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POLICIES AND INNOVATIONS TO PROMOTE ECONOMIC GROWTH AND EMPLOYMENT IN THE AGE OF GLOBALIZATION

Abstract:

Over the last two decades, economic relations have been marked by fundamental changes. Globalization, the fourth technological revolution, the global economic crisis of 2008 are only part of the challenges facing each national economy.

Methods have been used to illustrate the dynamics of the time series by major economic indicators through graphical and tabular visualization tools. Cross - correlation analysis using statistical software is applied to investigate the relationship and the relationship between the indicators used. The survey was conducted in the context of Bulgaria and the EU28 over a ten-year period by economic sectors and demographic groups.

In certain sectors, an increase or decrease in the overall trend during the study period is observed. The nature of jobs in terms of sectoral employment is clearly changing from primary and secondary to tertiary. There is a clear significant link between investment in innovation and lifelong learning on economic growth and the dynamics of the labor market.

In today's rethinking economic doctrines, the need to redefine economic policies is crucial in order to find the right path to manage the economic system through innovation, to enhance wealth through sustainable economic growth and an efficient labor market.

Keywords:

Innovation; Economic growth; Employment; Employment policies; EU; Bulgaria

JEL Classification: E01, E60, E24

1 Introduction

In the course of the last few decades, globalization has left an imprint on all the spheres of social and economic life, to such an extent that the resulting changes are leading to the emergence of new processes and phenomena such as high-technological society and high- technological national industries. The so-called Industry 4.0 was born, too. This leads to a focus on innovation and public policies in the field as key drivers for economic growth and employment. Innovation enhances and updates the manufacturing process, which increases competitiveness and productivity. The effect is that more goods and services are produced with the same amount of production factors, which in fact generates economic growth.

Innovation is also a huge potential for job creation, for improving the quality of our professional life, for higher incomes for the employed and, consequently, for better standards of living and higher consumption. At the same time, however, innovation is changing the structure and nature of work positions. Entirely new jobs and new sectors are being created which, though, set new requirements for employees and strongly individualize the work process. "Historical experience and emerging trends in the context of Industry 4.0 are leading towards an ever increasing demand for intellectual labor and towards reshaping the role of the individual as an economic unit from producer to product creator" (Dimitrov, 2019).

Globalization and the resulting innovations are improving the efficiency and functioning of the markets, which is achieved through a more efficient allocation of production factors. In the labor market, this effect is observed through migration processes, where, on the one hand, human resources are exported from developing countries to developed ones, and on the other hand, through import of capital via the so-called multinational companies which are a source of new employment in the developing countries (Lindsey, 2002). These processes turn the labor market into a global one and create conditions for faster development and diffusion of innovation. The opportunities of globalization are also viewed in the aspect of the creation of corporate research and development activities which enable the global distribution of knowledge networks and the creation of high-technology products with increased added value.

In recent years, ever more policies have been focused down on achieving sustainable development, based on innovations. This is why innovation policies have become a top priority for a number of countries. The focus of these policies is on investing in and developing: human capital; research and development; as well as strengthening social security (World Bank, 2019).

The presence of this issue in the policies of leading economies is drawing the attention of an increasing number of researchers to its study. Because of this, the main objective of the present treatise is to review the impact of policies and innovations on the labor market and employment, on the one hand, and on the economic growth, on the other, in the context of globalization within the EU28 and Bulgaria. This allows for the creation of a coherent logical framework which analyzes both, the impact of globalization through innovation on the labor and the economic growth, and the policies necessary to reduce or promote these impacts.

2 Literature review

It is of broad research interest to study the links between innovation and innovation policies, on the one hand, and the economic growth and employment, on the other. Undoubtedly, this link is particularly evident in the endogenous growth theory developed by Romer (1986), Lucas (1988), Grossman and Helpman (1994). With these approaches, the focus is on the contribution of one of the determinants of growth, and namely, the human capital and its development through the accumulation of new knowledge. The result of a purposeful development and dissemination of knowledge is innovation, which is a source of increasing competitiveness and profitability for the entrepreneurs, and a source of economic growth for the national economy.

An alternative study places the development of ideas which are a key driver of economic growth at the fundamentals of innovation. Therefore, "the more inventors we have, the more ideas we discover and the richer we all become" (Jones, 2005). Institutions, in particular the patent system and research universities, play a crucial role in improving the welfare, as they are the source of ideas (Jones, 2005); and the impact and distribution of ideas is at the heart of scientific and technological excellence or innovation, which in turn increases labor productivity as well as the share of high-technological production.

Innovations which trigger the economic growth and employment are also based on other factors such as a favorable institutional and political environment, which are often linked to economic and institutional reforms. An adequate basis for the development of innovation is the pursuit of a policy comprising elements such as: "competition, openness to international trade and foreign direct investment, well-functioning factor markets, secure property rights and appropriate incentives needed to transform knowledge and skills into growth and competitiveness" (Blomström, et al, 2002). The quality of the institutional environment comes down to the ability of the government to implement policies and measures which support the sophistication of the education system and hence, the human capital; also, the research and development and the stimulation of the private sector to invest in innovation.

With regards to innovative policies to trigger the economic growth and employment within the EU, the debate is focused on the creation of "smart innovation policies" where it is necessary for them to be applied accordingly, complying with the regional peculiarities and formulated "as a result of different modes of implementation of the various phases of the innovation process - production/acquisition of knowledge, invention, innovation, growth - according to the territorial specifics" (Camagni, et al. 2013). Therefore, in order for any innovation policy to be effective, it must aim at supporting areas where particular regions are experiencing difficulties and weaknesses, rather than at those which are already well-functioning and well-developed.

Empirical studies examine the link between R&D investments and those in the economic growth. They prove that public support for R&D through subsidies stimulates private sector investments in innovation. The effect of this funding depends, on the one hand, on the innovation level achieved and, on the other, on the labor productivity; the lower the labor productivity, the greater the amount of R&D subsidies which are received by the companies. Therefore, in order for the innovation policy in the private sector to be effective, it is necessary that subsidies which meet the needs of the companies are applied (Czarnitzki, 2013).

Innovation policies also affect employment: “research and innovation activities investments and the stimulation of emerging and high-technological sectors can be a means of promoting competitiveness, economic growth and job creation. Both industrial and innovation policies must be careful in considering a series of complex interactions between process innovation and product innovation.” (Vivarelli, 2015). It must be emphasized, that those policies related to promoting innovation can be a source of new employment if they are aimed at stimulating the product innovation, but at the same time they can also be a factor in the emergence of technological unemployment if they are aimed at sophistication of the process innovations. This necessitates the implementation of policies which stimulate R&D spending and hence the creation of product innovation and new employment (Vivarelli, 2015).

In the course of the political debate on the role of innovation policies on employment, the assumption that innovation threatens low-skilled jobs but, on the other hand, creates new employment for highly qualified staff from whom specific skills are required, is becoming prevalent. However, for innovation policies to be implemented effectively and for the conditions for increase of employment to be introduced, a stable macroeconomic environment is required. Achieving such an environment is possible through the application of a set of reforms which can target different spheres and areas. For example, labor market reforms should include the implementation of lifelong learning policies which are an opportunity to enhance qualification and employability and hence to create innovation. On the other hand, these types of reforms allow that technical changes create more job opportunities. (OECD, 1998).

2.1. Employment policies to maintain sustainable growth.

The modern nature of jobs and the public policy assessment is seen in three fundamental interrelated dimensions: globalization, technological advancement and demographic shifts. New occupations, created under the influence of the three dimensions, require, in addition to multiple skills and competencies, a new form of public policy management. Labor market regulations will no longer fulfill their functions submerged into the new reality. Otherwise, there is a risk of increasing poverty and, consequently, inequality and inability to grow. Governments can no longer delay reforming the systems, but must look for new opportunities to ensure transfer efficiency and economic growth. This problem is ever more complicated in the context of the global financial and economic crisis of 2008, which has faced them with the need to pay increasing attention to fiscal stability and to preserve the degree of social tolerance based on the preservation of the achieved level of welfare and avoidance of loss of human capital, on the one hand, and the maintenance of sustainable economic growth, on the other, which requires higher tax or social security funding, structural reforms or increased state debt. Non-standard forms of employment, the result of globalization and innovation processes, have become a contemporary feature of the labor markets worldwide.

During the last few decades the global economy has been influenced by globalization, characterized by the internationalization of production, finance (including currency transfers), trade and migration (ILO, 2017). This megatrend is in part the result of political decisions which are conducive to technological advancement. The opposing views are that rather bringing prosperity, it brings inequality and injustice. In this context, the adoption of the ILO's Social Justice Declaration in 2008 is an effort to aid countries in achieving progress and social justice in

the age of globalization. Another key aspect of globalization is the growing financial activity of the businesses with a focus on financial return on real (non-financial) investment. In 2015, the portfolio of investment and financial derivatives accounts for about 70% of global financial flows, with the rest being a more stable form of foreign direct investment (ILO, 2017). This phenomenon can encourage the companies to adopt shorter-term and risky strategies. The technological changes are a major driver of growth and development, but nevertheless they are extremely linked to shift in the labor market. The technological innovations at the heart of the Fourth Industrial Revolution are a generator of transformative impact on the new nature of labor. While the overwhelming evidence of past technological developments shows that the waves of technological change lead to short-term job destruction, followed by job creation and better positions, today technological advancement is emerging at an unprecedented pace and is changing labor in ways never observed before. Despite the expected productivity profit that technology will bring in the long run, policy makers will have to manage the uneven distribution of those gains and the potential and disproportionate impacts by gender, sector and skill level. They will also have to evaluate the consequences in terms of quantity and quality of work. The impact of technology on labor will depend on how profits are distributed, given the widening income gaps between countries and regions and whether the transition creates quality work. While technology and innovation tend to dominate the debate about the future of labor, in many countries the demography are is raising debate about policies of a completely different kind. Young people entering the labor market, fueling urbanization and contributing to international migration, predominate in the developing countries. There is a huge opportunity to harness the potential of this significant youth cohort and to accelerate the economic growth. In the developed countries, the aging of the population increases the importance of the older cohorts. Aging reflects improvements in health and longevity. Such a change, though, will increase the pressure on people of working age, especially with respect to care responsibilities. In the absence of productivity gains, it will lead to slower growth due to shrinking savings (older people tend to save less) and may also increase the pressure on public finances as pensions and health care costs will increase (ILO, 2017).

The general significance of non-standard forms of employment has been expanding over the last few decades in both industrialized and developing countries as their use has become more widespread in the economic sectors and occupations. It is those which are already forming the need for new management. Four different employment arrangements are included, already classified by the ILO (ILO, 2016) which deviate from the standard employment legislation. The latter so far comprises full-time work, indefinite hours, and traditional hierarchical relations between employee and employer:

- Temporary employment in which workers are engaged for a fixed period of time and have fixed-term contracts, completing projects or specific tasks, as well as seasonal or daily work, including day work. Fixed-term contracts may be written or oral, but they are characterized by a pre-determined or foreseeable term. In most countries, they are governed by specific legal provisions regarding the maximum duration of the contract, the number of renewals and the motivation for its use.

- Hourly employment where normal working hours are less than full-time hours. In some cases, work arrangements may not include fixed hours and the employer is thus not required to provide a specific number of hours of work. These arrangements are settled in various contract forms depending on the country, including the so-called "zero hour contracts", but commonly referred to as "on-call duty". Their basic characteristic is the great deviation from a work time schedule.
- Multilateral agreements are when workers are not directly employed by the company to which they provide services. In most countries, the employment arrangement happens between the agency and the employee, while a trade contract binds the agency and the consumer firm. The company pays fees to the agency, and the agency pays the employee's wages and social benefits. Due to the many parties involved, there may be confusion as to the rights of the worker, especially if he/she has provided services to the consumer company for an extended period.
- Self-employment often hides employment in companies, which diminishes the worker's protection and he/she is thus deliberately misclassified as such.

For some, the unconventional employment is a definite choice and has positive results. However, for most workers it is uncertain. It can also present challenges for the businesses, the overall performance of labor markets and economies, and the societies in general. The support for decent jobs for all requires authorities to thoroughly understand its current nature and its consequences. It reflects the changes in the labor world caused by globalization and social change - such as the increased role of women in the global workforce, but also regulatory changes. It is considered that the laws are coined to encourage the use of unconventional employment - purposefully or accidentally - by creating incentives for the businesses to use it. In other cases, there are loopholes in the law which allow for the development of non-standard working conditions. Some of these gaps are the result of the decline in collective arrangements in countries where collective labor contracts have previously been dominant as a form of regulation. It is in employment relations where the public policy in terms of innovation will mostly affect job management. The future of labor management will also be determined by the future of industrial relations, social dialogue and tripartism. Tripartism has, over the years, been used almost always by a number of governments as a tool to formulate complex solutions to complicated problems, which then facilitates the rapid and smooth implementation of coherent policy measures (ILO, 2016). Although the state remains a central and major player, the modern forms of government emphasize the value of public participation as a democratic practice. The question which arises under the new labor realities is how to build such tripartite model. However, the current models of participation need to be based on a regulatory framework based on an approach to achieving effective results. The critical question is whether those who are directly affected, and are otherwise excluded, are empowered and allowed to influence policy design and implementation. At national level, work management has long been a reflection of the ILO's global model, functioning as cooperation between countries and representatives of employers and workers.

However, employers 'and workers' organizations will have to adapt to the modern reality. As a result, the effectiveness and legitimacy of these organizations and of the social dialogue in work management will first depend on their capacity to generate and share the "fruits of economic progress" (Hirshman, 1970) and to represent the interests of employers or workers reliably. "If,

the legitimacy of the representative partners to engage in social dialogue is called into question, then the serious place of tripartism as a cornerstone of government will be too.”(ILO, 2016). New ways of workers’ organization emerge in a range of employment conditions, including in the informal economy, too. This comes to emphasize the importance of alliances with other participants which will be the source of new ideas. However, there is a need to reconstruct the social solidarity in order for it to become an effective management tool to tackle inequality through inclusive regulatory strategies. With regard to employers and business organizations, expectations about the role of business in society and the need for stable support for SMEs, which in many countries represent a significant proportion of employment, reinforce the importance of ensuring togetherness. In Western Europe, employers’ organizations and business associations are adapting their organizational structure and activities to the changing needs of the business. This includes streamlining membership through mergers with trade associations and the creation of functional adaptations, shifting from the narrow labor market to management of broader implementation of policies for a favorable business environment and offering a range of business services.

ILO tools recognize the need for social dialogue between governments, workers’ organizations and employers as key to managing labor, as well as for the process of management reshaping to meet current and future challenges. This is sometimes criticized for allowing the interests of employers and workers’ organizations to dominate political debates in order to exclude other important interests (such as those in the informal economy) and the common welfare. Some discern the inherent paradox of corporate policy-making: workers’ organizations are required to make concessions and inevitably co-operate in management, rendering them unable to effectively defend the interests of the working class. In some countries, two of the pillars of tripartism - trade unions and employers’ organizations, are weak and the question is how to include another participant beyond these membership organizations. Critics insist that while tripartism is certainly the most widespread form of labor market governance, it is time-consuming and is not appropriate in times of abrupt changes or economic crisis. It may face resistance, which in turn would delay the implementation of key measures and the adjustment of the economy. In addition, many institutions of the tripartite social dialogue find ways to either integrate broader interests into relevant policy discussions or to attract civil society voices in structures which are already described as ‘tripartite plus’. This introduces a new level of complexity: civil society as a whole is not a collective participant (a membership-based organization) but rather an electoral product characterized by interest groups. However, ILO management tools already envisage the involvement of these different interests. For example, as regards to the fixing of statutory minimum wages, the 1970 Minimum Wage Convention (No. 131) provides for consultation and involvement of employers and workers’ representative organizations. Such tripartite processes may already include representation of other organizations, such as small enterprises or workers in the informal economy, not necessarily represented by the participating employers and workers’ organizations. Similarly, governments, employers and workers’ organizations are involved at international level, and they take decisions in setting international labor standards (ILO, 1996, 2011, 2017).

The interaction of public and private labor management is characteristic of the ‘new management’ approach to public policy. In many areas, the modern management is increasingly common,

emphasizing, among other things, the involvement of non-state participants and cooperation among the stakeholders (Lobel, 2004). In the context of labor market management, this can be understood as the interests of the state and the representatives of employers and workers, united to develop and implement the relevant policy (WB, 2017). The transition to new management reflects the realization that while it is imperative that the governments lead and legitimize the process, it is not the only means of ensuring management (Ruggie, 2014). In this line of thought, new management means using private incentives to achieve public goals more effectively (Weil, 2008). Modern management offers the opportunity to adapt governance to institutional context - and its success depends on it (Dubash and Morgan, 2012).

3. Methodological approach

In the course of the last few decades, globalization has succeeded in reshaping the economic relations and making labor as global as it was never before in history. Over the last three decades, international trade, financial flows and migration processes have led to increasing interconnections around labor markets worldwide. The sophistication of technologies and communications has helped to integrate them into the global trade and financial flows.

Globalization influences the labor market through: flexing labor relations; the different forms of employment - on-site, remote, virtual; the structural shifts in the workforce between the different sectors, generated both by regional and national specializations and advantages, and by technological changes which require another type of workforce in terms of quantity, quality, knowledge and skills. In this sense, the study of changes in employment, and more specifically, in the context of part-time work, as well as in different demographic groups, shows these changes in the labor market. The 10-year survey period, from 2009 to 2018, gives an objective image of the impact of globalization and the crisis on the labor market in Bulgaria and the EU28 in the context of temporary and part-time flexible employment, which are becoming increasingly important as a form of employment in the context of the new economic realities.

The measures and policies to promote economic growth and economic management in a globalized environment place an emphasis on innovation, on the one hand, and investment in a quality workforce in terms of knowledge and skills, on the other. In this way, the impact of globalization can be transformed from a challenge to the economy into an opportunity to improve the efficiency and productivity of the national economy and the well-being of society.

Part of the policies implemented to achieve sustainable economic growth within the EU are aimed at developing and diffusing innovation. It is therefore of particular importance to monitor the dynamics of innovation. A convenient basis for the evaluation of European innovation activities is the use of indicators which cover investment (i.e. funding and support) in innovation, namely public and private sector R&D expenditure. They, subsequently, promote the philosophy of lifelong learning. Using the R&D expenditure indicator, we could, on the one hand, reveal trends in the development of new technologies and the future competitiveness of the EU. On the other hand, the analysis of these indicators makes it possible to evaluate the business environment for innovation development by creating new knowledge and by disseminating modern technologies or industries.

In order to evaluate the results of innovation, it is also necessary to analyze the scientific and technological results, which can be achieved by assessing the distribution of knowledge. The indicator which provides adequate data is the share of high-technology export from the total export.

The assessment of the contribution of innovation to the economic growth is made by evaluating the correlation dependency of the time series of R&D expenditure, real GDP growth in Bulgaria and the EU28 for the period 2010 - 2018.

4. Conducting research and results

Tables 1 and 2 show in tabular form the fluctuations in the share of employment in each economic sector according to the surveyed demographic groups in Bulgaria and the EU28 on part-time employment (Table 1) and temporary employment (Table 2) in 2018 compared to 2009 in percentage points.

Table 1. Change in employment of part-time employed in demographic groups in 2018 compared to 2009 in Bulgaria and the EU28

	part time employment	demographic groups					
		total	15-29	25-49	50+	men	women
	sectors						
EU28	Agriculture, forestry and fishing	↓ -2,35	↓ -1,62	↓ -1,25	↓ -5,22	↓ -4,34	↓ -1,85
EU28	Industry (except construction)	↓ -0,34	↑ 0,00	↓ -0,71	↓ -0,02	↓ -0,21	↓ -0,46
EU28	Construction	↓ -0,10	↓ -0,47	↓ -0,23	↑ 0,10	↓ -0,48	↓ -0,12
EU28	Wholesale and retail trade, transport, accomodation and food service activities	↑ 0,77	↑ 2,44	↑ 1,30	↑ 0,96	↑ 2,11	↑ 0,14
EU28	Information and communication	↑ 0,03	↓ -0,44	↑ 0,11	↑ 0,25	↑ 0,09	↓ -0,06
EU28	Financial and insurance activities	↓ -0,17	↓ -0,40	↓ -0,26	↑ 0,08	↑ 0,06	↓ -0,21
EU28	Real estate activities	↓ -0,01	↑ 0,01	↓ -0,04	↓ -0,07	↓ -0,03	↓ -0,01
EU28	Professional, scientific and technical activities; administrative and support service activities	↑ 1,16	↓ -0,37	↑ 0,92	↑ 2,04	↑ 1,25	↑ 1,10
EU28	Public administration, defence, education, human health and social work activities	↑ 0,86	↓ -0,04	↑ 0,42	↑ 1,77	↑ 0,35	↑ 1,63
EU28	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	↓ -0,33	↓ -0,63	↓ -0,51	↓ -0,05	↑ 0,56	↓ -0,56
EU28	No response	↑ 0,47	↑ 1,53	↑ 0,25	↑ 0,17	↑ 0,63	↑ 0,40
Bulgaria	Agriculture, forestry and fishing	↓ -8,46		↓ -2,76	↓ -17,50	↓ -8,56	↓ -8,41
Bulgaria	Industry (except construction)	↓ -5,36					
Bulgaria	Construction	↑ 1,49				↑ 1,36	
Bulgaria	Wholesale and retail trade, transport, accomodation and food service activities	↓ -0,76	↑ 0,10	↓ -5,19	↑ 3,96	↓ -7,06	↑ 5,30
Bulgaria	Information and communication						
Bulgaria	Financial and insurance activities						
Bulgaria	Real estate activities						
Bulgaria	Professional, scientific and technical activities; administrative and support service activities	↑ 2,96		↑ 1,19		↑ 1,99	↑ 0,87
Bulgaria	Public administration, defence, education, human health and social work activities	↑ 6,60		↑ 3,90	↑ 11,09	↓ -1,76	↑ 7,60
Bulgaria	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	↑ 2,99			↓ -1,84		↓ -0,15

Source: own compilation, data Eurostat

The data in Table 1 reveal the following information:

- the Agriculture, forestry and fishing sector reduces its share of employment in all demographic groups in the EU and in Bulgaria;
- the Industry sector (excluding construction) reduces its share of employment in all demographic groups in the EU and in Bulgaria. The only group in which employment increments is young people aged 15-29, and only in the EU;
- the Construction sector decreases in share of employment in both Bulgaria and the EU in all demographic groups, with the exception of the 50+ age group. Bulgaria is within this group, where there is an increase mainly of male employees;
- the Wholesale and retail trade, transport, accommodation and food service activities sector raises its share of employment in the EU in all demographic groups. There is a fall in Bulgaria, with the exception of the following groups: young people aged 15-29, adults 50 and employed women increasing their employment;

- in sector Information and communication – there is missing information for Bulgaria, while the share of employment in the EU as a whole increases, except for the demographic groups of young people 15-29 and employed women;
- Financial and insurance sector - no data available on Bulgaria, the share of employment in the EU decreases, except for demographic groups 50+ and employed men;
- Real estate activities sector - no record available for Bulgaria, the share of employment in the EU falls overall, except for the demographic group 15-29;
- sector Professional, scientific and technical activities, administrative and support service activities - the share of employment in both Bulgaria and the EU increments for all demographic groups, except for those aged 15-29 in the EU only;
- Public administration, defence, education, human health and social work activities increase in both Bulgaria and the EU across all demographic groups, with the exception of: employed aged 15-29 in the EU and employed men in Bulgaria;
- the Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies sector - decreases its employment share in the EU, except for employed men. In Bulgaria, there is an overall increase for the country, with the exception of a decrease in the employed aged 50+ and the employed women;

Based on the totals, we can deduct that in Bulgaria in 2018, compared to 2009, there is a decrease in the share of employment in three sectors, with the most significant negative fluctuation in the sector Agriculture, Forestry and Fishing by -8.46 percentage points. Four sectors experience increase in the share of employment, which is most evident in the Public administration, defense, education, human health and social work sector - by +6.6 percentage points. There are no data for three sectors. Taking this into account, in the EU28 in 2018 compared to 2009, there is a decrease in the share of employment in six sectors, with the largest negative change being in the Agriculture, forestry and fishing sector by -2.35 percentage points. The other four sectors increment their share of employment, as the strongest trend is in the sector Professional, scientific and technical activities, administrative and support service activities by +1.16 percentage points. Comparing the EU with Bulgaria, it is obvious that there are two common sectors where there is a reduction in the share of employment: in Agriculture, Forestry and Fishing and in Industry (excluding construction); two common sectors in which there is a rise in employment: Professional, scientific and technical activities, administrative and support service activities and Public administration, defense, education, human health and social work; three sectors in which the dynamics diverge and imply the presence of specific factors which have uneven effects in Bulgaria and in the EU and should be investigated: Construction, Wholesale and retail trade, transport, accommodation and food service activities, Arts, entertainment and recreation; other service activities, activities of household and extra-territorial organizations and bodies.

Table 2. Change in employment of temporary workers in the demographic groups in 2018 compared to 2009 in Bulgaria and the EU28.

	temporary employment sectors	demographic groups					
		total	15-29	25-49	50+	men	women
EU28	Agriculture, forestry and fishing	↑ 0,09	↓ -0,14	↑ 0,10	↓ -0,19	↑ 0,28	↓ -0,13
EU28	Mining and quarrying	↓ -0,04	↓ -0,05	↓ -0,05	↓ -0,03	↓ -0,09	
EU28	Manufacturing	↑ 0,70	↑ 0,32	↑ 1,37	↑ 0,95	↑ 1,15	↑ 0,13
EU28	Electricity, gas, steam and air conditioning supply	↓ -0,07	↓ -0,12	↑ 0,00	↓ -0,14	↓ -0,13	↓ -0,02
EU28	Water supply; sewerage, waste management and remediation activities	↑ 0,13	↑ 0,11	↑ 0,16	↓ -0,03	↑ 0,27	↓ -0,03
EU28	Construction	↓ -2,57	↓ -3,18	↓ -2,67	↓ -1,06	↓ -5,22	↓ -0,16
EU28	Wholesale and retail trade; repair of motor vehicles and motorcycles	↑ 0,26	↑ 0,55	↑ 0,93	↑ 0,37	↑ 0,71	↓ -0,14
EU28	Transportation and storage	↑ 0,96	↑ 0,85	↑ 1,09	↑ 0,68	↑ 1,45	↑ 0,42
EU28	Accommodation and food service activities	↑ 1,47	↑ 2,02	↑ 1,25	↑ 1,68	↑ 1,65	↑ 1,32
EU28	Information and communication	↓ -0,09	↓ -0,12	↓ -0,07	↑ 0,01	↑ 0,08	↓ -0,27
EU28	Financial and insurance activities	↓ -0,23	↓ -0,51	↓ -0,13	↑ 0,07	↓ -0,18	↓ -0,27
EU28	Real estate activities	↑ 0,08	↓ -0,01	↑ 0,07	↑ 0,30	↑ 0,07	↑ 0,08
EU28	Professional, scientific and technical activities	↑ 0,11	↑ 0,11	↑ 0,25	↓ -0,21	↑ 0,09	↑ 0,14
EU28	Administrative and support service activities	↑ 0,11	↓ -0,01	↓ -0,14	↑ 0,42	↑ 0,11	↑ 0,10
EU28	Public administration and defence; compulsory social security	↓ -1,17	↓ -1,38	↓ -1,40	↓ -1,24	↓ -1,36	↓ -0,99
EU28	Education	↓ -0,23	↑ 0,01	↓ -0,41	↓ -1,97	↓ -0,22	↓ -0,13
EU28	Human health and social work activities	↑ 0,32	↑ 0,78	↑ 0,07	↑ 0,48	↑ 0,56	↑ 0,28
EU28	Arts, entertainment and recreation	↑ 0,22	↑ 0,68	↑ 0,03	↓ -0,40	↑ 0,18	↑ 0,26
EU28	Other service activities	↓ -0,23	↓ -0,41	↓ -0,06	↓ -0,05	↓ -0,07	↓ -0,36
EU28	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	↓ -0,50	↓ -0,56	↓ -0,77	↓ -0,06	↓ -0,13	↓ -0,82
EU28	Activities of extraterritorial organisations and bodies	↑ 0,01		↑ 0,03		↓ -0,01	↑ 0,04
Bulgaria	Agriculture, forestry and fishing	↑ 7,12	↑ 9,11	↑ 5,79	↑ 6,80	↑ 6,12	↑ 8,37
Bulgaria	Mining and quarrying	↓ -0,78		↓ -1,62		↓ -0,18	↓ -1,65
Bulgaria	Electricity, gas, steam and air conditioning supply						
Bulgaria	Water supply; sewerage, waste management and remediation activities						
Bulgaria	Construction	↓ -4,20	● 12,06	↓ -4,18	↑ 0,26	↓ -5,91	
Bulgaria	Wholesale and retail trade; repair of motor vehicles and motorcycles	↓ -2,07	↓ -1,03	↓ -1,37		↓ -0,51	↓ -2,14
Bulgaria	Transportation and storage						
Bulgaria	Accommodation and food service activities	↑ 2,39	↑ 3,96	↑ 2,46		↑ 3,51	↑ 0,35
Bulgaria	Information and communication						
Bulgaria	Financial and insurance activities						
Bulgaria	Real estate activities						
Bulgaria	Professional, scientific and technical activities						
Bulgaria	Administrative and support service activities	↑ 2,76		↑ 2,72	↑ 2,11	↑ 1,88	↑ 0,79
Bulgaria	Public administration and defence; compulsory social security	↓ -5,13		↓ -2,90	↓ -6,44	↓ -3,21	
Bulgaria	Education	↓ -0,30					
Bulgaria	Human health and social work activities	↑ 1,73		↑ 0,05	↑ 5,12		↑ 3,21
Bulgaria	Arts, entertainment and recreation						
Bulgaria	Other service activities						
Bulgaria	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use						
Bulgaria	Activities of extraterritorial organisations and bodies						

Source: own compilation, data Eurostat

Table 2 presents the change in the share of employment in each economic sector according to the surveyed demographic groups in Bulgaria and the EU28 of temporary employment in 2018 compared to 2009 in percentage points.

- The Agriculture, forestry and fishing sector is increasing its share of employment in Bulgaria and the EU. Only three demographic groups in the EU fluctuate: 15-29, 50+ and employed women;
- The Mining and quarrying sector is reducing its share of employment in Bulgaria and the EU across all demographic groups;
- The Manufacturing sector expands its share of employment in the EU in all demographic groups and shrinks its share of employment in Bulgaria, again across all demographic groups.
- Electricity, gas, steam and air conditioning supply sector - no data on Bulgaria, but increments its share of employment in the EU by all demographic groups, except in 50+ and employed women demographic groups in the EU;
- Water supply; sewerage, waste management and remediation activities - no data on Bulgaria; however, dropping EU share in all demographic groups except in the aged 25-49 in EU;

- The Construction sector is reducing its share of employment in Bulgaria and the EU across all demographic groups, with the exception of the employed at the age of 50+ demographic group in Bulgaria;
- Wholesale and retail trade; repair of motor vehicles and motorcycles sector expands its share of employment in the EU in all demographic groups, with the exception of only the group of employed women, and decreases its share of employment in Bulgaria again across all demographic groups.
- Transport and storage sector - no data on Bulgaria, but increasing its share of employment in the EU in all demographic groups;
- Accommodation and food service activities – there is an increase in share of employment in Bulgaria and the EU across all demographic groups;
- Information and communication - there is no data on Bulgaria; however, it reduces its share of employment in the EU in all demographic groups except 50+ and employed men;
- Financial and insurance activities - missing record on Bulgaria; decrease in share of employment in the EU for all demographic groups except the demographic group 50+;
- Real estate activities - no information for Bulgaria, but it increases its share of employment in the EU for all demographic groups, except for the aged 15-29;
- The Professional, scientific and technical activities contain no data on Bulgaria, but there is a growth in share of employment in the EU across all demographic groups, with the exception of the aged 50+;
- The Administrative and support service activities sector expands its share of employment in Bulgaria and the EU. Only two demographic groups in the EU show other dynamics: ages 15-29 and 25-49;
- The Public administration and defense, compulsory social security sector reduces its share of employment in Bulgaria and the EU for all demographic groups;
- The Education sector lowers its share of employment in Bulgaria and the EU. Only one demographic group in the EU shows a different pattern: the aged 15-29;
- The Human health and social work sector expands its share of employment in Bulgaria and the EU across all demographic groups;
- Arts, entertainment and recreation sector – lack of data on Bulgaria, but drops EU share in all demographic groups, with the exception of 50+ in the EU;
- Other service activities sector - missing information on Bulgaria, but a decreasing EU share for all demographic groups;
- The sector Activities of households as employers; undifferentiated goods and services – producing activities of households for own use - there is no data for Bulgaria, but there is a drop of share of employment in the EU in all demographic groups;
- Activities of extraterritorial organizations and bodies – lack of data on Bulgaria; it increases its share of employment in the EU across all demographic groups, with the exception of the employed men demographic group;

All in all, based on the totals, we can conclude that in Bulgaria in 2018, compared to 2009, there is a decline in the employment share in five sectors, with the most significant negative change in the Public administration sector by -5.13 percentage points. In five sectors there is an increase in the share of employment, which is strongest in the Agriculture, forestry and fishing sector by +7.12 percentage points. Data for twelve sectors is unavailable.

Summarizing the EU28 indicators, in 2018 compared to 2009, there is a decrease in the share of employment in nine sectors, with the largest negative fluctuation in the Construction sector by -2.57 percentage points. In the other twelve sectors there is an expanse in the employment share, which is most considerable in the Accommodation and food sector by +1.47 percentage points.

Comparing the EU and Bulgaria, we see that there are three common sectors where there is a reduction in the share of employment: Construction, Public Administration and Education; four shared sectors in which there is an increase in employment share are: Agriculture, forestry and fishing, Accommodation and food services, Administrative and support service activities and Human health and social work; in two sectors the dynamics diverge which implies the presence of specific factors which have different effects in Bulgaria and the EU and should be investigated: Manufacturing and Wholesale and retail trade; repair of motor vehicles and motorcycles.

Table 3. Temporary and part-time employment in Bulgaria and the EU28 in absolute numbers and share for the period 2009 - 2018.

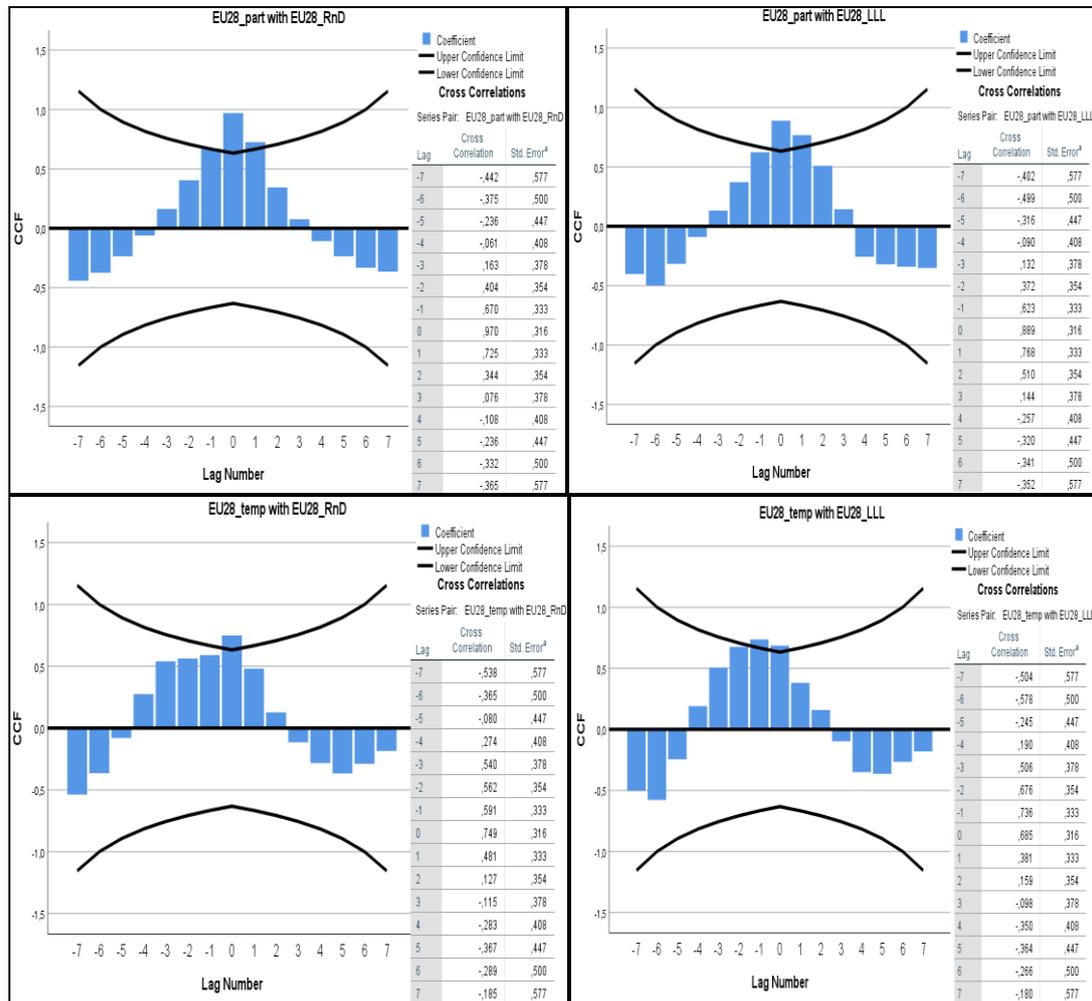
years	temporary employment				part time employment			
	absolute number	percent	absolute number	percent	absolute number	percent	absolute number	percent
	EU28	EU28	Bulgaria	Bulgaria	EU28	EU28	Bulgaria	Bulgaria
2009	24783,5	11,3	134,7	4,1	40752,9	18,6	75,9	2,3
2010	25012,4	11,6	121,2	3,9	41499,8	19,2	73,3	2,4
2011	25302,3	11,7	107,1	3,6	42167,3	19,5	69,7	2,4
2012	24647,8	11,4	116,2	4	43087,2	20,0	71,6	2,4
2013	24547,2	11,4	146	5	43993,1	20,4	78,2	2,7
2014	25438,5	11,6	138,9	4,7	44635,9	20,4	79,1	2,7
2015	26168,8	11,8	118,8	3,9	45174,1	20,4	72,4	2,4
2016	26839,5	12	110,9	3,7	45751,9	20,4	66,4	2,2
2017	27520,9	12,1	125	4	46173	20,3	76,4	2,4
2018	27620,8	12	114,3	3,6	46330,2	20,1	64,6	2,0
line chart								
column chart								

Source: own compilation, data Eurostat

Table 3 presents the correlation between temporary and part-time employment in Bulgaria and the EU28 in absolute numbers and share from the total employment for the period 2009 - 2018.

Table 3 indicates that if in the EU28 temporary and part-time employment are increasing as an absolute number and share of the total employment, the opposite is observed in Bulgaria. In the EU28, temporary employment rises from 11.3 percentage points in 2009 to 12 percentage points in 2018, indicating that temporary employment, on the one hand, is increasing in absolute numbers (from 24783.5 thousand to 27620.8 thousand), but it is also ahead of other forms of employment. Part-time employment in the EU28 shows an even stronger positive trend. This form of occupation rises from 18.6 percent in 2009 to 20.1 in 2018, indicating that part-time employment, on the one hand, increases in absolute value (from 40752.9 thousand to 46330.2 thousand) but also overcomes the other forms of employment. In Bulgaria, though, the trend is reversed. At first, temporary employment decreases from 4.1 percent in 2009 to 3.6 in 2018, indicating that this type of employment, on the one hand, decreases in absolute numbers (from 134.7 thousand to 114.3 thousand) and simultaneously, declines compared to other forms of employment. Part-time employment drops from 2.3 percentage points in 2009 to 2 percentage points in 2018, indicating that part-time employment decrease in absolute terms (from 75.9 thousand to 64.6 thousand), but at the same time shrinks compared to other forms of employment.

Graph 1. The correlation dependencies in a time line between temporary and part-time employment in the EU28 and certain macroeconomic indicators (R&D and LLL expenditure) for the period 2009 - 2018.



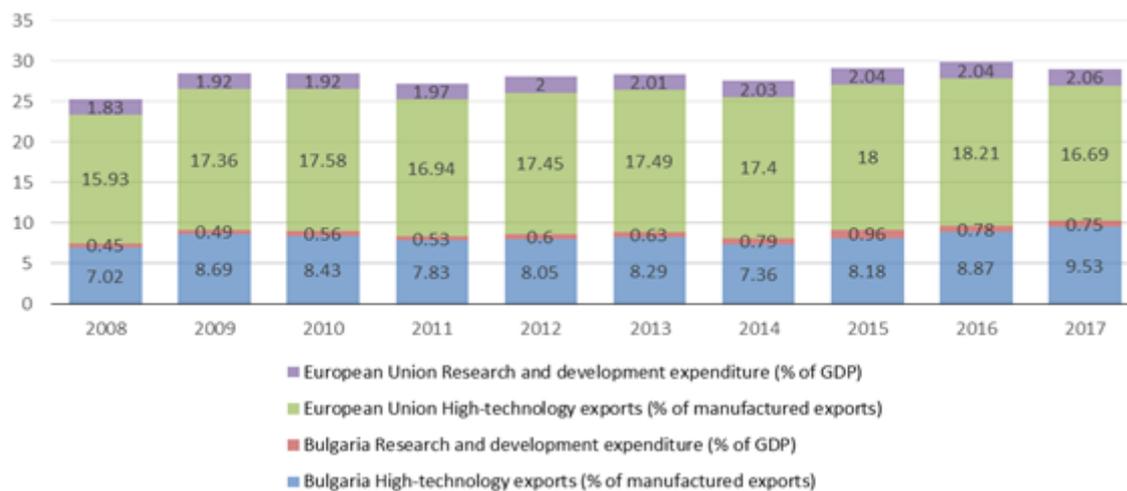
Source: own compilation, data Eurostat

The data of *Graph 1* indicate that when examining the existence of temporal correlation within the EU28 for the impact of innovation on temporary employment, a strong positive dependence is observed at lag 0 with a correlation coefficient of 0.97, and a similar, weaker, but statistically significant one is recorded at lag +1. When examining the existence of a temporal correlation within EU28 on the impact of lifelong learning (LLL) policies on temporary employment, a strong positive dependence is recorded at lag 0 with a correlation coefficient of 0.88, and a similar, weaker one, but statistically significant is also observed at lag +1. When considering the existence of temporal correlation within the EU28 for the impact of innovation on part-time employment, a positive dependence is observed, though weaker than that of the temporary one, at lag 0 with a correlation coefficient of 0.75. When examining the existence of temporal correlation in the EU28 for the impact of lifelong learning policies on part-time employment, a strong positive dependence is recorded at lag -1 with a correlation coefficient of 0.74, and a similar, weaker one, but still statistically significant - also at lag 0.

At the application of the cross - correlation time analysis in Bulgaria, no statistically significant relationship is recorded. In terms of explanation for the difference in the statistical significance for the EU28 and for Bulgaria, we can outline the much stronger influence of external and internal factors on the growth and the labor market, which minimizes the impact of innovations and makes it more difficult to distinguish them individually.

The monitoring of the dynamics of the two innovation evaluation indicators, namely the development of Research and development expenditure (as % of GDP) and High-technology exports (as % of manufactured exports) in the EU28 and Bulgaria over the period 2008 – 2017, provides information on the level of innovation development achieved in the EU28 and Bulgaria. (see *Graph 2*)

Graph 2. Trend of innovation in Bulgaria and EU, 2008 – 2017



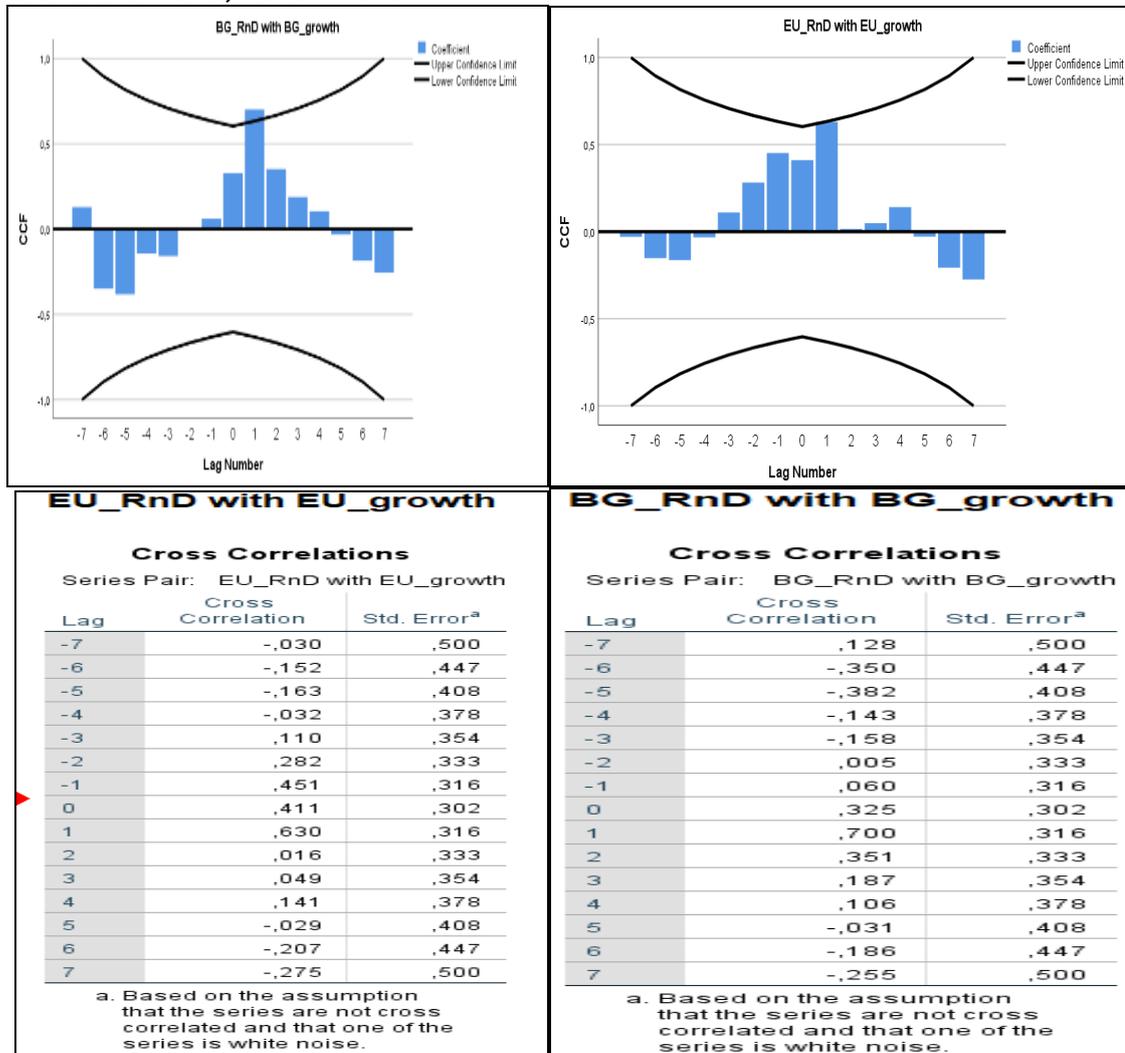
Source: World Development Indicators of World Bank

The trend observed in *Graph 2* indicates that the amount of R&D expenditure as a percentage of GDP in the EU28 increases over the considered period, albeit at a slower rate of 1.83% in 2008 to 2.06% in 2017, i.e. over the entire 10-year period, it expands by only 0.23 percentage points. For the same period, the indicator in question does not show a trend of steady growth in Bulgaria, since in 2015 it reaches its maximum, after which it starts to decrease. The share of R&D expenditure of GDP in Bulgaria increases from 0.45% in 2008 to 0.75% in 2017, or almost doubles. Comparing the values of this indicator in Bulgaria and the EU28, we reach the conclusion that at the beginning of the period under review, about 4 times less funds are spent in Bulgaria than in the EU28 for the development and diffusion of innovation, and at the end of the period this gap shrinks to about 3 times less.

The information in the graph also emphasizes that the other innovation indicator, namely the high-technology exports as % of manufacturing exports, has significantly higher values for the average European level than for Bulgaria. In 2008, the share of high-technology exports in Bulgaria is 7.02%, and in 2017 its size is 9.53%, i.e. the increase is 2.51 percentage points. In Bulgaria this indicator is averagely about 2 times lower than in the EU28. Therefore, the reason for this is that for the period under focus, the Bulgarian economy is less capable to create new knowledge which to be transformed into products with a high added value.

The graph data lead us to the conclusion that innovations at the average European level are much better developed than in Bulgaria. A possible reason is that, since the entry into force of the Single European Act, the EU has set itself the goal of consolidating the scientific and technological base of the European industry and of preserving the European competitiveness on the world market. Bulgaria joins the EU at a later stage and this is probably one of the reasons for the delay in innovation development.

Graph 3. Correlation between time series of R&D expenditure and real GDP growth in Bulgaria and the EU28, 2010 – 2018



Source: own compilation, data Eurostat

The information in *Graph 3* indicates that, at examining the existence of a time correlation within the EU28 for the impact of innovation on the economic growth, a statistically significant positive dependence is observed at lag +1 with a correlation coefficient of 0.63. The figures for Bulgaria show a clearer statistically significant correlation between the time series of R&D expenditure and GDP growth, also at lag +1 with a correlation coefficient of 0.70. As a summary of the data, we could say that there is a correlation between innovation and economic growth, and is logically positive with the economic growth. Such dependence is most pronounced at a positive lag of 1 to

3 years, i.e. with some delay, with the correlation dependence for the EU28 and Bulgaria being statistically significant. In explanation of the statistical significance in the EU28 and Bulgaria, we can emphasize that the role of innovation is clearly differentiated and has a positive impact on the economic growth.

5 Conclusion

Undoubtedly, from the results obtained of the empirical study, we reach the conclusion that knowledge, active measures and policies in the field of innovation as a leading factor, the expenditure in research and development, the lifelong learning as a public philosophy and economic necessity, the education and science, are vital both to the labor market and to the whole economic system. The commercial and financial markets, as well as the location of production, have become much more sensitive to the workforce, skills and qualifications, the cost of labor and labor policies. All that resulted in stimulating migration flows, driven by the desire for prosperity, jobs and remuneration. This pace of globalization of the labor market is increasingly raising the question of the effects and consequences on labor, labor relations and standards, and on the dynamics of the labor markets, as well as on the economic growth. Even within a generation, the many changes, creating opportunities and threatening the traditional national labor market frameworks, necessitate a better understanding and comprehension of these processes. The role of the state in the labor market through its legislation rules, regulations and policies, is called into question in today's ever more globalized world.

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