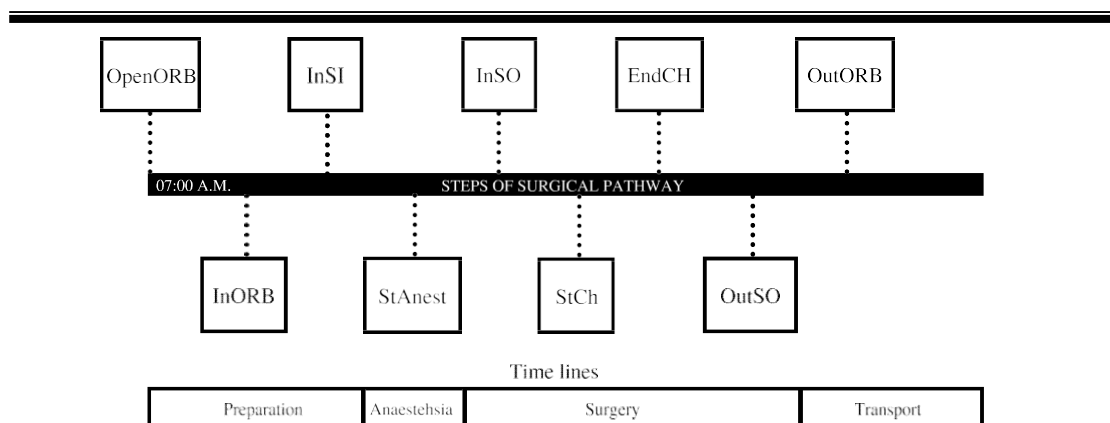
2. DATA COLLECTION AND METHOD

This study analysed data of patients with confirmed fracture of the femur in need of surgery that were treated at the ROI from 1 March 2020 to 1 March 2021. In particular, patients selected are those that were admitted to the hospital through the emergency room with 7915 and 7935 ICD-9-CM codes; they refer, respectively, to closed and open reductions of fractures with internal fixation of the femur.

The analysis of the average time spent takes into consideration the following aspects of time (Figure 1) considering some of the events of the surgical pathway:

1. From the opening of the operating room block (ORB) at 07:00 A.M. to the start of induction of anaesthesia (OpenORB-StAnest)
2. From the entry of the patient in ORB to the entry in the induction room (InORB-InSI)
3. From the entry of the patient in the induction room to the start of induction of anaesthesia (InSI-StAnest)
4. From the start of induction of anaesthesia to the entry in the operating room (StAnest-InSO)
5. From the entry into the operating room to the beginning of the intervention (InSO-StCh)
6. From the beginning of the intervention to the end (StCh-EndCh)
7. From the end of the intervention to the exit from the operating room (EndCh-OutSO)
8. From the exit of the operating room to the exit from the ORB (OutSO-OutORB)

Figure 1. Steps of the surgical pathway



Adapted from: Conferenza permanente per i rapporti tra lo Stato, le Regioni e le Province autonome di Trento e Bolzano (2020)

The total population targeted by the analysis is composed of 485 patients, of which 474 had negative swabs at the moment of the surgery and 11 had positive swabs.

In each phase, some patients have been excluded from the analysis due to some measurement errors, such as an excessive or omitted average time, or a time equal to zero.

The measurement of the average time from the opening of the ORB to the start of induction of anaesthesia (OpenORB-StAnest), that we identify as the average time for the preparation of the surgery, focuses only on the first patient of the day so that both surgical pathways have a common starting time (07:00 A.M.), reducing the number of patients to a subpopulation of 61. In addition, in the measurement of the average time from the exit of the operating room to the exit from the ORB, standard patients that used the recovery room were excluded, reducing the number of patients considered to a subpopulation of 306 patients. Since the COVID-19 surgical pathway does not include the recovery room and patients return directly to the COVID-19 ward after the surgery, they were excluded to make data comparable between the two surgical pathways. Table 2 shows the final subpopulation considered in each phase. Data were collected from ROI databases.

Table 2. List of population targeted by the programme

	COVID-19 patients	Standard patients	Total
1. OpenORB - StAnest	5	56	61
2. InORB - InSI	7	238	245
3. InSI - StAnest	11	446	457
4. StAnest - InSO	11	469	480
5. InSO - StCh	11	473	484
6. StCh - EndCh	11	474	485
7. EndCh - OutSO	11	467	478
8. OutSO - OutORB	8	298	306
Total n° of surgeries	11	474	485

3. RESULTS

3.1 Differences in average times

Analysing the events of the surgical pathway aforementioned, it has been found that the largest difference between the two surgical pathways is in the average time of preparation of the intervention (OpenORB-StAnest). From the opening of the operating room block at 07:00 A.M. to the beginning of the induction of anaesthesia, the time spent is on average 01h 34m 48s for a COVID-19 patient, while it is reduced to 00h 23m 28s for a standard patient. This difference of 01h 11m 20s can be explained by analysing the process of the surgical pathway of both types of patients. The time for dressing and for the preparation of the material is lower in the standard surgical pathway than in the COVID-19 surgical pathway.

Dressing in the COVID-19 surgical pathway requires more time because of the strict procedure that healthcare professionals have to follow. In the COVID-19 procedure, the material preparation time is also longer because a briefing before the intervention is needed to define in detail which are the necessary instruments. This is essential because in the COVID-19 areas, ORs are not equipped with any instruments, to contain the infection. Consequently, all the materials have to be prepared and transported from the cleaned areas before the intervention.

Looking at the average time of each single step of the surgical pathway, data in table 3 shows that there are no important differences between the two surgical pathways. The COVID-19 surgical pathway takes 4 minutes longer than the standard surgical pathway from the exit from the operating room to the exit from the ORB (OutSO-OutORB); 2 minutes more from the entry into the operating room to the beginning of the intervention (InSO-StCh); and 31 seconds more from the entry of the patient in the ORB to the entry in the induction room (InORB-InSI). On the other hand, the standard surgical pathway takes on average 24 minutes more from the beginning to the end of the intervention (StCh-EndCh); 14 minutes more from the start of induction of anaesthesia to the entry in OR (StAnest-InSO); 7 minutes more from the entry of the patient in the induction room to the start of induction of anaesthesia (InSI-StAnest); and 2 minutes more from the end of the intervention to the exit from the operating room (EndCh-OutSO).

Table 3. Average times in COVID-19 and in standard surgical pathways

Steps of surgical pathway	COVID-19 surgical pathway	Standard surgical pathway	Difference
OpenORB - StAnest	01:34:48	00:23:28	01:11:20
InORB - InSI	00:05:51	00:05:20	00:00:31
InSI - StAnest	00:05:16	00:11:49	- 00:06:33
StAnest - InSO	00:17:27	00:31:22	- 00:13:55
InSO - StCh	00:14:33	00:12:10	00:02:23
StCh - EndCh	00:46:33	01:10:56	- 00:24:23
EndCh - OutSO	00:12:55	00:15:01	- 00:02:06
OutSO - OutORB	00:24:52	00:21:05	00:03:47

3.2 Differences in workforce and equipment

The other resource aspects considered in this study are the workforce and the equipment used.

The workforce needed differs between the two surgical pathways. The COVID-19 surgical pathway requires one additional nurse outside the OR to supervise the surgery and to be ready in case of emergency and need of instruments not planned during the briefing. Nurses assisting in the OR are in contact with the positive patient and the procedure does not permit them to leave the not sterilized areas to take new instruments kept in the clean area. Differently, the additional nurse is in the clean area and can be ready in case of need. Considering the time from the entry to the exit of the patients from the ORB, using the information available it has been possible to estimate that the hospital paid the additional nurse for 16 hours for the eight COVID-19 patients.

The difference in the workforce can be found also in the staff employed for the cleaning of ORs. In both surgical pathways, internal cleaning professionals are responsible for cleaning the area. In the COVID-19 surgical pathway, however, additional cleaning made by an external cleaning agency is necessary after every case. In a standard surgical pathway, this additional cleaning is done just once a day when the ORB closes in the evening. The additional nurse and the second cleaning of the OR increase the costs for the hospital.

The COVID-19 surgical pathway requires more materials than the standard surgical pathway. According to the Emilia Romagna Regional Council Deliberation no. 404 of 27/04/202, to guarantee the safety of healthcare workers and patients and to avoid infections in clean areas, more personal protective equipment is necessary. All these additional protections affect hospital expenditure. Table 4 shows the materials used in both surgical pathways, those used in both surgical pathways with higher quantities in the COVID-19 and the additional equipment used in COVID-19.

Table 4. Material used in the two pathways

	Dressing	Undressing
Single use material used in both surgical pathways	1 box of FFP2 masks	1 hydro-alcoholic gel

	1 box of surgical masks	1 box of non-sterile gloves for each size
	1 box of surgical cup	headgear
	1 box of surgical gloves for each size	
	plastic overshoes	
	band-aid silk tape	
	1 box of non-sterile gloves for each size	
	2 clinipack	
Single use material used in both surgical pathways with higher quantities in COVID-19 surgical pathway	hydro-alcoholic gel	surgical masks
	surgical gloves	2 clinipack for waste at risk of infection
Single use material used only in COVID-19 surgical pathway	2 boxes of KNEE - HI BOOTS	2 water-repellent sacks for underwear infected
	1 box of TNT shoes	10 clean uniforms
	1 box of integral headgear	
	10 single-use visors	
	10 integral suits	
	5 non-sterile scrub suits	

4. CONCLUSION

Results show that surgeries of COVID-19 patients consume more resources than those of standard patients. The main reason is that it takes longer to prepare patients and more resources are used during the surgery. Furthermore, this requires appropriate scheduling and organization, especially for emergency rooms.

According to the literature, the time used to clean the OR in a standard surgical pathway is around 15-30 minutes (Jebali et al., 2006). Similarly, from the ROI database, the time used to clean the OR is extracted from the turnover indicator for the fracture of the femur procedure, and it is on average 28 minutes. In the ROI COVID-19 surgical pathway, the time to clean the OR can not be computed through the turnover indicator since there is just one COVID-19 intervention per day. Nevertheless, an internal interview highlighted how the in-depth cleaning by cleaning professionals and the second additional cleaning increased the time for cleaning to one hour.

Differently, results show that there is no important difference in the clinical times of both surgical pathways despite the additional stress of ROI health operators in a COVID-19 intervention due to the fear of being infected and to restrictions on movement imposed by PPE.

The additional resource consumption in the COVID-19 surgical pathway gets physicians to evaluate the possibility of waiting for the negative swab rather than operating the positive patient. Thus, clinicians have to analyse the opportunity – cost of each patient, on the basis of the diagnosis and urgency of each patient.

In particular, this study recommends to put more efforts into the scheduling of the preparation of the intervention rather than in the intervention per se for more efficient surgeries. The longer time needed for interventions on COVID-19 patients depends on the preparation time that is needed to safeguard the health of personnel.

Therefore, when a hospital dedicates an operating room to COVID-19 patients, it has to take into consideration that the increase in the time of preparation causes directly an increase in costs and indirectly a reduction of total surgeries. The additional personnel needed for the intervention of a COVID-19 patient results in an increase in the total costs incurred by the hospital since it could have been involved in other tasks. Lastly, the higher number of resources used also has an economic impact on hospital sustainability. Thus, an accurate planning of surgeries should be done in order to control the total hospital expenditure especially in a period of time in which hospitals try to reach a high level of performance using the lowest number of resources in terms of time and money.

A further study could analyse cost differences in the two surgical pathways from an accounting point of view. A clear cost indication for every phase of the surgical pathway might better highlight the difference in costs between a COVID-19 and a standard patient.

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DEVELOPMENT POLICIES THROUGH THE EUROPEAN PROGRAMS: THE CASE OF THE "EASTERN MACEDONIA & THRACE" REGION

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ABSTRACT

This paper reviews the impact on the regional development of European Programs focusing on "Eastern Macedonia & Thrace" Region and the belonging Regional Units Drama, Kavala, Xanthi, Rodopi and Evros. The used methodology is a historic review and evaluation of the Operational Programs in which Greece and the "Eastern Macedonia & Thrace" Region, have participated since Greece's entry into the European Union in 1981. The approach examines some great European Support Regional Programs as the Mediterranean Integrated Programs (IMPs) (1986-1993), the 1st Community Support Framework (CSF I) (1989-1993), the 2nd Community Support Framework (CSF II) (1994-1999), the 3rd Community Support Framework (CSF) (2000 -2006) as well as the National Strategic Reference Frameworks (NSRF) (2007-2013) and (2014-2020), combined with the respective National Development Laws. Some useful conclusions are drawn, mainly regarding the development of the specific region and the use of funds. This region is important because of its geopolitical position and its unique economic characteristics. It is one of the poorest in the European Union and it is of great sense to depict the social and economic impact of the Community Support Funds of European Commission to this region. The main target of these funds is to bring a sustainable social and economic growth to the poorest European neighborhoods to achieve the average European Union prosperity. Moreover, this region is of great geopolitical interest of EU because it is its southern land board with Turkey which is an important trade partner.

KEYWORDS

Development; Regional development; Regional policy; Region of East Macedonia and Thrace; European Programmes; NSRF (2007-2013) & (2014-2020);

JEL CLASSIFICATION CODES

N940, O18, R580

1. INTRODUCTION

Since ancient Greek times and the era of Aristophanes (Nefeles 423 BC.) and Sophocles (Antigone verse 892), dated back to 442/441 B.C., where the concept of sustainable development was first mentioned, we have not achieved to provide a unique and specific definition of this term.

According to Wayne H. Oberle, Kevin R. Stowers & James P. Darby development is a process in which increasingly more members of a given area or environment make and implement socially responsible decisions, the probable consequence of which is an increase in the life chances of some people without decreasing the life chances of others and has two advantages. The first one is that it aids a focus on the immediate and subsequent effect (s) which behavior has on the individual decision-maker and on the social structure of which he is a part (Journal of the Community Development Society, Volume 5, 1974-Issue1).

The term "sustainable development" in its current scientific sense, was first coined in 1980 in the "World Conservation Strategy", drafted by Unesco / Unep, WWF, IUCN and FAO and has since been defined and described in various ways. The most common definition, which was broadly accepted and formulated in 1987 by the "World Committee on Environment and Development" – WCED so-called Brundtland Report, states that: 'Sustainable development is a development that meets the needs of the

present without compromising the ability of future generations to meet their own needs'. This definition considers both intra- and intergenerational equity in its mentioning of both the fulfilling of present and future needs; however, it is the aspect of intergenerational equity which is more commonly referred to by sustainable development and, therefore, this is the context of the term considered here. The ability of future generations to meet their needs has often been related to the resources or capitals available to these future generations. For example, Victor (1991) claims that '...sustainable development requires that the stock of capital that one generation passes on to the next be maintained or enhanced'. According to this definition, sustainable development thus considers what one generation passes on to the next from a bird's eye perspective: The total global resources or stocks of capital should be maintained or enhanced from generation to generation.

Regional development is the label of the efforts to develop certain areas of a country, with the term development usually understood in its socioeconomic sense. Regional development, thus, is not only measured in terms of income, jobs, and demographic trends in a certain area, but it can also involve the more general dynamics, such as innovation and creativity in the region of interest. Regional development is clearly a multidimensional concept with a great socioeconomic variety that is determined by a multiplicity of factors, such as natural resource endowments, quality and quantity of labor, capital availability and access, productive and overhead investments, entrepreneurial culture and attitude, physical infrastructures, sectoral structure, technological infrastructure and progress, open mindedness, public support systems, and so forth (International Encyclopedia of Human Geography, Anon., 2009), (P.Nijkamp, 2009), (P.Nijkamp, 2009) (Baereholdt, 2009).

The above definition implies that the focus of regional policy is to take measures to improve the geographical distribution of economic activities, which will lead to the greatest possible assimilation of the inhabitants' standard of living in different regions of a country or a group of countries. Folmer (1986) identifies the set of actions of the central regional and local administration, which are intended to affect the financial situation of one or more regions.

As far as the European Union is concerned, regional policy is a strategic investment policy in all regions and cities of the EU, which aims to stimulate their economic development and improve the quality of its inhabitants' life. At the same time, it is an expression of solidarity, as the support is mainly for the less developed regions (Commission, 2014).

The regional policy is: "A policy aimed at boosting economic activity in a specific geographical area that is not the whole country and, as a rule, is in a worse economic situation than nearby areas. It may include incentives to provide jobs in the region" (Economist's glossary of terms).

Integrated regional policy (A Thierstein, 1998) thus encompasses not only regional policy in the strict sense, but also other spatially relevant policy fields like regional planning, environment, fiscal policy, innovation and technology policy. Further developments in regional policy take into account the altered relations between urban and local development. Next-generation regional policies focus on coherence between the territorial production system and the system of medium-sized towns that usually structure a region (Maillat, 1998). Two polar models of development are thereby distinguished, that of urban resources and of places of interaction: a metropolitan modality and a milieu-based modality (Corolleur, 1996).

The aim of EU regional policy is to reduce the significant economic, social and territorial disparities that persist between Europe's regions. Maintaining these inequalities would jeopardize some of the EU's cornerstones, such as its large single market and its currency, euro. Regional Policy targets all regions and cities in the European Union in order to support employment, business competitiveness, economic growth, sustainable development, and improve citizens' quality of life.

2. THE CASE OF THE EASTERN MACEDONIA & THRACE REGION (EMTH REGION)

2.1 Current situation of the EMTH Region

The region of Eastern Macedonia and Thrace (REMTH) is located on the North-East part of Greece, it is the 4th largest region in the country covering an area of 14.179 km² and its population amounts 608.182 inhabitants. It consists of 5 Regional Units, namely Drama, Kavala, Xanthi, Rodopi and Evros, including two major islands of the Thracian Sea, Thasos and Samothrace.

2.1.1. Employment

Regarding the social indicators of the Region, unemployment rate is permanently higher than those of the EU - 27 average from 2001 until today while the gap has been constantly widening since 2010 (14.2% and 9.6% respectively for 2010, 19.9% and 9.6% for 2011, 22.5% and 10.4% in 2012),

especially for the long-term unemployed, but for young people as well. Moreover, comparing to the national average, the Region accounts systematically higher unemployment throughout the last decade, with the exception of 2012, when it moved from the 2nd worst position to the 8th worst ranking among the 13 regions (due to lower development rate in other regions and not due to unemployment decline). It should also be pointed out that in 2013, the percentage of the population aged 25-64 in REMTH that falls into the lower category of education (no education, primary education and compulsory secondary education) was 51%, while the average for the country was 32.8% and for the EU27 was 24.9%. At the same time the percentage of the population with high and higher education showed an increase between 2001-2013 by 11.8 percentage points in REMTH, exceeding the growth rate of the EU-27 but not the national one (15.1 points for the country and 10.2 points for the EU-27 respectively). In the 30-34 years age group, REMTH nowadays continues to lag behind the national average by 12 percentage points and the EU-27 average by 14.2 points, since only 22.6% of the population has higher education. This practically means that the stock of qualified human resources that can potentially support innovative activity is very low and in order to reverse this, the Region needs to boost its efforts to connect education with production.

2.1.2. Agricultural sector, Natural and Mineral resources

The agricultural sector occupies the largest share of economic activity in the Region, despite the contraction it has undergone during the recent years, which is characterized mainly as agricultural. This also results from the fact that the primary sector is its main productive sector, with the share of the primary sector in the gross value added (GVA) of the Region amounting to 6.2% (twice the national average), which represents 26% of the total employment, while it participates with about 40% in the total exports of the Region. If we take into account its interconnection with other sectors of the economy (secondary, tertiary), then the participation of the primary sector is even greater than the officially recorded one.

The used agricultural land of the region amounts to 3,468 square kilometers or 28% of the total area of the Region. About 58% of the cultivated areas are irrigated. In the Region there is a tendency of specialization in industrial and / or extensive crops (mainly in Xanthi and Rodopi) such as cotton, corn, tobacco and cereals.

The ratio of crop-animal production in the Region in terms of production value is equivalent to the national average, approximately 7:3. The agricultural production in the REMTH, depending on the value of the production and the participation in the GVA of the primary sector, in sub-sectors, are: animal production (34%), cereals (22%), industrial plants (18%), vegetables and potatoes (17%) and fruits (6%). The main products produced are corn (13%), milk (13%), cereals (8%), cotton (8%), potatoes (6%), tobacco (5%) and grapes (4%) (ELSS data, 2009). Most of this production is intended for domestic consumption while the products exported mainly by the Region are table grapes, kiwis and asparagus, and in processed products olive oil, wine and tobacco. Limited quantities of ginned cotton and cottonseed are also exported (mainly to Turkey) as well as quantities of unprocessed wheat and corn.

A rapidly growing sector in the Region in recent years is fish-farming. The Thracian Sea is considered one of the most fish-producing marine areas of the country which is also rich in mineral wealth as around the island of Thassos the first submarine oil deposit of the country and the first submarine natural gas field were discovered. In addition, remarkable uranium and xylite reserves have been identified in the wider area of the Region, which is also wealthy in rocks, mainly marble and slate.

2.1.3. Infrastructure

Transport potential in the Region of Eastern Macedonia Thrace involves road and rail connections, as well as air and shipping cargo. The production and agricultural goods are mainly transported and distributed through newly constructed highways. The length of the National and Provincial road network that interconnect the Region accounted to approximately 3,800 kilometers.

The most important road project in the Region is Egnatia Highway Road which is part of the trans-European networks and, as a whole, covers the 680 km long axis of Igoumenitsa – Evros, while the section that crosses the Region extends from the Strymon bridge to the Kipon bridge (258 km) and connects the region with the main road network of the country, as well as with Turkey and Bulgaria.

There are two international airports in the Region (Kavala and Alexandroupolis) that serve domestic and international flights (regular flights and charter flights, mainly during the summer season). The main features of both airports are the low density of routes and the usage of small aircrafts. Both airports are going to be renovated so as to serve more passengers and greater volume of cargo.

REMTH has two major ports, Kavala and Alexandroupolis, and six smaller, including those on the islands of Thassos and Samothrace. The ports of Kavala and Alexandroupolis have been declared as of national importance and are among the most important in the country in terms of freight and passenger

traffic. The port of Alexandroupolis is mainly commercial, while it also serves passenger traffic to and from Samothrace. The old (central) port in the city of Kavala city currently serves the main volume of passenger traffic to Thassos, Lemnos and Mytilene, while there is steadily increasing arrivals of cruise ships and yachts, as the commercial traffic was transferred to the new port of Kavala. (Philip II) in the area of Nea Karvali.

The railway line that serves Eastern Macedonia - Thrace crosses 4 of the 5 Prefectures, except the Prefecture of Kavala, with 34 Railway stations and a total network length of approximately 400km and serves the local population and freight transport.

Water supply in the area is provided by local water resources (groundwater and surface water) and served by springs and boreholes, as well as individually small water supply projects (e.g., dams, tanks and pumping stations) managed by the local authorities.

In terms of sewerage infrastructure, its urban centers have complete integrated sewerage networks for both wastewater and rainwater. In the field of waste management infrastructure, the area currently has 3 Landfills (15 landfills), 15 Waste Transfer Stations (SMA) and 6 Recyclable Material Sorting Centers (KDAW) while Recycling Programs are implemented in the majority of the Municipality.

The REMTH is energy autonomous mainly due to the 485 MW power plant of Komotini (combined cycle unit using natural gas), the high - pressure transmission network of the National Gas Transmission System in the Region with the expansion of the transmission sector from Komotini to Greek - Turkish borders (Evros Kipi), hydroelectric projects (Nestos dam systems in Drama Prefecture) and Renewable Energy Sources projects (small hydroelectric, wind farms and solar panels). Large investments are being made in the Region for the construction of the gas transmission pipeline from Azerbaijan's Shah Deniz gas field to markets in Europe via Greece and Italy (Interconnector Turkey – Greece – Italy (ITGI)) and two liquefied natural gas depots in Prinos (Kavala) and Alexandroupolis.

Social Infrastructure plays an important role in the functionality and development of the areas. Health, welfare, education and sports are basic services offered to citizens in every residential area of the Region.

2.2 Economy and GDP at EMTH Region

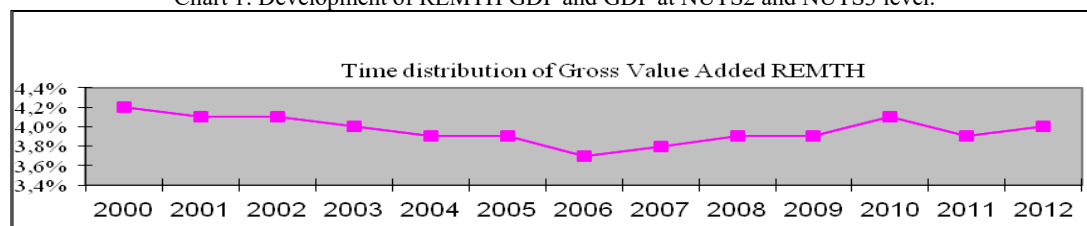
The Region is consistently included in the regions of the "convergence" goal over the last twenty years, as the per capita GDP of the Region in relation to the average of the European Union, depicts a very small and temporary improvement over the 2000-2010 decade (from 63% in 2000 to 70% in 2009 and to 66% in 2010). Also due to the latest Eurostat data is one of the lowest in Europe and the lowest in Greece since 2013. The main reason for this sharp decline in regional GDP is turbulent Greek financial crisis which took place the last decade.

From 2000 to 2008 the GDP p.c. of the region is constantly growing, at an average rate of 5.6%. Since 2009, the GDP has been declining by 1.9% in 2009, 1.4% in 2010, 11.5% in 2011, 6.9% in 2012 and 7.2% in 2013. From 2009 to 2013, GDP p.c. has fallen by a total of 24.6%. The large decrease (larger than any other region) of GDP p.c. between the years 2012 and 2013, ranks REMTH as the poorest region in Greece (a position that before 2012 had been occupied by Epirus).

With the exception of 2003, when the sector of “Wholesale - Retail, vehicle repair, transport, storage, accommodation and catering” had the largest share in the Gross Value Added, throughout the rest of the period the first place is occupied by the sector of “Public Administration, defense, social security, education, health and social welfare”, according to the Greek statistical authority. In fact, since 2009 onwards its participation in the GVA exceeds even 30% making REMTH the only region, along with that of the North Aegean, where the participation of this sector remains at these levels. To be precise, in 2009 its contribution amounts to 31.72%, in 2010 to 32.55%, in 2011 to 34.38%, in 2012 to 32.07% and in 2013 to 30.71%. This ranks the 2 aforementioned regions among the nine top regions (nuts2) of the EU with such a broad participation of the specific industry in the GVA for 2012.

The Chart 1 below depicts the evolution of GDP and GDP at the level of NUTS2 and NUTS3 in relation to the Gross Value Added in REMTH, for the years 2000 to 2012.

Chart 1: Development of REMTH GDP and GDP at NUTS2 and NUTS3 level.



Source: Hellenic Statistical Authority (ELSS) and own processing

3. EUROPEAN PROGRAMS IN GREECE AND THE DISTRIBUTION OF RESOURCES IN EASTERN MACEDONIA & THRACE REGION

3.1 European Programs

The first financial assistance was provided through the European Regional Development Fund (ERDF) during the period 1981-1985 and the actions consisted mainly of supporting infrastructure investments for development purposes and investments in the sectors of industry, handicrafts and services in disadvantaged areas, while the concepts of coordination were beginning to develop, the utilization of endogenous potential and the integrated development approach (Andrikopoulou E., 1995).

The Mediterranean Integrated Programs (IMP) initialized five years after the entry of the country into the Community and ended in 1993. The initial period of the IMP implementation was the 1986 - 1988 period, but it was extended until 1993 and this resulted in the simultaneous existence of IMF the Community Support Framework I which, like the next CSFs II and III, referred to both national and regional level (Mitoula, 2003).

The Community Support Frameworks are, in essence, documents approved by the European Commission, in agreement with the Member State concerned, following an assessment of the Plan submitted by the Member State and containing its strategy and action priorities of the Member States, their specific objectives, the contribution of Community assistance and other financial resources. This document is divided into priority axes and is implemented through one or more Business Programs.

Table 1 presents the financing of the Co-financed Development Programs in Greece from 1986 to 2020 according to the initial approval decisions.

Table 1: Funding table of Co-financed Development Programs in Greece

	IMP (1986-1989) in thousand ECU* at 1986 prices	CSF I (1989-1993) in thousand ECU* at 1989 prices	CSF II (1994-1999) in thousand ECU* at 1994 prices	CSF III (2000-2006) in thousand ECU* at 2000 prices	NSRF (2007-2013) in thousand €	NSRF (2014-2020) in thousand €
Total Budget	2.101.933	14.342.054	29.721.300	44.563.540	39.400.000	25.085.389
National Public Participation	695.740	5.802.196	7.069.900	11.126.075	11.800.000 (5.800.000 +5.700.000)	5.197.403
Community Participation	2.576.000	7.193.241	13.980.000	22.707.000	20.400.000	19.887.985
Private Participation	210.193	1.346.617	8.671.400	10.730.465	7.500,000	
Cohesion Fund (Community Participation)			3.061.200 k. ECU	3.320.000 k €	3.697.160 k €	

Source: Ministry of Economy & Finance * 1 ECU = 1 Euro (exchange rate of 01.01.1999)

3.2 Implementation of programs in the EMTH Region

The Integrated Mediterranean Program of Northern Greece was signed on October 22, 1985 in Thessaloniki and lasted for seven years, 1986-1992. The program with total funding for the REMTH 695.837k.ECU (Table 2) included 5 actions, which are the following:

- The adaptation of lowland crops to the market by improving production.
- Integrated development of inland areas.
- The support and modernization of handicrafts and industry.
- The development of the tourist potential.
- Enhancing livestock, fisheries and aquaculture.

Table 2: Funding table of IMP in Northern Greece.

IMP 1986-1992	Total Budget	National Public Participation	Community Participation	Bank Lending (National Bank of Greece)
Region of Macedonia & Thrace	695.837 k. ECU	204.909 k. ECU	406.765 k. ECU	120.000 k. ECU

Source: Eurostat * 1 ECU = 1 Euro (exchange rate of 01.01.1999)

During the 1994-1999 programming period (2nd CSF), the 2nd Regional Operational Program (2nd RDP EMTH) financed 820 operations with a total budget of € 617.5 million, an amount that corresponds to 2.9% of the total budget of the Second CSF in Greece.

During the 2000-2006 programming period (DG CSF) 4,285 budget operations of € 2.498 billion were financed in REMTH, an amount that corresponds to 6.1% of the total budget of DG CSF in Greece.

During the 2007-2013 programming period (NSRF), 6,560 budget operations were financed with € 2.133 billion, an amount that corresponds to 6.4% of the total NSRF budget in Greece.

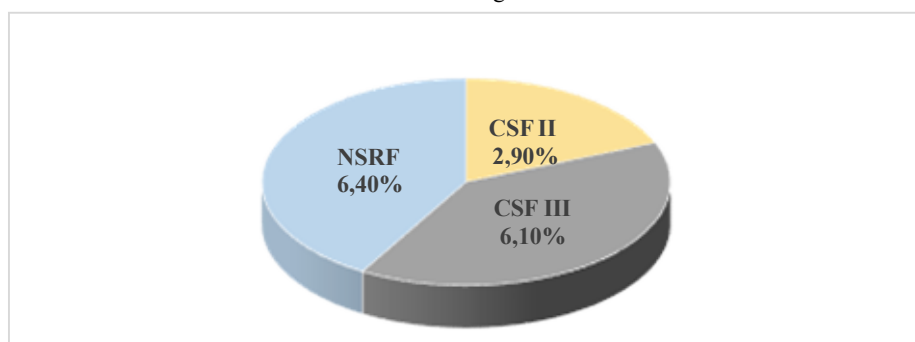
All the above are presented in Table 3 below in which we can see the distribution of resources in REMTH per source of funding while in Chart 2 is presented the Percentage that occupies in the budget of REMTH each program.

Table 3: Distribution of resources in the REMTH by source of funding.

SOURCE OF FUNDING	TOTAL BUDGET	BUDGET IN REMTH	NUMBER OF INTERVENTIONS
CSF II (1994 - 1999)	21.049.900.000 €	617.496.303 €	820
CSF III (2000 - 2006)	41.160.315.470 €	2.497.824.875 €	4.285
NSRF (2007 - 2013)	33.513.990.107 €	2.133.472.165 €	6.560
TOTAL	95.724.205.577	5.248.793.343	11.665

Source: Final report of OP 1994-1999, the M.I.S. Service, and the Managing Authority of R.O. P. of the REMTH.

Chart 2: Share of budget in REMTH.



From the above data it appears that REMTH received most of the funding from the NSRF 2007-2013 (6.4% of the total NSRF budget) in which it had the most transactions although the highest amount was received during the CSF III (€ 2,497,824,875).

The NSRF 2014-2020 was approved on May 23, 2014 and the budget for REMTH amounted 2.370.262.457 € while the actual payments are 834.514.900 €, until today. (Anaptyxis.gov.gr/Ministry of Development and Investments). The Regional program was approved on December 18, 2014 with total budget of Public Expenditure: 507,739,336 €, of which the amount of 406,191,468 euros is the European Union’s contribution and 101,547,868 euros is the Greek State’s stake. The strategy of OP is fully harmonized with the strategy of the NSRF 2014-2020 both at the strategic level (vision, goals) and at the operational level (specializations, actions). Thus, the project proposals in the Regional Operational Program are common with the main funding priorities of the NSRF and concerns with: enhancing business competitiveness / extroversion with an emphasis on quality and innovation, the development / utilization of human resources with emphasis on social inclusion, the protection of the environment and the transition to an environmentally friendly economy, the development of infrastructure to support economic and social development, and improving the institutional adequacy of public administration.

4. METHODOLOGY

As mentioned above, the data stem from the competent public authorities and specifically from the Ministry of Finance, Ministry of Development, the Managing Authority of Regional Operational

Program of the REMTH, Hellenic Statistical Service and Eurostat and refer to the Public Expenditure on European Programs. Public Expenditure is the total of National and Community participation, i.e., the total expenditure borne by both the state budget and secured through the Public Investment Program and the Structural Funds and Financial Instruments of the European Union.

More specifically, there are secondary data that are classified in large tables per funding program and annually for the years 1994-2013. With the help of descriptive statistics (statistical measures of position and distribution) we transformed them to quantified data so that the outcome on the return of funding can be measurable. In addition, the visualization is quite remarkable because it achieves the optimal perception of the data and contributes to the interpretation of the results.

We will use the innovative CHIC Analysis program (Correspondence & Hierarchical Cluster Analysis) to process our data and export productive and accurate conclusions. This software was created by Dr. Angelos Markos, who is a Professor at the Pedagogical Department of Primary Education (PTDE) of the Democritus University of Thrace (DUTH).

CHIC Analysis (Correspondence & Hierarchical Cluster Analysis) belongs to the family of Data Analysis software and is addressed to researchers who wish to apply two very common and complementary methods of DA: Correspondence Analysis and Hierarchical Cluster Analysis. The application of CA is compatible with both the French School and the Gifi Data Analysis System. CHIC Analysis combines the graphical capabilities of Delphi code gear with the computing power of MathWorks MATLAB.

Particular emphasis has been placed on graphical options for bi-plots, maps and tree charts and is standalone software (amarkos.gr).

In order to draw conclusions, we will analyze the data of the tables concerning the comparison of resource allocation in REMTH (1994-2013) (CSF II, CSF III, NSRF (2007-2014) and GDP of REMTH.

Gross domestic Product has been selected as the most widespread indicator of increasing prosperity in a region, so that we will be able to have safer results.

4.1 Comparison of resource allocation in REMTH (1994-2013) (CSF II, CSF III, NSRF 2007-2014) with the GDP

In order to compare the total distribution of the resources of REMTH from 1994 to 2013 (CSF II, CSF III, NSRF (2007-2014) with the formed Gross Domestic Product in REMTH we use data from Table 3 and Chart 1. We form a table with methods of large datasets and tables in order to reduce the dimensions of these tables and we evaluate the most useful data. These data are introduced in a special software which called CHIC Analysis Program, which leads us to the following two resource allocation diagrams compared to GDP in REMTH (chart 3 & 4).

Chart 3: Factor Comparison Table of resource allocation with GDP in REMTH.
Chart of eigenvalues

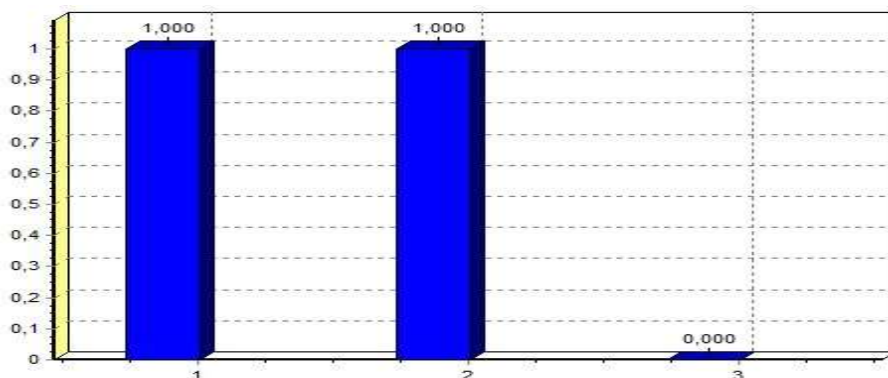
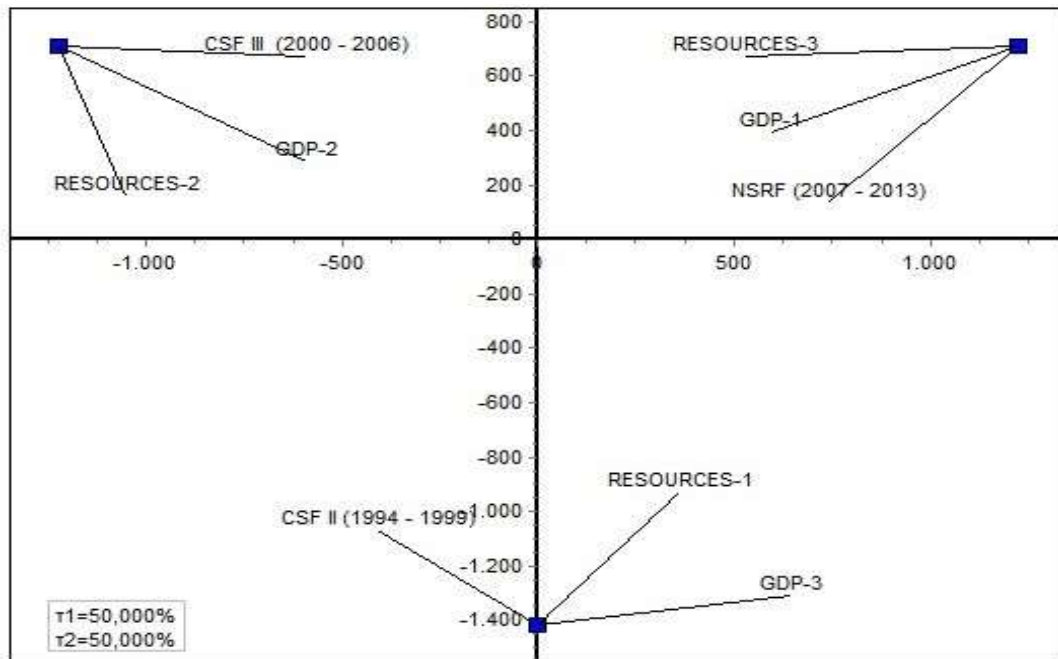


Chart 4: Factor Comparison Table of resource allocation with GDP in REMTH
 Level factorial 1X2



5. CONCLUSIONS

Taking into account the regions level of prosperity and development, REMTH ranks among the lowest in the country over time, more specifically through the years 2000, 2005 and 2008 it is on the 9th, 12th and 13th place accordingly among the thirteen regions of the country. In 2014 there is a great improvement for the region as it ranked in the 7th place.

The growth of REMTH the last twenty years, was based on two basic strategic advantages:

1. Its critical geographical position which gives it a great geopolitical value and its emergence as a transit and energy node and
2. the added value from the agricultural sector and alternative tourism, utilizing the rich endogenous potential of REMTH in these segments (natural resources, extensive and fertile plains, suitable livestock areas, sufficient water, geothermal fields, historical and cultural elements of high interest and areas of remarkable natural beauty such as forests, beaches, lakes, habitats, mountains, etc.).

In the implementation framework of this development strategy through the programs of the 2nd CSF, 3rd CSF and NSRF (2007-2014) operations were financed by a total budget of € 5.248 billion.

The majority of implemented projects in PAMTH (98,8%) concerns with budgets of less than, € 5 million, while 62.4% of them has budget less than € 100,000, and only 1.2% of transactions have a higher budget.

The majority of interventions with the highest funding are those that could be characterized as "easy", i.e., interventions for which there is relative maturity and experience for their implementation, such as the sector of Transportation (Accessibility) (local roads, water supply, sewerage, buildings, flood defenses, etc.).

The NSRF (2007 -2014) with € 2,133 billion Euro (6.4%) is the program with the biggest absorption ratio of the funding in REMTH, followed by the CSF III with € 2,497 billion Euro (6.1%) while the least amount € 617 million Euro, (2.9%) absorbed by the CSF II.

However, despite the large absorptions rates of the NSRF and CSF III programs, the positive spillover effect on Regions GDP was not analogous for the same period (3.9 - 4.0%). On the other side, region's GDP during the period of the CSF II (which is the program with the lowest absorption rate) increased significantly by 4.2%.

The structural problems of REMTH seem to be on stage despite the previous years implemented economic and social policies. The social inequalities persist, while poverty and unemployment increase, especially after the outburst of financial crisis in 2008. The effects of the economic crisis are reflected in the loss of 34,205 jobs during the period 2008-2011 while in the secondary sector there is

the largest decrease (46.8%) which is depicted in the unemployment rate which increased from 14.4% in 2010 to 26.4% in 2013, with greater intensity among young people (59.8% in 2013). At the same time, the participation of REMTH in employment (49.1% in 2013 for the ages 15-64), continues to lag behind the European average, as well as the National (64.1% and 49.3% respectively) while it is particularly low among young people (up to 24 years old).

The current NSRF Program (2014- 2020) has been extended due to coronavirus pandemic and so there is not yet the Final Report. However, the latest information we have, shows that the NSRF 2014-2020 has a very high absorption, which means that it will have a significant impact on the GDP of the region.

Through our methodical and persistent macroeconomic and financial analysis, we try to figure out if these Regional Development Programs achieve their goals and in which rate. We make a thorough analysis of the specific tasks that EU activates in order to support its poorest regions such as East Macedonia – Thrace region. The governments usually present the results of such programs in terms of Gross Domestic Product (GDP) or GDP per capita or by presenting the successful absorption rate, without introducing in more specific details about the social and economic impact of these tasks.

The officials in European Union have no thorough statistical data about the outcome of these support packages that inflow in the poor regions.

The research in this specific geographical area can demonstrate the strengths and weaknesses but moreover the opportunities for more efficient money management of these Structural Funds.

A key problem in the EU bureaucracy is that the positive impact of capital inflow on the EU's underdeveloped regions cannot be quantified with the usual terms of GDP and per capita GDP. There must be other critical measurements such as the business birth and death ratio, the trade balance etc.

The present research tries to highlight the economic and social welfare imprint of European support funds in a poor rural region of the Europe's South.

It is proposed to extend the research by adding more data sets in terms of time periods, funding economic sectors and eligible funding geographical areas. In the continuation of the research, we will focus on Regional Units in order to see if the programs have greater absorption in certain Regional Units, while we will include in our study the Gross Domestic Product and Gross Value Added indices, in order to see the quantitative contribution of the programs in the Region and in Regional Units.

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FISCAL DECENTRALIZATION IMPACT ON REGIONAL DEVELOPMENT

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ABSTRACT

This paper aims to examine how fiscal decentralization may influence regional development in selected CEE countries (the Czech Republic, Slovakia, and Poland). Previous research on this question has primarily focused on just the relationship between fiscal decentralization and growth. This paper further examines the effect of subnational revenue, subnational expenditure, and transfers to subnational governments on regional development, i.e., GDP growth rate and Human development index (HDI). Data from Organization for Economic Cooperation and Development (OECD) and World Bank from 2010 to 2019 at the subnational government finance, GDP growth and HDI for the examined countries were used. The analysis involved analysing the three countries by focusing on each individual country of the CEE countries to ascertain the results' strength and veracity. We find that decentralized revenues positively influence GDP growth rate and HDI in selected CEE countries with overall positive significant results in all countries. There is no significant effect for subnational expenditure in the two countries, the Czech Republic and Poland, except Slovakia. Although this impact is much less clear in some countries, central government transfers, however, showed no positive significance at all in each of the selected countries. Because the dependent and independent data are linear variables, we adopted the ordinary least squares regression analysis method.

KEYWORDS

Fiscal decentralization; regional development; OLS regression.

JEL CLASSIFICATION CODE

H77, 018, H00

1. INTRODUCTION

Fiscal decentralization policy was one of the most common development patterns in the 1990s (World Bank, 2000; Lamba, 2019; Sow, 2017). However, many of these time-consuming and expensive interventions (Bonet, 2006) have only made little progress towards their desired outcomes. Given this discrepancy in results, there has been a lot of discussion on whether fiscal decentralization is a good idea and how it culminates regional development. Decentralized finances are seen as an important determinant of sustainable economic growth (Romp and Haan, 2005). In light of the current trend in emerging economies to decentralize expenditures and revenues to subnational governments, it is important to consider whether and how fiscal decentralization affects regional development.

More so, interest in fiscal decentralization as a catalyst of regional development is not limited to emerging and transitional economies; it has risen to the top of most OECD country policy agendas (Vazquez and McNab, 2003). In view of this, the increasing number of countries' interests in fiscal decentralization is viewed as a move of adopting an effective tool for increasing the efficiency of public expenditure and shifting fiscal power to subnational governments to lessen the central government's grasp of the economy. As Taillant (1994) put it, the question in many of these countries is no longer "whether to decentralize" but rather "how best to decentralize."

Even though there are some proofs from earlier literature on the direct relationship between fiscal decentralization and economic growth, it is best inconsistent (Vazquez and McNab, 2003). It lacks a compelling statement in any direction as to the direct impact of fiscal decentralization on regional development. Theoretical advancement and evidence on the relationship between fiscal decentralization and regional development are not explored at length hence the consideration of the title effect of fiscal decentralization on regional development with emphasis to the HDI. This research contributes to new knowledge in that, we found that decentralized revenues positively influence GDP

growth rate and HDI in selected CEE countries with overall positive significant results in all countries. There is no significant effect for subnational expenditure in the two countries, the Czech Republic and Poland, except Slovakia. Although this impact is much less clear in some countries, central government transfers, however, showed no positive significance at all in each of the selected countries.

This paper first reviews the literature on what fiscal decentralization is and other main fiscal federalism theories to reveal the subject's empirical aspect. Secondly, a regression analysis of the data gathered from OECD was conducted and results computed. Thirdly, we critically reviewed the literature's main findings on the effects of decentralization on a relevant list of fiscal decentralization and regional development variables (e.g., subnational revenue, subnational expenditure, and transfers to subnational government, HDI and GDP growth). Findings were interpreted and discussed, and finally concluded.

The GDP growth rate is used as a dependent variable because it is our expectation that when subnational governments are allowed to raise their own revenue and decide on their investments and expenditures, it will improve upon the economic performance and public services of regions which will, in general, affect the national GDP growth rate of the country. Additionally, the HDI is considered a tool for ensuring efficiency and quality of life in the country. Hence, it is expected that when the quality of life at the subnational level is high, it will raise the general human development index of a country.

2. THEORETICAL BACKGROUND

Decentralization entails the delegation of decision-making authority to subnational governments, thus contrasting deconcentration, which involves decentralizing central government operations but not delegating decision-making authority. The concept of fiscal decentralization traces its roots to the theory of fiscal federalism, which was introduced by renowned scholars like Oates, Olson, and Tiebout, among others. The rationale behind this concept is to ensure or allow for economic wellbeing and efficiency as the delegation of factors like subnational revenue and expenditure could generate efficiency in the public sector. In his fiscal decentralization theorem, Oates further argues that the provision of public services through a decentralized government system would usually contribute to improved citizen wellbeing in the face of diverse desires and needs (Oates, 2005). Another opinion is that enhanced decentralization will boost government official's transparency, but it will also complicate policy coordination (Vázquez et al., 2017).

While the initial goal of decentralization was concentrated on the governance structure and its relationship to fiscal and economic matters, the number and levels of government, jurisdiction size, both expenditure and revenue allocations, decentralization later refocused more generally on the nature of those structures as political and economic entities (Weingast, 2009). On the other hand, fiscal federalism theory also emphasizes three major dimensions, stabilization, allocation, and redistribution (Musgrave, 1959), aiming to ensure a delegation of authority from the central to subnational government.

These lines of reasoning notwithstanding, several fiscal decentralization theories have contributed explicitly to the literature currently under review. For instance, fiscal interest theory assumes that revenue decentralization offers incentives to concentrate on economic expansion policies and reduce income and waste in the government by directly linking the impact of spending policies with the revenue budget (Weingast, 2009). In this same breath, Oates (2005) posited that subnational governments are considered serving their own interests rather than supporting fiscal federalism theory.

Some scholars (Andreas et al., 2012, Weingast, 2009, Careaga and Weingast, 2003) are also of the view that, the excessive central government financing with respect to revenue and expenditure of subnational government is counterproductive. As a result, revenue decentralization will improve government spending efficiency because central government expenditure is expected to reduce and in some cases, even decrease the total budget size. Based on this, we hypothesize that

H1a: subnational revenue has a significant positive effect on GDP growth rate

H1b: subnational revenue has a significant positive effect on HDI

Another notable theory is fiscal competitiveness; the literature on fiscal competition between subnational governments has yielded a range of fairly obvious insights into their spending composition. This is because competition in this respect is largely regarded as an active element in that subnational government uses tax and expenditure policies to execute its aims, i.e., the attraction of firms to generate employment and income (Ferreira et al. 2005). It is an established fact by Andreas et al. (2012) that, in countries where the government's transfers mainly finance subnational governments, the subnational

budget limitation is generally segregated from subnational expenditure decisions. As a result, there are far fewer transfers to implement regional development enhancing policies (such as investing in efficient infrastructure) than in countries where subnational governments are financed by their own revenues (Andreas et al., 2012).

Having identified these, we, therefore, hypothesize that

H2a: Transfer from central government has a negative influence on GDP growth

H2b: Transfer from central government has a negative influence on HDI

Ordinarily, if fiscal decentralization improves regional investment, development and overall economic growth are expected to increase. This statement is supported by the hypothesis of a hump-shaped relationship between GDP growth and fiscal decentralization as it appears to hold also for both federal and unitary countries as found by other scholars (Thiessen, 2003).

Having said that, regional development is the utmost priority of fiscal decentralization. Hence the link between fiscal decentralization and regional development is highly necessitated. Decentralized finance is considered the changing and disputed development concepts aimed to accommodate and reflect on regional diversity, unequal economic, financial, political, cultural, and environmental conditions and legacies in various places worldwide (Pike et al. 2010). Again, regional development is believed to have originated from the disparities between Eastern and South-Eastern Europe, underdeveloped or developed countries, and subjects of unbalanced regions (Tosun et al., 2003; Ildırar, 2004).

Some researchers established that it is not right and efficient to provide equalized public goods and services across regions (Oates, 1972, 1977). This is due to the fact that the marginal benefits of public services vary depending on the demand patterns in each population. Diversifying resources can be saved without causing damage to those involved in that government services are customized to suit the needs of the people. As a result, decentralized expenditure can result in greater consumer efficiency (Ulrich, 2003; Vazquez and McNab, 2003). Thus, fiscal decentralization theories emphasize maintaining stable and efficient production of public goods and services under certain revenue constraints, transfer of accountability, responsibility to subnational governments, and political power delegation, aiming to support and geared towards ensuring regional development.

Therefore, having seen this trajectory of development posed by decentralized expenditure, we, as a result of this, finally hypothesize that

H3a: subnational expenditure has a significant positive influence on GDP growth

H3b: subnational expenditure has a significant positive influence on HDI

While several recent studies have attempted to analyze the role of decentralization on growth, the question of the impact of decentralized finance on regional development and quality of life has remained unanswered. Hence, this paper sought to explore the impact of fiscal decentralization on GDP growth and HDI in selected CEE countries.

2.1 Methodology

As we stated above, data from Organization for Economic Cooperation and Development (OECD) and World Bank data for GDP growth rate and HDI for country level from 2010 to 2019 were used in this paper. The OECD receives information from its member countries and several non-member countries via thousands of individual data. OECD is among one of the best reliable sources of data used by researchers. We focus on fiscal decentralization variables, GDP growth rate, and HDI in some selected CEE countries - the Czech Republic, Slovakia, and Poland. In the instance of spatial analysis, the countries are chosen because they are neighboring territories for assessment, they joined the EU on the same date in the 2004 year, and these countries now represent a conventional Central European political and economic forum that promotes shared interests and attitudes in a variety of fields of development. These countries represent regions with diverse strides in the area of regional policy success and with different economic backgrounds in respect to their GDP and other related variables. The analysis involved analyzing the three models by first focusing on each model to assert the results' strength. In total, we analyze 28 observations in all selected countries. Because the dependent and independent data are linear variables, the traditional and commonly used is linear regression analysis (Legendre, 1805, Gauss, 1809), which is mathematically defined as:

$$y = \beta_0 + \beta_1 x + \varepsilon \quad (1)$$

Where “y” represents the dependent variable or output, “ β_0 ” represents the y-intercept, “ β_1 ” is the slope of the simple linear regression, “x” represents the value of the independent variable or the input variable, “ ε ” represents the random error variable. Selected dependent and independent data are shown in Table 1.

Table 2. Description of the variables used

Variables	Description	Sources
GDP growth (dependent)	Real Gross Domestic Growth (annual growth rate)	(Ebel et al. 2002; OECD Database)
Subnational expenditure (independent)	Decentralized Expenditure by economic classification comprises: current expenditure, i.e., compensation of employees, intermediate consumption, social expenditure, subsidies, and other current expenditures (taxes, financial charges, and adjustments); and capital expenditure, i.e. direct investment and capital transfers (level of subnational expenditure in Billions Eur).	OECD Database
Subnational revenue (independent)	Subnational Revenue Comprises tax revenue (current and capital grants and subsidies), tariffs and fees, property income, and social contributions (level of subnational revenue in Billions Eur).	OECD Database
HDI (dependent)	The HDI is a means of comparing key indices of human development, i.e. long and healthy living, access to education, living standards and the overall maturity of the state	(Huther and Anwar, 1998) World Bank Database
Transfers (independent)	Transfers to subnational from other levels of government (Share of total subnational revenues and grants in %)	(Martínez and Jorge, 2017) OECD Database

Adapted from OECD Database, World Bank Database

This paper sorts to analyse the impact of fiscal decentralization variables - the amount of subnational expenditure and revenue, transfers to the subnational government (as a share of subnational revenues) on the variables representing regional development as GDP growth and HDI.

Model Fit

The paper measured collinearity using the Variance Inflation Factor (VIF). The model showed no multicollinearity issues among the variables, with all variables showing less than ten values as propounded by (Hair et al. 2017). It also shows that about 98% of the variance is explained.

2.1.1 Results and Discussion

Regarding our analyses in Table 2 below, we first analyzed some selected variables on GDP and HDI in each country. Furthermore, following the approach of (Abel and Serdar, 2002; Martínez and Jorge, 2017) to obtain results that would be more feasible across the selected CEE countries, regression analyses of the data were performed.

Table 2. Results of Analysis

Variables	The Czech Republic		Poland		Slovakia	
	GDP growth	HDI	GDP growth	HDI	GDP growth	HDI
	P-Val (Beta)	P-Val (Beta)	P-Val (Beta)	P-Val (Beta)	P-Val (Beta)	P-Val (Beta)
Subnational Revenues	0.01*** (13.61)	0.39 (1.52)	0.01*** (12.51)	0.25 (7.70)	0.02** (12.77)	0.01*** (0.021)
Transfers	0.62 (-14.69)	0.20 (0.03)	0.37 (21.05)	0.89 (8.67)	0.33 (1.6)	0.77 (7.30)

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Subnational Expenditures	0.04** (-9.65)	0.54 (1.36)	0.08* (-7.60)	0.64 (-4.53)	0.19 (-4.33)	0.05** (0.01)
R ²	0.969	0.881	0.987	0.769	0.962	0.965
No. of Observations	28					

Source: own calculations

Legend: ***significant at p<0.01; **significant at p<0.05; *significant at p<0.10

As clearly shown in Table 2 above, the results show a positive and strong or medium significance regarding subnational revenue and GDP growth rate in all observed countries. There was a statistically significant and positive effect Regarding the GDP growth rate of the Czech Republic and the level of subnational revenue. Similarly, in Poland, the result shows a highly significant positive impact regarding subnational revenue and GDP growth rate. The Slovakian GDP growth rate was affected by subnational revenue only with moderately statistical significance. This means that for prudent growth in these countries, better performance and GDP growth is expected when the subnational government mobilizes its resources and revenues. The results effectively accept hypothesis H1a. The observed result is also in compliance with the finding of Andreas et al. 2012; Robert and Serdar, 2002; Jing and Heng, 2002; Gemmell et al. 2013, who affirm that decentralized revenue is very significant in ensuring GDP growth and overall development of countries.

Regarding subnational expenditure, a moderate significance and negative effect on GDP growth are observed in the Czech Republic. However, there is less significant observation for subnational expenditure and a negative effect on the growth of GDP in Poland. On the contrary, subnational expenditure shows no significance as observed but has a positive impact on the GDP growth in Slovakia. Based on observations, we reject hypothesis H3a. Although we reject hypothesis H3a, this result is surprising because the GDP growth rate is expected to improve when the government decentralizes its expenditure. This result completely contradicts the literature reviewed (Thiessen, 2003; Lessmann, 2006; Euijune et al., 2003; Weingast, 2009; Bähr, 2008), suggesting that increasing decentralized expenditure enhances growth which will trigger a corresponding increase in infrastructural development, etc.

Concerning HDI in the Czech Republic, none of the variables show statistically significant influence on HDI, but show a positive effect, most importantly with subnational revenue. Given Poland, fiscal decentralization variables show no statistically significant HDI results but show the highest positive impact on transfers. This means that when the central government persist or continually engage on funds or transfers, it rather leads to an obstruction of fiscal decentralization. Although this also accepts H1b and H3b hypotheses, this result could be better if the subnational government is fully responsible for their region's financial activities. Hence, it would have a positive influence on the quality of life. Subnational revenue in Slovakia shows a statistically highly positive significant effect on HDI. Subnational expenditure also indicates a moderate positive significance lower positive effect on HDI. In effect, this finding complies with the work of Libman, 2013; Bojanic and Collins, 2019. According to our expectation, improved fiscal decentralization will increase the quality of life in a country. Hence we formulated a hypothesis implying that the amount of subnational revenue and expenditure affects HDI positively. However, the hypothesis H1b, H3b is rejected given the subnational revenue and expenditure level with HDI in both the Czech Republic and Poland. Still, both are affirmed in Slovakia. The result (as shown in Table 2 above) accepting the formulated hypothesis H2b further confirms that transfers may not necessarily influence the GDP growth and efficiency of fiscal decentralization. The distribution without consideration of fiscal capacity and explicit measures of expenditure needs may increase inequality (Monoz et al., 2019). Additionally, some scholars have argued that transfers may be a yardstick for central government interference in the subnational government decision making process as it might want to decide for them which projects or activities they should carry out at a point in time (Kappeler et al. 2012).

Table 3: Summary of Hypotheses, Tests and Results

Hypotheses	The Czech Republic	Poland	Slovakia
H1a: subnational revenue has a significant positive effect on GDP growth rate	Accepted	Accepted	Accepted
H1b: subnational revenue has a significant positive effect on HDI	Rejected	Rejected	Accepted
H2a: Transfer from central government has a negative influence on GDP growth	Accepted	Accepted	Accepted
H2b: Transfer from central government	Accepted	Accepted	Accepted

has a negative influence on HDI			
H3a: subnational expenditure has a significant positive influence on GDP growth	Rejected	Rejected	Rejected
H3b: subnational expenditure has a significant positive influence on HDI	Rejected	Rejected	Accepted

Source: own calculations

In summary, the selected CEE countries' findings indicate that fiscal decentralization influences GDP growth and the HDI of countries. In particular, it shows a highly positive significant effect of subnational expenditure in Slovakia but negative and no significance in Czech and Poland. Consequently, subnational revenue shows a positive and high significance across all selected countries at $p < 0.01$ confidence level. The transfer shows a negative relationship with no significant effect on GDP growth and HDI in the Czech Republic, Poland, and Slovakia. This finding effectively accepts the formulated hypothesis H2a and H2b. This result conforms to an established fact (Andreas et al. 2012) that, in countries where the central government's transfers mainly finance subnational governments, the subnational budget limitation is generally segregated from subnational expenditure decisions.

As a result, there are far fewer transfers to implement regional development enhancing policies such as investing in efficient infrastructure than in countries where subnational governments are financed by their own revenues (Andreas et al., 2012). However, the result contradicted Gemmell's findings on the role of the central government transfers' in ensuring growth in their respective countries (Gemmell et al., 2013; Weingast, 2009). Though this position contradicts our results, the result affirms the view that considers transfers more effective in federal states. Hence, considering the selected countries in this research which unitary states, we consider the finding to be appropriate (Thiessen, 2003).

3. CONCLUSION

The paper aims to assess how fiscal decentralization variables such as subnational revenue, subnational expenditure, and transfers to subnational governments affects GDP growth rate and HDI. We examined whether decentralized finances carried out by the subnational government spurred regional development expressed by GDP growth and HDI. The descriptive statistics results demonstrated that the GDP growth rates in the Czech Republic, Poland, and Slovakia regarding subnational revenue are positively significant for regional development. In all countries under review, support for decentralization from their respective central governments were most influential for their GDP growth. The empirical results showed that carrying out subnational expenditure activities does not significantly stimulate regional development even though the significance was high in Slovakia. This implies that Slovakia experiences a higher relationship between decentralized subnational expenditure and GDP growth than the Czech and Poland experience.

However, we found out that the higher the amount of transfers from central government to subnational governments, the stronger the negative impact on GDP growth and HDI in all countries, affirming our formulated hypothesis. Finally, the study concluded that decentralization increasing is very significant to spur GDP growth and HDI in the selected CEE countries. It complements the view that an increased decentralization in both federal and unitary countries would be beneficial to ensure the development process is efficient and expedited (Feld and Dede, 2005). Consequently, this research contributes to new knowledge in that, it found that decentralized revenues positively influence GDP growth rate and HDI in selected CEE countries with overall positive significant results in all countries. There is no significant effect for subnational expenditure in the two countries, the Czech Republic and Poland, except Slovakia. Although this impact is much less clear in some countries, central government transfers, however, showed no positive significance at all in each of the selected countries.

In total, we analyze 28 observations in all selected countries. As it is difficult to get information and data regarding some decentralization indicators in some countries. The number of observations is quite less, and we consider it as weakness of the research. Therefore, future research in line with this subject area should address an investigation of the data from all CEE countries. Moreover, the effects of transfer could be explored in more detail.

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SHOPPING IN GREECE: WHERE IS THE LINE BETWEEN ONLINE AND OFFLINE MARKET?

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ABSTRACT

Online shopping is the process according to which consumers directly purchase products and services from a vendor without an intermediary service over the Internet, whereas Offline shopping utilizes offline media channels to create awareness of a company's products and services. Greek people present a high level of Internet penetration and Internet activities, but engage in few online purchasing activities. This phenomenon is still not fully understood as the barriers for this online activity are still being debated worldwide. There are still people who like to see an item in person and touch it before deciding to make a purchase. That said, while physical stores are unlikely to go extinct soon, mobile devices will play a crucial role in people's overall shopping experience. Comparison between online and offline shopping will continue to gain attention in 2021. This survey has been conducted to find out how consumers measure channels for their purchasing activities in Greece. The study aims at understanding some of the barriers to the e-commerce practices. To understand the low e-commerce practices in Greece, hierarchical moderated regression analysis was used to test the model. Four factors were examined according to the literature review: Risk, Ease of use, Usefulness and Online experience. The proposed model was tested in a sample of 300 respondents. The findings disclose a positive correlation between the E-commerce practices and the Ease of use, the Usefulness, and the Online experience factors. A negative correlation was exposed between the E-commerce practices and the Risk factor. The high values presented in the Risk factor show that Greek people still show some uneasiness concerning the security and difficulties in e-commerce practices. The perception of the many different risks presented in online shopping seem to be the main reason for the low number of online purchases. The solutions for lowering the perceived risks of online shopping may be to increase the online experience of the individuals, since it is negatively correlated with the perception of the risks, or to solve each sub-risk with the proper resolution. The traditional service quality and website features may give customers confidence and build trust in e-commerce. The aforementioned findings may offer valuable information for improving e-commerce in Greece. Future research on the subject could specialize the research in such a way that it would be possible to individually improve the quality of the offered e-commerce services.

KEYWORDS

E-government, municipality of Kavala, citizens' attitudes.

JEL CLASSIFICATION CODES

L81, L86

1. INTRODUCTION

The percentage of Greek people buying online is much lower than the European average, which in 2019 stood at 57%. Statistics for Greece's data also show that clothing and sports products are the items we buy most. The reality is that Greek people do not use the Internet for purchasing activities as much as they should when considering their online practices (Edwards, 2021). The question is why they are unwilling to buy online when compared to other countries in EU-28, and whether this is a cultural problem or not. There are not many studies about e-commerce business in Greece with significant findings regarding the influencing variables and barriers. The findings regarding the correlations between online purchasing habits and other variables are not certain as many of them have mixed

findings. Therefore, the Greek demographic characteristics, habits, and thoughts may influence e-commerce practice in different ways. The perception of the many risks presented in e-commerce, or the difficulties in using this new technology may be hidden behind the low online purchases.

E-commerce has obliged retailers to face new challenges, as online shopping offers immediate and full access to a multitude of products, effortlessness comparison between alternatives and lower prices on average than a conventional store (Brynjolfsson et al., 2013).

Nowadays, the development and management of channels is becoming more integrated, which can blur the common borders between them (Verhoef et al., 2015) and prompt retailers to re-evaluate their strategies as old obstacles like geography and customer ignorance start to disappear (Brynjolfsson et al., 2013).

As the industry evolves towards this synergetic model, the distinctions between online and offline will ultimately vanish (Brynjolfsson et al., 2013). Ensuring effective touchpoints with consumers across all channels is essential to provide a smooth and enjoyable journey for them.

Since the emergence of online channels, researchers have been focusing on distinguishing the factors that influence shoppers' intention to buy online and offline. In the multi-channel environment, research shopping is becoming more complex as consumers seek hybrid benefits through various channels (Chiu et al., 2011). Consumers tend to perceive online channels as riskier to buy from when compared to physical stores (McKnight et al., 2002). Furthermore, shopping offline can sometimes be almost like an event (Herring et al., 2014).

Regarding price, web stores are usually able to offer lower prices as they do not bear the costs of maintaining a physical store (Rigby, 2011). Moreover, online channels facilitate the comparison of prices as there are websites such as Skrouz, BestPrice etc. that are simple comparison tools. Therefore, price-sensitive consumers tend to prefer online channels.

The assortment is also a critical factor when deciding which channel to use. The Internet allows people to choose from a much more comprehensive variety of products by just clicking on a mouse or tapping on a screen (Sahney et al., 2013).

Brynjolfsson and Smith (2000) discovered that the prices online, compared to the traditional retail outlets, were 8% to 15% lower. In sum, it is possible to understand that the customer has the ability of choosing where to buy, to compare multiple products with no effort and lower prices and choose the delivery place, reducing even more the effort of picking a product up. Besides, Atif (2002) found that the five most common reasons to buy online are reduction of shopping time, timing flexibility, less physical effort, saving of aggravation and the opportunity to engage in impulse buying or directly responding to an advertisement.

2. BACKGROUND THEORY

Perceived ease of use is defined as *“the degree to which a person believes that using a particular system would be free from effort”* (Davis, 1989; Davis et al., 1992). Davis studied the impact of the ease of computer usage and the Internet practice and concluded that there is a positive and significant correlation between the two. This phenomenon is easy to understand as in most systems, the easier the practice, the less effort will be required, thereby increasing the likelihood of usage by the individuals. In order to simplify the online experience, different browsers were created resulting in user directed programs and a great number of browsers from which users can choose. These developments affect the ease to use the Internet and, therefore, the e-commerce as the shopping must be done in a web browser. If they are used in the online purchases example, one can expect that the e-commerce' perceived usefulness will display a significant and positive correlation with the e-commerce activities, since the online experience of an individual has been proven to be positively correlated with online purchasing practices (Miyazaki & Fernandez, 2000; Thompson, 2001).

Perceived usefulness is defined as *“the degree to which a person believes that using a particular system would enhance his or her job performance”* (Davis, 1989; Davis et al., 1992). This variable has a positive influence on the adoption of technology. Therefore, if used in the example of the e-commerce, one can expect that the e-commerce perceived usefulness has a significant and positive correlation with e-commerce activities (Gefen & Straub, 2000).

Levin et al. (2003) states that the lack of ability to see and touch the product, as well as the absence of personal service is a great disadvantage to the online commerce. Levin et al. (2003) even concludes that these handicaps are greater in some products, usually the ones that have “high-touch” needs like

clothing, and inferior in others, such as the “low-touch” products, like a computer software. Still the importance of tactile information such as smell, vision, touch, sound and even taste must be considered as it is present in offline shopping ([Childers et al., 2001](#)). Even the haptic attributes like texture, hardness, temperature or the weight must be reflected as a disadvantage in online commerce ([Childers et al., 2001](#)). This handicaps must be taken into consideration since a consumer will become frustrated with his/her online purchasing experience and feel less confident in the product if a barrier to direct experience is felt ([Childers et al., 2001](#)).

Although the amount of Internet users has grown in a fast and continuous rate, the number of online shoppers has not been able to accompany this kind of growth. Lardner (1999) blames this occurrence on the perception of a great number of risks inherent in e-commerce. Lardner (1999) even states that *“there is a great lack of public confidence, which in turn poses a serious impediment to full-scale electronic commerce”*. Pavlou (2003) describes perceived risk as a *“subjective belief of suffering a loss in pursuit of a desired outcome”*. The psychological perception of these possibilities is the most important variable to be understood when exploring why so many users refuse to use a technology that is so convenient and helpful ([Pavlou, 2003](#)). The perception of any type of risk in buying online is negatively correlated to future online purchases ([Liebermann & Stashevsky, 2002](#)). This relationship is found in apprentice and experience Internet users although higher online experience will decrease the perceptions of the risks ([Miyazaki & Fernandez, 2000](#); [Liebermann & Stashevsky, 2002](#)). Numerous theories have been created as this variable should be decomposed into the many risks, or “sub-risks”, and fears that users suffer from ([Bettman, 1973](#); [Lardner, 1999](#)). Bettman (1973) separates the risks into financial, physical, psychological and social. Others even consider the technological risk, which is the fear of technological complicated innovations, usually undergone by people of higher ages ([Bélanger & Carter, 2008](#)). [Corbitt et al. \(2003\)](#) divide the risks into performance, financial, social, psychological and time risks. It’s important to separate the multiples types of risks as to fully understand the actions that should be made in each case to increase the usage of the e-commerce. For instance, if a clutch of people present a higher perception of privacy risks, the solution may be to convince them that they will have confidentiality when visiting the website or buying online. But if the problem is a higher perceived product risk, the retailers will have to gain the users trust and confidence in order to sell.

Borchers (2001) found that the consumers' trust is negatively related to their perceived risk of a transaction and positively related to their intention to purchase. McKnight et al. (2002) and [Pavlou \(2003\)](#) also found that the respondents that present higher values of trust are more likely to shop online. The inclusion of a third party in these online transactions seems to be a very reliable way to ensure higher trusting in the relationship of the buyer and seller. This practice seems to be increasing and must be understood by the consumers as an important barrier to most of their perceived risks. Trust plays a central role in the decision to overcome the perception of risk and insecurity ([Borchers, 2001](#); [Corbitt et al., 2003](#)). As long as the e-commerce business continues to transmit the idea of multiple risks, trust will be an essential mechanism to persuade the consumers.

3. METHODOLOGY

The chosen method of data collection was the online questionnaire, using, therefore, a quantitative approach. This method ensured an advantage in time, cost, efficiency and convenience of the respondents compared to the other deliberated methods. Five factors and five demographic variables were chosen to enter the survey. The collected data was processed to the Statistical Package for the Social Sciences (SPSS), so that the hypotheses presented could be tested and the relationship between the chosen factors and the demographic variables could be understood.

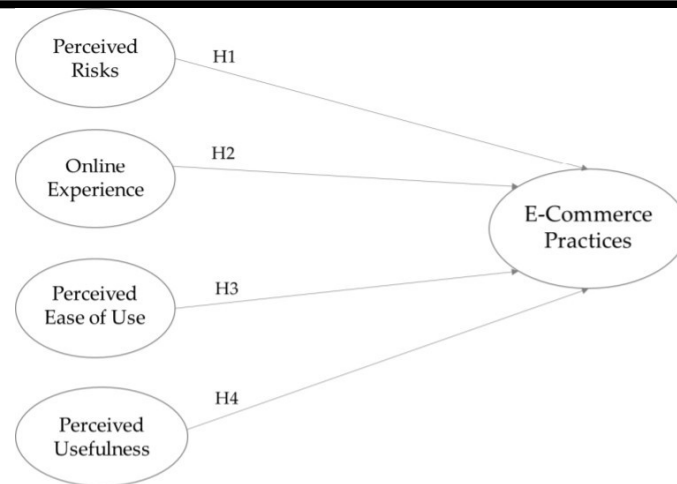


Figure 1. Proposed Theoretical Model

The presented theoretical model (Figure 1) summarizes the selected hypothesis to be tested, analysing the relationships between the chosen factors and the E-Commerce Practices. The model will be tested using a Linear Regression to understand the importance of the factors on the dependent variable (E-Commerce Practices).

3.1 Data Collection Instrument

In order to analyse the proposed relationships and hypothesis, a questionnaire with 3 pages, 5 factors, and 27 questions was created. The survey was based on other studies and translated from English into Greek to ensure the native language of the respondents, it was created using the Google Forms and then distributed via “Facebook” and e-mails. Before the divulgation of the survey, two pre-tests were made to ensure that the questionnaire didnot have interpretation problems, errors or miss translations. The first test showed two minor errors that were rapidly revised. The second test showed no problems. Each test consisted of 10 respondents. According to the pre-tests, only four minutes should be spent answering this questionnaire. While the participants were previously informed of the academic nature of the survey.

All questions were obligatory to answer, and no participant could advance to the next page or submit the answers with any missing query. In all questions, except for the gender and age of the respondent, there was given the possibility of answering “Don’t Know / Don’t Answer.” The survey was active and received answers for a period of 60 days. The questionnaire was divided into 3 pages that are summarized below.

In the first page, a multi-choice was presented in order to quantify the weekly online involvement of the individual in 4 activities. These questions used a Likert scale from 1, with the meaning of 0 minutes, to 5, implicating more than 8 hours. Afterward, a star rating was presented to evaluate the level of disagreement or agreement with different statements referring different risks of the e-commerce practice. These star ratings used a Likert scale where 1 meant “Totally disagree with the statement” and 5 “Totally agree with the statement”.

Four drop down list questions were then presented in order to evaluate the individuals’ e-commerce practices. These also had a Likert scale to ensure compatibility with the additional questions. To finish the second page a new star rating, using the Likert scale, was then presented with the purpose of evaluating the individuals’ perceived ease of use and usefulness of the e-commerce practices. The respondents had to enumerate the level of agreement or disagreement of 6 sentences, where 1 meant “Totally disagree with the statement” and 5 “Totally agree with the statement”. Three of the questions were regarding the perceived ease of use and three the perceived usefulness.

Lastly, the third page was composed by five demographic questions, gender, age, educational level, income and marital status, in order to characterize the individual.

Table 1 - Items of the Factors used in the Online Survey

Online Experience

On average, how much time per week do you spend on each of the following web activities?
<ol style="list-style-type: none"> 1. Reading the newspaper on the web? 2. Reading and/or posting messages in newsgroups? 3. Accessing information on the web about products and services you may buy? 4. Shopping (i.e. actually purchasing something) online?
Perceived Risks
<ol style="list-style-type: none"> 1. I believe that on-line purchases are risky because the products / services delivered may fail to meet my expectations. 2. I believe that on-line purchases are risky because the products / services delivered may be of inferior quality. 3. I believe that on-line purchases are risky because the products / services delivered may be dangerous to use. 4. I believe that on-line purchases are risky because the products / services may be available at a lower price somewhere else. 5. I believe that on-line purchases are risky because it may cause others to think less highly of me. 6. I believe that on-line purchases are risky because the products / services delivered may fail to fit well with my personal image or self-concept. 7. I believe that on-line purchases are risky in terms of time because the products / services delivered may fail to be delivered within the expected time frame. 8. Purchasing from a Website would involve more financial risk (i.e. fraud, hard to return) when compared with more traditional ways of shopping.
Perceived Ease of Use
<ol style="list-style-type: none"> 1. It is difficult to learn how to use the Internet to do my shopping activities. 2. I took a long time to learn to use the Internet to do my shopping activities. 3. I often become confused when I use the Internet for my shopping activities.
Perceived Usefulness
<ol style="list-style-type: none"> 1. Using the Internet enables me to accomplish my shopping tasks more quickly. 2. Using the Internet makes it easier for me to shop. 3. Overall, I find the Internet useful for my activities.
E-Commerce Practices
1. I have purchased from the Internet:
2. The value of my total online purchase is approximately:
3. The ratio of online purchase to total purchase in value is approximately:
4. I anticipate that my online purchasing within the next 2 years will be most likely to:

3.2 Variables

To analyze the proposed relationships, five factors were used: Perceived Risks; Online Experience; Perceived Ease of Use; Perceived Usefulness; E- Commerce. These factors were used in other studies, presenting a Cronbach value higher than 0.70, and were slightly modified in order to fit together in the same questionnaire. One of the adjustments was the scale that had to be identical in all the factors. A 5 Likert scale was chosen in order to ensure the possibility of a neutral response using the number 4 answer. The questions of the online survey are presented in the following table (table 2), to understand the factor components.

The Online Experience factor from the McKnight et al. survey (2002) used a 7 Likert scale. This factor was measured through four questions regarding the number of hours that each individual spent on a weekly basis in four online practices, from a range of 0 hours to more than 8 hours.

Corbitt et al. (2003) measured the perception of risks through a seven question factor. The original scale chosen by the authors consisted of a Likert 5 point scale. In order to add the “payment risk,” another question was added from the Kim et al. (2008) study. The factor was measured through 8 statements, referring to different kinds of risks that the respondent had to answer from 1, meaning “Strongly disagree” to 5 stars, meaning “Strongly agree”.

The Perceived Ease of Use and the Perceived Usefulness factors withdrawn from the Corbitt et al. (2003) study used a 5 Likert scale. Both factors were composed of three statements each, from which the respondent had to answer from 1, meaning “Strongly disagree” to 5 stars, meaning “Strongly agree”.

The E-Commerce factor was used in Corbitt et al. (2003) study. The first question measured the times the respondent purchased online. The higher response was changed to “more than twenty times”. The second question perceived the amount of money spent by the individual. The original answers already presented a suitable amount of money. The third question measured if the respondent believed that his/her online shopping habits would increase, decrease or maintain the same in the next 2 years. The last question of the E- Commerce factor was to understand the ratio of the online purchases compared to the individuals’ total purchases. The original higher response was of 20%, which was altered to 25% since the scale was also altered from 5 to 7 points.

In the gender variable, number 1 was given to the female gender and number 2 to the male. The single individuals were given number 1. The married, widowed, in non-marital partnership and divorced were assigned the numbers 2, 3, 4 and 5 respectively.

4. RESULTS

The information collected from the survey will be used to test the previously presented hypotheses, compare to the discussed studies and understand the relationship between the chosen factors and the demographic variables.

4.1 Overview

The collected sample is composed by 400 inquiries which included 54,8% answers from female and 45,2% from the male gender with ages comprehended between 18 and 75 years old. The widowed, in non-marital partnership and divorced answers were excluded from the marital status analysis since only 22 individuals presented this status.

4.2 Confirmatory Factor Analysis

Using the SPSS program, a confirmatory factor analysis was conducted in order to measure the relationship between the observed and the unobservable variables and thus verify the hypothesis that the selected items are associated with specific factors. The factor loading of each question represents the scales’ validation for the analysis and measurement of specific factors, demonstrating the correlation between the original variable and the factors (Hair et al., 2006). According to Hair (2006) the value of the factor loadings must be higher than ± 0.4 , being minimally accepted near this limit. It is important to refer that all these statements are based on a significance level of 0.05 (Hair et al., 2006). Table 2 presents the collected factor loadings for each question.

Table 2. - Results from the Confirmatory Factor Analysis

Factor	Abbreviation	Question	FactorLoading	Cronbach'sAlpha	N° ofItems
Online Experience	OE	OE1	-0.493	0.722	4
		OE2	0.492		
		OE3	0.548		
		OE4	0.581		
Perceived Risks	PR	PR1	-0.693	0.792	8
		PR2	-0.582		
		PR3	-0.591		
		PR4	-0.652		
		PR5	0.721		
		PR6	0.634		
		PR7	0.542		
		PR8	-0.537		
Perceived Usefulness	PU	PU1	0.652	0.736	3
		PU2	0.610		

Factor	Abbreviation	Question	FactorLoading	Cronbach'sAlpha	N° ofItems
		PU3	0.601		
Perceived Ease of Use	PEU	PEU1	-0.582	0.795	3
		PEU2	0.637		
		PEU3	0.618		
E-Commerce	EC	EC1	0.722	0.802	3
		EC2	0.645		
		EC3	0.695		
		EC4	0.425		

In order to make the analysis easier and simpler a list of abbreviations was made. These abbreviations will be used from this point on. Any question regarding these variables will be abbreviated with the standard variable abbreviation and the regarding number (table 2). For instance, the second question of the E-Commerce variable will be given the name EC2.

As it can be observed, almost all of the chosen questions achieved a factor loading value superior to 0.4. The only one that did not meet this standard was EC4, a fact that resulted in its exclusion from the E-Commerce factor.

To validate the factors enumerated before, a reliability analysis was performed concerning each one of them. The output enabled the validation of all factors with the Cronbach's Alpha superior to 0.700 as represented in table 2.

Table 3. Correlation between the E-Commerce and the other factors

Construct	Correlation			
	Perceived Ease of Use	Perceived Risk	Perceived Usefulness	Online Experience
PearsonCorrelation	.312**	-.522**	.462**	.616**
Sig.(2-tailed)	0.003	0	0.001	0
N	84	80	86	85

*.Correlation is significant at the 0.05 level (2-tailed).

4.3 Model Analysis

As expected, the Online Experience factor demonstrated a negative correlation with the age of the respondents (Thompson, 2001). The anticipated correlation between the Online Experience and the gender of an individual did not verify. No studies were taken into account regarding the Online Experience factor correlating with the income level and marital status of the respondents, but both were verified.

The Perceived Risk factor verified, as anticipated, a positive correlation with the age and marital status and a negative correlation with the educational level of the individuals.

The Perceived Usefulness factor showed the expected negative correlation with age and an unanticipated positive correlation with the income level of the respondents.

The Perceived Ease of Use demonstrated, through the collected results, to have a significant correlation with the age and educational level of the individuals. The first two correlations were expected by Zeffane& Cheek (1993).

As expected, the E-Commerce factor verified a positive correlation with education and income level, and a negative correlation with the age of the individuals. The online purchasing habits seemed to also have a negative and unexpected correlation with the marital status of the respondents.

With the intention of summarizing all the identified and significant correlations in the collected sample, table 5 is presented. It can be used to compare the previously expected outcomes versus the real achieved results. It is important to refer that none of the results attained stood against the ones expected at the beginning of this study although some correlations had been obtained when none was expected and vice-versa.

Table 4 - Achieved correlations between the factors and the demographic variables in the survey. “+” and “-“ signs refers to the type of correlations between variables and “N.C” means “No Correlation”

Variables	Age	Gender	Income	MaritalStatus	Education
PerceivedRisk	+	N.C.	N.C.	+	-
PerceivedUsefulness	-	N.C.	+	N.C.	N.C.
PerceivedEaseofUse	-	N.C.	N.C.	N.C.	+
OnlineExperience	-	N.C.	+	-	N.C.
E-Commerce	-	N.C.	+	-	+

The model presented in figure 2 shows the standardized coefficients Beta above and the t-value below the arrow, representing each relationship.

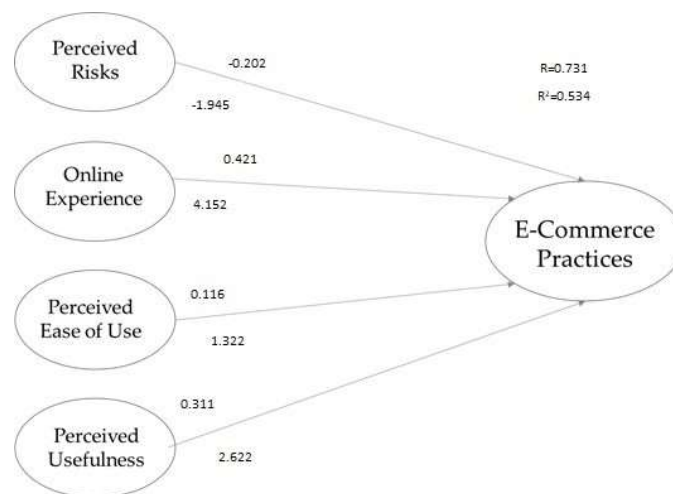


Figure 2 - Model of the factors' relationship with the E-commerce Practices

4.4 Hypothesis Results

The conclusions regarding the correlation between the E-Commerce variable and the Online Experience, Perceived Ease of Use, Perceived Usefulness, and Perceived Risk were the expected. The four hypotheses are supported to a 99.0% significance level. The following table (table 5) resumes the findings and displays the collected data.

Table 5 - Results of Research Hypothesis

Hypothesis	Explanation	Coefficient values	Sig. Value	Conclusion
H1	There is a significant negative correlation between the Perceived Risk variable and the E-Commerce variable	-0.522	0.001	Supported
H2	There is a significant positive correlation between the Online Experience variable and the E-Commerce variable	0.594	0	Supported
H3	There is a significant positive correlation between the Perceived Ease of Use variable and the E-Commerce variable	0.312	0.003	Supported
H4	There is a significant positive correlation between the perceived Usefulness variable and the E-Commerce variable	0.462	0	Supported

5. DISCUSSION

The Online Experience factor demonstrated a negative correlation with age. Although there were no collected data regarding the correlation, the marital status variable showed a negative correlation. To perform the statistical analysis of this variable, value “1” was attributed to the single status and “2” to the married individuals. All other statuses were ignored due to the low number of answers acquired. The fact that this correlation has had a negative connotation means that single individuals presented higher online experience than married ones. As it can be easily understood, married individuals were, in general, older than single, as it is presented in table 6.

Table 6 - Mean Age of Married and Single Status

MaritalStatus	Age Mean
Single	26.21
Married	53.45

Older individuals had lower online experience, which can relate both age and marital status with this factor. Concerning the gender variable, no correlation was found, against what was expected. This can be explained by the fact that the majority of the collected sample was placed in younger ages and significant differences in gender concerning online experience were mainly present in older age groups.

One could expect a positive or no correlation between the educational levels of the tested sample and its online experience; the results showed that the second theory was verified. This could be justified by the idea that new generations have Internet access almost everywhere.

The positive correlation found between the demographic variable income and the Online Experience factor was not anticipated because there were no studies previously identified that would approach this issue in a precise manner. However, a positive correlation with a challenging meaning was obtained. This may happen due to the use of new technologies such as tablets and smartphones that allow the user to surf the Internet in almost any place in the world. Despite its benefits, these technologies are still expensive products and not affordable by everyone, mainly when taking into consideration the economic situation of the country and the high prices of Internet packages. One can then infer that individuals with financial capacity to buy these products will, in general, show better results in this factor.

As expected, the factor Perceived Risks had a positive correlation with age. Conversely, the absence of relationship between this factor and the demographic variable gender was not anticipated at all. A possible reason for such phenomenon was the lack of correlation between the factor Online Experience and gender which, if present, would indirectly lead to a correlation with the factor being discussed. In other words, what would influence the risks perception would not be the gender by itself but the online experience which would be lower in female individuals. Given this, it would be wise to perform new studies with higher number of inquiries also controlling the Online Experience factor.

There was not much information available about the existing relationship between income and risk perception, but as it could be verified, no significant correlation was obtained in the tested sample.

The positive correlation with marital status was expected and could be justified by taking into consideration what has been discussed in the Online Experience factor regarding this demographic variable. This means that, as the married sample of individuals presented higher ages, it was expected that this variable responded in the same way as the age variable. Such concept can be validated or discarded through a new study where age could be a controlled variable in order to understand the true correlation between marital status and perceived risks.

It was anticipated that education would present a negative correlation with this factor, and it was verified. The negative correlation found, appeared to demonstrate that users with higher educational degrees felt less apprehensive than the others.

There was no data collected relating the factor Perceived Ease of Use with the demographic variable's income and marital status. The first showed no correlation, but the second demonstrated a negative correlation. Once again, it is important to refer that the meaning of this result must be further analysed by studies with a test over the age variable.

The expected positive correlation found with the education variable could lead to the conclusion that higher educated individuals perceived a greater ease to use of the e-commerce. This phenomenon should be considered and should be further studied with higher detail.

The expected negative correlation between this factor and age was confirmed although the same could not be said to the gender variable.

There was no relationship between this factor and the gender, marital status and education variables. There was however an unexpected positive correlation with the income variable. This occurrence seemed to have no explanation whatsoever and should be considered as a unique correlation of this sample, until a further study is made in order to fully understand it. The negative correlation with the age variable was expected and verified.

The demographic variable gender, against the expectations, showed no correlation with online shopping habits. This occurrence could be explained by the abnormal equality in online experience found in both genders in the sample. The gender correlation had many different findings but when the online experience was tested the same results were found (Thompson and Vivien, 2000). It is important to understand if this is a sample phenomenon or if it happens in Greece in general. If so, one may conclude that only the online experience influences the online purchasing habits, and if this variable is tested, the gender plays no role in this commerce.

As expected, there was a significant positive correlation between income and the factor E-Commerce. We cannot make conclusions from here since it would be very unusual not to find this occurrence. As explained before, higher income values lead to superior online purchasing habits.

The negative and significant correlation between the age and the factor E-Commerce could be explained by the theory exposed before. Since there was no check over other variables, older individuals presented higher Perception of Risks and lower Perception of Ease of Use, Usefulness and Online Experience which were positively correlated with the online purchasing habits of an individual.

Against expectations, the marital status variable demonstrated a negative correlation with the E-Commerce variable. This could be explained, like all the other correlations with this demographic variable, with the specific characteristics found in the married sample since they had a higher age mean than the single individuals.

As expected, there was no correlation between the collected samples' educational levels and their online purchasing habits.

If one combines all of the collected and significant data, it could describe the characteristics of a typical Greek e-commerce consumer. S/he is young of age and possesses a high income. These demographic characteristics are not of the typical Greek since around 44% of the population has a higher age than 50. The mean income in Greece is relatively low in comparison with the rest of the Europe.

The conclusion may seem simple by decreasing the perception of risks and increasing the online experience, perception of usefulness and ease of use of the Greek, but the task is far more difficult than that. To increase the perceived ease of use of individuals, classes could be provided but the costs would be overwhelming. This factor seemed to be the most efficient one since it influences the perception of risks negatively and the online experience and e-commerce habits positively, even though the collected mean was relatively high.

Since the collected answers showed a high mean on Perceived Usefulness, this factor did not seem to be problematic since the advantages of online purchasing appear to be present in the mind of the Greek people.

The Online Experience responses found in the collected sample were relatively low and should be regarded as problematic for the e-commerce habits. In order to solve this problem, the Internet should be accessible to all, regarding of their age, income, and other demographic variables. The technological advances, like tablets, smartphones and smartwatches, that continuously appear, seem to be helpful.

It is important to mention that the Greeks seemed to have perceived four of the eight types of risks as troublesome. These were the “PR1”, fear that the product/service will fail to meet their expectations, “PR2”, the fear that the product/service will be of inferior quality, “PR7”, the fear that the product/service will fail to be delivered within the expected time frame and “PR8”, the fear of financial risks such as fraud, difficulty in devolution, etc. These must be considered and treated as main barriers to the e-commerce growth in Greece. It is therefore imperative to ask these questions: Does the Greek e-commerce business fail at these points? Do Greek people have too high expectations? Does the fact that Greece is isolated from his European peers aggravates any of the risks? Further studies should be made in order to understand this phenomenon and to achieve the most efficient way to resolve them.

Since Greece is situated in the corner of Europe, without many terrestrial passages for product importation, the following issues are important because e-commerce is a global business. The delivery cost and time may be superior in Greece due to its geographical position, if the company is not Greek.

It is important to ask: Does it take longer to deliver the products from other countries? Is the financial risk greater? Does the quality worsen?

6. CONCLUSIONS

This survey has helped to further understand the Greek variables for online purchases. The perception of usefulness and ease of use have been proven to have a positive correlation with the e-commerce practices, as expected from the technology acceptance model (TAM). The online experience has also been proven to have a positive correlation with the Greek online shopping habits. The only factor to present a negative correlation was the Perception of Risks. As the null hypothesis was rejected, the chosen variables must be considered important and capable of influencing the online purchasing practices of the Greek consumers.

Regarding the demographic variables, it is important to refer that the high age of the Greeks increased the perception of risks and lowered the e-commerce consumption. The age variable also had a negative impact in the online experience, where younger individuals seemed to have higher values, and thus higher e-commerce practices. The correlation found between the educational level and the Perception of Ease of Use and the Perception of Risks results in an indirect relationship with the e-commerce practices and should be studied. It is imperative to refer that the correlations found between education and Perceived Ease of Use and Perceived Risk may be of great importance in order to understand if the education levels do interfere with the online purchasing habits of an individual. Lastly, the gender variable seemed to have no influence whatsoever in any of the discussed variables. It should be determined if the online experience of both genders is, in fact - like it was found in this sample - equivalent, by creating a new study where their online experience is compared.

In sum, although the Greeks may seem to spend a great number of hours seeking information online, the perception of risks seemed to inhibit the online shopping practice. The demographic characteristics, such as age and income seemed to aggravate the perception of the risks associated with the e-commerce habits, reducing its practice.

The number of inquiries that were analysed can be considered relatively low in order to determine if the findings were, or not, relevant to the Greek habits. The survey was available online but most of the answers collected represent the Eastern Macedonia and Thrace region. It is important to understand if the individuals from other regions around Greece show the same behaviours and patterns. The number of individuals that represented the married status was also low. The amount of answers from individuals with lower education was also relatively low.

In order to ensure that the results represented the Greek reality, a study should be made with a greater number of respondents to guarantee that the marital status, age and educational levels have a greater diversity. This study should be capable of concluding if, in fact, there is a correlation between the marital status and the perception of risks, online experience and e-commerce practices as well as the correlation between the educational levels and the perception of risks and ease of use.

A study should also be made in order to understand if the location of Greece worsens the quality or increases the costs of the products or services sold online and thus resulting in higher levels of perceived risks.

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THE ROLE OF UNIVERSITIES IN REGIONAL INNOVATION: DOES QUALITY MATTER?

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ABSTRACT

The aim of this paper is to estimate the effect of technological related and unrelated variety and the impact of the university quality on regional knowledge production function. We are using data for 209 EU NUTS-2 regions for the period 1995-2012. Our findings indicate that both related and unrelated variety are positively correlated with innovation output. However, the contribution of the unrelated variety to new knowledge production is higher than the related. Furthermore, our findings indicate that the university quality does matter. The university quality increases the impact of researchers on innovative activity. The simultaneous consideration of the related variety increases the impact of good universities on patents' production and vice versa. On the other hand, the increase in the number of good universities in a region lowers the effect of unrelated variety on knowledge creation. Finally, the increments in unrelated variety reduce the impact of good universities on knowledge creation.

KEYWORDS

Knowledge Spillovers, Technological Variety, University Quality

JEL CLASSIFICATION CODES

O31, O33, O38.

1. INTRODUCTION

The European Union strategy for national/regional research and innovation development builds on each country/region's strengths, competitive advantages and potential for excellence. Smart Specialisation assumes knowledge spillovers increase when regions diversify into technologies, products and services related to existing dominant technologies and regional skills. Thus, knowledge spillovers increase within related industries. On the other hand, some recent studies have explored the impact of technological diversification, unrelated to existing technologies, on regional knowledge spillovers. Unrelated diversification may contribute to new path development through knowledge spillovers and innovation production gleaned from the combination of dissimilar technologies. In like case, unrelated diversification could be incorporated into the new innovation strategy of the coming EU Cohesion Policy. There are only a few relative studies that directly connect technological diversification with regional innovative performance. Castaldi et al. (2015), Miguelez and Moreno (2017) and Tavassoli and Carbonara (2014) found that related and unrelated variety foster innovation. Considering the aforementioned, it is of research interest to investigate if the related or unrelated variety affects the knowledge creation at the European regional level.

Literature considered the essential role of universities in knowledge spillovers impact on economic development and innovation. The EU member states developed the National Reform Programmes under the Lisbon strategy because they recognized the importance of public research and universities for knowledge transfer. Besides, the European universities and research institutions realized their changing role in the globalized economy. Thus, they have undertaken initiatives like sharing knowledge through R&D collaborations with business, etc. (European Commission, 2007). However, although those policies have underlined the need for general collaborations between universities and industry, they do not offer a consistent response why the innovative activity flourishes more in some regions than in others. Good universities generate and diffuse state of the art knowledge to the innovation ecosystem stakeholders (industry, researchers, etc.). For instance, Silicon Valley is a global centre for high technology and innovation collocated with some World Class Universities (Stanford University, Caltech, University of California Berkeley, etc.) which supply high valued human capital and knowledge to the Silicon Valley companies. Thus, it is no coincidence strong innovative systems emerged in areas where good universities are located.

The aim of this paper is twofold. First, we estimate the effect of technological related and unrelated variety on a regional knowledge production function. Second, we investigate the impact of the university quality on regional knowledge production function. We are using data for 209 EU NUTS-2 regions for the period 1995-2012 (for the first question) and for the period 2003-2012 (for the second question). To the best of our knowledge, there have been no studies to associate the quality of universities with new knowledge production. Hence, we argue that apart from the existence of universities in a region the role of good universities on the production of new knowledge does matter. Furthermore, we assume that the simultaneous consideration of the related/unrelated variety and university quality level influences the marginal effects of these independent variables on new knowledge production. Consequently, we incorporate a synergetic (interaction) term of varieties and university quality to respond to this assumption.

Our findings indicate that both related and unrelated variety are positively correlated with innovation output. However, the contribution of the unrelated variety to new knowledge production is higher than the related. Furthermore, our findings

indicate that the university quality does matter. Good universities increase the regional capability to produce new knowledge. A notable finding arising from our estimations is that the university quality increases the impact of researchers on innovative activity. Moreover, we find the simultaneous consideration of the related variety increases the impact of good universities on patents' production and *vice versa*. An increase in the number of good universities lowers the effect of unrelated variety on knowledge creation. Finally, the increments in unrelated variety reduce the impact of good universities on regional knowledge creation.

The rest of the paper is organized as follows. In Section 2, we discuss the theoretical issues concerning the diffusion of knowledge and we present the research hypotheses. Section 3 gives a short description of the methodology and reports the data. Section 4 presents the empirical results and the discussion. Finally, Section 5 presents a conclusion along with some policy implications.

2. LITERATURE REVIEW AND HYPOTHESES SETTING

The theoretical and applied literature has documented factors that influence regional knowledge diffusion and innovation activity (Griliches, 1979; Moussa and Varsakelis, 2017; Uyerra, 2010) using R&D expenditures and human capital as basic inputs and patents as output in the knowledge production function. Geographical and technological proximity between regions affects the inter-regional knowledge spillovers and new knowledge production. Various studies at state level (Jaffe 1988, 1989; Woerter, 2012) and regional level (Archontakis and Varsakelis, 2011; Audretsch and Feldman, 1996; Bottazi and Peri, 2003; Fritsch and Schwirten, 1999; Kalapouti et al., 2017) suggested that innovative units absorb more knowledge (absorptive capacity) when they innovate in similar technological fields with others, given the geographical distance.

Moreover, literature has set the hypothesis about the diversity or specialisation of regional economic activity, technological change, and economic growth. The MAR theoretical track (Marshall, 1890 – Arrow, 1962 – Romer, 1986) suggests specialisation better promotes knowledge spillovers and regional development. Jacob's theory (1969) suggests the wide industrial diversity in a city increases the knowledge diffusion between the agents and leads to higher regional innovation activity. The next studies do not unanimously support either theory by focusing the EU regions (Fritsch and Slavtchev, 2010; Kalapouti and Varsakelis, 2015; Kalapouti et al., 2017).

2.1. First Research Hypothesis

In recent years, the specialisation/diversification of innovation activity has been a crucial element of the EU regional innovation policy. Specialized diversification (OECD, 2013) includes the approval, diffusion, and adoption of general-purpose technologies in a wide range of areas. The EU emphasizes the related variety where innovation is more likely to occur in diversified regions than in specialized ones. However, this type of knowledge diffusion can only occur in the case of “relatedness” between technology domains (European Commission, 2013). The related variety has been used to explain the regional growth (Content and Frenken, 2016) and the diversity of regional economic activity (Frenken and Boschma, 2007). Frenken et al. (2007) introduced this concept since they explored “which precise composition of sectors in a regional economy creates most spillovers” (Frenken et al., 2007, p. 687).

Similarly, the unrelated variety was introduced to capture the idea that major technological changes come from a combination of non-relevant cognitive domains (Castaldi et al., 2015). Thus, Frenken et al. (2007) extended Jacob's externalities by inducing the differentiation between the related and unrelated variety. The authors argued that the existence of at least some complementarities in capabilities of sectors contributes to knowledge diffusion between them. There are only a few studies that connect technological diversification with innovative regional performance. Castaldi et al. (2015) used patent data for U.S. states in the period 1977- 1999 and found that both related and unrelated variety foster innovation. However, although knowledge spillovers between unrelated sectors are less likely, successful recombination of unrelated knowledge leads in radical innovations.

Migueluez and Moreno (2017) examine the effect of related and unrelated variety on the number of patents by using data on 255 European NUTS-2 regions. Their results suggest that both related and unrelated variety increase innovation. However, they found that unrelated variety only affects innovation if weighted by their value using forward citations – breakthrough innovations. Tavassoli and Carbonara (2014) measure the impact of internal and external knowledge intensity and variety on regional innovation output (patent applications) by using data on 81 regions of Sweden. They found that related variety increases regional innovation, while such an effect is not found for unrelated variety. Concluding, it is important to investigate the correlation between a related or unrelated variety of innovative activity and knowledge creation at the European regional level.

Thus we posit the following research hypothesis:

RH₁: The related and unrelated variety of the EU regions' innovative activity affect their knowledge production.

2.2. Second Research Hypothesis

Most empirical studies underlined the role of R&D expenditures and human resources in knowledge creation where the role of universities was evident either in terms of the R&D expenditures or as a stakeholder of the regional innovation system. Jaffe (1989) found that if a state improves its university research the local innovation activity advances. Kantor and Whalley (2014) estimated the causal effect of university activity on local labor income in non-education sector firms. They found local spillover effects from university activity are larger when local universities are more research-intensive or

local firms are technologically close to universities.

Zucker et al. (1998) concluded that researchers coming from top universities create more biotechnology start-ups. Fritsch and Schwirten (1999) found significant cooperation between public research institutes and private companies especially when they are co-located. Caloghirou et al. (2001) prove that ventures with at least one university exhibited increased research-output. Hall et al. (2003) presented similar results for the US since 60% of the funded research projects involved firms and universities. Brostrom and Loof (2008) found that academic research diffusion helps private firms to increase their R&D efforts, innovation sales, and patent applications.

Finally, some studies investigated the effectiveness of university research either through university licensing (Siegel et al., 2003; Thursby and Kemp, 2002; Thursby and Thursby, 2002) or knowledge diffusion between the university and other agents (Anderson et al., 2007; Berbegal- Mirabent et al., 2004; Chapple et al., 2005). These studies used the university research expenditure either as innovation input or as output and examined the creation of start-ups university licensing income and patents production.

Thus, we posit the second research hypothesis:

RH_{2a}: Good universities contribute to the creation of new knowledge in the EU regions.

RH_{2b}: Good universities affect the role of unrelated variety to the creation of new knowledge in the EU regions.

RH_{2c}: Good universities affect the role of related variety to the creation of new knowledge in the EU regions.

3. THE MODEL, DATA AND METHODOLOGY

To test the research hypotheses we estimate a Cobb-Douglas knowledge production function (KPF) at regional level. We use data for 209 EU NUTS-2 regions for the period 1995-2012. The data are from Eurostat. The patent applications (patents per million of inhabitants) to European Patent Office (EPO) is the KPF output. These patent applications are distributed in 121 3-digit technological fields according to International Patent Classification (IPC). Patent applications have extensively used as a proxy of a KPF output because it is the most direct and reliable indicator of innovation measurement (Botazzi and Peri, 2003).

To test Hypothesis 1, Shannon’s Entropy index (1951) at regional level is used to measure the industrial (or sectoral) diversification as it is characterized by a decomposition feature and be decomposed into each technological field (sector) (Frenken et al., 2007). Following the methodology presented in Frenken et al., (2007), the *unrelated variety* (UV) is measured by the entropy at 2-digit technological fields and *related variety* (RV) is measured by the weighted sum of entropies within each 2-digit technological classification field. Thus, all the 3-digit technological sectors i will be expressed into 2-digit technological sectors S_g where $g= 1, \dots, G$:

$$P_g = \sum_{i \in S_g} p_i$$

Where p_i is the percentage of the 3-digit technological sector i in the total number of patents and the sum is the total share of patents in two-digit technological sectors (g) to the total number of patents in that region, P_g .

The entropy at two-digit technological sectors, according to Frenken et al., (2007), is the unrelated variety (UV):

$$UV = \sum_{g=1}^G P_g \log_2 \frac{1}{P_g}$$

The entropy within each 2-digit technological sector is given by:

$$H_g = \sum_{i \in S_g} \frac{p_i}{P_g} \log_2 \frac{1}{p_i/P_g}$$

Then, the relative variety (RV) is defined as the weighted sum of H_g ’s to the share of the technological sector g in the total number of patents in the region, P_g :

$$RV = \sum_{g=1}^G P_g H_g$$

The sum of UV and RV for each region equals to the total entropy index (EI) which is $EI=UV+RV$.

Since our dataset consists of 121 *3-digit* sectors i (subclasses) which are grouped into 27 *2-digit* sectors g (super classes), the normalized EI is given by the following equation:

$$NEI = \frac{EI}{\log_2(121)}$$

The NEI takes values from 0 to 1. If $NEI = 0$ the region produces innovations in one field only. If $NEI = 1$, the regionally produced innovations are equally distributed across the 121 technological fields.

To test Hypothesis 2a, we used data from the Academic Ranking of World Universities (ARWU). The ARWU list provides data from 2003 and therefore Hypothesis 2a is tested using a dataset that covers the period 2003-2012.

ARWU list presents universities across countries. They ranked the universities according to the quality of education, quality of faculty, research output, and per capita performance. Thus, this list based on the above criteria evaluates and ranks the world-class universities from 1st to 500th place.

We construct a database that presents all the EU universities which were ranked as world-class in the period 2003-2012. We match each world-class university with a region. It is worth mentioning that the world-class European universities are located in 100 regions. Also, several regions have more than one world-class university (e.g. London, Île de France, Lombardia, etc.). Our research goal is to include to our dataset the 209 regions but since almost half of them do not have any world-class university our estimations would not be statistically valid. To respond to this problem we construct a database for 209 regions and for ten years (2003-2012) where the WCU variable is categorical and takes value 1 for those regions that do not have any world-class university, value 2 for those regions that have one, value 3 for those regions that have two, value 4 for those regions that have three and value 5 for those regions that have four or more universities.

We use the following control variables in our estimations. The number of researchers in science and technology (**RS**) and the expenditures in research and development (**R&D**). The data on Human Resources in Science and Technology (HRST) as percentage of total population is a proxy for the first input and the total intramural R&D expenditure (GERD) measured as euro per inhabitant is a proxy for the second input. A second set of control variables is the *inter-regional* spillovers captured by indexes that measure the geographical and technological proximity between regions. To construct the geographical and technological proximity index, we follow the methodology presented in Kalapouti and Varsakelis (2015). The variable **GPS** measures the inter-regional knowledge spillovers due to spatial proximity and the variable **TPS** measures the inter-regional knowledge spillovers due to technological proximity.

The estimation procedure is divided in three parts: First, we estimate using panel data method a Cobb- Douglas KPF across 209 EU regions for the period 1995-2012. The KPF is:

$$P_j = C \cdot RD_j^{\alpha_1} \cdot RS_j^{\alpha_2} \cdot UV_j^{\alpha_3} \cdot RV_j^{\alpha_4} \cdot TPS_j^{\alpha_5} \cdot GPS_j^{\alpha_6} \quad (1)$$

Second, we estimate using panel data method an extended Cobb- Douglas type KPF across 209 EU regions for the period 2003-2012. This KPF is:

$$P_j = C \cdot RD_j^{\alpha_1} \cdot RS_j^{\alpha_2} \cdot UV_j^{\alpha_3} \cdot RV_j^{\alpha_4} \cdot TPS_j^{\alpha_5} \cdot GPS_j^{\alpha_6} \cdot WCU_j^{\alpha_7} \cdot INT1_j^{\alpha_8} \cdot INT2_j^{\alpha_9} \quad (2)$$

In functions (1) and (2), the dependent variable P_j , is the patent applications. The variables RD_j and RS_j are the R&D expenditures and number of researchers, GPS_j and TPS_j measure the inter-regional knowledge spillovers. UV_j and RV_j capture the unrelated and related variety, WCU_j is the world class university indicator. Finally, INT_1 and INT_2 are two synergetic (interaction) terms between UV and WCU and RV and WCU correspondingly. The interaction term in a regression measures the marginal effect of an independent variable depending on the values of another independent variable (Hirschberg and Lye, 2010). The (1) and (2) are transformed into logarithmic form.

We use a panel data set of 209 European regions at the NUTS-2 level for the periods 1995–2012 for equation 1 and 2003-2012 for equation 2. Our dataset presents a highly diverse landscape. The innovative activity’s distribution is uneven since some regions present high innovative activity and some others very low, as it is shown in Table 1 (minimum and maximum values of patents). However, almost all the 209 regions increased their innovative activity during the examination periods. Therefore, since there is a variation of innovative activity both across time and across regions, we decide to use panel data analysis. Tables 1 and 2 report some descriptive statistics.

Table 1 Descriptive Statistics (209 regions, 1995-2012)

Variable	Mean	Median	Min	Max	Standard Deviation	Number of Observations
<i>Patents</i>	107.72	68.01	0.02	1018.94	124.69	3762
<i>RD</i>	377.98	239.7	2.6	3309	407.21	2223
<i>RS</i>	25.37	25.1	7.8	85	7.84	3432
<i>UV</i>	3.26	3.45	0	4.09	0.63	3762
<i>RV</i>	1.05	1.16	0	1.91	0.46	3762
<i>TPS</i>	10975.37	11543.14	12.05	19264.27	3852.07	3762
<i>GPS</i>	613.16	450.94	0.56	3289.08	591.08	3762

Table 2 Descriptive Statistics (209 regions, 2003-2012)

Variable	Mean	Median	Min	Max	Standard Deviation	Number of Observations
<i>Patents</i>	118.52	74.63	0.17	775.85	131.06	2090
<i>RD</i>	427.38	276.65	2.6	3309	441.10	1542
<i>RS</i>	27.75	27.6	9.2	85	7.7	2061
<i>UV</i>	3.35	3.47	0	4.09	0.47	2090
<i>RV</i>	1.10	1.18	0	1.90	0.4	2090
<i>TPS</i>	12496.94	12955.24	1228.87	19264.27	3184.98	2090
<i>GPS</i>	673.24	492.34	1.574	3289.08	623.81	2090
<i>WCU</i>	1.81	2	1	5	0.95	2090

Tables 3 and 4 report the correlation between the explanatory variables. Since there is no strong correlation between

any pair of experimental variables, there are no multicollinearity issues in our estimations.

Table 3 Correlation Matrix (209 Regions, 1995-2012)

	<i>Ln (Patents)</i>	<i>Ln (RD)</i>	<i>Ln(RS)</i>	<i>Ln(UV)</i>	<i>Ln(RV)</i>	<i>Ln (TPS)</i>
<i>Ln (Patents)</i>						
<i>Ln (RD)</i>	0.85					
<i>Ln (RS)</i>	0.6	0.67				
<i>Ln(UV)</i>	0.6	0.54	0.33			
<i>Ln(RV)</i>	0.61	0.6	0.39	0.55		
<i>Ln (TPS)</i>	0.49	0.52	0.45	0.55	0.5	
<i>GPS</i>	0.7	0.54	0.4	0.36	0.45	0.34

Table 4 Correlation Matrix (209 Regions, 2003-2012)

	<i>Ln (Patents)</i>	<i>Ln (RD)</i>	<i>Ln (RS)</i>	<i>Ln (UV)</i>	<i>Ln (RV)</i>	<i>Ln (TPS)</i>	<i>GPS</i>
<i>Ln (Patents)</i>							
<i>Ln (RD)</i>	0.85						
<i>Ln (RS)</i>	0.64	0.69					
<i>Ln(UV)</i>	0.56	0.52	0.35				
<i>Ln(RV)</i>	0.64	0.6	0.42	0.52			
<i>Ln (TPS)</i>	0.47	0.51	0.32	0.59	0.55		
<i>GPS</i>	0.7	0.53	0.38	0.35	0.45	0.34	
<i>WCU</i>	0.42	0.5	0.34	0.27	0.38	0.42	0.23

4. EMPIRICAL RESULTS

The first estimations refer to the impact of variety on innovative activity of 209 EU regions for the period 1995-2012. The Hausman test suggests fixed effects method and the corresponding results are presented in Table 5.

Table 5 Panel Estimation Results (1995-2012)

Independent Variable	Model 1 Knowledge Production Function	Model 2.a Intra-Regional Spillovers	Model 2.b Intra-Regional Spillovers	Model 3 Inter Regional Spillovers	Model 4.a Intra & Inter Regional Spillovers	Model 4.b Intra & Inter Regional Spillovers
<i>Intercept Term</i>	-0.36 (1.25)	-1.11*** (4.30)	-0.29*** (1.10)	-2.89*** (6.27)	-1.95*** (5.09)	-1.31*** (3.56)
<i>Log(RD)</i>	0.61*** (11.16)	0.39*** (8.98)	0.43*** (9.81)	0.50*** (9.38)	0.33*** (8.10)	0.36*** (8.52)
<i>Log(RS)</i>	0.25** (2.08)	0.22** (2.15)	0.19* (1.92)	-0.009 (0.08)	0.04 (0.44)	0.024 (0.23)
<i>NEI</i>		3.20*** (9.48)			2.98*** (8.08)	
<i>Log(UV)</i>			0.94*** (6.67)			0.81*** (5.37)
<i>Log(RV)</i>			0.18*** (6.46)			0.17*** (6.04)
<i>Log(TPS)</i>				0.41*** (8.21)	0.17*** (3.21)	0.19*** (3.92)
<i>GPS</i>				0.0002*** (2.93)	0.0005*** (6.43)	0.0005*** (6.41)
LSDV R ²	0.95	0.96	0.96	0.96	0.96	0.97
F-Statistic Test	F(2, 203) = 136.14 (p-value=3.15784e-038)	F(3, 203) = 196.27 (p-value=9.85659e-060)	F(4, 203) = 108.14 (p-value=3.42118e-049)	F(4, 203) = 123.48 (p-value=3.08144e-053)	F(5, 203) = 138.4 (p-value=2.1324e-063)	F(6, 203) = 95.25 (p-value=2.73754e-056)
Hausman Test	χ^2 test(2) = 72.49 (p-value=1.81085e-016)	χ^2 test(2) = 118.81 (p-value=1.3877e-025)	χ^2 test(2) = 149.31 (p-value=2.85799e-031)	χ^2 test(2) = 101.58 (p-value=4.52564e-021)	χ^2 test(2) = 99.05 (p-value=8.34995e-020)	χ^2 test(2) = 120.57 (p-value=1.23223e-023)

Note: a) t-student in parenthesis. b) ***significant at the 0.01 level; ** significant at the 0.05 level. c) Log(RD) is the logarithm of the

expenditures in Research and Development, Log(RS) is the logarithm of the Human Resources in Science and Technology, Log(UV) is the logarithm of the Unrelated Variety, Log(RV) is the logarithm of the Related Variety, NEI is the Normalized Shannon's Entropy Index for technological diversity, Log(TPS) is the logarithm of the Technology Proximity between the regions, GPS is the Geographical proximity between the regions.

Table 5 presents four models. Model 1 is the estimation of the original KPF with the expenditures in Research and Development and the Human Resources. The estimated coefficients are, as expected, positive and statistically significant. Then we inserted the intra-regional knowledge spillovers captured by NEI (Model 2.a) and UV and RV (Model 2.b). In Model 3 we included the inter-regional knowledge spillovers measured by the geographical and technological proximity. The estimated coefficients indicate that both types of spillovers have a positive correlation with the regional patents production. Finally, the Model 4 incorporates both the intra and inter-regional spillovers. The introduction of knowledge spillovers affects negatively the impact of R&D expenditures and RS on innovation output. This result stresses the significant effect of knowledge spillovers in new knowledge creation. “Not only are the regional resources (inputs) necessary for new knowledge production but also the global knowledge.

Research hypothesis 1

Regarding the first research question, our findings suggest that both related and unrelated variety matter for new knowledge creation. Model 2.b presents the results which imply that both unrelated and related variety is positively correlated with patents production. Both the related and unrelated variety increases the intra- regional knowledge spillovers contributing to the volume of patents. However, the impact of unrelated variety on new knowledge creation is stronger than that of the related variety. These findings are similar to Castaldi et al. (2015) and Miguelez and Moreno (2017) who found that both related and unrelated variety increase knowledge spillovers and foster innovation. Tavassoli and Carbonara (2014) estimated that related variety increases regional innovation, but unlike our findings, the unrelated variety does not.

Research Hypothesis 2.a

Table 6 presents two models.

Table 6 Panel Estimation Results and Between the Means of Regions Estimation Results

<i>Independent Variable</i>	Model A Panel Estimations Results	Model B Between The Means of Groups Estimations Results
<i>Intercept Term</i>	-0.87 (1.16)	5.13** (2.46)
<i>Log(RD)</i>	0.31*** (6.79)	0.59*** (10.51)
<i>Log(RS)</i>	-0.01 (0.14)	0.55*** (3.12)
<i>Log(TPS)</i>	0.11* (1.79)	-1.09*** (4.96)
<i>GPS</i>	0.001*** (9.37)	0.0006*** (9.50)
<i>Log(UV)</i>	1.26** (4.43)	3.02** (3.82)
<i>Log(RV)</i>	0.20*** (3.27)	0.10 (0.41)
<i>WCU</i>	0.55** (2.62)	1.17** (2.08)
<i>INT₁[Log(UV)*WCU]</i>	-0.49*** (2.94)	-1.00** (2.16)
<i>INT₂[Log(RV)*WCU]</i>	-0.02 (0.86)	0.43*** (2.61)
LSDVR ²	0.97	
Hausman Test	χ^2 test(2) = 131.961 (p-value=4.68515e-024)	
R ² <i>adj</i>		0.88
F- Statistic Test		F(9, 194) = 166.9575 (p-value=2.44e-86)

*Note: a) t-student in parenthesis. b) ***significant at the 0.01 level; ** significant at the 0.05 level. c) WCU is the level of university quality. d) Log(UV)*WCU is the interactive – synergetic affect between unrelated variety and university quality level. e) Log(RV)*WCU is the interactive – synergetic affect between related variety and university quality level.*

Model A shows the panel estimation for the 209 regions for the period 2003-2012. Model B shows the estimation between the means for the same period. We decided to follow this approach because our dataset includes only 54 regions with variation to their university quality level across time while for 155 regions the WCU is time invariant. Thus, Model A takes into account the time, and Model B is time-invariant. The Model A was estimated with fixed effects.

In both models, the variables retain the similar significance with the previously estimated models (Table 5). Our findings show that the university quality has a positive impact on regional innovative activity in both models but is higher in Model B. As the average return on regional innovation activity is equal to 5.13, if a region increases the number of good universities by 1.8 (the mean of *WCU*), then the return on regional innovation activity will increase by 6.3. Thus, as the number of good universities increases the regions exhibit a higher ability to produce new knowledge. Good universities increase new knowledge creation, and the university quality is a substantial factor in regional innovative capacity and activity.

It is worth mentioning that the inclusion of the university quality in Model B is associated with an increase of the RS impact on innovation activity. This result allows us to analyze the relationship and interaction between a quality university and the researchers located in a region. The researchers can come into formal and informal contact with the good university professors facilitating the knowledge transfer and strengthen their research potential. Simultaneously a quality university attracts distinguished visitors (e.g. Nobel laureates, professors from other top-class universities) and so researchers could benefit from their knowledge. Hence, good universities contribute to knowledge exchange environment as the social networking among the “excellent” is observed mainly in such ecosystems.

Research Hypothesis 2.b and 2.c

As variety in innovative regional activity and quality of universities enact an important role in new knowledge production, it is important to test the effect of possible interaction between these two factors on patents production. We constructed the two synergetic (interaction) terms *INT1*, the product of *UV* and *WCU* and *INT2*, the product of *RV* and *WCU*.

According to Hirschberg and Lye (2010), the interaction term in a regression measures the marginal effect of an independent variable depending on the values of another independent variable. Equations (3) and (4) are the first-order partial derivatives - marginal effects of *WCU* and *UV* using the estimations of Model A. The sign of these marginal effects depends on the values of the other independent variable entering in each marginal effect equation, namely *WCU* for equation (3) and *UV* for equation (4).

$$\frac{\partial l(\text{Patents})}{\partial l(UV)} = 1,26 - 0,49 \cdot WCU \quad (3)$$

$$\frac{\partial l(\text{Patents})}{\partial (WCU)} = 0,55 - 0,49 \cdot l(UV) \quad (4)$$

It is evident from these two equations that the simultaneous consideration of the *WCU* reduces the impact of the *UV* and *vice versa*. Equation (3) shows an increase by one of the number of good universities decreases the partial derivative $\frac{\partial l(\text{Patents})}{\partial l(UV)}$ by 0.49. This finding is similar using the estimated coefficients of Model B. This result suggests that adding a quality university the need for knowledge transfer across 2-digit sectors declines. This is because firms turn to universities to receive knowledge. Thus, the effect of the intra-regional spillovers due to the unrelated variety on regional innovative activity is reduced with the presence of high-quality universities.

On the other hand, equation (4) suggests the increased unrelated variety of the regional innovative activity reduces the impact of good universities on new knowledge creation. This finding indicates that the existence of cognitive or technological distant industries reduces the need of receiving knowledge from universities. This might be more reasonable for internationalized industries which transfer knowledge to other industries that innovate in different technological fields. To such a degree, these industries might not substantiate the need to absorb knowledge from universities.

Equations (5) and (6) are the first-order partial derivatives - marginal effects of *WCU* and *RV* using the estimations of Model B. The sign of these marginal effects depends on the values of the other independent variable entering in each marginal effect equation, namely *WCU* for equation (5) and *RV* for equation (6).

$$\frac{\partial l(\text{Patents})}{\partial l(RV)} = 0,10 + 0,43 \cdot WCU \quad (5)$$

$$\frac{\partial l(\text{Patents})}{\partial (WCU)} = 1,17 + 0,43(RV) \quad (6)$$

According to equation (5), the simultaneous consideration of the *WCU* increases the impact of the *RV* and *vice versa*. This result indicates that an increase of the related variety innovation at 3-digit sectors, which is more specialized in specific product and technological characteristics, produces original knowledge and therefore the need for universities' basic research is high. This finding verifies previous literature showing that the technological proximity between sectors facilitates the cross-sectoral knowledge spillovers.

5. CONCLUSION

This paper aimed to investigate the effect of technological varieties and university quality on regional innovation activity. Literature validated the positive role of knowledge spillovers in innovation process. However, the impact of the technological variety, related and unrelated, on innovation has not been investigated. Besides, even though literature examined the positive correlation between the collocation between universities and firms and innovation performance the quality of universities has not been entered into the discussion.

We responded to the above research questions with an extended regional knowledge production function using data for 209 European regions. The analysis proceeded in two stages. The first stage covered the period 1995-2012 and the second the period 2003-2012. We introduced the university quality variable in the second stage. Our findings indicate patents are

positively correlated with researchers and RD expenditures. The estimated coefficient of technological proximity is positive and statistically significant. The estimated coefficient of geographical proximity is also positive and statistically significant.

The first research hypothesis refers to the intra-regional knowledge spillovers. The estimated coefficients for unrelated and related variety are positive and statistically significant. Thus, the higher the unrelated and related variety the higher the intra-regional knowledge spillovers and the knowledge creation. But, the effect of unrelated variety is greater than the related. This might indicate that regions innovating in more decentralized technological areas could achieve increased innovation performance. Consequently, regions could focus on innovation activities where cognitive and technological proximity contributes to new knowledge creation but it would be more efficient if they innovate into dissimilar (unrelated) sectors.

The second research hypothesis state the role of good universities on regional innovation. Our empirical estimations show that university quality has a positive impact on regional innovative activity. Any increase in the number of good universities advances the regional capability to produce new knowledge. Hence, the universities quality does matter. Besides, the universities quality is related to the productivity improvement of regional researchers. Good universities offer to researchers significant learning opportunities through social networking activities such as tacit knowledge, conferences, consultancy, etc.

Our estimations included the synergetic terms between unrelated and related variety and university quality. Our results show that if the number of good universities increases, the effect of unrelated variety on knowledge creation falls. This might indicate that the impact of a good university in a region reduces the need for knowledge transfer between the 2-digit sectors. In other words, if a region has high-quality universities then the need for cross-sectoral knowledge diffusion decreases because they could get knowledge from the universities. Thus, the existence of unrelated variety of innovative activity does not contribute to knowledge creation when the region hosts high-quality universities.

Alternatively, our findings suggest that when a region presents a high-unrelated variety the impact of good universities on knowledge creation declines. Therefore, we conclude that the existence of many industries with low cognitive or technological proximity reduces the need for taking knowledge from universities because these industries produce and diffuse knowledge. The synergetic term of related variety and good universities indicates that the universities’ basic research increases the innovation activity.

The policy implications of our results are significant. Regarding the composition of innovative activity of the European Innovation System, the related and unrelated technological variety improves knowledge spillovers and increases knowledge creation. Moreover, a region could achieve higher innovation performance if innovates in unrelated sectors. Thus, national and regional authorities should promote technological diversification rather than specialisation. The new knowledge based on existing related technologies is also important for the EU innovation system as this can lead to new improved versions of existing technologies. Yet, regional authorities should focus on technologies with more general applications because a broader range of sectors could use them. The new knowledge based on unrelated technologies is crucial since it could lead to the emergence of innovations avoiding regional lock-ins and ensuring long-term competitive advantage. For example, the conversion of the traditional textile and shoe industries into nanotech textiles and shoes. Therefore, we conclude that the European innovation policy should focus on funding more horizontal than vertical projects.

As regards the role of universities, it is proved that the higher the university quality level the higher the production of patents. Until recent years, the EU policies have mainly managed the role of universities in diffusing knowledge oriented towards linking research with industry. However, in the light of our results, this is a one-sided policy because it does not include the quality parameter. Knowledge spillovers per se are not enough to generate “good knowledge” or “good patents”. It is of high importance for authorities to invest in high-quality universities where first class researchers can produce state of the art knowledge. High-quality universities enhance the contribution of researchers to regional innovation activity because they encountered distinguished scientists and experts and take advantage of their knowledge and experience. The need for good universities is further enhanced by considering the relationship between this factor and technological varieties. The existence of good universities in a region decreases the need for knowledge diffusion between unrelated industries as the latter can absorb new knowledge from high-quality universities. Hence, the EU should focus on the improvement of the universities quality or/and invest in technologies unrelated to the existing ones.

Regarding the relationship of world-class universities with related variety, it is proved that these factors are complement. Industries that innovate in related sectors increase their contribution to new knowledge creation when they cooperate with good universities. The latter gives all the appropriate knowledge to the first to produce their products characterized by specialized features.

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