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**Article**

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**IMPACT OF LABOR, FDI AND R&D ON BUSINESS SUSTAINABILITY**

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**Abstract**

The research addresses the problem of identifying the impact of the labor force, of the investments and the research and development on the direction of the long-term growth strategy, in order to achieve the business sustainability of some countries of the European Union.

The paper addresses the main challenges and macroeconomic developments at European level, as well as, relevant aspects reflected in some research, representative studies for the analysed issues. It also includes the empirical study conducted for 24 European countries, over a 22-year period, in which, based on the use of the multiple regression model, we analysed the correlations between the Export and Import indicators – endogenous variables, considered to be the promoters of business sustainability, and the macroeconomic indicators Labour force, FDI (Foreign Direct Investment) and R&D - exogenous variables. In the short term, the research reflects the fact that the two indicators R&D expenditures and the number of researchers have a statistically significant positive impact on the exports of the states. In addition, the participation of the Labor force and FDI helps to increase the share of exports in GDP, too. According to the results of the research, the advanced economies register a benefit in the export activity, supported also by the large number of researchers, involved in the research and development activity. In the long term, R&D expenses and Labor force participation have a bigger impact on exports compared to other factors taken into account, given that the level of unemployment in an economy does not have a significant impact on foreign trade.

Our work adds value to existing research by addressing the issue of evaluating the impact of *innovation* (through the variables: research and development expenses, researchers involved in research and development, patent applications - nonresidents and patent applications - residents), of *labor force* (through the variables: labor and unemployment - % of total labor force) and of *investments* (through the variable: foreign direct investment) on foreign trade of some countries of the European Union.

**Keywords:** business sustainability, innovation, labor force, investment, research – development, export, import, European Union (EU).

**JEL Classification:** C23, O11, O47, O52, Q56.

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## Introduction

Sustainability of economic growth at European level, increasing competitiveness of European economy and companies, adoption and development of new technologies, attracting capital and foreign direct investment, efficient allocation of capital at European Union level, development of the European Union's capital market are both prerequisites and resulting from a European strategic vision, which must be anchored at the level of sustainable businesses, developed at European level.

The innovation, the research development activity and especially the capacity to transfer them to the business environment, the use of new networks of collaborators, the knowledge of the digital and traditional behavior of the "new" consumers, represent prerequisites for the development of sustainable businesses and consumption, support for growth sustainable economic.

In this context, the article aims to address the issues of business sustainability, labor force, micro-level R&D activities and to correlate with foreign trade, export activity, transposed into the external balance of a country, which has significant contribution to the (sustainable) economic growth of the respective country.

Our article inter correlates and analyzes, both from a strategic, qualitative perspective, and through the use of quantitative instrumentation, the micro and macro elements, which can support results and proposals, a support for future policies.

In the empirical study we will offer some answers to the fundamental question that is in fact the focus of this research: which of the indicators analyzed at the level of the 24 European economies (research and development expenses, researchers involved in research and development, patent applications from non-residents, patent applications from residents, labor force, unemployment (%) of total labor force, as well as, foreign direct investment), over a period of 22 years, have a positive impact determining / influencing in a relevant way the evolution of exports and imports and implicitly, the sustainability of business?

In the section dedicated to the results and discussions, we will ask other questions, both to provide alternative answers and to formulate new objectives for future research.

The purpose of this research is to evaluate the impact of labor, investment and research and development on foreign trade of countries, an indicator having impact on business sustainability. For this, we selected the exports of goods and services (weight in GDP) and imports of goods and services (weight in GDP), as dependent variables, highlighting the foreign trade activity of a country.

### 1. Foreign trade - a determinant element of business sustainability

At European Union level, is noticeable the need for strategic positioning and highlighting of the competitive advantages over the other global players, especially towards US and China.

An adequate response to digital challenges, cyber risks and other categories of risks associated with technological innovations, climate change and the risks induced by them, must be supported by adequate mechanisms for allocating financial resources, a trained labor force and educated, that can accumulate and use new skills, the ability to build new strategic relationships.

Especially in the context of the post-financial crisis, the issue of sustainability, attached to broad and diverse formulations and understandings (sustainable business, sustainable development, sustainable economy, sustainable financing, sustainable projects, sustainable entrepreneurship) has reserved a very important place, in the decision-makers' concerns, policies, governments, corporate concerns, academic research, non-governmental organizations initiatives. Building a sustainable vision, developing the policies and tools needed to support and implement it, the ideological and applied convergence, at the macroeconomic and microeconomic level, is, in fact, a very important opportunity.

The sustainable development of the commercial activities is considered essential to maintain the competitive advantage, through reputation and trust, transferred to those who work or live in the micro environment in which the company operates, which can represent a positive contribution on the company, implicitly by managing the impact of the business on the environment (Dinu, 2010). An initiative supported at the level of US corporations (promoted by the Business Roundtable organization; 181 chief executives of the largest US companies have signed a letter emphasizing that the goals of a company must include all "stakeholders"), in 2019, proposes to replace the essential objective, to create value for shareholders, with that of creating value for all interested parties (employees, suppliers, business partners, company). Extending, at semantic level, the word "company" comes from the French word "compagnie", from the 12th century, with the meaning "society, friendship, camaraderie, group of soldiers". Collaboration between companies, commercial relations, export, import, trade, were initially synonymous with the social relations. At the macroeconomic level, the strategic vision and policies developed must be harmonized, converging with the efforts made by each company. This convergence is decisive for the sustainability of the businesses of a country, of a region and for the sustainability of the businesses of the companies, public and private entities that operate in that socio-economic space.

The transition to a sustainable economy is, in fact, the responsibility of all participants in the economic activity, state or private actors, large companies or SMEs, as well as the academic environment, which can contribute to identifying new trends, evaluating the implications, offering new paradigms and correlating with practical solutions, informing political and business elites, accelerating the dissemination of new knowledge. This transition cannot be achieved without the decisive support of the financial sector. For example, at European level, the European Commission's Action Plan for Financing Sustainable Economic Growth, adopted in March 2018, envisages reorienting capital flows towards sustainable investments, in order to achieve inclusive and sustainable economic growth, managing the financial risks arising from the changes of the climate, degradation of the environment and other social problems, as well as increasing transparency and setting long-term goals in economic and financial activity.

Sustainable development (according to the Brundtland Report "Our Common Future", within the World Commission for Environment and Development; The European Commission has taken over the objective of sustainable development, in accordance with Article 3 (3) of the Treaty on European Union), one of the most used concepts, represents the ability of an activity to exist constantly, assuming the needs of the present are met, without compromising the ability of future generations to meet their own needs. The concept of sustainability includes connecting three elements: economic, environmental and social. From an economic point of view, sustainable economic growth implies a growth rate, which can be maintained without generating other significant economic problems,

especially for future generations. At EU level, trade and sustainable development policy supports the promotion of sustainable development through: trade agreements, special aid programs for developing countries, trade and development policies.

From a microeconomic perspective, the first phase of business sustainability, called "integration of companies", is based on a business model that responds to market changes, in order to increase the competitive position, by integrating sustainability into the existing business context. The next phase of business sustainability, called "market transformation", is based on a dynamic business model, which aims to modify, adapt market behaviors, without waiting for incentives for sustainable practices. Companies create these changes to enable new forms of business sustainability. Business integration is focused on current successful measures, and the market transformation will help companies identify benchmarks, measures that will be implemented in the future.

From a macroeconomic perspective, sustainable economic growth can be highlighted by reference to GDP (Gross Domestic Product), based on the identification of production expenses for obtaining products and services at the level of an economy. According to the definition:  $GDP = \text{Final consumption expenditure of the population and companies} + \text{Gross expenditures for investments in the national economy} + \text{Government expenditure for the purchase of goods and services} + \text{Net export (exports - imports)}$ , it can be noticed the direct dependence of the economic growth on final consumption of population and companies, of investments made within the national economy and of net export.

Thus, foreign trade continues to be one of the fundamental factors of economic growth, both export and import contributing to the growth of national economies. Each country has competitive advantages in terms of resources, capabilities and mechanisms of use. Some countries benefit from natural resources (fossil fuels, wood, fertile soil or precious metals and minerals), while other countries are resource deficient. Some countries have developed infrastructures (financial, telecommunications and data, transportation), education systems and capital markets, which allow them to engage in complex innovative processes. Other countries have not benefited from such investments, they do not have such infrastructures and they do not benefit from innovation capabilities. Although efforts are being made within the European Union for convergence, there are persistent significant differences between the countries of the Union, including from the perspective of the structure of exports and imports, the use of the results of development research, the use of labor and capital.

The structure of exports, the level of technology and innovation that a country includes in its exports, the dynamics of high value-added exports, contribute to economic growth. Imports of goods and services are added to the stock of a country's material resources. Imports represent an outflow of funds from a country, as they represent payments made by local companies (importers) to exporting entities. A high level of imports indicates a strong domestic demand and a growing economy. The structure of imports is decisive for the importing economy, to the extent that they are integrated, in order to contribute to improving long-term productivity.

At European level, important investment programs and consistent initiatives were developed to support innovation (The Juncker plan, with a value of about 500 billion Euro; the Horizon 2020 program with a value of about 80 billion Euro is considered the largest innovation program in the world) and research.

A first indicator of the analysis on foreign trade is represented by *innovation*, a notion that aims at a marketable application in practice of an invention, an integration of the invention in the economic-social practice. The usual method of measuring innovation is based on the use of indirect indicators: - data on research and development (an indicator that measures part of the inputs (inputs) in the innovation process indicates resources spent) and, respectively, - data on patents of invention (granted for inventive technologies, with marketing perspectives).

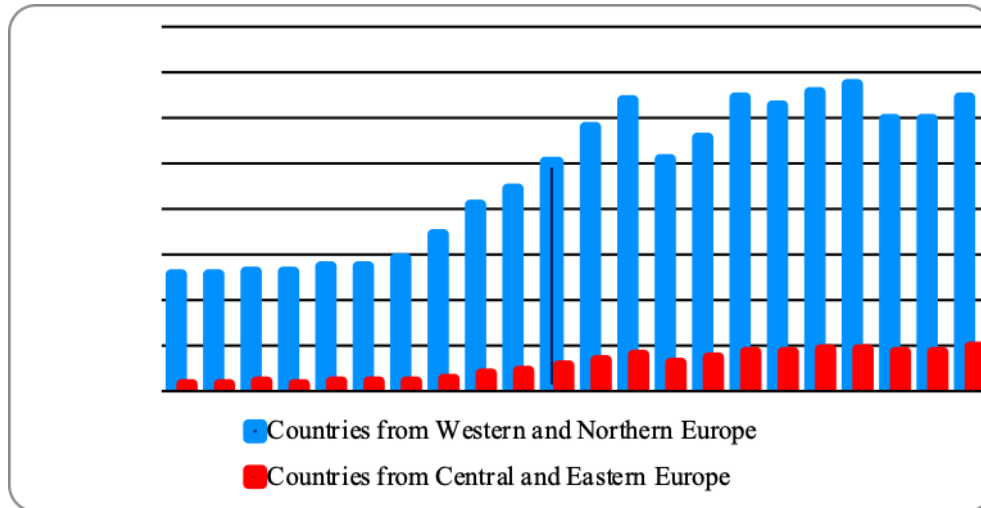
Within the EU, starting with 2011, the innovation performance has increased in 25 countries. According to international rankings, Sweden is the EU innovation leader in 2019, followed by Finland, Denmark and the Netherlands. Lithuania, Greece, Latvia, Malta, the United Kingdom, Estonia and the Netherlands are the fastest growing innovators (in order to evaluate the innovation performances of the Member States, a *European Innovation Scoreboard (EIS)* was developed, which allows a comparative analysis of the performance of the innovation activities of the EU Member States).

*The labor force* is the second indicator considered in the empirical study. Differences in development within the EU have favored a situation in which capital moves from west to east and labor in the opposite direction. This difference in the evolution between capital and labor has allowed capital, which is more dynamic and flexible than labor, to put pressure on certain Member States to generate a favorable framework for development and multiplication. Differences from one country to another in terms of employee rights, etc. (for example: limiting the rights of employees, restricting social dialogue, limiting access to collective bargaining, so on and so forth) or cultural differences have limited a firm and efficient reaction to the behavior of capital, from the labor factor. Thus, as consequence, a large part of the employees, due to the lack of options, of small salaries, poverty, chose to migrate to the developed states, from the east to the west of the European Union, significantly diminishing the chances of development in the countries of origin. The difficulty of balancing the differences in dynamics between labor and capital derives also from the fact that although workers mobility was encouraged, at least politically, at EU level, this situation was viewed with skepticism by Member States, especially those in Western Europe.

A third selected indicator is the *Foreign Direct Investment (FDI)*. The evolution of this indicator, as well as, its impact on the economy of a country, represents a particular concern at the level of governmental authorities, but also at the level of the academic and research environment. Within an increasingly sophisticated financial environment, in order to support the needs of an economy, foreign direct investments can complement the investment made based on the respective country's capital.

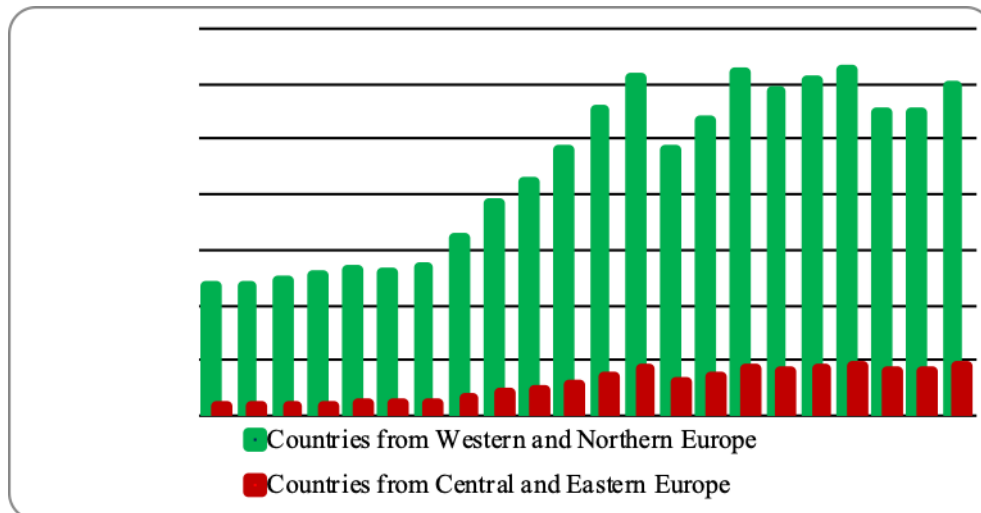
In the section on the literature review, we will include comments related to the numerous studies on the complex relationship between business sustainability (presented at the level of a country from the perspective of exports / imports) and innovation, the labor market and the level of foreign direct investments.

Figures 1 and 2 show the evolution of total exports and the evolution of total imports, at the level of the 24 countries included in the empirical study, highlighted separately by the two groups: developed countries (Western and Northern Europe) and countries that have made certain progress (Central and Eastern Europe).



**Figure no. 1: Evolution of exports within the countries included in the empirical analysis**

Source: own processing; data source: World Bank database



**Figure no. 2: Evolution of imports within the countries included in the empirical analysis**

Source: own processing; data source: World Bank database

Thus, it can be observed that in the countries of Central and Eastern Europe, the variations of exports and imports are more pronounced compared to those recorded in the developed countries, with mature economies, which can absorb the impact of the influence factors.

Given to the orientation of the empirical study to the European economy, we will introduce both relevant elements for the evolution of the economic growth at European level, as well as, at the individual level of the countries selected for the empirical study, respectively 12

countries with developed economies from Western and Northern European Countries: Austria, Belgium, Denmark, France, Germany, Italy, Luxembourg, the Netherlands, Norway, Spain, Sweden and the United Kingdom, as well as, 12 countries whose economies have made significant (emerging or developing) progress in Central and Eastern Europe: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia FYR, Poland, Romania, Slovak Republic and Slovenia.

## **2. Review of the scientific literature**

In this section of the research, we analyzed relevant aspects of some studies and researches conducted previously, which include both the issue of business sustainability through the evolution of exports and imports, as well as, analyzes regarding the seven macroeconomic indicators included in the empirical study, as well as their correlations.

Business sustainability is considered a mean to compensate for poverty and unemployment (Alvarez and Barney, 2014). In addition, the functional strategies and practices applied by entrepreneurs can have a favorable effect on the sustainability of the enterprise, which can reduce its risk of failure (Bamiatzi and Kirchmaier, 2014; Bunea and Țurlea, 2016). Achieving business sustainability is an important goal for the small businesses. Among the multiple factors that can adversely affect the profitability and sustainability of small businesses (Kosi and Bojnec, 2013), there are embargoes, widely known as economic sanctions, which often restrict small businesses from conducting financial and business transactions.

Cahoy and Colburn (2014) and Dinu and Bunea (2018) concluded that legislation and regulations must play an important role in the transition to more sustainable business practices. Broadly, the law can provide companies with an optimal framework for sustainability and competitive advantage through financing models, intellectual property rights and means of collaboration. In addition, the law can act to impose the transition, forcing companies to act through certain regulatory structures, accounting and governance mechanisms.

Accounting, social and environmental reporting play a relevant role in this context in analyzing the sustainability performance of organizations. The Sustainability Reporting Guide for the Global Reporting Initiative (GRI, 2006) was developed to help organizations report on their environmental, social and economic performance, in order to increase responsibility. However, the evidence in practice seems to show a different reality. Some organizations that report themselves as GRI reporters do not behave responsibly in terms of sustainability issues, such as gas emissions, social equity or human rights.

The economic dimension of corporate sustainability is approached as a "generic dimension" (Baumgartner and Ebner, 2010; Nedelcu (Bunea), Siminica and Turlea, 2015). Economic sustainability encompasses general aspects of an organization that must be respected in order to remain on the market for the long term. There is an increasingly prominent trend, which mentions that corporate management should also consider other aspects to achieve economic success, not just focus on financial results. Aspects of the economic dimension of corporate sustainability are "innovation and technology", "collaboration", "knowledge management", "processes", "acquisition" and "sustainability reporting".

Ebner (2008) considers that the social dimension of corporate sustainability implies the positive influence of all present and future relationships with stakeholders. Clarkson (1995) argues that corporate actions should create value for the community through consultation with



stakeholders. Miles, Munilla and Darroch (2006) recommend proactive involvement of specific stakeholder groups in order to enhance the corporate social responsibility strategy.

The ecological dimension of corporate sustainability addresses the impact of corporate activities on the environment. There are several publications on the most relevant ecological issues: use of limited resources, emissions into air, water or soil, as well as hazardous waste (GRI, 2006).

Schumpeter (1934) defines the term innovation as "the totality of changes with a view to the implementation and use of new types of products, means of production and transport, markets and forms of organization of the production process", a definition that has become considered standard by the financial markets (OECD, 2005). Drucker (2002), by his definition of innovation, clearly highlights its role, considering it a specific tool of an entrepreneurial manager, a means by which he exploits change as an opportunity for different businesses or different services. To these definitions attributed to innovation it can be added the definition proposed by Damapour and Goplakrishnan (2001) regarding innovation as "accepting any idea related to product, service, system, technology, policy or program, which can be adopted at the level of an organization".

Regarding the relationship between innovation and exports, in the specialized economic literature there are mainly two approaches:

- on the one hand, there are international trade models that emphasize the characteristics of the product cycle in the production of goods over time. These commercial models tend to regard innovation as exogenous and conclude that innovation influences exports. Models for such a product cycle include the analyzes by Krugman (1979), among others. The basic prediction of all these models is that the developed countries export innovative goods, which are subsequently imitated by the developing countries, because these products become mature, so that the developing countries will export these goods to the developed countries. For developed countries to maintain their exports (and revenues), they must constantly innovate. The more they innovate, the higher their exports. This is the hypothesis we propose to test empirically in this research paper.

- on the other hand, there are endogenous growth models, which recognize the effects of the open economy. These growth models endogenize the innovation rate and predict the dynamic effects of international trade on innovative activity. Models with such effects include studies by Grossman and Helpman (1989; 1990; 1991), Segerstrom (1990), Young (1991) and Aghion and Howitt (1998).

In the empirical tests at the level of the German manufacturing companies, Lachenmaier and Woessmann (2004) tried to identify whether innovation favorably impacts exports; the two authors concluded that the innovators determined an export share of 12.6 percentage points higher than the non-innovators. The results of the two showed that a better performance tends to precede the export and that this temporal pattern can be determined by the causal effect of the innovative activity on the exports. As these findings support the development of innovative technologies, incorporated into exported products, the results of Lachenmaier and Woessmann are added to other research supporting the temporal correlation of trade patterns with the product cycle (Krugman, 1979). Industrialized countries should innovate continuously if they want to remain competitive in global markets and maintain their standards of living.

In the general economic concept, the countries focused on the development of foreign trade have a more robust economic growth compared to the countries that support the protection

of the national economy by limiting international trade. Thus, in these countries, the absolute comparative advantage, a concept advocated by economist Adam Smith, can no longer be applied, according to which the goods which are produced internally at high costs can be imported from other countries, where the production costs of the respective goods are much lower.

Majeed and Ahmad (2006) consider foreign trade as an important catalyst in the optimal allocation of world resources. Also, is highlighted the positive correlation between the optimal allocation of resources and the labor force, which determines the level of production.

The labor force includes all persons who provide labor available for the production of goods and services over a certain period of time, regardless of whether they are employed or unemployed. For example, in emerging countries, the problem of disguised unemployment (includes low productivity, poorly paid jobs) can be solved by transferring the labor force affected by this phenomenon to the industrial sector, in order to support the production and implicitly, the development of exports. Therefore, the skilled labor force is the one that generates added value, while ensuring the competitiveness of the exports through the prism of lower production costs. However, in many developing countries unskilled labor predominates, with a negative effect on export competitiveness.

Analyzing the labor force in the new, constantly changing digital, technological context, it is relevant to add the entrepreneurial component, which represents a catalyst for innovation, for testing certain ideas, business models and implicitly for building resilient organizational capabilities. Entrepreneurship contributes to the development of new attitudes, behaviors, approaches, and support for building an organizational culture of quality. Hapenciuc, Pînzaru, Vătămănescu and Stanciu (2015) consider that sustainable entrepreneurship, by approaching and integrating the three levels: human resources management (people), concern for the environment and efficiency (represented by profit), is required as a determining factor for sustainable business of companies. Of these components, the study notes the correlation of the marketing tools with "the most important dimension of sustainability - people".

With regard to Foreign Direct Investment (FDI), authors such as Borensztein, De Gregorio and Lee (1998) consider that FDI has a positive effect of growth when the recipient country has a high education category, being able to exploit the spillover effects (spillover effects - propagating, spreading effects) that FDI involves.

Hoekman and Djankov (1998) analyzed the change in the structure of exports from Central and Eastern European countries. In most countries of the two regions, exports of semi-finished products and machinery generate the most significant structural changes in exports, as local companies import know-how and technology in order to improve their production quality and thus to increase their share market in the European Union. They also noted that, in these countries, FDI is concentrated in the less developed sectors, because foreign investors consider these industries to be viable in the medium term and with growth potential, including on the foreign market, which will determine in time and variations in the structure of exports.

Bengoa and Sanchez-Robles (2003) argues that FDI is positively correlated with economic growth, but they argue that the host countries need human capital, economic stability and liberalized markets in order to benefit from the long-term effects of FDI flows. In 2000, Carkovic and Levine reach the same conclusion, but Balasubramanyam, Salisu and Sapsford (1996) note that the degree of trade liberalization is decisive for the positive effects of FDI.

Also, Ismail and Yussof (2003) pointed out that in an increasingly competitive economic environment, as a result of globalization, a high yield is not sufficient to ensure a growing FDI flow. In this respect, an important role in attracting FDI is assigned to the labor force. A sufficient supply of labor force, both quantitatively and qualitatively, involving low wage costs, with a direct impact on production costs, will also amplify FDI flows. Thus, the skilled labor force in the host country will act as a catalyst for the introduction of advanced external technologies in the production process.

UNCTAD (United Nations Conference on Trade and Development) (2000) presented the example of Ireland, which has attracted a significant inflow of FDI into the electronics industry after creating a skilled workforce in this field. Later, Ireland also supported multinational companies, world leaders in the electronic industry, in setting up local production units. However, there are divergent views in the literature on the ability of low wages to support long-term growth, given that a low wage level is usually associated with unskilled labor and reduced productivity. Therefore, for a sustainable development of the business, the increase of the average wage must be correlated with that of the productivity and the improvement of the production flows.

Research conducted by Almfrajia and Almsafirc (2013) concluded that, in the relationship between FDI and economic growth, FDI exerts positive effects on the economic growth of the host country; only in a few cases did negative or null effects occur. Investigating how these effects were achieved, it was identified that the appropriate level of human capital, developed financial markets and open trading regimes play a positive role in the relationship between FDI and economic growth, while the dependence on FDI and the technical gap contributes negatively to the relationship FDI - economic growth.

The aggregation, harmonization and modification in the structure of role of the factors of production, the technological evolutions, the new role played by the labor force, the new relations between people and technology constitute, both at the microeconomic level and at the macroeconomic level, fundamental aspects that must be integrated for the development of some sustainable business.

The empirical study proposes a complex instrumentation and testing of some supporting hypotheses, resulting in conclusions that may contribute to the development of future policies.

### **3. Methodology and data**

The research focuses on the European space, including countries with different stages of economic development, of which 12 countries with developed economies (from Western and Northern Europe) and 12 countries whose economies have made significant progress (from Central and Eastern Europe). We also used a mix of quantitative instruments to analyze the evolution of these relevant indicators and the influences on exports and imports for the 24 countries over a 22-year period.

The methodology used to verify the research hypotheses includes the collection of 380 observations and is based on econometric modeling using Stata 13. The data series included in the regression model have an annual frequency, the analysis being performed on the basis of a data panel from 1996 to 2017, taken from the World Bank database, for 24 countries in Europe (12 countries in Western Europe and Northern: Austria, Belgium, Denmark, France, Germany, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden and the United Kingdom, as well as 12 countries in Central and Eastern Europe: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia FYR, Poland, Romania, Slovak Republic and Slovenia).

With regard to *the selected countries*, on the one hand were included the founding countries of the European Union (Germany, Great Britain, France, Italy, Spain, Denmark, Holland, Belgium, Sweden, Luxembourg, except Austria) and on the other Central and Eastern European countries (Poland, Czech Republic, Croatia, Romania, Hungary, Slovak Republic, Slovenia, Bulgaria, Lithuania, Latvia), representative from the perspective of structural changes in the economy (affected by transition processes from centralized economy, to market economy). The delimitation of the perimeter of the selection also took into account the level of exports and imports registered by the respective countries (in relation to the realized GDP). Also, *the selected time interval* is relevant, both for the period before the economic and financial crisis and for the post-crisis period.

Next, were evaluated the characteristics of the aforementioned variables to select the optimal analysis methodology. The estimation of the simple and multiple regression models implies the existence of some essential characteristics of the data series, so that the obtained results are relevant, both at the statistical level and at the economic level.

Given the relevance of the foreign trade of a country, an indicator having impact on the sustainability of the businesses, in the research we selected the exports of goods and services (weight in GDP), as the dependent variable.

Because imports also play an important role in the international economic relations of a country (and implicitly, on business sustainability), we used this dependent variable to verify the robustness of the initially obtained results for exports. The variables used in the analysis are presented in table no. 1, being evaluated for the 24 European countries presented in the table no. 2, for the period 1996 - 2017.

**Table no. 1: Variables used in the analysis**

Type of variable	Variable name	Description
Endogenous	EXPORTS	Exports of goods and services (% of GDP)
	IMPORTS	Imports of goods and services (% of GDP)
Exogenous	RD	Research and development expenditure
	UNEMPL	Unemployment, total (% of total labor force)
	LF	Labor force, total
	PATENT_NONRES	Patent applications (nonresidents)
	PATENT_RES	Patent applications (residents)
	FDI	Foreign direct investment, net inflows
	RESEARCHER_RD	Researchers in R&D (per million people)
	ADVANCED	Dummy variable taking the value 1 for advanced economies and 0 for the developing ones.
	L.variable name	1 <sup>st</sup> order lag of the variable.
	L2.variable name	2 <sup>nd</sup> order lag of the variable.
L3.variable name	3 <sup>rd</sup> order lag of the variable.	

*Source: authors' own contribution*

**Table no. 2: List of countries based on their grouping according to the development level**

Western and Northern European Countries Advanced Economies		Eastern and Central European Countries Emerging and Developing Economies
1	Austria	Bulgaria
2	Belgium	Croatia
3	Denmark	Czech Republic
4	France	Estonia
5	Germany	Hungary
6	Italy	Latvia
7	Luxembourg	Lithuania
8	The Netherlands	Macedonia, FYR
9	Norway	Poland
10	Spain	Romania
11	Sweden	Slovak Republic
12	Great Britain	Slovenia

*Source: authors' own contribution*

To analyze the level of intercorrelation between the indicators defined above, the following working hypotheses were formulated, with applicability for both dependent variables (EXPORTS and IMPORTS):

- I1:** The R&D sector has a positive impact on long-term foreign trade;
- I2:** Unemployment has a negative impact on foreign trade;
- I3:** Foreign trade is significant and positively influenced by foreign direct investments;
- I4:** The level of development of the country significantly influences the components of foreign trade.

All quantitative variables were transformed using the natural logarithm, thing that allows for the interpretation of the results in terms of elasticities. In order to choose the optimum methodology for this analysis, the features of the data were analyzed. Issues like stationarity and autocorrelation were evaluated (results are available upon request). The most important aspect is that all of the variables turned out to be highly autocorrelated, of different orders.

Bearing in mind the specificities of the analyzed panel, the methodology of dynamic panel was chosen in order to assess the impact of the considered factors upon the evolution of the foreign trade sector – difference and system GMM (the difference and estimators' system of GMM (Generalized Metod-of-Moments), models developed by: Holtz-Eakin, Newey and Rosen (1988, *Econometrica* 56: 1371-1395); Arellano and Bond (1991, *Review of Economic Studies* 58: 277-297); and Blundell and Bond (1998, *Journal of Econometrics* 87: 115-143). This dynamic approach was applied with the help of Roodman's (2006) method ("xtabond2" command in STATA). When evaluating the correlation coefficients, we observed that the considered factors are highly correlated (see table 3).

Table no. 3: Correlations between variables (coef., p-value)

Probability	Export	FDI	Imports	LF	PATENT_ NONRES	PATENT_ RES	RD	RESEARCHER_ RD	UNEMPL
<b>EXPORTS</b>	1.00								
	-----								
<b>FDI</b>	0.84	1.00							
	0.000	-----							
<b>IMPORTS</b>	0.99	0.85	1.00						
	0.000	0.000	-----						
<b>LF</b>	0.76	0.62	0.75	1.00					
	0.000	0.000	0.000	-----					
<b>PATENT_ NONRES</b>	0.55	0.49	0.55	0.69	1.00				
	0.000	0.000	0.000	0.000	-----				
<b>PATENT_ RES</b>	0.83	0.68	0.84	0.91	0.76	1.00			
	0.000	0.000	0.000	0.000	0.000	-----			
<b>RD</b>	0.97	0.79	0.97	0.75	0.61	0.88	1.00		
	0.000	0.000	0.000	0.000	0.000	0.000	-----		
<b>RESEARCHER_ RD</b>	0.64	0.49	0.61	0.12	0.26	0.36	0.67	1.00	
	0.000	0.000	0.000	0.013	0.000	0.000	0.000	-----	
<b>UNEMPL</b>	0.47	0.39	0.51	0.88	0.53	0.73	0.50	-0.14	1.00
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	-----

Source: authors' own contribution

Consequently, in order to avoid multicollinearity problems, simple regression models were constructed between the dependent variables and each factor. Analyses were conducted based on simulations with different lags and different numbers of instruments. The most consistent / valid model was chosen and present in each case. The number of instruments is presented for each model. Because the sample is made up of both developed and developing countries, we split it based on this aspect using a dummy variable. The goal was to analyse the impact of the level of economic development upon the foreign trade part of the economy.

The final form of the estimated models (models 1 – 8) is:

$$Y_i = \text{const.} + \sum_j \beta_j \times L_j \cdot Y_i + \beta_2 \times X_i + \sum_k \beta_k \times L_k \cdot X_i + \beta_m \times \text{ADVANCED} + \varepsilon_i \quad (1)$$

where: Y – the dependent variable: Exports or Imports,

$L_j \cdot Y$  – lag of order  $j$  of the dependent variable,

$X_i$  – factor variables,

$L_k.X_i$  – lag of order  $k$  of the factor variables,

$j$  – order of the lag of the dependent variable (takes values from 1 to maximum 4, depending on the model),

$k$  – order of the lag of the factor variable (takes values from 1 to maximum 2, depending on the model).

All models were estimated in the robust form, in order to correct for heteroskedasticity problems. They were validated using post-estimation procedures.

An important aspect is that short-term coefficients are obtained through such an analysis and, based on them, the long-term ones can be computed. They are computed based on the following formula:  $(\beta_2 + \sum_k \beta_k)/(1 - \sum_j \beta_j)$ .

The Wald test was used to evaluate their significance. The null hypothesis is the same as in the case of any coefficient testing procedure – no significance.

Analyses were conducted in Eviews 7 and STATA 13.

#### 4. Results and discussions

Table no. 4 referring to *Estimates for exports (baseline models)* reports the results of the seven models, which analyze the determinants of the trade activity expressed by the share of exports in GDP, for a sample of 24 EU countries, span over the period 1996-2017. Based on the properties of the series included in the analysis, namely the strong persistence unveiled by the preliminary analysis, and to meet the scope of our study, we use the difference and system GMM approach with several lags as empirical estimation strategy.

**Table no. 4: Estimates for exports (baseline models)**

Dependent variable: *Exports*

Indep. Variables	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)	(1.7)
<b>L.EXPORTS</b>	0.51*** (0.162)	1.284*** (0.036)	0.897*** (0.068)	0.943*** (0.029)	1.045*** (0.96)	1.119*** (0.051)	0.907*** (0.033)
<b>L2.EXPORTS</b>	0.197*** (0.071)	-0.336*** (0.034)	-0.419*** (0.075)	-	-0.47*** (0.096)	-0.356*** (0.07)	-
<b>L3.EXPORTS</b>	-	-	0.697*** (0.097)	-	-0.488*** (0.081)	0.501*** (0.072)	-
<b>L4.EXPORTS</b>	-	-	-0.289*** (0.058)	-	-	-0.362*** (0.059)	-
<b>RD</b>	1.273*** (0.078)	-	-	-	-	-	-
<b>L.RD</b>	-0.975** (0.245)	-	-	-	-	-	-
<b>UNEMPL</b>	-	-0.747*** (0.073)	-	-	-	-	-
<b>L.UNEMPL</b>	-	1.43*** (0.15)	-	-	-	-	-
<b>L2.UNEMPL</b>	-	-0.669*** (0.091)	-	-	-	-	-
<b>LF</b>	-	-	12.166*** (3.203)	-	-	-	-

<b>L.LF</b>	-	-	-12.05*** (3.195)	-	-	-	-
<b>FDI</b>	-	-	-	0.099*** (0.025)	-	-	-
<b>L.FDI</b>	-	-	-	-0.055* (0.031)	-	-	-
<b>PATENT_NONRES</b>	-	-	-	-	-0.365*** (0.128)	-	-
<b>L.PATENT_NONRES</b>	-	-	-	-	0.434*** (0.127)	-	-
<b>PATENT_RES</b>	-	-	-	-	-	-0.301* (0.17)	-
<b>L. PATENT_RES</b>	-	-	-	-	-	0.37** (0.185)	-
<b>RESEARCHER_RD</b>	-	-	-	-	-	-	1.572*** (0.389)
<b>L. RESEARCHER_RD</b>	-	-	-	-	-	-	-1.562*** (0.41)
<b>ADVANCED</b>	-0.512 (0.438)	0.132*** (0.047)	-0.15 (0.096)	-0.207** (0.09)	-0.474** (0.203)	-0.01 (0.064)	0.135** (0.566)
<b>Constant</b>	1.232* (0.656)	1.098*** (0.135)	1.18** (0.539)	0.598 (0.426)	-1.635** (0.734)	2.04*** (0.209)	2.213*** (0.4.7)
<b>Hansen test (prob.)</b>	0.159	0.102	0.183	0.174	0.081	0.050	0.128
<b>Arellano-Bond AR(2)(prob.)</b>	0.558	0.648	0.278	0.171	0.250	0.931	0.541
<b>Wald Chi<sup>2</sup></b>	12671.65	50617.34	6460.02	15477.4	10311.16	30654.27	4963.63
<b>No. of instruments</b>	23	23	23	23	22	22	22
<b>Long-term coefficient (Chi<sup>2</sup>)</b>	<b>1.018*** (215.68)</b>	<b>0.254** (3.99)</b>	<b>1.026*** (18.44)</b>	<b>0.773*** (11.9)</b>	<b>-1.098*** (8.15)</b>	<b>0.704*** (14.75)</b>	<b>0.107 (0.01)</b>

Source: authors' own contribution

Table no. 5 regarding *Estimates for imports (robustness check)* presents the results, based on the same models, using imports as a share in GDP, being our dependent variable.

**Table no. 5: Estimates for imports (robustness check)**

Dependent variable: Imports							
Indep. Variables	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.6)	(2.7)
<b>L.IMPORTS</b>	0.356*** (0.138)	1.04*** (0.035)	0.863*** (0.107)	0.937*** (0.03)	1.051*** (0.084)	1.125*** (0.057)	0.898*** (0.031)
<b>L2.IMPORTS</b>	-	-0.238*** (0.05)	-0.385*** (0.065)	-	-0.521*** (0.097)	-0.369*** (0.082)	-
<b>L3.IMPORTS</b>	-	0.403*** (0.029)	0.433*** (0.095)	-	0.527*** (0.08)	0.487*** (0.112)	-
<b>L4.IMPORTS</b>	-	-0.313*** (0.021)	-	-	-	-0.35*** (0.097)	-
<b>RD</b>	1.386*** (0.065)	-	-	-	-	-	-
<b>L.RD</b>	-0.736*** (0.185)	-	-	-	-	-	-
<b>UNEMPL</b>	-	-0.525*** (0.044)	-	-	-	-	-



L.UNEMPL	-	0.568*** (0.046)	-	-	-	-	-
LF	-	-	16.14*** (4.197)	-	-	-	-
L.LF	-	-	-16.038*** (4.207)	-	-	-	-
FDI	-	-	-	0.13*** (0.03)	-	-	-
L.FDI	-	-	-	-0.079** (0.034)	-	-	-
PATENT_NONRES	-	-	-	-	-0.394*** (0.147)	-	-
L.PATENT_NONRES	-	-	-	-	0.467*** (0.144)	-	-
PATENT_RES	-	-	-	-	-	-0.572** (0.279)	-
L. PATENT_RES	-	-	-	-	-	0.652** (0.298)	-
RESEARCHER_RD	-	-	-	-	-	-	1.874*** (0.412)
L. RESEARCHER_RD	-	-	-	-	-	-	-1.871*** (0.462)
ADVANCED	-1.191*** (0.306)	0.244*** (0.043)	-0.213* (0.117)	-0.292*** (0.102)	-0.419* (0.217)	-0.037 (0.087)	0.129 (0.095)
Constant	2.85*** (0.895)	2.081*** (0.16)	0.844* (0.435)	0.623 (0.44	-1.553** (0.721)	2.209*** (0.285)	2.486*** (0.447)
Hansen test (prob.)	0.181	0.071	0.098	0.168	0.083	0.055	0.127
Arellano-Bond AR(2) prob.)	0.984	0.763	0.158	0.803	0.212	0.537	0.730
Wald Chi <sup>2</sup>	3220.58	31733.16	5927.01	9421.78	6973.6	28963.67	3541.8
No. of instruments	23	23	23	23	22	22	22
Long-term coefficient (Chi <sup>2</sup> )	<b>1.008*** (521.13)</b>	<b>0.401*** (27.58)</b>	<b>1.131*** (16.64)</b>	<b>0.814*** (11.78)</b>	<b>-1.292** (6.12)</b>	<b>0.744*** (12.31)</b>	<b>0.025 (0.00)</b>

Source: authors' own contribution

As the used methodological approach allows for the computation of both short- and long-term coefficients, we will first discuss the short-run estimates:

- first, we notice that, depending on models' estimations, all lags of the dependent variable are strongly statistically significant and consistent with our expectations and the choice of the modeling strategy. Moreover, one-lag values of exports have a positive influence on the current level ones exhibiting to some countries extend a snowball effect. However, when we increase the number of lags, the results seem to be mixed;

- second, two out of four variables, namely expenditures and number of researchers in research and development (hereafter R&D), used as a proxy for states' research-development-innovation (hereafter RDI) behavior, present positive statistically significant impact on states' exports, while a negative one when considering the first lag. Overall, the impact of the coefficients is relatively higher when the number of researchers in research and development is taken into account. As for the sign of the coefficients, the situation is the opposite when we use non-resident patent applications as a proxy for RDI; also, we mention that the size of the coefficients is well below the value one;

• third, the labor force participation and FDI help in boosting the share of exports in GDP. Besides, when the level of nations' development exhibit statistical significance, the advanced economies seem to have a benefit in exporting activity only taken together with the number of researchers in R&D.

Moving on to the long-run findings, some important points must be highlighted. Except for the model 1.5 (see column 6 of table no. 4), all the long-term coefficients present a positive effect on the analysed countries' exports activity.

Furthermore, for the models where the associated coefficient is positive and statistically significant, the impact fluctuates from a value of 0.254 to a value of 1.026. This implies that, on the long run, the R&D expenditure and labor force participation have larger impacts on the share of exports, compared with the other considered factors. As an example, an 1% increase of R&D expenditure increases the share of exports in GDP with 1.018%, on average, while the number of patents for non-residents decreases the share with 1.098% (model 1.5), on average. Additionally, we notice that the sign of the variable, the patents of residents change from negative to positive one when examining the long-term effect.

Unemployment has a negative impact on the short term, but also a positive impact on the long term. This is because foreign investors can come to a market with high unemployment and benefit from a cheap labor force. In the long run, this will lead to an increase in exports of goods and services, on the one hand, and through an increase in revenues, will also lead to an increase in imports. However, the long-term coefficient is among the lowest, pointing out that, in fact, the level of unemployment in an economy does not have a major impact on foreign trade.

As a robustness check, we estimate the same models using the imports as a share of GDP as our dependent variable. In general, the basic conclusions are similar, both in terms of coefficient signs and in terms of statistical significance (see table no. 5 related to *Estimates for imports (robustness check)* for more information). Nonetheless, we mention that the magnitude of both short- and long-run coefficients are much larger in case of imports, while the associated coefficient of our dummy variable (i.e. ADVANCED) is no more statistically significant for the model with the variable number of researchers in R&D, compared with the export's models.

Consequently, consolidating the baseline findings, the estimations seem to reveal that the developing and transition economies' participation in world trade has gained more and more weight, even managing to outrun the developed ones.

Evaluating the obtained results, we can conclude that the first working hypothesis **I<sub>1</sub>** is validated. Research and development has a positive influence on the foreign trade sector, both in the short and long term. Similar results are also obtained when the resident patents are considered. When R&D is included in the analysis, from the perspective of the labor force involved in this sector, even if in the short term the impact is positive, it is canceled in the long term.

Unemployment has a negative impact on foreign trade, both for exports and imports, in the short term. But in the long term, the relationship is positive and statistically significant, which leads to the long-term invalidation of hypothesis **I<sub>2</sub>**.

Also, the hypothesis **I<sub>3</sub>** is validated, FDI positively impacting exports and imports, both in the short and long term.

Hypothesis **I<sub>4</sub>** is not always validated. The existence of significant differences between developed and emerging countries, on the foreign trade side, depends on the main factor analyzed, but also on the proxy for foreign trade. Thus, for example, when the research and development is considered, the level of development of the countries does not significantly influence the exports, but it influences the imports, in a negative way - the developed countries have imports, lower, than the emerging ones.

The main results of the paper can be transposed into certain important implications of economic policy. On the one hand, the specialty literature reflected that the commercial activity and the degree of openness of the world economy contribute substantially to the well-being of nations. As such, it is very important to determine the factors that can greatly affect the expressed commercial activity, both through exports and through imports, so that international bodies can intervene when necessary and support states to achieve a positive trade balance. Although, taken together, our conclusions suggest that RDI strategies, together with the ability of countries to attract investment and a broad labor market, are important factors of commercial activity. We mention the need for caution regarding the share of imports in economic growth.

Thus, an appropriate policy to stimulate and support internal RDI projects can be an effective tool to encourage technological advance, which can positively affect exports. Additionally, additional export revenues and increased diversification can be provided through FDI and new job opportunities, created through the development of new technologies.

In contrast, a competitive and innovative economic environment may, to some extent, limit the need to import certain goods and services and, therefore, maximize the perspectives for a trade surplus.

As a fundamental pillar of economic growth, business activity together with business sustainability should be monitored carefully to avoid possible imbalances. Trade policy and related investments should be permanently adapted, both at country level and at European Union level, in order to capture the dynamics of the economic environment, technological, behavioral, climatic and societal changes.

Our analysis offers a new perspective on the determinants of commercial activity / business sustainability in the EU countries, offers validated conclusions with specific quantitative instruments, in support of future policies. Future research can focus on the determinants of general trade, respectively imports and exports, trade balance, as well. It can be introduced different types of trade, in order to better analyze and understand how aggregate and disaggregated commercial activity responds to various potential macroeconomic factors, with stimulatory or blocking role.

### **Conclusions**

Our work adds value to the existing research, by using and correlating the quantitative instrumentation with the qualitative, conceptual analysis. We have selected important variables, included in three main categories: innovation, labor force, investments, described granularly at the level of a representative database and we have investigated their impact on the foreign trade of some countries of the European Union, a relevant indicator for business sustainability.

Business sustainability is a complex economic concept that manifests itself as a new trend. The Brundtland report (published in 1987 by the United Nations; the report firmly placed environmental issues on the political agenda, aiming to discuss environment and development as one problem) underlined that sustainability is a concept aimed at the relationship between people, planet and profit. Sustainable business with the supply chain is trying to balance the three components, using sustainable development and sustainable distribution to protect the environment, business growth and society.

Our research aimed to identify the factors with the higher capacity to stimulate foreign trade, approached as a determining element of business sustainability, starting from a data panel over an extended time horizon of 22 years (1996-2017), in which 24 European countries were included. Foreign trade represents an important catalyst, both at the micro level, at the level of business of some companies and at the macro level, at the level of business of some countries, regions. From the perspective of a company, export, foreign trade activities contribute to the diversification of risks, eliminating dependencies on the internal market and internal shocks, building relationships with external partners, developing new consumer behaviors, on external markets, contributing to the creation of new chains having international value. This component, in conjunction with the loyalty, the specialization of the labor force, with the research and development activities, brings value to the company, to all the stakeholders and contributes in a consistent way to the sustainability of the business of the company and its partners. The same elements can be extrapolated and integrated to the strategic interests of a country, contributing to the sustainability of the business, to the development of the strategic capabilities and to the relational management of the respective country.

The empirical analysis of business sustainability, approached from the point of view of foreign trade (export / import), highlighted that, in the short term, the R&D expenses and the number of R&D researchers have a statistically significant positive impact on the exports of the states. Also, the participation of the labor force and FDI helps to increase the share of exports in GDP. In the long term, R&D expenditures and labor force participation have a bigger impact on exports compared to other factors considered.

We consider that by identifying and studying the complementarities between the 24 European economies, alternative solutions and commercial collaborations can be developed on deficient and complementary sectors, at individual level, both between the 24 countries, as well as between them and third countries outside the European Union.

From the perspective of future research approaches, we highlight the environmental component, the "green" component, which is, in fact, in the current socio-economic context, integrated with the concept of sustainability. This is a very important piece in the strategic puzzle, developed both globally and at European level and we intend to develop it in future research.

In the context of a new European political cycle and in view of the significant developments of the last 10 years, we consider that a "momentum" must be created for making strategic decisions, in order to consolidate sustainable development, to integrate technological advance, to integrate behavioral developments, to bring value and sustainable business for both companies, consumers and society as a whole.

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