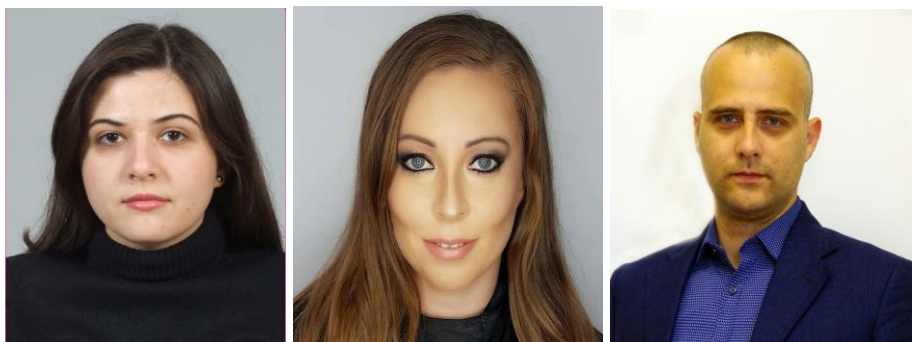


THE RELATIONSHIP BETWEEN INNOVATION AND TECHNOLOGICAL PROGRESS ON THE LABOUR MARKET

*Blaga Madzhurova**, *Dobrinka Stoyanova***, *Stefan Raychev****



Introduction

The labour market and the nature of jobs are subject to many powerful factors that combine and make their actions even more significant. These factors are globalization and technological advancement, and the channels through which they influence the nature and structure of jobs either by affiliates of transnational companies, or through labour migration channels, and third, by the channel of technology (technological) change. Technological advances are changing the content of workflows and organizational forms. The professional structure is changing as industry-related professions die and new professions emerge, such as the so-called influencers and bloggers. The profile of the new professions includes key IT qualifications; linguistic; communication skills and more. These new challenges to the design of professions require greater flexibility and adaptability.

The significant change in the structure of jobs redirects labour towards development activities. This also leads to a change in the educational process. It does not end with an educational degree, but on the contrary, it starts with starting a job, precisely because of the dynamics of jobs. For this reason, the role of lifelong learning policies is strengthened, which makes it possible to adapt the workforce to the changes in the labour market and to the needs of the economy.

Technological advances, on the other hand, increase labour efficiency and productivity, leading to a reduction in the labour force and production costs, and ultimately leading to economic growth. At the heart of the technological advancement and innovation is the development and improvement of human capital. This idea is also embedded in the 'new' theories of growth, incl. and in Romer's endogenous growth model, in which knowledge accumulation and the improvement of human capital are the main drivers of the long-term economic growth: *'An economy with a larger total human capital stock will experience faster growth. This finding suggests that free international trade can act to accelerate growth ... low levels of human capital can help to explain why growth is not observed in underdeveloped economies.'* (Romer, 1986).

* Chief Ass. Prof., PhD Division Economy Sciences, University of Plovdiv Paisii Hilendarski.

** Chief Ass. Prof., PhD Division Economy Sciences, University of Plovdiv Paisii Hilendarski.

*** Chief Ass. Prof., PhD Division Economy Sciences, University of Plovdiv Paisii Hilendarski.

The theme of the effect of technological progress and innovation already exists in the writings of the representatives of the classical school, such as Adam Smith ("Wealth of Nations", 1776), who advocates the idea that technological improvements lead to lower production costs and to more effective division of labour, and ultimately to greater profitability and prosperity. The relevance of the topic is highlighted by the fact that it is present in the policies of leading economies such as that of the EU: „*Workplace innovation serves to sustainably improve the productivity of organizations, while improving the quality of professional life. Innovative jobs foster social and organizational change, incorporating integrated and sustainable approaches, improving enterprise performance and reducing long-term operating costs.* (European Economic and Social Committee, 2011, номер на страница). The effect of improving innovation is linked to: supporting the workforce by improving the quality of jobs; the increase of employers' profits as a result of increased productivity; as well as improving the effectiveness of society as a whole by achieving sustainable growth.

Institutional support for the spreading of innovation across the EU is reinforced by the presence of the topic as a key priority in the Europe 2020 strategy for smart, sustainable and inclusive growth, where building knowledge and innovation-based economy is one of its main priorities. In the new EU Cohesion Policy for the period 2021-2027 one of the leading goals is a 'smarter Europe' that is once again achievable through innovation.

Methodology

The aim of this study is to investigate the change in jobs created by many factors over the years. In this regard, the methodology should determine which indicators clearly show the dynamics of jobs in the first place, and there should be highlighted precisely this dynamics generated by specific factors leading the workforce and entrepreneurship in one or another economic activity and minimizes the overall economic impact of business cycle, the so called cyclical component on national employment. In addition, the timeline and the national and supranational entities subject to analysis are precisely determined.

For this reason, the dynamics of employed by economic activities A10, expressed in thousands, i.e. in absolute numbers, is used as a basis for obtaining the dependencies on the change in jobs.

The study period is 2009 - 2018 (10 year period), giving a sufficiently long and resource-secured timeline covering the impact of the global crisis and the recovery from it.

The employment in Bulgaria and the EU 28 by economic activities is examined, thus aiming to identify the specific features of the change in jobs in Bulgaria and by the general, global trends of the EU28 example averaging the data of all 28 Member States.

In order to remove the cyclical component on the dynamics of employment and change of jobs, the indicator for employment by economic activities has been modified in the indicator **Share employment from the total employment**. The modification is obtained by correlating the dynamics of employment by economic activity in thousands of people to the total employment of all sectors (total activity all NACE v2). In this way, we first eliminate the impact of the dynamics of total employment on the sectoral one, and secondly we are able to derive the change over the years in the sectoral employment in percentage change expressed in percentage points. This reveals the power of change in sectoral employment,

irrespective of total employment and not dependent on the business cycle, because share employment shows the boom or crisis in individual sectors irrespective of the change in total employment generated by the dynamics of economic activity due to cyclical developments.

The following indicators that influence job change have been used:

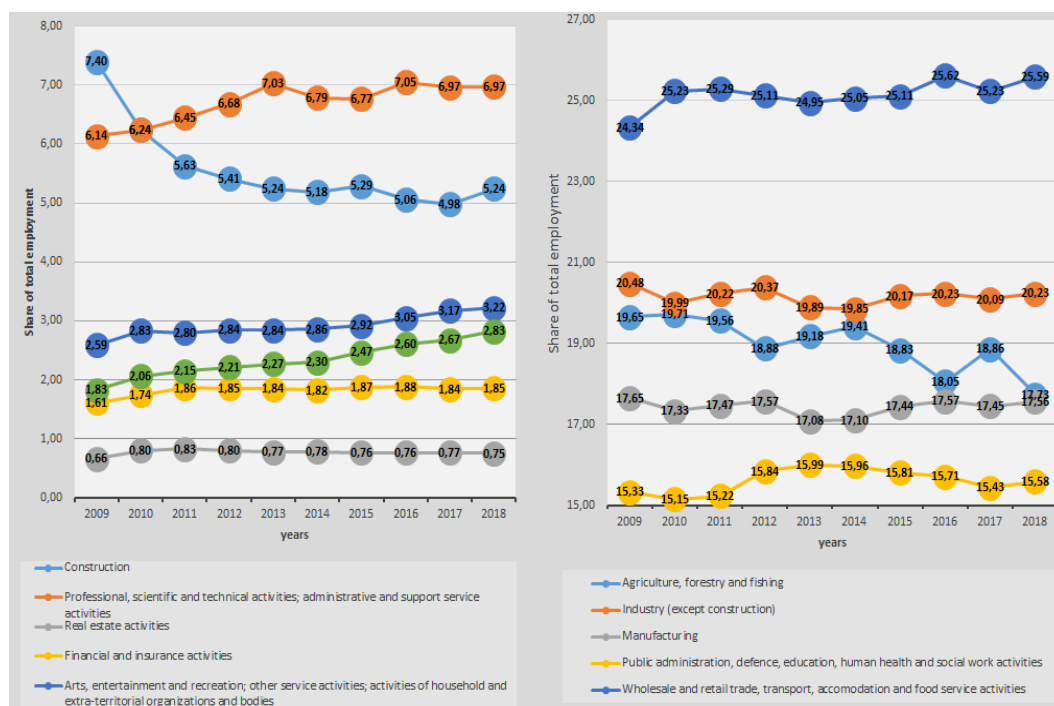
- **R&D expenditure on national level.** The link lies in the extent to which investment in innovation has an impact on the job change, making certain sectors more competitive and thus affecting the demand and supply of labour exactly at the level of economic activity. Undoubtedly, technological innovations have a strong influence on various economic activities and the consideration of correlation dependence is important as a moment explaining this specific impact.

1. Research and results

The dynamics of the sector employment relative to the dynamics of the total employment in Bulgaria is shown in fig. 1. Two points stand out. First, the main employment is in the sectors of Agriculture, Forestry and Fisheries, Industry (excluding construction), processing industry, State government; education; human health and social work, and Trade, transport, hotel and restaurant business, with employment being the largest in the Trade sector. Second with a share of less than 8% comes the employment in the Construction, Professional activities and research sectors; administrative and support activities, Real estate activities, Financial and insurance activities, as well as entertainment, Culture, sports and entertainment, repairs of household items and other activities. Employment is the lowest in the Real estate sector.

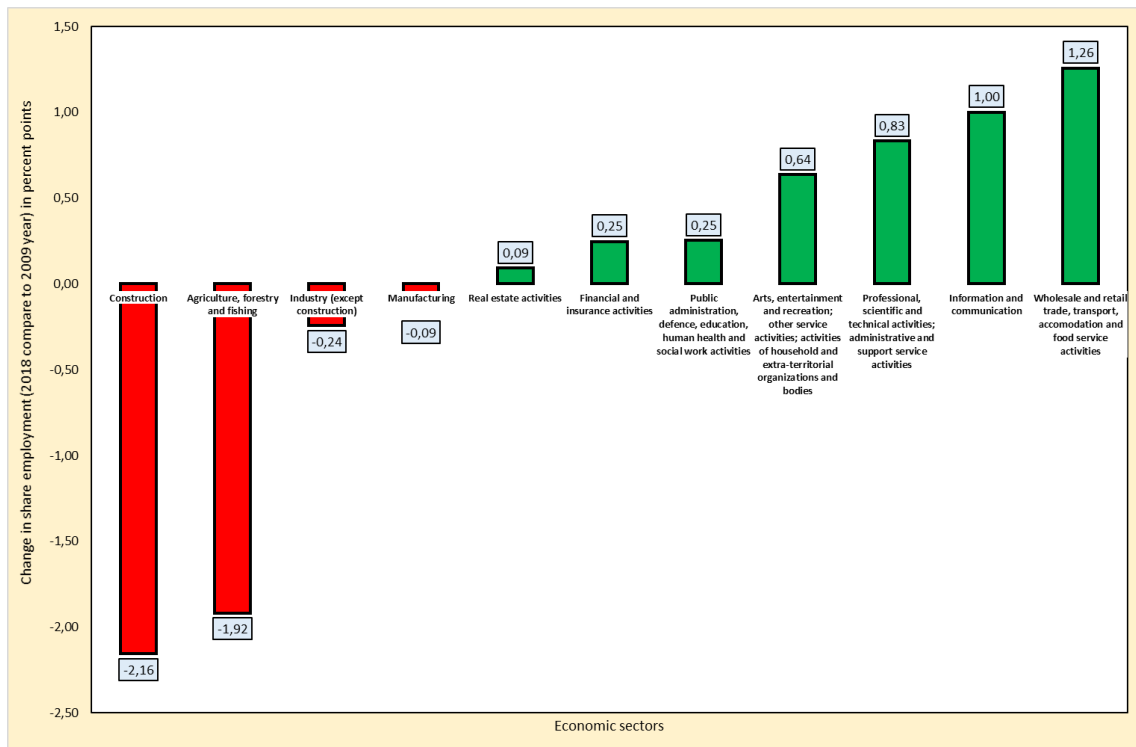
The figure also clearly shows the dynamics over the years in share employment. Most sectors increase or decrease their share of total employment relatively linearly. An exception is the Construction sector, in which the impact of the global crisis reflects in a sharp decline from 7.4% in 2009 to 5.63% in 2010. Thereafter, a relative sustainability is observed until the end of the period. The Agriculture, forestry and fisheries sector also shows a relatively steady increase and decrease in the share over the years, with the overall downward trend being more wavy in terms of share dynamics.

Figure 1. Dynamics of the share employment in Bulgaria for the period 2009 - 2018



An important point is the change in the share employment during the studied period, as the difference between the values in 2018 and 2009. This change is presented in fig. 2. Share employment increases in 2018 compared to 2009 in 7 sectors: Creation and dissemination of information and creative products; telecommunications; Culture, sports and entertainment, repair of household items and other activities; Financial and insurance activities; Real estate operations; Professional activities and research; administrative and support activities; Trade, transport, hotel and restaurant business; State government; education; human health and social work. The share employment in the same period decreased in 4 sectors: Construction; Agriculture, forestry and fisheries; Industry (excluding construction); processing industry. The strongest is the positive change in the Trade, Transport, Hotel and Restaurant Sector with 1.26 percentage points, followed by the Creation and Dissemination of Information and Creative Products sector with 1 percentage point. The strongest negative change was observed in the Construction sector with 2.16 percentage points and Agriculture, forestry and fisheries with 1.92 percentage points.

Figure 2. Change in the share employment by sectors in Bulgaria in 2018 compared to 2009

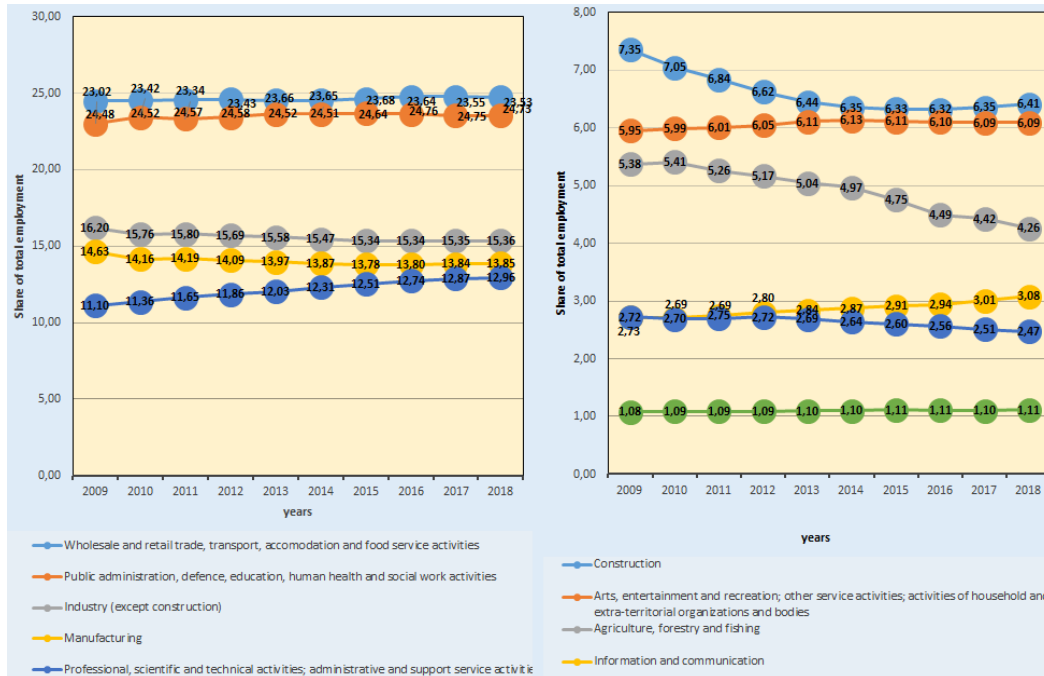


For the last 10 years, the employment in Bulgaria, which is indicative of the change in jobs, has been shifting from several economic activities to others. In particular, there is a shifting of jobs from the Construction Sector; Agriculture, forestry and fisheries; Industry (excluding construction); processing industry to sectors Creation and dissemination of information and creative products; telecommunications; Culture, sports and entertainment, repair of household goods and other activities; Financial and insurance activities; Real estate operations; Professional activities and research; administrative and support activities; Trade, transport, hotel and restaurant business; State government; education; human health and social work. The biggest change is from the Construction sector to the sectors of Creation and dissemination of information and creative products; telecommunications; Culture, sports and entertainment, repair of household items and other activities. This data leads to the conclusion that in the last 10 years in Bulgaria there has been a transition of jobs from the sectors related to extraction, processing industry, construction and industry to the services and public sectors. This dynamics so far shows that the top three employment sectors after Trade, transport, hotel and restaurant business are Agriculture, forestry and fisheries; Industry (excluding construction); processing industry, despite their share reduction in the total employment by economic activities.

The dynamics of sectoral employment relative to the dynamics of total employment in the EU 28 is shown in fig. 3. Two points stand out. First, the main employment is in the following sectors: Professional activities and research; administrative and support activities; Trade, transport, hotel and restaurant business; State government, education, human health and social work; Industry (excluding construction); processing industry. Second important employment with a share below 8% comprises of the sectors Creation and dissemination of information and creative products; telecommunications; Culture, sports and entertainment,

repair of household goods and other activities; Financial and insurance activities; Real estate operations Construction; Agriculture, forestry and fisheries.

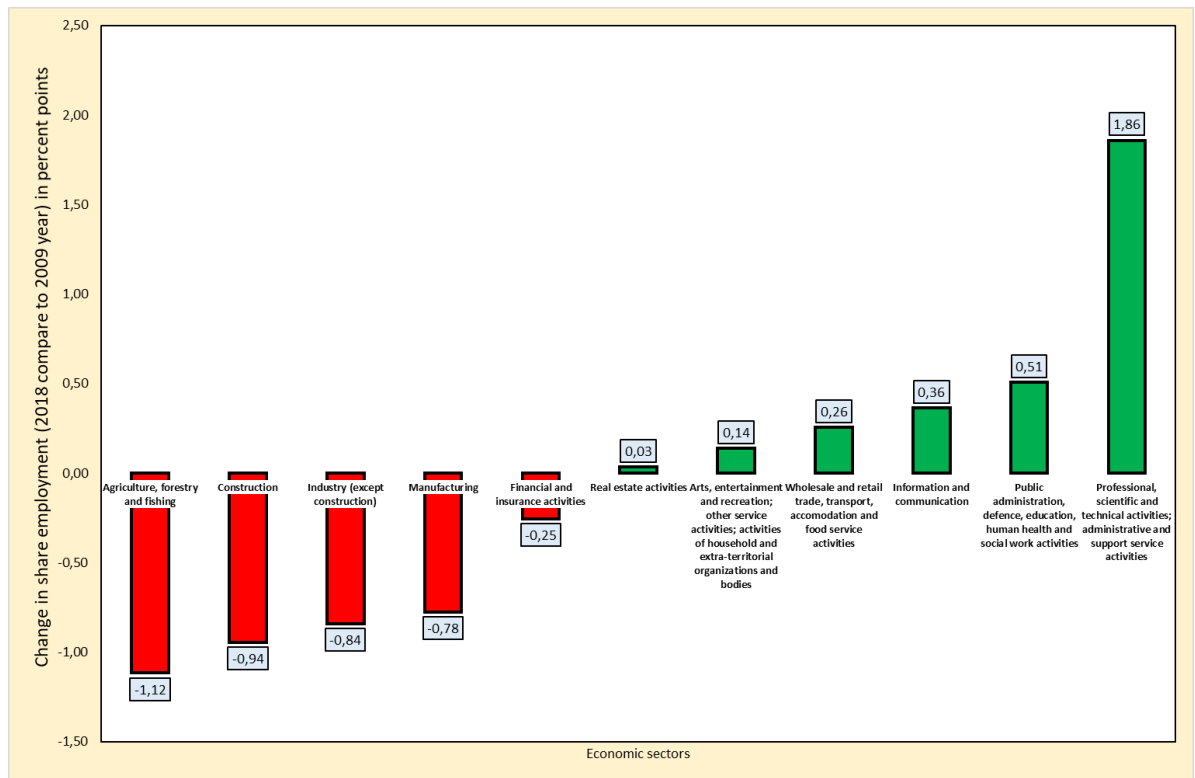
Figure 3. Dynamics of EU-28 employment share for the period 2009 - 2018



The figure also clearly shows the dynamics over the years in share employment. Most sectors increase or decrease their share of total employment relatively linearly. An exception is the Construction sector, in which the impact of the global crisis reflects in a sharp decline from 7.35% in 2009 to 6.41% in 2010, although the decline is not as sharp as in Bulgaria, after which a relative stability to the end of the period. A sharp decrease is also observed in the Agriculture, forestry and fisheries sector from 5.38% to 4.26%, which, unlike the situation in Bulgaria, is relatively linear and does not show any elements of a wavy change over the years.

An important point is the change in the share of employment during the study period, as the difference between the values in 2018 and 2009. This change is presented in fig. 4. Employment increases irrespective of the dynamics of the total employment in 6 sectors: Creation and dissemination of information and creative products; telecommunications; Culture, sports and entertainment, repair of household goods and other activities; Real estate operations; Professional activities and research; administrative and support activities; Trade, transport, hotel and restaurant business; State government; education; human health and social work. Employment declines in 5 sectors: Construction; Agriculture, forestry and fisheries; Industry (excluding construction); processing industry; Financial and insurance activities.

Figure 4. Change in share employment by sector in the EU 28 in 2018 compared to 2009



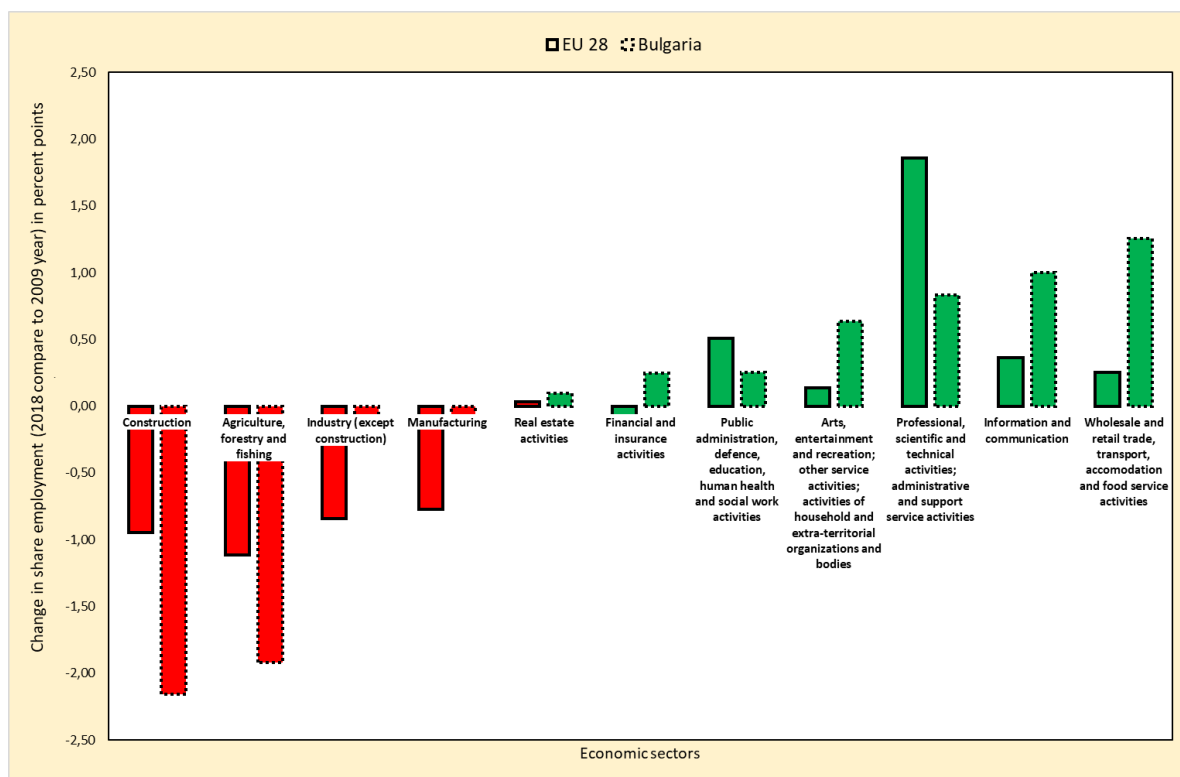
The strongest is the positive change in the Professional Activities and research sector with 1.86 percentage points, followed by the State government sector; education; human health and social work by 0.51 percentage points. The strongest negative change is observed in the Agriculture, Forestry and Fisheries sectors by 1.12 percentage points and Construction by 0.94 percentage points.

For the last 10 years, employment in the EU 28 has shifted from several economic activities to others. In particular, there is a change of jobs in the sectors of Construction; Agriculture, forestry and fisheries; Industry (excluding construction); processing industry and Financial and insurance activities to the sectors of Creation and dissemination of information and creative products; telecommunications; Culture, sports and entertainment, repair of household goods and other activities; Real estate operations; Professional activities and research; administrative and support activities; Trade, transport, hotel and restaurant business; State government; education; human health and social work. The biggest shift is from the Agriculture, forestry and fisheries sector to the sector of Creation and dissemination of information and creative products; telecommunications, and Professional activities and research. These data lead to the conclusion that in the EU28, for the last 10 years, there has been a shift in jobs from the extraction, processing, construction and industry sectors to the services and public sectors, with the exception of financial services. With this dynamics, at this moment, the three leading employment sectors after Trade, transport, hotel and restaurant are State government; education; human health and social work; Industry (excluding construction); processing industry, despite their share reduction in the total employment by economic activities.

A comparison between Bulgaria and the EU 28 on the change in the share employment by economic activities for 2018 compared to 2009 is shown in fig. 5. Comparing

the change in employment by economic activity, it is clear that irrespective of the strength of the change in six sectors, there is an increase in employment both in Bulgaria and in the EU in the following sectors: Creation and dissemination of information and creative products; telecommunications; Culture, sports and entertainment, repair of household goods and other activities; Real estate operations; Professional activities and research; administrative and support activities; Trade, transport, hotel and restaurant business; State government; education; human health and social work. In four sectors there is a decrease in employment in Bulgaria and the EU: Construction; Agriculture, forestry and fisheries; Industry (excluding construction); processing industry. And there is only one sector reporting non-matching, i.e. financial and insurance activities.

Figure 5. Comparison of the change in the share employment by sectors in Bulgaria and the EU 28 in 2018 compared to 2009



Comparing the change in jobs between Bulgaria and the EU28, one can clearly see the transition from the primary and secondary sectors to the tertiary sector. Despite the average values for the EU 28 and the expected slight change in share employment between economic activities, it is noticeable that in four sectors the change is greater in comparison to Bulgaria. In two of them the change is in the negative aspect: Industry (excluding construction); processing industry. In two of them the change is positive: Professional activities and research; administrative and support activities and State government; education; human health and social work. As a general conclusion, it can be pointed out that the transition in employment from the Construction and Agriculture, forestry and fisheries sectors to the sectors Trade, transport, hotel and restaurant business, State government; education; human health and social work and Professional activities and research; administrative and support activities, is the greatest.

Table 1 presents the correlation between the dynamics in the share employment by economic activities and the expenditure on R&D in Bulgaria, while Table 2 - for the EU 28. The two tables show two types of dependencies. First, between the change in share employment and expenditure as a percentage of GDP for R&D, and secondly, the existence of a correlation between the change in share employment between the sectors themselves, that is, whether there is a dependent change caused by certain sectors to others. In Bulgaria, there is a negative relation between expenditure and the Agriculture, forestry and fisheries, Construction, and a positive one for the sectors Trade, transport, hotel and restaurant business, Creation and dissemination of information and creative products; telecommunications, Financial and insurance activities, Professional activities and research; administrative and support activities; Culture, sports and entertainment, repairs of household items and other activities. There is no statistically significant correlation with the following sectors: Industry (excluding construction); Processing industry, Real estate operations and State government; education; human health and social work.

1. Correlation between the share employment by economic activities and the expenditures for research and development in Bulgaria for the period 2009 - 2018

		Correlations											
		Agriculture, forestry and fishing	Industry (except construction)	Manufacturing	Construction	Wholesale and retail trade, transport, accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities; administrative and support service activities	Public administration, defence, education, human health and social work activities	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	R&D expenditure
Agriculture, forestry and fishing	Pearson Correlation	1	-.189	-.359	.572	-.683 [*]	-.869 ^{**}	-.563	.075	-.735 [*]	-.331	-.812 ^{**}	-.781 ^{**}
	Sig. (2-tailed)		.600	.308	.084	.029	.001	.090	.837	.016	.350	.004	.008
	N	10	10	10	10	10	10	10	10	10	10	10	10
Industry (except construction)	Pearson Correlation	-.189	1	.939 ^{**}	.475	-.201	-.168	-.305	-.442	-.355 [*]	-.323	-.184	-.101
	Sig. (2-tailed)	.600		.000	.166	.578	.642	.391	.201	.314	.362	.612	.781 ^{**}
	N	10	10	10	10	10	10	10	10	10	10	10	10
Manufacturing	Pearson Correlation	-.359	.939 ^{**}	1	.331	.065	.066	-.183	-.355	-.248	-.442	.090	.117
	Sig. (2-tailed)	.308	.000		.351	.859	.856	.613	.315	.490	.200	.805	.748
	N	10	10	10	10	10	10	10	10	10	10	10	10
Construction	Pearson Correlation	.572	.475	.331	1	-.728 [*]	-.793 ^{**}	-.943 ^{**}	-.577	-.886 ^{**}	-.558	-.741 [*]	-.699 [*]
	Sig. (2-tailed)	.084	.166	.351		.017	.006	.000	.081	.001	.093	.014	.024
	N	10	10	10	10	10	10	10	10	10	10	10	10
Wholesale and retail trade, transport, accommodation and food service activities	Pearson Correlation	-.683 [*]	-.201	.065	-.728 [*]	1	.761 [*]	.775 ^{**}	.584	.573	.027	.796 ^{**}	.668 [*]
	Sig. (2-tailed)	.029	.578	.859	.017		.011	.008	.076	.083	.941	.006	.035
	N	10	10	10	10	10	10	10	10	10	10	10	10
Information and communication	Pearson Correlation	-.869 ^{**}	-.168	.066	-.793 ^{**}	.761 [*]	1	.712 [*]	.149	.842 ^{**}	.302	.971 ^{**}	.850 ^{**}
	Sig. (2-tailed)	.001	.642	.856	.006	.011		.021	.682	.002	.397	.000	.002
	N	10	10	10	10	10	10	10	10	10	10	10	10
Financial and insurance activities	Pearson Correlation	-.563	-.305	-.183	-.943 ^{**}	.775 ^{**}	.712 [*]	1	.670 [*]	.775 ^{**}	.467	.644 [*]	.656 [*]
	Sig. (2-tailed)	.090	.391	.613	.000	.008	.021		.034	.008	.174	.045	.039
	N	10	10	10	10	10	10	10	10	10	10	10	10
Real estate activities	Pearson Correlation	.075	-.442	-.355	-.577	.584	.149	.670 [*]	1	.178	.012	.210	.026
	Sig. (2-tailed)	.837	.201	.315	.081	.076	.682	.034		.623	.975	.560	.943
	N	10	10	10	10	10	10	10	10	10	10	10	10
Professional, scientific and technical activities; administrative and support service activities	Pearson Correlation	-.735 [*]	-.355	-.248	-.886 ^{**}	.573	.842 ^{**}	.775 ^{**}	.178	1	.673 [*]	.756 [*]	.782 ^{**}
	Sig. (2-tailed)	.016	.314	.490	.001	.083	.002	.008	.623		.033	.011	.008
	N	10	10	10	10	10	10	10	10	10	10	10	10
Public administration, defence, education, human health and social work activities	Pearson Correlation	-.331	-.323	-.442	-.558	.027	.302	.467	.012	.673 [*]	1	.134	.333
	Sig. (2-tailed)	.350	.362	.200	.093	.941	.397	.174	.975	.033		.713	.348
	N	10	10	10	10	10	10	10	10	10	10	10	10
Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	Pearson Correlation	-.812 ^{**}	-.184	.090	-.741 [*]	.796 ^{**}	.971 ^{**}	.644 [*]	.210	.756 [*]	.134	1	.768 ^{**}
	Sig. (2-tailed)	.004	.612	.805	.014	.006	.000	.045	.560	.011	.713		.009
	N	10	10	10	10	10	10	10	10	10	10	10	10
R&D expenditure	Pearson Correlation	-.781 ^{**}	-.101	.117	-.699 [*]	.668 [*]	.850 ^{**}	.656 [*]	.026	.782 ^{**}	.333	.768 ^{**}	1
	Sig. (2-tailed)	.008	.781	.748	.024	.035	.002	.039	.943	.008	.348	.009	
	N	10	10	10	10	10	10	10	10	10	10	10	10

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

In the EU 28, there is a negative relation between expenditures and the Agriculture, forestry and fisheries sector, Industry (excluding construction); processing industry, Construction, and a positive one for Trade, transport, hotel and restaurant business, Creation and dissemination of information and creative products, Real estate operations, Professional activities and research; administrative and support service activities, Culture, sports and

entertainment, repairs of household items and other activities, and State government. There is no statistically insignificant correlation with any of the sectors.

2. Correlation between share employment by economic activity and EU28 R&D expenditure for the period 2009 - 2018

		Correlations												
		Agriculture, forestry and fishing	Industry (except construction)	Manufacturing	Construction	Wholesale and retail trade, transport, accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities; administrative and support service activities	Public administration, defence, education, human health and social work activities	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	R&D expenditure	
Agriculture, forestry and fishing	Pearson Correlation	1	.838**	.766**	.774**	-.902**	-.985**	.961**	-.849**	-.967**	-.583	-.889*	-.852**	
	Sig. (2-tailed)		.002	.010	.009	.000	.000	.000	.002	.000	.077	.027	.002	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Industry (except construction)	Pearson Correlation	.838**	1	.992**	.950**	-.740*	-.830**	.791**	-.935**	-.937**	-.911**	-.894**	-.986**	
	Sig. (2-tailed)	.002		.000	.000	.014	.003	.006	.000	.000	.000	.000	.000	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Manufacturing	Pearson Correlation	.766**	.992**	1	.959**	-.663*	-.762*	.711*	-.917**	-.892**	-.951**	-.916**	-.977**	
	Sig. (2-tailed)	.010	.000		.000	.037	.010	.021	.000	.001	.000	.000	.000	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Construction	Pearson Correlation	.774**	.950**	.959**	1	-.627	-.789**	.659*	-.880**	-.903**	-.922**	-.973**	-.961**	
	Sig. (2-tailed)	.009	.000	.000		.053	.007	.038	.001	.000	.000	.000	.000	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Wholesale and retail trade, transport, accommodation and food service activities	Pearson Correlation	-.902**	-.740*	-.663*	-.627	1	.835**	-.881**	.717*	.850**	.438	.462	.716*	
	Sig. (2-tailed)	.000	.014	.037	.053		.003	.001	.020	.002	.206	.179	.020	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Information and communication	Pearson Correlation	-.985**	-.830**	-.762*	-.789**	.835**	1	-.944**	.828**	.964**	.589	.722*	.863**	
	Sig. (2-tailed)	.000	.003	.010	.007	.003		.000	.003	.000	.073	.018	.001	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Financial and insurance activities	Pearson Correlation	.961**	.791**	.711*	.659*	-.881**	-.944**	1	-.791**	-.910**	-.502	-.567	-.789**	
	Sig. (2-tailed)	.000	.006	.021	.038	.001	.000		.006	.000	.139	.087	.007	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Real estate activities	Pearson Correlation	-.849**	-.935**	-.917**	-.880**	.717*	.828**	-.791**	1	.903**	.851**	.848**	.924**	
	Sig. (2-tailed)	.002	.000	.000	.001	.020	.003	.006		.000	.002	.002	.000	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Professional, scientific and technical activities; administrative and support service activities	Pearson Correlation	-.967**	-.937**	-.892**	-.903**	.850**	.964**	-.910**	-.903**	1	.746*	.832**	.946**	
	Sig. (2-tailed)	.000	.000	.001	.000	.002	.000	.000	.000		.013	.003	.000	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Public administration, defence, education, human health and social work activities	Pearson Correlation	-.583	-.911**	-.951**	-.922**	.438	.589	-.502	.851**	.746*	1	.933**	.903**	
	Sig. (2-tailed)	.077	.000	.000	.000	.206	.073	.139	.002	.013		.000	.000	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	Pearson Correlation	-.689*	-.894**	-.916**	-.973**	.462	.722*	-.567	.846**	.832**	.933**	1	.917**	
	Sig. (2-tailed)	.027	.000	.000	.000	.179	.018	.087	.002	.003	.000		.000	
	N	10	10	10	10	10	10	10	10	10	10	10	10	
R&D expenditure	Pearson Correlation	-.852**	-.986**	-.977**	-.961**	.716*	.863**	-.789**	.924**	.946**	.903**	.917**	1	
	Sig. (2-tailed)	.002	.000	.000	.000	.020	.001	.007	.000	.000	.000	.000		
	N	10	10	10	10	10	10	10	10	10	10	10	10	

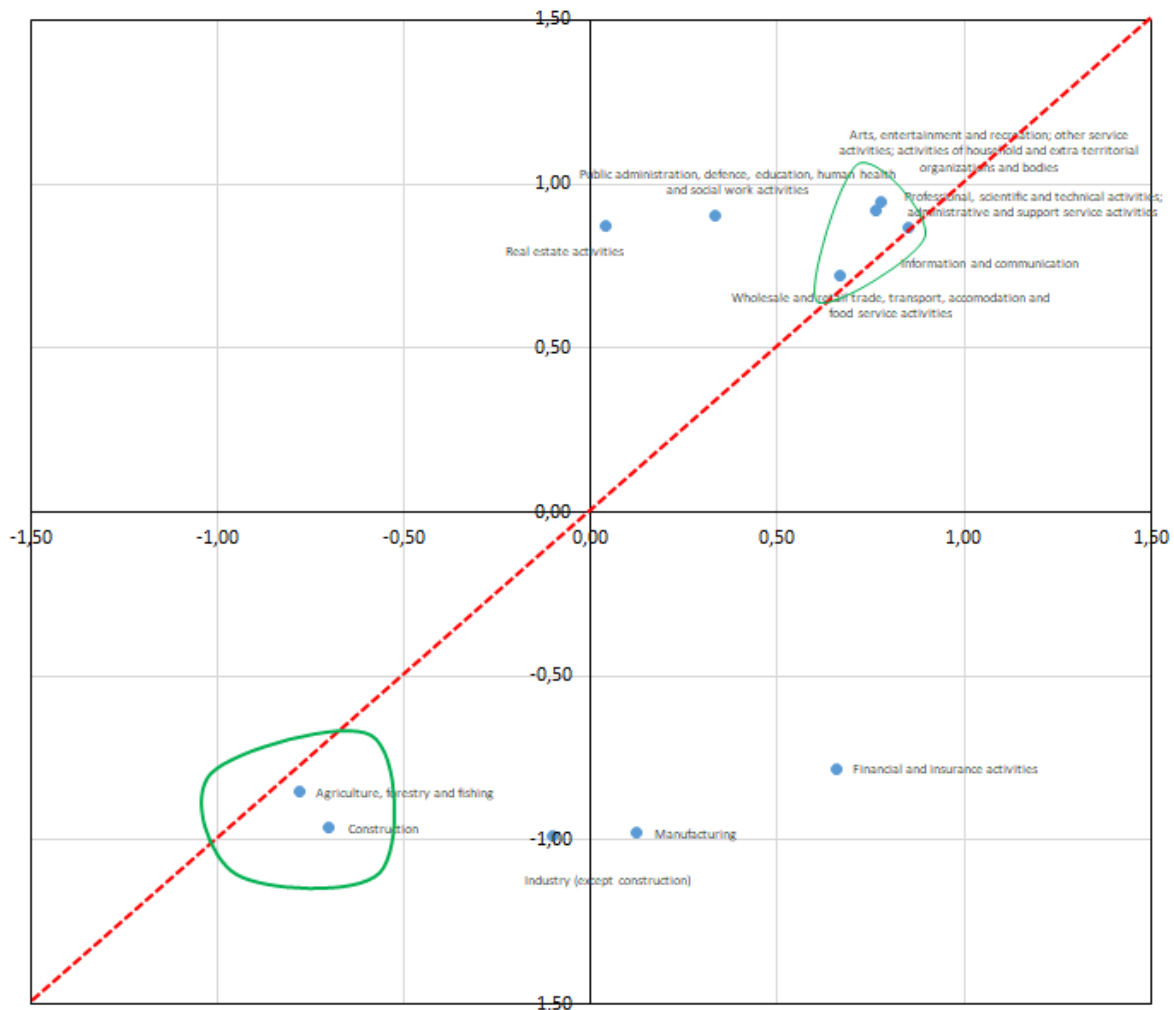
** . Correlation is significant at the 0.01 level (2-tailed).

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

The tables also show whether or not there is a correlation between the dynamics in the share employment by economic activities in Bulgaria and the EU, which should allow for further research into the interrelationship of economic sectors by similar factors and dependencies affecting specific areas.

Figure 6 presents the relation between the correlation coefficients of change in share employment in 2018 compared to 2009 in the sectors and expenditure on R&D in the EU28 and Bulgaria. The horizontal axis shows the values for Bulgaria and the vertical axis - the values for the EU28. The red dashed line shows the complete matching between the correlation coefficient for Bulgaria and the EU28. It can be clearly seen that in two sectors there is a pronounced negative proximity in the correlation link, namely the sectors Construction and Agriculture, forestry and fisheries. In four sectors there is a clear positive link between the Trade, transport, hotel and restaurant business sectors, Creation and dissemination of information and creative products, Professional activities and research; administrative and support activities, Culture, sports and entertainment, repairs of household items, and other activities. These data clearly show in which sectors the R&D expenditure ratios have a similar attitude and in which economic activities the change is similar.

Figure 6. Correlation coefficients between the dynamics of the share employment by economic sectors and the expenditures for research and development in Bulgaria compared to the EU28 for the period 2009 - 2018



As a result of the study it should be noted that governments need to rethink their public policies. Possible analyses provide the following conclusions and guide through necessary changes. Clearly there has been a rapid development of technology over the last decades, with a significant relationship on economic sectors. This phenomenon is now referred to as the "Fourth Industrial Revolution", part of the globalization processes. It happens because of a technology merger that ranges from a variety of digital technologies, new materials, new processes (OECD, 2018). All these have certain consequences, such as a change in the nature of jobs. This is because these technologies are transforming production and will have long-term effects on productivity, employment, skills, income, dissemination, trade, well-being and the environment. The policies of states will face new realities that have political and economic consequences. One of the markers of globalization noted above is that of a structural change in the economy, which consists in a significant movement of GDP shares from agriculture to the services sector. Labour reality is changing and becoming more complex. Some professions can be automated through the use of robots and AI, other professions and activities are changing and new forms of labour are being created, while at the same time some other forms of work remain unchanged.

However, it is difficult to separate the effects of technology from those of other structural changes, such as changes in institutional systems and social norms, globalization of production and markets, labour, education and tax policies. While technological advances have contributed to the elimination of certain jobs over the last two centuries, new technologies have also helped create jobs (UN, 2017). Technological progress is widespread and the distributional effects in some sectors are positive, while in others - negative. In general, the main motivation for introducing new technology in one workplace is to increase labour productivity. Occasionally labour is replaced by capital, but seldom entire professions are replaced. Instead of eliminating professions, technology changes the way jobs are completed and the number of people needed to complete the tasks. By introducing new tools and techniques, technological advances sometimes change the tasks that the profession requires. Bessen (2016) characterizes the automation seen over the past half-century as "partial" automation, and therefore fears that capital will completely shift work in some industries in the new digital reality should not be considered as a likely hypothesis. Surely, however the new labour realities will lead to new requirements for the competences of workers, to changes in employment relationships, and from there towards new social security provisions.

Skills and competences for the new jobs

The development of technology, as evidenced by the research carried out, necessitates a change in the labour market, namely the increasing demand for highly specialized workers. Due to the superimposed realities and the opportunities that globalization processes provide, along with technological development, the jobs themselves will become more flexible and less secure. This will lead to new key competencies that will be sought. Creating a skilled workforce for future work is based on a growing demand for advanced cognitive skills, socio-behavioural skills and adaptability. The ability of an employee to adapt quickly to the change is increasingly appreciated by the labour market. The sought-after trait is adaptability - the ability to respond to unexpected circumstances and quickly unlearn and learn again. This trait requires a combination of certain cognitive skills (critical thinking, problems) and socio-behavioural skills (curiosity, creativity) (WB, 2019). All these skills are formed in early childhood and the formal education systems need to be reformed and adapted to the changing environment. Some countries in Western Europe such as France faced this change by having children start school at the age of 3. In addition to building key competences needed by future workers, the risk of poverty for entire families is reduced as the child begins to attend compulsory educational institutions and parents and, more often, the mother, are given the opportunity to start work and re-enter the labour market, and hence to contribute to the social security system. In addition to early childhood education, higher education comes to the forefront (see Dimitrova, 2019).

According to the World Bank (2019), the changing nature of work makes higher education more attractive in three ways. First, technology and integration increase the demand for general cognitive skills of higher order - such as solving complex problems, critical thinking and advanced communications that are sorely needed in new jobs, but cannot be acquired only through training, but through education. The increasing demand for these skills leads to higher wages for higher education graduates while reducing the demand for less educated workers. Second, higher education increases the demand for lifelong learning policies. Workers are expected to have multiple careers, not just a few jobs throughout their lives. Higher education, with a wide range of course offers and flexible models for acquiring online education and open universities, is responding to this growing demand. Third, higher education - especially universities - is becoming more attractive in a changing world, serving

as a platform for innovation. The importance of higher education systems for the future of work depends on how well they handle these three areas. Increasingly, skill acquisition is a continuum, not a finite, unchanging path (WB, 2019). Flexibility is increasing and should happen so as to guarantee a sustainable economic development.

Social policy and tax systems for the new jobs

Undoubtedly, the threat posed by globalization and technological change in jobs and the loss of security with increased flexibility is precisely the increase in inequality. That is why the social systems must respond to such a challenge. The traditional mixed social model will not be sufficient as a response to the new realities of the labour market. In this sense, the eight-hour working day with the salary received, even more so in the presence of a minimum statutory limit, hence the costs of social security by the employer and the employee, and in case of any insurance risk occurring, will not correspond to the flexible jobs. The increasing role of the capital-coverage pension system should not be ignored, especially since the fiscal pressure from the expenditure side will increase onto the budget. Traditional employment relationships are based on an unlimited, permanent and direct full-time contract with a single employer. As a result of digitalization, the development of the "economy of platforms" and the emergence of new forms of employment, the border between employers and employees is increasingly blurred. Changes in employment patterns affect the balance of responsibilities between employers and workers and in some cases workers' responsibilities with regard to working conditions are likely to increase, for example with regard to health and safety at work and working hours. Despite the changes in employment patterns, decent work conditions must be guaranteed for all (EC, 2017). The World Bank (2019) believes that this fact is surmountable by the presence of a social minimum, which includes a range of social benefits and programs that provide financial support to a large proportion of the population, or even the whole, that is, a form of unconditional basic income. Already being under pressure, the worker, by the worries about available capital, expanded social assistance is highlighted by the increasing risks in the labour market and the importance of providing adequate support, no matter how a person is engaged in the labour market. A guiding principle for enhancing social assistance is progressive universalism. The aim of this approach is to extend coverage while giving priority to the poorest people by increasing coverage levels, which in fact reduces inequality and the risk of poverty. Compulsory income-based contributions are also required and will not disappear. The expanded coverage of social assistance and the provision of subsidized social security imply a greater role for governments. Progressive universalism requires a gradual expansion in line with the prevailing fiscal space. Increased social assistance and insurance reduce the burden of regulated work. Lower labour costs improve firms' adaptability to the changing nature of work, while encouraging more formal employment, especially for new entrants in the labour market and low-skilled workers. Informal workers may also be better protected. However, the right balance between regulation and job creation must be maintained. The additional support for gaining new skills as well as new arrangements to strengthen the representativeness of workers' associations are all the more important. Effective representation of both official and informal sector employees ensures that the element of "security", of the "flexible security" is maintained (WB, 2019).

Regulations on the labour market should be reconsidered. Increasing flexibility for businesses comes with a stronger social protection, job placement mediation and assistance, programs and arrangements to strengthen the trade union organizations. In addition to the basic provisions, protection must be provided for all working people, regardless of their participation in the labour market, as part of a holistic approach to social protection and

labour institutions. This approach would provide additional protection for many workers - often the most vulnerable - who are effectively excluded.

Tax systems also need reform. Property taxes in cities, excise taxes on sugar, tobacco and carbon taxes are among the ways to increase budget revenues. The focus should be shifted from labour taxes to others in order to prevent fiscal pressure from the expenditure side.

Conclusion

The results of the study show that technology changes the skills needed for work - the requirement for skills that can be replaced by technology decreases. Technology is blurring the boundaries of the company, as evidenced by the increase of market platforms. Utilizing digital technology, entrepreneurs are creating global platforms that are different from the traditional manufacturing processes dominated by input-output systems. In the EU and Bulgaria, there is a transfusion of labour from the primary and secondary (type) to tertiary based on the relationship between scientific and technological progress. Such a reality leads to the need of rethinking the public policies in the field of education, social and fiscal systems of the country. If aspirations are linked to opportunities, then the conditions for inclusive, sustainable economic growth are achieved. But if there are inequalities of opportunities or a mismatch between available jobs and skills, the frustration can lead to a migration or a fragmentation of society.

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