

## **“INDUSTRY 4.0” – CHANGING THE ECONOMIC AND SOCIAL REALITIES**

In September 2017, the Faculty of Economics and Business Administration at Sofia University “St. Kliment Ohridski”, the Department of Economics at the University of National and World Economy (UNWE) and the Institute of Economics at the Bulgarian Academy of Sciences, jointly organized an international scientific conference devoted to the “Industry 4.0” phenomenon, the rapidly developing digital technologies and the economic and social effects they have on industrial production, business and society. The scientific forum entitled “Economic and Management Policies and Challenges: Towards Industry 4.0 - Technologies vs Ideologies” was held on 29-30 September at the Rectorate of Sofia University “St. Kliment Ohridski”.

This conference is the second one organized jointly by the three institutions in the framework of the series “Economic Challenges”. Last year, on October 21<sup>st</sup> and 22<sup>nd</sup>, 2016, the International scientific conference “Economic Challenges: Migration, Globalization, Sustainability and Policies” was held at the University of National and World Economy.

The purpose of the the scientific forum in 2017 was to focus on the relatively new topic of Industry 4.0 in Bulgaria and to enable researchers, economists and representatives of industry, business and government institutions to discuss the economic, managerial and social implications of the development of modern digital technologies and their application in industry and business.

The official opening of the forum was attended by Prof. Anastas Gerdjikov, Rector of the Sofia University “St. Kliment Ohridski”, Prof. Statty Stattev, Rector of the University of National and World Economy, Prof. Alexander Tasev, Director of the Institute of Economics at the Bulgarian Academy of Sciences and Mrs. Mariya Gabriel, European Commissioner for Digital Economy and Society (via video address).

The conference was opened by the Rector of Sofia University who welcomed the participants and expressed his satisfaction with the fact that the event has become a significant and traditional scientific forum. He noted that it included the three most serious organizations that produce scientific results in the economic field – the Sofia University, the University of National and World Economy and the Institute of Economics at the Bulgarian Academy of Sciences. Prof. Gerdjikov also addressed the question of whether the future of the economic thought is related more to technologies or ideologies and noted that the law correctly banned political parties' activities at the universities, but stressed that it is at the universities and the Bulgarian Academy of Sciences where the policies of the future should be developed.

For his contribution to the development of the academic cooperation between Alma mater and UNWE, Prof. Gerdjikov awarded Prof. Stattev with the Honorary Sign of the Rector of the Sofia University "St. Kliment Ohridski". "It is clear that as a result of this cooperation, our power is not twice as great as if each of us was struggling for himself, but far greater", Prof. Stattev said, and thanked for the recognition and the fruitful collaboration. The participants in the conference were also greeted by Prof. Alexander Tasev, Director of the Institute for Economic Research at the Bulgarian Academy of Sciences and Mr. Ognian Trayanov, Chairman of the Bulgarian Association of Information Technologies.

*Prof. Joachim Schwalbach* from the Humboldt University in Berlin expressed his joy at the long-standing and successful cooperation with Sofia University and highlighted the collaboration with his Bulgarian colleagues in various fields such as digitization, industry, technologies and others. He stressed on the wide variety of challenging topics that were being discussed within the forum, concerning not only business but also the future development of society as a whole.

The European Commissioner for Digital Economy and Society *Mrs. Mariya Gabriel* congratulated the participants in the conference with a special video address. She welcomed the guests and thanked for the invitation to take part in this wide-ranging discussion, drawing the attention to such an important topic for the European economy and society as Industry 4.0. Mrs Gabriel noted that today we could put a sign of equality between Industry 4.0 and the powerful digital technologies because the industrial production in Europe, which is a significant part of the economy, is undergoing a major transformation, and digitization is at its heart. This digitization has the potential to create new types of jobs and to provide European consumers with the most up-to-date goods and services.

According to her, digitization means more than the introduction of new information and communication technologies or a high-speed connection. It is a complete transformation of what, where, how and why we produce products and how we shape them; it is a total transformation of workers' skills, of the services and supply chains. "Today, it is clear that digitization improves the competitiveness of our industry by reducing costs and developing innovative products and services," said Mrs. Gabriel, adding that rapid technological advances lead to changes in the labor market. On the one hand, jobs disappear, but on the other - new ones appear, responding to the new realities and requiring new specific skills.

She mentioned good practices within the initiative "Digitizing European Industry", which aims to ensure that every sector of the economy can take full advantage of the digital innovation. For that purpose, Mariya Gabriel proposed the creation of a network of digital innovation hubs in Europe. One of the main priorities being to have such a hub in each region by 2020 and for each company to find support. She also pointed out that Industry 4.0 is the future of production and that in order to be ready for the challenges it presents we need an approach involving all stakeholders (the public and private sectors, academic circles and civil society),

and stressed that this conference is a step forward in this respect. At the end of her speech, Mrs. Gabriel wished the participants a fruitful discussion and bold ideas for the future.

Within the framework of the event, *Prof. Anastas Gerdjikov*, the Dean of the Faculty of Economics and Business Administration *Assoc. Prof. Teodor Sedlarski*, the *President of the German-Bulgarian Chamber of Industry and Commerce Mr. Tim Kurt* and the *Chief Manager of the Chamber Dr. Mitko Dimitrov* signed a Cooperation Agreement between the Sofia University “St. Kliment Ohridski” and the German-Bulgarian Chamber of Industry and Commerce.

The agreement provides for a cooperation between the Sofia University and the German-Bulgarian Chamber of Industry and Commerce in the preparation of highly qualified specialists in the field of economy and management, in close interaction with German business. The two organizations agreed to cooperate in discussing the curricula of the subjects taught in the Bachelor's and Master's programs of the Faculty of Economics and Business Administration in accordance with the current needs of business. The agreement also provides for the exchange of lecturers, guest lecturers and visiting researchers; the discussion of research papers, including participation in research seminars, scientific and practical conferences and discussions; joint participation in projects under national and international programs; joint specialized trainings, round tables, conferences and other events, in accordance with the needs of the practice, as well as visits to enterprises, which are members of the German-Bulgarian Chamber of Industry and Commerce and have achieved high results in their field.

After the introductory part, the scientific conference continued with scientific sessions on topics related to Industry 4.0, the economy in general (including the green economy), finance and accounting, innovation and technologies, entrepreneurship, education, etc. Concurrent events were also held, such as the “Global Compact Network Bulgaria” Panel, representing the UN sustainable development goals, the Responsible Education in Management Discussion, a scientific seminar on the Solidarity Economy in the Industry 4.0 era, a PhD student panel and Youth Entrepreneurship Exchange.

### **“Economic and Social Challenges Related to Industry 4.0”**

The first panel, moderated by *Prof. Statty Stattev* (University of National and World Economy), was dedicated to both: a more general presentation of the concept behind the Industry 4.0 phenomenon, as well as to its specific aspects.

*Prof. George Chobanov* (Sofia University) associated the fourth industrial revolution with the overall digital robotization of human society and predicted that it would lead to major economic changes whereby robots will replace people in almost all human economic activities. Together with the overall changes in numerous economic sectors and the banking system that would be fully automated, Industry 4.0 is likely to lead to dramatic social consequences for human

society, increasing both - labor productivity and unemployment. However, according to Prof. Chobanov, this is not necessarily a negative effect, because higher productivity could allow the introduction of minimum basic income for all members of a society, while the bigger amount of leisure time could lead to the development of new economic sectors that provide opportunities for recreation and entertainment.

With her report “Innovative Cities - a Concept for Development in Conditions of Enhanced Technological Change” *Prof. Rossitsa Chobanova* (Institute of Economic Research at BAS) contributed to a better understanding of the idea of innovative cities as a concept for territorial development in the era of accelerated technological change. In this respect, she characterizes innovation as a function of the city, identifying its nature and specifics, as well as the prerequisites for its creation. Four types of innovative urban development and the stages of their development were presented. Prof. Chobanova concluded her speech with recommendations for the construction of a modern innovative city management.

*Prof. Dieter Fleming* (Technical University - Berlin) provoked the audience’s interest with his research on the development of Energy 4.0, in which he presented practical approaches to energy technologies in European cities.

Within this panel, good practices for the introduction of Industry 4.0 high technologies were also presented by two German companies operating in Bulgaria – “Festo Production” and “ABB Bulgaria”.

### **“Institutional Framework of Industry 4.0”**

The second scientific panel of the conference was led by *Prof. Rossitsa Chobanova* from the Institute for Economic Research at the Bulgarian Academy of Sciences.

Its opened with the presentation of *Prof. George Chobanov* (Sofia University) entitled “The Rose Road as a Shortcut to the Modern Silk Road”, where he expressed his view on the possible participation of Bulgaria in the large-scale initiative of the Chinese president for the modern equivalent of the ancient Silk Road trade routes - the Belt and Road Initiative - a multibillion-dollar project involving more than 60 Asian and European countries, connected by land, rail and sea transport. Prof. Chobanov proposed a shortcut to the Silk Road, passing through Bulgaria, called “The Road of the Rose”, as Bulgaria is known for its rose valley and holds the second place, surpassed only by Turkey, in the world's rose oil production. The city of Bourgas and the Bourgas port could serve as a logistical center of the Silk Road both on land and sea, with a further railway link to Sofia and Central Europe. The current Chinese government’s initiative is an excellent opportunity to deepen the economic cooperation and trade between China and Bulgaria.

This discussion was further developed and enriched by the presentation of *Dr. Ivaylo Gatev* (University of Nottingham in Ningbo, China), who talked about the Eurasian land transport in the era of hyper-connectivity.

The role of Industry 4.0 standards was the topic of the research of *Prof. Barbara Engels* (Cologne Institute of Economic Research - IW Köln eV). She stressed on the importance of having global standards as a key to the successful implementation of Industry 4.0 and Digital Transformation. In order to be able to communicate smoothly with each other, all elements of a network need a common language, expressed in the process and product data standards. She presented her research on digital transformation standards based on a 2016 IW Future Panel dataset that surveyed approximately 1,200 companies in the industrial sectors. The survey's results clearly show that the majority of German companies consider standards important for digital transformation. However, companies that have already introduced standards, have often done this not from a strategic point of view but rather in response to the requirements of their customers. The probability of adopting standards increases with the existence of a corporate digital strategy, the volume of turnover and the number of partner companies. The main obstacles are the doubts about the costs and benefits, as well as the lack of standardization among the customers and suppliers. Thus, the study shows that the lack of standardization acts as a brake to digitization. Although standards are needed for the digital transformation, companies start accepting them only when they are at an advanced stage in the process. This means that non-digital companies are preventing their digital counterparts from taking advantage of the networking effects of standardization.

The subject of the research of *Prof. Plamen Chipev* (Institute of Economic Studies at the BAS) was the neoclassical model of the economy and the adequacy of the main economic paradigm and its postulates and conclusions. He noted that the failure of the traditional theory's defenders to recognize and acknowledge even the most controversial claims of dominant theory raises many questions, such as what the most important points of the obsolete paradigm are and what makes them so indispensable.

*Assoc. Prof. Mariya Neycheva* (Burgas Free University) continued the macroeconomic analysis with her paper on the neoclassical growth model developed by Mankiw, Romer and Weil (1992). As one of the most widely used assessment tools in empirical growth research, the original model underwent a number of expansions and developments. They were the subject of the presented research focused on the mathematical description of the model as well as on the key contributions related to its structure and assessment methods.

*Chief Assist. Prof. Peter Stankov* (University of National and World Economy) focused on the dynamics of right populism and macroeconomic shocks in Germany and Bulgaria since 1980. He used data on the authoritarian populism by Haino (2016) and combined them with data on the macroeconomic and social shocks. The applied empirical methods produced the following conclusions: 1) the growth of income per capita coincides with an increase in right-wing populism; 2) inflation plays a statistically significant but politically insignificant role; 3) a rise in

unemployment, income inequality, trade openness and net migration are all associated with an increasing electoral support for right-wing populism; 4) right-wing populism increases despite the simultaneous increase in government social spending; 5) the effects are stronger after the Great Recession; 6) there are significant differences in how right and left electoral support for populism is associated with macroeconomic and social shocks.

*Assist. Ignat Ignatov* (Plovdiv University "Paisii Hilendarski") focused on the specifics of the econometric modeling of the Keynesian cost multiplier, showing how the multiplier as a macroeconomic variable represents a mediator between the fiscal impulses and the real economy. On the basis of its dynamics, it can be concluded that a single value of the multiplier does not exist. The fact that its magnitude varies according to various factors complicates the prediction of its value at a given time and hence the prediction of the fiscal policy's effects on the economy. In this direction, the econometric estimation of the multiplier could reveal certain features of the multiplier, and in turn serve to describe its future dynamics.

The role and influence of the transaction costs and the institutional change in trade disputes in Bulgaria were analyzed by *Chief Assist. Prof. Shteryo Nozharov* (University of National and World Economy) and *Chief Assist. Prof. Petya Korolova-Nozharova* (Veliko Tarnovo University "Todor Kableshev"). The research presented by them used the methods of the new institutional economy to identify the existence of indirect (hidden) transaction costs in trade disputes in Bulgaria. For its purposes, a statistical model was developed to measure this type of transaction costs. According to the paper's authors, market efficiency and economic growth could not be achieved without identifying and measuring the existing transaction costs. The convergence of the Bulgarian economy with that of the European Union also depended on the availability and amount of transaction costs. As an additional result, an attempt was made to measure the effectiveness of the institutional change in the commercial justice system and the impact of the judiciary reform on the business turnover. The conclusion that was made is that the disputes over the existence or absence of a judicial reform, as well as its effectiveness, could also be resolved through the economic approach. The increase or absence of a reduction in the transaction costs in the resolution of trade disputes would show the ineffectiveness of the judicial reform. Vice versa, their reduction would mean that an effective judicial reform is achieved.

### **"Industry 4.0 - Ideology or Technology?"**

The scientific panel dedicated to the discussion of whether the phenomenon Industry 4.0 belongs solely to the technological field, or is rather a bearer of a new type of ideology, was led by *Assoc. Prof. Stella Raleva* (University of National and World Economy) and provoked an interesting discussion among researchers, lecturers and business representatives.

*Assoc. Prof. Krasimira Schvertner* (Sofia University) presented the technological factors in the digital transformation of business as components of Industry 4.0. She described the "Industry 4.0" phenomenon as a current trend in the automation and data exchange in manufacturing technologies, including cyber-physical systems, the Internet of things, cloud computing, and cognitive calculations. Collecting and providing data, horizontal and vertical integration, cloud computing, large data analysis, mobile and social technologies and the Internet of things are some of the core components of the fourth industrial revolution.

Industry 4.0 is related to the digital transformation of business, industrial markets and manufacturing and requires a strategic vision that includes modern robotics, augmented reality, simulation, horizontal/vertical integration, the industrial Internet of things, cloud technologies, cybersecurity and big data and analysis as leading technologies in the concept.

*Prof. Schvertner* presented the possibilities for digital business transformation as changes related to the implementation of digital technologies in all aspects of business. A digital business survey found that the maturity of the digital businesses focuses on the integration of digital technologies, such as social, mobile, analytical/big data and clouds, in the transformation of the way businesses work. Companies where big data, cloud, mobile, and social technologies are critical parts of the infrastructure are or will soon be more profitable, with higher revenue and a higher market rating than rivals without a strong vision.

However, the research also shows that, similarly to all emerging technologies, there are also significant challenges connected with data security, the lack of interoperability with existing information systems, and the lack of control, which hamper their wider adoption.

Continuing the discussion on the technological aspect of Industry 4.0, *Dr. Daniel Molt* (Hamburg University) and the *PhD student Nevena Krusteva* (Sofia University) presented a paper on the forecasting of business processes through Petri networks. According to the authors, through the presenting of the organization as a system, it is possible to model any kind of organizational change and thus to define the criteria for the initiation of those changes. Based on the Business Process Reengineering (BPR) theory, they assumed that the modeling of complex systems of systems (SoS) could be improved by BPR methods combined with ultra-high-quality Petri networks.

The innovativeness of the research stems from the use of graphically modeled modeling techniques (high level Petri nets) to explain the changes in the technological processes based on the concept of the organizations' reengineering. The paper included an analysis of economic case studies and models of information science to allow the application of the modeling theory in business informatics.

*Chief Assist. Prof. Monika Moraliyska* (University of National and World Economy) and *Albena Antonova* (Sofia University) analyzed Industry 4.0 as a technological, economic and social trend, looking at the ideology behind its

transformation processes from a micro perspective. For that purpose, they outlined the main concepts behind the new institutional framework and the tools to help organizations tackle new technological challenges; they presented the EU policy initiatives for the introduction of the next revolutionary transformation into SMEs and the empirical data from Bulgarian SMEs illustrating the perception and practical application of Industry 4.0 in the Bulgarian industry.

The representatives of the company “NearSoft” *Mr. Vladimir Filipov* and *Mr. Plamen Vassilev* attracted the attention of the audience with their topic concerning the management of the production operations through Smart backbone Industry 4.0. According to them, Industry 4.0 offers an unprecedented opportunity for intelligent digital transformation but companies need to be ready for it with the right software. They presented their vision of what the industrial firms need in order to stimulate their production in the world of the Internet of things. They also discussed what Smart Manufacturing means and why companies need to start working on its deployment today.

“Digital skills as a key factor in Industry 4.0” was the topic of the empirical research of *Chief Assist. Prof. Nikolay Velichkov* (University of National and World Economy) and *Assist. Christina Stefanova* (University of National and World Economy). It focused on digital skills as a prerequisite for the development of Industry 4.0 and included an empirical analysis of leading indicators describing the level of development of the digital skills in the EU and Bulgaria. The results have shown that the more economically developed countries in the EU meet the new requirements of Industry 4.0 implementation faster, as they have achieved a significantly better performance in their digital skills development.

### **“Economy and Finance”**

The papers and discussions in this panel were in English, with moderator *Prof. Zhelyu Vladimirov* (Sofia University “St. Kliment Ohridski”).

The first paper was presented by *Assoc. Prof. Marcellin Yovogan* (Sofia University “St. Kliment Ohridski”), who emphasized the importance of intellectual capital as an important component of the overall capital of a business, especially with the continuous increase in the volume of knowledge-based services and activities. Compared with other elements of the business capital, however, the intellectual capital is more difficult to manage, identify and evaluate.

*Assoc. Prof. Yovogan* presented a research where he applied some of the existing methods for assessing the intellectual capital using data from Bulgarian companies from different sectors. The results have shown that the intellectual capital can vary across industries and there is no relationship between it and the financial profitability of the studied firms, as measured by traditional financial ratios.

*Assoc. Prof. Bozhidar Nedev* (Sofia University “St. Kliment Ohridski”) and *Assoc. Prof. Boryana Bogdanova* (Sofia University “St. Kliment Ohridski”) presented a topic connected with the behavioral model in the long-term revenues

from current portfolios on the Bulgarian Stock Exchange. They pointed out that the Momentum effect is one of the hardest challenges against the Efficient Market Hypothesis and that the standard compensation for risk does not account for or explain the abnormal portfolio profits. Thus, behavioural explanations of return predictability are associated with the pattern of long-horizon returns of momentum portfolios. The authors presented an analysis based on their study of the Bulgarian Stock Exchange.

The innovations in the banking security were addressed in the paper of *Assist. Prof. Petya Biolcheva* (University of National and World Economy), who highlighted the opportunities offered by Industry 4.0 in the banking sector and banking security.

Information technologies, telecommunications, security systems and monitoring merge into an integrated security system. She said that although it is not possible to determine how the security of the banks will look like in the future, the integrated security system will be able to organize itself and the process automatically, according to the identified needs. In addition, despite the high degree of banking security, human intervention will remain a major part of it – in the form of a manager who will use his/her intellect to tailor all processes and procedures. For the deployment of Industry 4.0, the banks will have to introduce different innovations in order to achieve the level of security needed to respond to the dynamic changes in the banking environment.

The capital requirements of the Capital Requirements Directive (CRD) were presented by *Prof. Nadya Velinova-Sokolova* (Sofia University “St. Kliment Ohridski”). She stressed that the financial crisis has revealed a vulnerability in the regulation and supervision of the banking system on European and global level. The new EU framework covers both the credit institutions and the investment firms, and sets the minimum amounts of own financial resources that banks need to have in order to cover the risks they are exposed to. Prof. Sokolova identified the EU’s contribution to the development of the new standards for capital, liquidity and leverage by the Basel Committee on Banking Supervision, adding that it ensures that important European banking specifics and issues are properly addressed.

A study on the “Effectiveness of the functioning of the financial management and control system in the municipality of Veliko Tarnovo” was presented by *Chief Assist. Prof. Daniela Yordanova* (St. Cyril and Methodius University of Veliko Tarnovo), who presented the role of the financial management and control systems in the state and local administrations for ensuring the economical and efficient implementation of activities in public sector organizations. In her study, she examined the efficiency of the functioning of the financial management and control systems and the obstacles to their effectiveness in the municipality of Veliko Tarnovo.

Accreditation, creativity and international recognition were the subject of the research of *Dr. Emil Gyorgov* (ACBSP Brussels) and *Dr. Jeremy Krips* (Tiffin Ohio, USA). In their view, there is a widespread recognition of the link between

educational level and prosperity. The evidence from the 2010 OECD PISA Assessment Program confirms the “high costs of low educational efficiency.” Nevertheless, governments, even in OECD countries, spare no more than 5% of the GDP for education and in many cases they make cuts. The authors believe that the applied austerity in the education sector is one of the reasons why the Europe 2020 target for 40% enrollment of young people in the higher education system have not been achieved.

A good example is the United States, which keeps on investing in the competitive world of international higher education and still hold the first place. Increasing the public education spending as a necessary investment for the success of the recovery from the financial crisis and the growth of private philanthropy traditionally represent the financing model of the American universities.

The authors of the paper think that the Bologna process has failed to provide guidelines including a set of standards for the creation of independent accrediting bodies to accredit universities and higher colleges in the European Union. They analyze the nature of the accreditation standards, as well as the requirement for transparency, accountability and reporting on the problems faced by higher education institutions, and point out five standards that could nudge “accreditation introverts in Europe towards a more extroverted approach” that can be taken on by universities in the United States and the rest of the world.

### **“Economy and Finance”**

The panel, moderated by *Prof. George Chobanov* (Sofia University “St. Kliment Ohridski”), included topics from different spheres of economics, finance and accounting, directly or indirectly related to the new digital technologies and Industry 4.0.

The study “Cryptocurrencies and Funding of Social and Anti-Social Projects” by *Dr. Milka Semova* (Sofia University “St. Kliment Ohridski”), *Assoc. Prof. Violeta Dimitrova* (Varna University of Economics) and *Assoc. Prof. Kaloyan Haralampiev* (Sofia University “St. Kliment Ohridski”) was aimed at exploring the capabilities of the platforms on which the cryptocurrencies were built, the community building and funding of social causes, as well as the analysis of the users' profile, the messages of involvement and the channels through which they reach the users of virtual currencies.

Using content analysis, examples were given in which users of cryptocurrencies are a target segment of non-profit organizations for attracting funds. Examples were given of both good cryptocurrencies that have a positive impact on the development of local societies, as well as bad cryptocurrencies that are used to finance terrorist actions, human trafficking and drugs. A statistical analysis of the profile of the crypto traders was also made. Based on an online survey of current users of cryptocurrencies in Bulgaria and potentially interested people attending training on the subject of cryptocurrency trading, the users' attitudes towards engaging in publicly important causes were studied.

*Prof. Maria Vidolova* (Sofia University "St. Kliment Ohridski") presented a report focusing on the application of IFRS 9 in banking and the need to make significant changes to a number of parameters in the banking information systems and to implement the regulatory requirements for the classification of exposures and the requirements of the applicable accounting framework regarding the calculation of impairment allowances.

*Prof. Iliyana Ankova* (Sofia University "St. Kliment Ohridski") and *Assoc. Prof. Nadia Velinova - Sokolova* (Sofia University "St. Kliment Ohridski") spoke about the challenges facing the Bulgarian insurance market. They explained the legislative project known as Solvency II, the implementation of which is essential for the provision of a stable and secure insurance market capable of delivering sustainable insurance products and supporting the real economy by implementing long-term investments and ensuring further stability. The authors also presented the new Solvency II requirements regarding the analysis and assessment of insurers' assets and liabilities.

Industry 4.0 and accounting were subject to an analysis by *Assoc. Prof. Petya Petrova* (St. Cyril and Methodius University of Veliko Tarnovo), who noted that the integration of modern information and communication techniques into the industrial production, along with the changes in people's lives, lead to changes in the corporate requirements and their management. The new mode of production also implies new requirements towards the type of information needed to make rational management decisions. As much of this information is a product of accounting, it outlines new opportunities for the development of the organization and its accounting technologies, the specifics of which were the subject of her study.

*Assist. Anika Petkova* (University of National and World Economy) presented the interdependence between the foreign direct investment, consumer spending of the households and their effects on the economic growth's dynamics, including the effect of this process on the country's imports.

*Chief Assist. Dimitar Damyanov* (University of National and World Economy) focused on the demographic challenges facing the European economies at the dawn of the fourth industrial revolution, focusing on the problem with the European population's aging. He analyzed the impact of the demographic changes on several economic processes so far, and forecasted some interactions between the demographic and economic processes in the EU in the future.

*Assoc. Prof. Bistra Vassileva* (Varna University of Economics) attracted the audience's interest with her research concerning the alternative tourism and the challenges of Marketing 4.0, pointing out that, in the context of the information society and knowledge economy, consumers are well informed and have high demands, the media space is in the Web 4.0 phase, and marketing managers are under constant pressure from the stakeholders. As a result, a transformation of the model of strategic thinking and the introduction of a new type of business processes to develop innovative and creative products and services is required.

These trends concern the tourism sector, as well, which is characterized by a constant growth on a global scale. The author presented the opportunities and challenges of Marketing 4.0 in the sphere of alternative tourism, and the results of a comparative study of the attitudes of small companies in the field of alternative tourism in seven European countries.

### **“Competitiveness, Entrepreneurship, Marketing”**

The first panel on the second day of the conference was held under the management of *Assoc. Prof. Maria Marikina* (University of National and World Economy).

It started with a report on the competitiveness of SMEs through advanced technology strategies, prepared by *Assoc. Prof. Nikko Kostovski* and *Assist. Snezhana Hristova* (University American College Skopje). In their view, technological change is one of the main drivers of competition. The effective implementation of sophisticated manufacturing technologies allows companies to simultaneously achieve economies of scale and scope. Consequently, investing in advanced production technologies is a strategic opportunity. The purpose of the analysis was to explore how advanced technologies can enhance the competitiveness of SMEs in the Republic of Macedonia.

The topic was continued by *Assoc. Prof. Elena Bundaleska*, *Assoc. Prof. Nikko Kostovski* and *Assist. Snezhana Hristova* (University American College Skopje), who spoke about the strategic planning of SMEs in Macedonia. They found out that most of the Macedonian SMEs often do not realize that spending time on fostering and promoting their internal culture and processes, as well as on setting long-term goals, is certainly paid off in the long run.

The analysis of the three authors examined the concept of formal strategic planning for small and medium-sized enterprises in Macedonia. They presented the findings of a critical analysis of the suitability of formal planning for SMEs in Macedonia, and identified some of the barriers which hinder the effective implementation of strategic plans.

Interesting conclusions were presented by *Mrs. Makedonka Dimitrova* (UAKS Institute for Entrepreneurship and Leadership Development), *Mrs. Ilijana Petrovska*, *Mr. Dimce Micevski* and *Mr. Marjan Bojadjev* (University American College Skopje) in their study “Social Media as a Tool for Customer Communication: Evidence from the Macedonian Start-up Community”. In today's technological age social media is a necessary tool for most businesses to communicate with their consumers. The authors focused on the awareness and benefits of social media as a communication channel between the participants in the Macedonian startup community. Their survey found that 60% of respondents fully agree that using social media as a communication channel with the consumers improves the image of the company. Contrary to Bayman and Hansen's (2012) findings, which conclude that only large companies are aware of the use of

social media, the survey proves that all 25 startup companies or 100% of respondents in the empirical study use social media to manage their business.

The paper on “The Participation in Industrial Clusters and the Opportunity for the Innovation of Organizations” by *Assoc. Prof. Ivan Angelov* (Sofia University “St. Kliment Ohridski”) proposed a modern understanding of the conceptual idea of clusters, as well as some practical applications implementing innovations in businesses. *Assoc. Prof. Todor Yalamov* (Sofia University “St. Kliment Ohridski”) presented an original view of the impact of the economic crisis on the main economic actors, and *Assist. Pavel Stoyanov* (Sofia University “St. Kliment Ohridski”) presented contemporary definitions and research on the issues discussed thus far in three aspects - security, technology and competitiveness.

*Chief Assist. Eduard Marinov* (Institute of Economic Research at BAS) spoke about the open access to scientific publications and their importance for Industry 4.0. With the development of digital technologies, and especially the opportunities for electronic publishing, open access publishing is becoming more and more global. Open access means unrestricted online access to scientific research and scientific data. *Chief Assist. Marinov* introduced the concept of “free access to research data in the context of Industry 4.0 and the Digital Single Market” and presented some of the main initiatives of the EU in this direction.

### **“Industry 4.0 and Bulgaria”**

This panel was moderated by *Assoc. Prof. Vanya Ivanova* (University of National and World Economy) and was opened by *Assoc. Prof. Desislava Yordanova* (Sofia University “St. Kliment Ohridski”), who presented a research on the entrepreneurship education and the technopreneurial intentions of Bulgarian students in science and engineering. She emphasized on the technological entrepreneurship as an important and attractive scientific field that is relatively unexplored and thus presents various new research opportunities (Shane and Venkataraman, 2003). The research objectives of the presented work were two: 1/ to investigate the influence of the participation in entrepreneurship education on the technopreneurial intentions of Bulgarian science and engineering students, and 2/ to determine the effects of educational variables, including content, pedagogical methods and learning from entrepreneurship education, on the technopreneurial intentions of Bulgarian science and engineering students.

The opportunities for re-industrialization in the European Union and Bulgaria were presented by *Prof. Iskra Hristova-Balkanska* (Institute of Economic Research at BAS). She related them to the objectives of the European structures for improving competitiveness on the basis of industrial modernization that would stimulate the production of goods with high added value. Raising the role of the industry helps to reduce unemployment and to create new jobs. It is important for the Bulgarian industrial policy and practice to adapt to the new conditions after the economic crisis and to enhance the industrial modernization.

*Prof. Zhelyu Vladimirov* (Sofia University “St. Kliment Ohridski”) stressed in his presentation that in the economy, based on knowledge, innovation is considered as a key driver of competitiveness and growth for companies and countries (Lundvall and Borrás, 1997). However, the data show that there is a significant and permanent gap in innovation performance between the old and new Member States of the European Union. Most of the Eastern European countries are moderate innovators, with the exception of Slovenia, while Bulgaria and Romania represent modest innovators (EIS, 2016). These economies face more challenges in the development of effective innovation policies, as their competitiveness is still based on relatively low production costs. However, their integration into the European and world economy forces them to improve their technological capabilities. It is therefore crucial that these countries decide what types of innovations they will support and how to do it in terms of budget constraints and trade incentives directed towards specialization in low value added activities.

Bulgaria's Digital Competitiveness in 2017 was analyzed by *Assoc. Prof. Maria Marikina* (University of National and World Economy). She related the adequacy of a country to make the right decisions for digital transformation to the need for the essence of the country's digital competitiveness to be clarified and presented in a comparative aspect. The object of her research was digital competitiveness, and its subject was the Digital Competitiveness Index as a measure of a country's ability to accept and explore the digital technologies that lead to the transformation of government practices, business models and society as a whole.

*Prof. Yossif Avramov* (Co-Chair of the Innovation Council and Member of the Management Board of the Bulgarian Chamber of Commerce and Industry - BCCI) completed the panel discussion by analyzing the way the strategies of the BCCI's Innovation Council to establish a Technology Transfer Center and a Center for the Selection, Financing and Development of Start-up Companies are embedded in the National Concept for Industry 4.0 which was approved by the Government.

### **“Sustainable Development and Green Economy”**

The last panel, led by *Prof. Iskra Balkanska* (Institute of Economic Research at the Bulgarian Academy of Sciences), started with a research on the impact of the exclusive use of renewable energy sources in modern economies and societies. According to its authors - *Prof. Dusmanescu Dorel* and *Assoc. Prof. Andrei Jean* (Petroleum-Gas University of Ploiesti, Romania) - the reasons for the rapid development of renewable energy sources are two: on the one hand, the need to reduce the massive pollution of the environment, including the pollution caused by the burning of fossil fuels, and on the other hand, the prospect of these fuels' exhaustion within a limited time frame. Moving towards a society and an economy based exclusively on renewable energy will lead to important changes in all aspects of public life. The two researchers analyzed the effects of switching to

the exclusive use of renewable energy sources on the economy and society. Since the comprehensive study of these issues goes beyond the authors' individual capabilities, the article explores the main effects in the following areas: energy production, industrial production, agriculture, transport and labor force structure.

A new understanding of the key competences was presented by *Prof. Albena Vutsova* (Sofia University “St. Kliment Ohridski”) and *Prof. Emil Mitov* (Sofia University “St. Kliment Ohridski”), who believe that the sustainable functioning of the companies is crucial in today's fast-changing market environment. Different companies that compete on a niche market achieve different outcomes due to certain market advantages or because of the lack of them. One of the important factors for creating long-term competitive advantages is the organizational key competence. Organizational key competences are part of the overall business process, but their extensive research has recently been expanded. The authors analyzed and presented the main elements of the organizational key competences and the factors that affect them.

A report on the “Promotion of eco-innovations and green technologies - a road to establish a new socio-ecological model of development in Bulgaria” was presented by *Assoc. Prof. Vanya Ivanova* (University of National and World Economy). In her presentation she stressed on the fact that the technologies and eco-innovations are the two most powerful pillars in the green economy's accelerated development. Being aware that the demand for organic products is constantly growing and that the opportunities for servicing the “green markets” have to follow it is essential for the successful future economic development. In addition, an ambitious and successful policy to promote the principles of the green economy is not only an opportunity but also an imperative need in order to modernize the economy. This policy must be able to provide the real sector with clear and precise rules related to eco-innovations. This is of particular importance both in terms of competitiveness and in terms of the need for greater environmental friendliness and experience in solving some of the global environmental problems. In her research, *Assoc. Prof. Ivanova* analyzes the measures that public authorities should undertake in order to accelerate the ecological transformation of production and stimulate the marketing of eco-efficient innovations.

This discussion was enriched by the presentation of *Dr. Milkana Mochurova* (Institute of Economic Research at BAS) and *Dr. Maria Kotseva* (Sofia University “St. Kliment Ohridski”, Institute for Economic Research at BAS) on an index for the assessment of the green economy in Bulgaria. The concept of the green economy covers various aspects and issues and aims to achieve synergy in the performance of different tasks. Therefore, it is not possible to measure progress with one or several indicators, but it is necessary to use a set of indicators, merged into one or several indexes. Various indexes have been developed, including: the Global Green Economy Index (GGEI), the Social Progress Index ([www.socialprogressimperative.org](http://www.socialprogressimperative.org)), the Leatthum Prosperity Index

([www.prosperity.com](http://www.prosperity.com)), the Sustainability Development Index ([www.sdgindex.org](http://www.sdgindex.org)) and the Human Development Index (<http://hdr.undp.org>). To assess the development of the green economy in Bulgaria, a modified version of the GGEI index was developed, focusing on the “green aspects” of the economy, namely RES, low-carbon development, environmental protection. The evaluation revealed and presented the unsustainable and inconsistent development of different green activities in Bulgaria and their insufficient rationalization and ineffective resource orientation.

*Assist. Prof. Vasil Gechev* (University of National and World Economy) drew the attention to the problem of globalization and income inequality, and expressed the opinion that the issue can only receive a legitimate response once the global poverty situation is reviewed carefully and an objective analysis of the changes in the different forms of income inequality is made. These two strands are the basis of his research, the results of which unequivocally show that: 1) there is no reason for globalization to be unilaterally associated with the deepening of inequality on a global scale; 2) the selective analysis of the effects of globalization, which are limited to certain countries or population groups, may lead to misleading assessments because it is a complex process, accompanied by both positive and negative effects on income inequality.

The opportunities and challenges before the Corporate Social Responsibility (CSR) in the changing digital environment were presented by *Prof. Irena Slavova-Georgieva* (University of National and World Economy). According to her, digital transformation is not just a technological and financial transformation but a fundamental social and ethical one. There is a trend towards increasing the pace of digital technologies’ deployment and use in the economy and society, as well as an increased focus on CSR. The main research question is how the digital environment changes the dynamics of the relations between business and society. The analysis of the “cross-points” between the digital technologies and the CSR is made in two aspects: on the one hand, these are opportunities that modern technologies provide to business organizations as solutions for socially responsible behavior, and on the other, there are numerous challenges that arise from the changing digital environment.

“Arguments for (or Against) State Support to Culture and Art” was the topic of research of *Chief Assist. Prof. Tony Kondzhov* (Sofia University “St. Kliment Ohridski”). He talked mainly about the economic issues related to the stage art. In that sphere, competition is imperfect and there are peculiarities in the marginal and average aggregate costs. Therefore, support from the public or private sector is needed and a limitation of state subsidy is recommended.

The panel was closed with the presentation of *Anton Vasilkovski’s* paper on the collective way of life in the Bulgarian village until the Liberation and the cooperative movement until the Second World War.

The PhD Panel, moderated by *Prof. Joachim Schwalbach* (Humboldt University - Berlin) and *Prof. Henrik Egbert* (University of Applied Sciences, Anhalt, Germany), included interesting papers concerning different areas of Industry 4.0, economics and finance.

*Theodora Marinova, PhD student* (Sofia University "St. Kliment Ohridski") presented a study on the new product development model including a conceptual methodology that analyzes whether and how consumer integration in this process positively affects the commercial success of the product.

*Chief Assist. Prof. Vasil Stoyanov* (Sofia University "St. Kliment Ohridski") shared his work on the relationship between the development of a new product and the needs of the user in the context of Industry 4.0, including consideration of the correlation between the investments in research and development (R&D) made for the development of new products and the total cost of the consumption of new goods and services. He also presented arguments regarding the discussion on whether the economy is currently entering the sixth wave of the Kondratiev cycle or the fourth industrial revolution.

*Tsvetina Lungarova, PhD student* (Sofia University "St. Kliment Ohridski") presented a study on the need to develop human, institutional and organizational capacity in the economy and the society in the context of Industry 4.0. She discussed the importance of answering the question of what new skills we will need to acquire as a result of technological developments. In her opinion, it is very important that we analyze and discuss this process extensively in order to establish the necessary capacity in the various social, institutional and organizational structures that would allow us to adapt quickly and effectively to the new status quo.

*Alexandra Mirchevska, PhD student* (Sofia University "St. Kliment Ohridski") raised the issue of global governance and its impact on the socio-economic aspects of an international system. She made a detailed overview of the concept of global governance and its theoretical analysis by reviewing the international system and its ways of managing socio-economic relations. By looking at the concept retrospectively, the hypothesis of the existence of a deep historical background of the institute of "Global Economic Governance" was examined.

*Dilyan Vassilev, PhD student* (Sofia University St. Kliment Ohridski) presented a paper on the theory of secular stagnation, which is both extremely difficult and attractive to model because of the major shortcomings of the applied macroeconomic models explaining different phenomena after the crisis, such as low inflation, low wages, slow growth, and slow growth rates.

In his work he found that, from the point of view of supply, there are a set of indicators such as demographic and productivity-related factors that could effectively "warn against" a slow secular stagnation in the medium and long term. The author also analyzed the interaction between demographics and innovations/productivity, as well as the relationship between the real neutral

interest rate and the potential growth in order to extract indicators serving as signs of such stagnation.

The study of the consumer demand for cloud services based on quantitative methods and information technologies of *Slavi Slavchev, PhD student* (Sofia University "St. Kliment Ohridski") continued the discussion on the previous topic. Its purpose was to present a thorough overview of cloud services and gain a better understanding of which economic factors have the biggest influence on the consumers' demand for them.

*Aleksey Potebnya, PhD student* (Sofia University "St. Kliment Ohridski") analyzed the presence of the brand in the digital space. He noted that the number of active players in the digital space is steadily increasing and that, like the people who build their digital identity, trademarks are actively working to create their own digital identity. The major research problem for the PhD student was to identify and explore the presence of brands in the digital age.

"FINTECH - transforming the financial sector under the influence of destructive technologies" was the topic of the innovative study of *Ruslan Tsankov, PhD student*, and *Stella Valeva* (University of National and World Economy). According to them, the massive use of the Internet, the increase in mobile services and the rapid processing of large databases lead to the emergence of innovative services and the formation of a new type of consumption that puts traditional sectors such as banking and insurance under strong pressure by virtual competitors. The purpose of the paper was to explore the economic reasons for the growth of innovations arising from destructive technologies. It was specified by an analysis of the major transformations in the Fintech industry and the example of leading companies in six major areas, covering the changes in payment services, savings and lending, investment management, business finance, insurance services and the role of new technologies such as artificial intelligence in the sphere of finance.

The authors made basic assumptions and economic predictions in the context of the new technologies and the pressing need of financial institutions to adopt digital transformation.

*Luboslav Kostov, PhD student* (University of National and World Economy) presented a study concerning the effects of economic growth on inflation and unemployment in Bulgaria in the period 2006 - 2016. He analyzed whether the theory of a positive link between economic development and inflation is confirmed in Bulgaria in this period. The analysis has been carried out by performing an econometric check of the preliminary collected data on quarterly indicators at national level. Following the addition of the laboratory effects in the survey, the results have shown three main trends: 1) the economic growth has had a positive impact on inflation in Bulgaria; 2) the economic growth has had a negative impact on unemployment; 3) The "Oaken Act" is valid, although there is a trend towards

the reduction of the negative correlation between growth and unemployment as a whole over time.

*Olga Ignatova, PhD student* (Sofia University "St. Kliment Ohridski") placed at the center of her work the new model of public-private partnership and its ability to contribute to achieving smart growth. She shared the view that in the new dynamic economic environment there is a growing need for united public and private sector efforts to respond both to the pace of development and the needs of a society. The European Union promotes research, innovation and entrepreneurship in all regions by complementing the European, national and regional instruments supporting these activities. There are a number of working models of PPPs and some of them are applied in Bulgaria. The article offers a new vision for creating a public-private partnership that could ensure smart growth in the country. The specifics of the public-private partnership and the evaluation of its effectiveness, on the basis of which a model of public-private partnership was developed, were analyzed.

*Snezhana Kondeva, PhD student* (Sofia University "St. Kliment Ohridski", Chairman of the Board of Directors of the Second Multiprofile Hospital for Active Treatment - Sofia) turned to the issue of the technologization of medical practice, which favors the increase in the average life expectancy of the population but presents new challenges to the health systems in Europe. One of them is related to the fact that high-tech medicine is increasingly blamed for the rising healthcare costs, but innovation is also a major factor in healthcare growth and efficiency. The aim of the presented study was to trace the changes, attitudes and expectations of doctors and patients in the new technological reality and the trend to create multidisciplinary teams, including new roles and professions, to ensure access to high-quality healthcare.

The economic and social risks of the higher institutional protection of property rights were the subject of the study of *Stoyan Shalamanov, PhD student* (University of National and World Economy). Without doubting the protection of the property rights as one of the most important roles of the state, the author presented two types of concepts - those that establish a correlation between the protection of property rights and economic growth and those who critically examine the matter and find that the institutional protection of property rights could lead to conflict between different social groups. Other trends were also considered, such as the observation that the stronger property protection may lead to weaker grey capital in the economy, increased inequality in some cases, and may even lead to a decline in economic growth.

Within this panel, the PhD students received valuable guidance and recommendations for their further research and scientific work.

\*

Within the scientific conference, several specialized panels were also organized with participants from different national and international institutions and business representatives. Two of them were related to the concept of sustainable development and the progress so far in achieving its ambitious goals.

The first discussion “Investing in Future Generations: Business Initiatives on Innovations and Jobs” took place after the first scientific panel and was moderated by Mr. Ognian Trayanov, President of the Global Compact Network Bulgaria. It began with an interactive presentation of the UN sustainable development goals by Mrs. Alexandra Tarazi, United Nations Global Compact, followed by a statement by Mr. Trayanov. Mrs. Detelina Smilkova, Chairperson of the Bulgarian Association of People Management, presented good practices in the field of human resource management and made forecasts for future trends in the field. The panel ended with the sharing of experience by the Human Resources Manager of Overgas Inc., who presented good practices from the management of the private Bulgarian School “Bulgarsko shkolo”.

Within the “Responsible Education in Management” Panel, *Mr. Nikolay Ivanov* (UN PRME, New York) presented the principles of the United Nations in the field of responsible education in management, followed by *Assoc. Prof. Irena Slavova* (University of National and World Economy) and *Dr. Marina Stefanova* (Sofia University “St. Kliment Ohridski”) who spoke about the corporate social responsibility in higher education in business and management, presenting and discussing the experience of Bulgaria in this direction.

In the panel discussion held on the second day of the conference entitled “Manifestation of Solidarity Economy in Industry 4.0” with moderator *Dr. Marina Stefanova* (Sofia University “St. Kliment Ohridski”) there were several topics that were discussed, such as group fundraising as a tool for solidarity in the digital environment (paper by *Dr. Marina Stefanova*), and the problems and prospects for the social and solidarity economy in the context of Industry 4.0 (research by *Prof. Nako Stefanov, Dimitar Matev and PhD student Tzvetina Lungarova*, Sofia University “St. Kliment Ohridski”). *Assoc. Prof. Teodor Sedlarski* (Sofia University “St. Kliment Ohridski”) was a participant in the discussion.

On behalf of the organizing committee, the conference was closed by Prof. Dr. Teodor Sedlarski, who thanked the participants from Bulgaria and abroad for the high quality of the presented papers and comments. He expressed his satisfaction that this series of joint conferences became a tradition of sharing the achievements of the Bulgarian and international economic scientific community and announced the intention of the organizers to include a broader range of institutions of national and international importance next year.

Prof. Dr. Habil. George Chobanov