

Development of New Business Opportunities for Sustainable Development – Lesson Learned from Pandemic Crisis

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ABSTRACT

During the pandemic crisis it was observed that the whole global economy was affected especially by severe disruption of supply-demand balance. Even so, the most affected were low-income economies because of lack of resources to redistribute in the sake of resilience and recovery. We cannot say that the developed economies were not affected, in real terms probably much more than the lower-income ones, but developed countries or regions were capable to dislocate huge financial support to overcome the crisis and to quickly regain the level before shock. The purpose of this research is to analyse the effects of health crisis over the economy. Because four crises are overlapping (health, energy, geostrategic conflict, and food), it is quite difficult to measure the impact of each driver with accuracy. To determine the impact of those four factors is necessary to understand the dynamic of productivity and competitiveness during shocks, even though we cope with health influence, energy prices, geopolitical turbulence, or food security. All in all, partially for energy crisis, the other crises were totally unexpected, and the response of humanity, global institutions, alliances, and association of countries is customized according to the evolution of turbulences. Here is the role of government because, from the capacity building perspective, there is necessary more integration between government, research/education, and business ecosystem in order to encourage innovation, creativity, and entrepreneurship. In the 4th Industrial Revolution, the main resource and key factor is knowledge embedded in every step of the process, embodied in equipment and machinery, on the one hand, and in human, on the other hand. Robotics, new materials, nanotechnologies, and digital environment give a new dimension to productivity and competitiveness. From this perspective, our goal is to demonstrate the supremacy of collaborative approach for shaping knowledge in the way of creativity, innovation, entrepreneurship, productivity, and competitiveness.

Keywords: productivity, competitiveness, crisis, sustainable development, knowledge economy

1. Introduction – Impact of COVID-19 on economy

In the global economy, the pandemic shock was reflected in an accelerated decreasing in 2020 and a slow recovery in 2021, as new waves of COVID-19 still coming (Popescu *et al.* 2021). During 2022, the performance increased, somehow to the level of 2019. For 2022, the total output exceeds 100 trillion US dollars, for the first time in history. The pandemic shock was reflected in a different ways throughout economic sectors, as long as IT&C and healthcare sectors performed well, also constructions, beverage and food sectors, despite of some difficulties in recovery of other sectors like HORECA

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(hotels, restaurants, catering), tourism, transportation, cultural activities (Burlacu *et al.*, 2020).

Due to pandemic effects over the entire socio-economic life, it was stringent to accept that digitalization makes the difference and replaces the downsizing of mobility (Sarbu *et al.*, 2021). Moreover, accelerating digitalization process because of health crisis, seems to be a game changer in the entire economy and social life (ILO 2020).

In this context, it occurred the concept of telework at the extended scale (Broughton *et al.* 2021). Another effect of sanitary shock was the observation that people with higher education were able to cope better with restriction threats and to find opportunities for development (Negescu *et al.*, 2021)..

During the pandemic crisis it was observed that the whole global economy was affected especially by severe disruption of supply-demand balance. Even so, the most affected were low-income economies because of lack of resources to redistribute in the sake of resilience and recovery (Burlacu *et al.*, 2021). We cannot say that the developed economies were not affected, in real terms probably much more than the lower-income ones, but developed countries or regions were capable to dislocate huge financial support to overcome the crisis and to quickly regain the level before shock.

At the same time, we can say that the interconnectivity of global supply chain was drastically affected, but more isolated economies (partially disrupted from global chain) were affected the most because the incapacity to restart the economic cycles, because of internal causes generated by the health crisis. The path of recovery is different even in developed regions, for example US is recovering faster than EU because it is a different model of economy where the administrative burden is lower.

Specific for the sanitary crisis was that is coming from outside the economic environment, but with dramatical impact on the supply side, on the one hand, and on the demand side, on the other hand). For the first time in the modern world economy, the cooperation between healthcare system, business environment, and ministration was much more present than ever. Basically speaking, the economic activities were developed considering pandemic forecasts.

From economic perspective, medical system has intervened to limit the effects of disease with great impact on human resources and the sanitary risk for doing business. From the same economic perspective, business environment has struggled to survive to mitigate the equilibrium between supply and demand, keep jobs, and deliver wages at a decent level with great impact also on the Human Capital and wellbeing. The role of government was very active in this framework with focus on regulation flexibility and financial support. In one way or another, in the center of this approach was situated the human factor (Radulescu *et al.*, 2021).

Another specificity for this sanitary shock is the effect over the entire world at the same time. Considering the last shock generated by the financial crisis in 2009, this was starting late 2007 in USA, then it contaminated step by step all the financial markets in the world. Now, the beginning of 2020 was a general lockdown for most of the important economic regions in the world. The end of the first quarter of 2020 marked the general spreading of the first wave of pandemic.

Critical for sanitary crisis was the downsizing of the demand and supply at the same moment. Even though Summer of 2020 marked the time of eliminating restrictions, the

second wave of COVID-19 determined a return to restrictions in the Autumn of the same year. This slalom between waves, lockdowns, outbreaks, and restrictions has continued in 2021, and the beginning of 2022 means the efforts for mitigation of the 5th wave.

Considering the development of pandemic crisis, it seems that June 2020 was the approximate time of the 1st wave ending, and some restrictions were starting to remove, step by step. This was an opportunity to restart the economy and to try to regain pre-pandemic path. Anyway, this decision was connected to each region or country evolution of crisis.

2. Literature review - premises for performance improvement

During the pandemic, there were many studies regarding the impact of COVID-19 over local or global economy and there were released considerable contributions to figure out the real situation and to find solutions for recovery.

Most of the studies are referring to the subject considering that a universal solution will be found, and the only one thing to address is to recover and to get back to the 2019 performance (Imai 1986).

As the things are evolving, we can say that conclusions are still far from what we can envisage today. In this respect, it is very important to identify the most relevant approaches (Stiglitz *et al.* 2014) for the subject of economic crisis considering the dynamic of productivity during pandemic era, then to find the key point to address and to provide kind of common adapted solution to deal with, in the post-pandemic time (Burlacu *et al.*, 2021).

From this perspective, some real facts deeply affect the way of doing business or develop economic related activities (Radulescu *et al.*, 2020). Of course, we have in mind here the administration, local development, research, and education as considering all these connected to the economic performance (Jessop *et al.* 2008).

Despite health approach, for sustainable development (Romer 1986) we observe that innovation, technological advance, and digitalization are the common solutions for fast recovery, but the common factor which cover these three fields is the knowledge and the process to manage knowledge in a smart way.

From a quantitative perspective, the more capital and labour the better the outputs (Ladaru *et al.*, 2022). But capital and labour from numerical angle don't speak too much about quality, effectiveness, and efficiency. Then, Solow (1956) has described this issue by introducing the concept of technical advancement where steady state is overcome by the qualitative inputs along capital and labour. Finally, endogenous growth theory (Romer 1990) considers knowledge as an endogenous production factor. Of course, at this point, the progress on analysing the residual of TFP is on the way, there were made significant steps ahead, but still need more efforts to understand the complexity of knowledge process in the context of Internet, Artificial Intelligence, the 4th Industrial Revolution, and others knowledge creation environments. For example, at global level, the contribution of labour factor to growth is declining, especially in the most advanced economies.

Additionally, a particular role is played by the SMEs. On the one hand, these are quite vulnerable in front of shocks, but on the other hand SMEs are flexible, dynamic, and adaptable to the new market conditions. The missed link is the role of government as

facilitator for supporting SMEs with access to financial resources, integrated policies (education-research-digitalization-competitiveness), renewed legislation, and robust institutional capacity for productivity and competitiveness. SMEs have a great potential for boosting innovation, creativity, entrepreneurial behaviour, all the premises for increasing productivity and competitiveness (Stankovic *et al.* 2021).

The SMEs sector is very important for the EU economy as far as more than 2/3rd labour is acting in this area, and more than 50% of value added in economy is creating by SMEs (Davis *et al.* 1996).

SMEs were the most affected by pandemic shock, first because the lockdown, then the lack of resources related to disruption on demand side, and lately because the necessity to allocate resources for surviving instead to invest (Samek Lodovici 2021).

There are necessary consistent efforts (Schumpeter 1942) to reorient the SMEs activities toward area of innovation, research, and creativity, to increase the capacity to collaborate with different actors from other sectors (universities, research institutes, local communities) and to be integrated in the global supply chain. Widespread digitalization is the next step in a new paradigm of development for SMEs, public services, electronic commerce, education, etc (Rossato *et al.* 2020).

At this point, we can conclude that the pandemic crisis was a speed up driver for knowledge intensive sectors and facilitate a higher adaptability context for digitalization, research, innovation, and education (Clar *et al.* 2015). Here is the role of government because, from the capacity building perspective, there is necessary more integration between government, research/education, and business ecosystem in order to encourage innovation, creativity, and entrepreneurship (Parker *et al.* 2005).

On a regular basis, teleworking approach of performing jobs is tailored to keep up with daily activity in the place of work, but in a remote way with the support of digital assets and IT&C tools and devices (Batuk *et al.* 2021). In this way, organizations plan to achieve the objectives, maintain the level of performance, and increase efficiency. Pandemic crisis was an accelerator of the process, even though the organizations were prepared to make this step to teleworking regime or not (Belostecinic *et al.*, 2022). By that time, the differentiator factor was the previous experience in teleworking, translated in the ability to perform work remotely and to dispose of the necessary tools to help this process. Considering the urgency of adopting teleworking system during 2020 (JRC 2021), there were adapted and developed different environments to facilitate remotely work:

- Legal environment – adopting the regulation for allowing employees to work from home
- Organizational environment – change internal conduct to assure the same productivity by teleworking approach
- Digital environment – developing online platforms for increasing the efficiency and effectiveness for remote work
- IT&C environment – endowment of personnel adequately to be capable to virtually perform jobs and interact each other

Despite the urgency of the moment, rearranging operational flows around teleworking matrix was a big challenge not only for individuals and organizations, but for systems, sectors, and administrations, too. Suddenly, collaboration based on face-to-face interaction

was hindered by the remote communication, with specific consequences for slowing down innovation and creativity at organizational level. It was a big challenge for managers to organize the space of work in the virtual arena and keep the employees motivated and result oriented.

To increase the productivity in this new environment, managers had to keep closer with their staff, to create an accurate framework for processes, timing, and schedules. After these years of health crisis, teleworking style of performing jobs became familiar, and the development of regulation, digital assets, IT&C capabilities, mentalities, and flows of activity, contributes to manage productivity performance in a new working environment.

3. Methodology of research – analysis of the factors

To understand better the interaction among productivity factors, we have to consider separately traditional factors such as labour and capital and analyse in depth the residual from TFP representation through Cobb-Douglas function of production.

Using derivation from standard Cobb-Douglas production function, a better representation of growth equation is:

$$W_L = Y/L$$

$$Y = Tfp * (K/L)^{(1-\alpha)} * I^\alpha$$

Where W_L = labour productivity

Y = output

L = labor input

I = Intellectual Capital

Tfp = Total Factor Productivity

α = elasticity coefficient of labour

TFP is embedded in the production flow at all stages and in all factors.

Basically speaking, we can say that for productivity we have following representation:

Productivity = hard production factors + soft production factors

Where productivity is W, hard production factors are KL and soft production factors are TFP, that means $W = KL * TFP$

We chose the concept of Intellectual Capital instead Human Capital for a better representativity of the entire environment surrounding innovation, creativity, and entrepreneurial behaviour of human being.

Our approach is keen with Including TFP and Intellectual Capital in the production function. In this way, we frame the entire picture of nowadays approach of the development. In the 4th Industrial Revolution the main resource and key factor is knowledge embedded in every step of the process, embodied in equipment and machinery, on the one hand, and in human, on the other hand. Robotics, new materials, nanotechnologies, and digital environment give a new dimension to productivity and competitiveness.

In the same way, the metamorphosis of Cobb-Douglas production function is reshaping under Solow technological advancement theory and Romer endogenous growth theory. The challenge for modern economists is to describe more accurate TFP and to treat it as a constant factor not as a residual. There were so many endeavours to do that, at level of individuals, and at institutional level, too. OECD, World Bank, EIT (European Institute

of Innovation and Technology), APO (Asia Productivity Organization) and many others, provide new measurement systems, aggregate indices, new methodologies, and standards for a better capture of TFP in the process.

Even of considerable progress, there is no unitary approach so far, and more efforts on standardization and accuracy of measurement are needed.

For the above formula, in order to address better the issue of productivity, we have to introduce the contribution of natural resources, expressed as Natural Resources Capital (Nr).

In such conditions, the production function will be:

$$Y = Tfp * K^{1-\alpha-\gamma} * Nr^\gamma (I * L)^\alpha$$

Where γ is the use of natural resources coefficient.

In our approach, the finding is: the deeper the knowledge is embedded in the process, the lower is the use of natural resources especially non-renewable ones. Continuing this rationale, in the spirit of Romer model of development, we can say that TFP is directly correlated with productivity of resources: the higher the TFP, the better the use of natural resources per unit of production is.

In the context of repetitive shocks in economy, the trend of investments is very problematic as long as the figures are not optimistic at all, considering the successive and sometimes overlapping crises of pandemic, energy, food, and war. The most affected sectors are research and sustainable development, considering the most part of investment is oriented towards short term response to effects of crisis. This will directly affect the technological advancement, as TFP is in the above equations, affecting the productivity in general and subsequently, productivity of resources. Political decisions for disrupting European economies from the traditional gas, oil, and agriculture products suppliers from Russia will hinder the productivity in the near future and sustainable development on the long run.

From this perspective, once more we make the apology of collaborative approach for shaping knowledge in the way of creativity, innovation, entrepreneurship, productivity, and competitiveness (Etkowitz *et al.* 2008). The need of a new business model development is more actual than ever in the context of need for synergy among key stakeholders from governments, business environment, technology providers, local communities, and research institutes.

The value added of this research consists of the findings that in the actual context, productivity and competitiveness is everybody's business. Letting the issue of productivity just in the manufacturing sector responsibility, or agriculture, this is no more realistic in the actual geopolitical context and successive crises.

2018 – 2019, it was developed KEP (Knowledge Economy Pyramid) model (Șerban 2019), when neither pandemic crisis, nor energy or war crisis were in place. At that time, this model was an evolved approach of productivity and competitiveness in the complex world of the 4th Industrial Revolutions. The evolving reality during 2020 – 2022, shows us that collaborative work in finding the best solutions for economic growth is the progress key from now on. As long as most of the crisis are starting to come from outside of economic landscape, there is necessary more than ever to enlarge the circle of collaboration in order to include actors from different political, economic, and social environments.

If we analyse the sensitivity of labour productivity and TFP during pandemic crisis, we can start with Cobb-Douglas formula:

$$Q = (A_K K)^\alpha (A_L L)^\beta (A_I I)^\gamma$$

Q = product; L = labour; K = capital; I = other inputs (as residual in the production function)

A_K = Capital productivity

A_L = Labour Productivity

A_I = Inputs productivity

By logarithmic approach, we have:

$$\text{Log}Q = \alpha(a_K + k) + \beta(a_L + l) + \gamma(a_I + i) = q$$

At this point, total derivative is:

$$dq = \alpha(da_K + dk) + \beta(da_L + dl) + \gamma(da_I + di)$$

For this representation of production function, we'll take TFP cycle as:

$$tfp_c = q - \alpha k - \beta l - \gamma i$$

Similarly with derivative approach representing above, we have:

$$dtfp_c = dq - \alpha dk - \beta dl - \gamma di$$

Then, total derivative of TFP is:

$$dtfp = dq - [I/(Q-I)]di_u - \alpha^k dk - \beta^l dl$$

where i_u is the unit cost obtained as volume of other inputs (residual) per unit of concrete outputs. In this case we have Q-I as value added in production;

We have also α^k as value added capital share, and β^l as value added labour share; the equation is transformed in:

$$dtfp = dq - [\gamma/(\alpha+\beta)]di_u - [\alpha/(\alpha+\beta)]dk - [\beta/(\alpha+\beta)]dl$$

Considering this approach, at level of organization we have:

$$dtfp = [1/(\alpha+\beta)]dtfp_c$$

When the pandemic crisis is ended, we can apply this formula to the entire series of data during the last years, starting with 2019, in such a way to determine accurately the impact of health shock on productivity considering the two components: labour productivity and TFP.

4. The global context – EU versus US

According to Eurostat database, in the first 6 months of 2020, the labor force decreased with 5 million in the Euro-area, mainly as a result of productivity loss (-12.1% labor productivity per employee) and unavailable recruiting possibilities considering the effects of lockdown (8.7% unemployment). In these conditions, the opportunity of teleworking has arisen, with 1/3 of jobs in the new working regime. This trend will increase, as long as digital revolution will be absorbed in the socio-economic processes. Comparing with Euro-area, in USA the unemployment reached 14.7%. The most affected were the low educated individuals because the specific tasks they performed in their job, which are not compatible with teleworking system in the given conditions at that time (Djankov *et al.* 2020). Opposite, highly educated and skilled personnel could shift immediately to teleworking, then the unemployment did not affect this category.

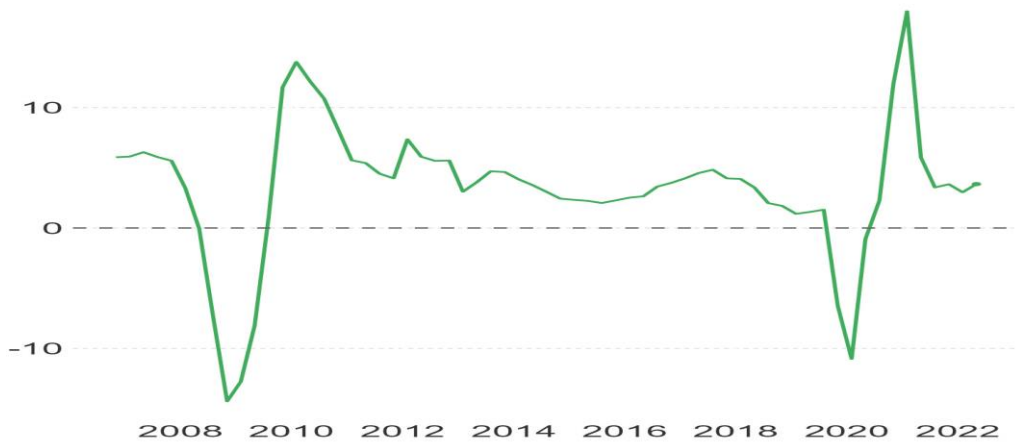


Figure 1: Shock impacts on global manufacturing (UNIDO 2021)

In the above representation (Figure 1) we can observe the impact of the last two shocks, 2009 and 2020 on manufacturing at global level. By comparison, we see that the financial crisis in 2009 was deeper and larger than the pandemic crisis in 2020, but with a big disruption for both. In our opinion, the differences in amplitude were mitigated by the nature of crisis: 2009, it was quite subjective source generated by some speculation on real estate market with dramatical consequences on financial markets, and 2020, it was a quite objective source generated by health disorder at global level. In the first case the implication of governments was not so sudden and based on difficult negotiation with big corporations affected by the shock, and in the second case the governments involvement was very prompt with the main focus on population health condition, then on business environment and other socio-economic sectors. According to ILO stats, there are approximately 400 million full time jobs lost as result of reducing working-hours in 2020.

5. Analysis of productivity and competitiveness

5.1. The dynamic of productivity

Previous economic shock generated by financial crisis at global level in 2009, determined a dramatic decrease of productivity, recording negative figures during the crisis. The path of recovery was very slow and in 2018, the productivity at global level achieved just 1.8%.

In the long run, this level is not sustainable if we count the necessity to increase the income level, or cope with inflation and unemployment, poverty, and lack of natural resources, nonetheless mitigating bad effects of climate changes, or even wars.

Convergence effect in productivity field works, but in a passive way, in the sense that the path in the advances economies is slowing down, losing the momentum, and in emergent countries the rate of productivity increasing slow, in a moderate way. The expected active way of performance in achieving convergence objective is supposed to be the one where the rate of growth is increasing in the advanced economies and it is speeding up in the emergent economies, generating the catching up effect.

Concrete, after several years of recovering from financial crisis 2008-2010 until the starting of current pandemic crisis, productivity had increased in advanced economies with only 0.8% on average, way far from precrisis performance, 1.5%. In the same conditions and context, in developing countries the highest level was in 2007, meaning 6.6%, then decreasing to a half (3.1 – 3.5%) in the years before COVID-19 crisis. We can see that the convergence still exists in productivity at the global level, but at a half of previous performance.

In the poor countries, the level of productivity in the years between last two crisis was 2.4%, reinvigorating the negative path of several decades ago.

We can conclude that, even though the rate of productivity increasing still reveals convergence effect, the problem is not the rate, but the level of productivity if we compare performance in advanced economies and emergent ones. In terms of productivity level, developing economies perform at 20% from the level achieved in developed countries, and in the poor countries is 50th times weaker than advanced economies. The expecting catching up effect is not working properly in these conditions.

5.2. Disturbing factors during crisis

During the last years, we were facing off a massive shock at global level, totally different from global financial crisis, 2008 – 2010. From economic perspective, COVID-19 crisis does not depend on economic cycles, some deficit accumulation, or a huge misconduct on the financial, estate, or capital markets. It is the most important adverse event exclusively coming from outside economic environment, more precisely, a huge pandemic disaster. The rapidity, novelty, amplitude, and long lasting, were the main features of this disturbing event. Unfortunately, we all already experienced 5 waves of pandemic and we are not still sure what is next. The situation is still uncertain, and the next years are quite unpredictable.

When starting this research with the objective to study the effect of COVID-19 on productivity and competitiveness, we treated health crisis as an major disturbing crisis, coming from outside of the economic arena, with dramatic impact on global economy and social life.

Now, when the analysis of the pandemic crisis effects is not totally done, we are confronted with similar major crisis related with geostrategic conflicts, energy resources and prices, and we can say that the food security crisis is right to the corner. As we mentioned before, we are experiencing a very bad context by overlapping all these crises and the perspective to generate typical economic crises is very high.

From this reason, in order to capture in the most accurate way the impact of turbulences, we changed taxonomy from something very specific, pandemic crisis, to other thing more general, such as the effect of major shocks on productivity and competitiveness.

Even though we stated that all these adverse major events are belonging to other than economic causes, we appreciate that every of these events, stand alone, have its own particularities, source, dynamic, development and impact. In such conditions, there is very hard to capture separately the impact of all the details with relevance on productivity and competitiveness, as long as we are on the midst of these events under development.

For productivity and competitiveness, also innovation, we observe that breaches in the global supply chain, diminishing energy resources, losing jobs, increase inflation,

escalating deficits, are just some of the major disturbing factors with dramatic impact on economic performance in the near future.

The aggregate demand is also disturbed considering the adverse effects of crises on business environment, and the most important effect is increasing the costs for raw materials. In such condition, scarcity for investing in innovation is lowering the productivity possibilities for economic recovery. In other words, global economy is encountering major adverse effects which contribute to go rapidly into a deep recession. In this context, it is very hard to address each of these factors individually, as long as the causes of disruption are still fully active, but an efficient way to mitigate the effects is to develop an effective mix of policies.

At this stage, several steps have to be considered, as followings:

- first step is the rapidity to react in order to create a resilient framework for productivity, innovation, and competitiveness. Here, we consider useful a policy to reinforce the cohesion and collaboration among involved institutions, such as universities, research centres, entrepreneurs, technology providers, and local/regional communities;
- second step for recovery is to strengthen the role of institutional integrator in matter of productivity, or to create such an administrative capacity if this doesn't exist. National Productivity Centres are qualifying for the best institutional profile to cope with destabilizing drivers;
- third step is to facilitate a business-friendly environment taking into consideration the constrains of adverse events effects in economy. Allocate substantial support for SMEs, provide preferential loans, reduce administrative and fiscal burden;
- fourth step is to enhance investments in infrastructure, especially in research, education, and technology;
- fifth step is to secure jobs and gradually orient the human resources towards sectors more resilient to the effects of adverse events. Here, it is necessary to focus on process for acquiring a high level of skills based on improving education, facilitate learning programmes, build up a self-driven behaviour, and continuous learning attitude.

5.3. Productivity differentiation by regions

In the last years, COVID-19 have impacted in a dramatic way the overall performance in business environment, with a peak of counter-performance during lockdown. Then, once the shock started to be absorbed, the situation was slightly improved, but the successive waves of pandemic provide a jigsaw trend shape.

Now, we can see that other adverse events impacted negatively global economy, and is too early to anticipate the development as long as we don't have answers regarding when is ending the war in Europe, how is solved the issue of gas supply, how is the price fluctuation for energy supply, how is solved the breach in the global supply chain, how will be solve the shortage in the food supply, and so on.

At this point, we can call these turbulences as adverse events and to analyse the opportunities to diminish the negative impact over productivity and competitiveness. Probably, the most important response is to design a new policy framework, more integrated and collaborative, targeted to offer solutions firstly on the short run but with an eye open to the targets already set before the shocks.

It is clear crystal that the most prolific domain during such a bad time was digitalization. Considering the constrains imposed first by pandemic crisis, those related with lack of mobility, lockdown, moving education on-line, enforce teleworking, recalibrate e-commerce, and many other aspects, digitalization gained new positions and offers an opportunity to mitigate the adverse effects of health crisis in economy and generally in society.

In these conditions, our remark is that this complex crisis has generated the necessity for two catching-up races:

- first, global economy has to regain the position from 2019 as soon as possible; here are necessary to find alternative ways for development, with more resilient business environment, more flexible supply chain, creating new strategic alliances, and an updated education system;
- second, emergent and developing economies have to intensify efforts to close the gap in productivity and competitiveness with the level of most developed countries; this could be an opportunity to use the advantage of digitalization to move quicker in the field of research, education, innovation, creativity, and entrepreneurship.

According to data extracted from Eurostat, in the Eastern EU countries the rate of productivity was 2.5% between the first year of recovery after the financial crisis (2008 – 2010) and last year before pandemic crisis. Particularly in Romania, the lack of capital accumulation counts $\frac{3}{4}$ from slowing down productivity growth.

Beside investment in digitalization, research, and innovation, it is an opportunity to consider increasing the allocations for education and Intellectual Capital in order to boost productivity growth.

6. Data analysis – GDP and Productivity dynamic in EU vs Romania

According to this research, the impact of pandemic crisis in the TFP on private sector at EU level was strongly decreasing, while in the medium-run there is a perspective of reduction to 1%. The situation in the long-run is highly-dependant on the evolution of sanitary crisis. Now, the estimation of COVID-19 evolution is still uncertain, but analysing the contraction of R&D sector, loses determined by the interruption of education programmes, lack of mobility, raw materials and energy crisis, these are the premises for a negative impact on increasing productivity rate. This regression of productivity during health shock is conducting to a lower performance in productivity if we consider EU trend in the last decade. During the sanitary shock, the dynamic of GDP and labour productivity is represented below, in the Table 1.

Table 1: GDP and labour productivity dynamic over the pandemic crisis, EU vs Romania (EUROSTAT 2023)

Indicator	Region	2019		2020				2021				2022		
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
GDP and main components (output,	EU 27	3501	3655	3348	3073	3402	3569	3367	3546	3651	3882	3728	3910	3962

expenditure and income) Bill. Euro	RO	61	67	45	46	58	67	46	55	65	72	55	67	79
Real labour productivity per person employed (%)	EU27	1,9	1,2	1,0	-8,6	-1,4	-1,3	1,8	10,5	3,4	3,8	2,6	1,8	0,8
	RO	3.6	3,1	2.0	-6.2	-2.7	0,7	0.1	11.0	3.3	-0.3	5.2	5.6	3.9

According to the data collected for GDP, here below, Figure 2, it is shown the comparative approach at EU and national (Romania) level.

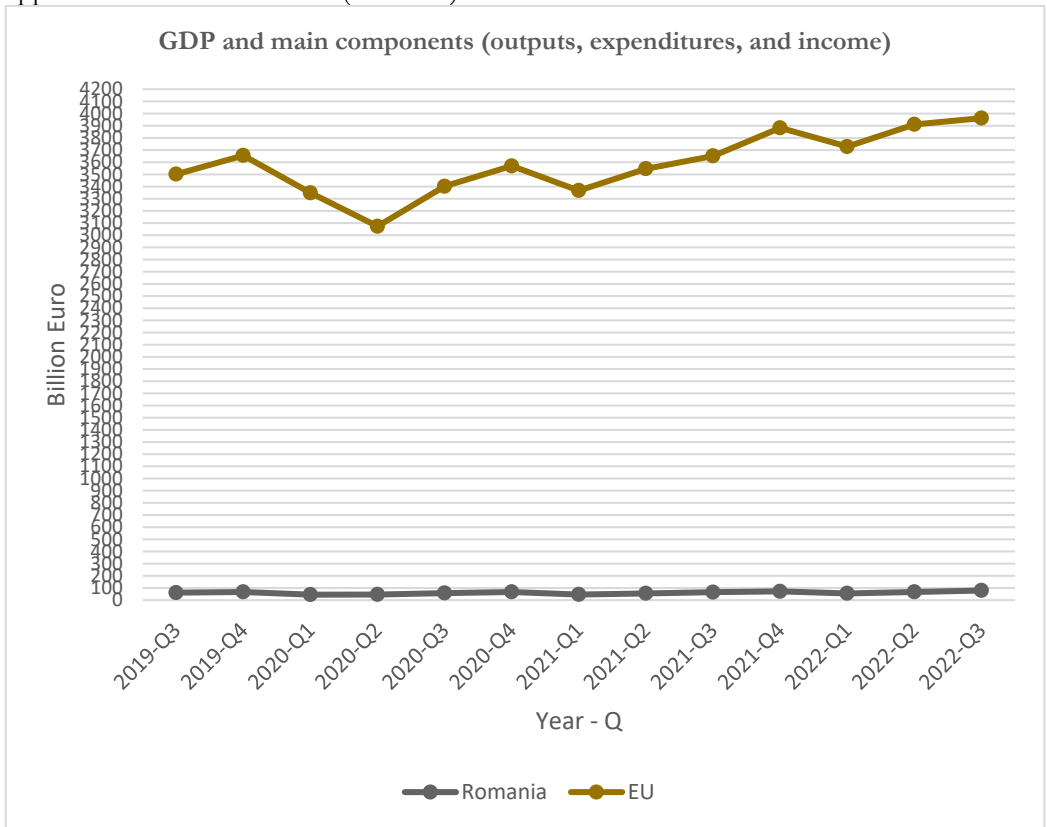


Figure 2: Trend of GDP during pandemic crisis

From the other perspective, the dynamic of labour productivity is represented in the Figure 3.

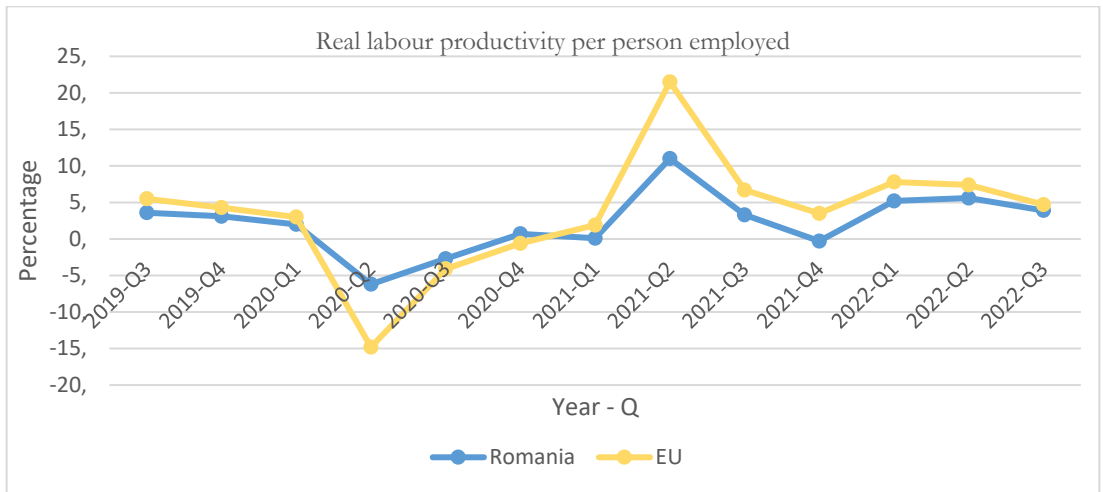


Figure 3: Trend of real labour productivity per person employed

6.1. Results and findings - interpretation

Because of uncertainty and unpredictable trend of pandemic shock over the global economy, in the first two years of disease development, 2020 – 2022, the economists shaped different forms of recovery, starting with V-shape, then W, and the most reliable K-shaped.

V-shape is referring to a strong recovery after a deep recession and succeeding to establish in a quite short time the level before the crisis.

Considering the waves of COVID-19 in the first two years, even though the recovery at a certain time was V-shaped, a new wave after recovery determined a new recession, then the model was W-shaped recovery. It is well known that in 2022, the global socio-economic climate was hit by the 5th wave, then the economists were inclined to say that the recovery is like saw teeth. Anyway, other economists identified U-shaped recovery, L-shaped, but the K-shaped seems to be the most interesting one, because the lockdown caused a sever drop at the beginning, then the new coordinates of socio-economic life determined two types of recovery for different sectors, depending on the level those were affected by pandemic conditions.

In this way, after a dramatic depression, the recovery is split in two directions with revigorated activity in sectors like digital, e-commerce, IT&C, and high-tech, and downsizing sectors as tourism, agriculture, and transportation, according to directions of the two arms of letter K. Of course, we have to consider the impact of “creative destruction” theory and reallocation of resources to the most performant business. Even so, this could be taken into consideration just to understand the trend of economic activities towards innovation, Artificial Intelligence, digitalization and so on, but at the same time we cannot survive without agriculture, cultural environment, customer services and others. From this perspective, K-shaped recovery model is showing us where in the economy to put financial support in such a way to keep the most affected sectors in competition with the objective to assure a transition period until a self-development is possible when the shock is absorbed.

Moreover, we can see in this research, that sectors closer to knowledge frontier are more adaptable, flexible, and able to survive but this not means that we need rather IT&C sector than agriculture, or rather robotics than tourism. The result of this demonstration is that there are some sectors with better application of innovation, creativity, and entrepreneurship than others, but we need all the others, too, in order to assure sustainable development in the long run. In these conditions, what we need is to understand the process of self-development innovation, creativity, entrepreneurship and to redesign the most affected sectors in such a way to absorb better these ingredients for increasing productivity and competitiveness.

6.2. Solutions - The Action Plan

As a quick response to the pandemic shock in economy, the most relevant actors in the global competition were decided to allocate big resources to cover the effects of COVID-19. Beside specific health support for diminishing the spreading capacity of the virus, there were allocated huge financial resources for economic recovery. US administration approved a recovery plan with more than 2.000 billion dollars, EU a recovery plan involving 750 billion Euro, Japan more than 1.000 billion US dollars, and so on.

At the EU level, at that time, the forecast for depression level was 7.4% dropping of GDP. In order to find the best way to allocate financial resources, at EU level was released the “Regulation of the European Parliament and of the Council establishing a Recovery and Resilience Facility“ (European Parliament and Council 2021). Beside this plan under the “Next Generation EU” framework, there were proposed “Just Transition Fund”, “React EU”, and subsidies for agriculture sector.

At the same time, the most relevant financial institution developed active plans for recovery. This is the case of International Monetary Fund and World Bank with an allocation of 1 160 billion US dollars for recovery of emerging economies after COVID-19 shock.

6.3. The case study of Romania

In Romania, the recovering process was dependent on the pandemic waves. According to National Statistics Institute, in the first semester of 2021, the level of development reached the 2019 level, then the new wave of CORONAVIRUS affected the performance in the second semester. In these conditions, with a relatively high uncertainty regarding the evolution of sanitary shock, the Romanian GDP rate will reach 4.5% for the next two years, based on the big contribution of consumption as long as the supply chain will remain open. On the other hand, the investment side is fostered by the contribution of European Structural and Investment Funds and the impact of National Plan for Recovery and Resilience. Considering the “Winter Forecasts for 2022” GDP growth rate (Figure 4) was 4.5% in 2022, will be 2.5% in 2023, and 3.0% in 2024. Regarding the recovery model, we can see that for Romania is relevant the V-shaped recovery, but still dependant on the pandemic waves and the ability to cope with health crisis.

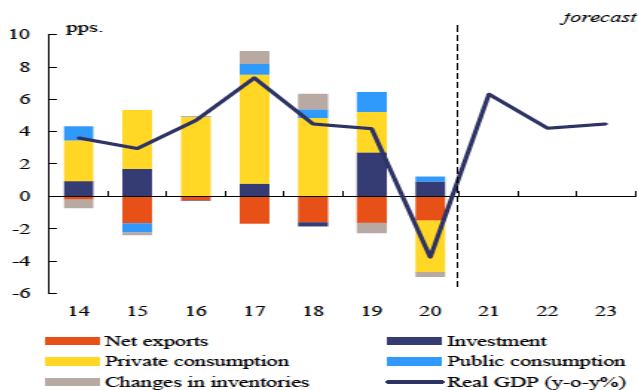


Figure 4: GDP growth rate and contribution of each component (European Commission 2023)

As many other times, the actual political configuration, the pressure of labour unions, unemployment risks, and the consequences of low vaccination rate, these all will affect the structural deficit as long as there are some initiatives to increase pension expenses, social allocations, reconfiguring the taxation system. In this context, considering the sanitary crisis is overlapping energy crisis, at the beginning of 2022, inflation reached 8.4% with a peak of 15-17% at the end of 2022 and the beginning of 2023. From the National Institute of Statistics, we can find that the economic growth for 2021 was 5.6%, a bit under the estimation of European Commission with 6.3%, and a perspective of slowing down at 4.2% in 2022 and 4.5% in 2023. In 2020, national GDP was 218 billion Euro, which represents the 13th position in the EU ranking system, even though Romania is the 7th large Member State before Brexit. Opposite, five economies counts almost 70% of EU GDP, we talk about Germany, France, Italy, Spain, and the Netherlands. According to the same forecasts, the unemployment will decrease from 5.1% in 2021, to 4.4% in 2023, but some redistribution of jobs are necessary considering the effects of pandemic crisis and the lesson learned during this time. Financial deficit will decrease from 8% in 2021 to 5.3% in 2023, while governmental debt will increase at 57.1% in 2023. The current account deficit will decrease from 6.5% in 2021 to 6.1% in 2023.

According to UNIDO (2021) Statistics regarding competitiveness, in 2019 Romania is on the 33rd position out of 152 countries in the ranking system of Competitive Industrial Performance Index 2021. Overall, the impact of COVID-19 reveals a decreasing of manufacturing output growth with 6% in the first three months after discovering the disease with same trend in the first semester of 2020 to a decrease of 11%. From the same sources (UNIDO Stats) we found out that the most part of global economy was contracted with 4.8% when we compare March 2020 with December 2019. FDI level decreased with 40% in 2020, mainly as a result of contracting the demand side.

For a country like Romania (European Commission 2021), pandemic crisis was reflected on a shortage of national budgetary resources, as far as in the mid of 2021 Romania entered in the procedure of excessive government deficit with a perspective of 4 years for recovering. The Council has recommended to decrease the government deficit to 8% of GDP in the first year, then 6.2% for the second, 4.4% the third year, and finally below 3%

for the last year. Commission had considered as reliable this Council recommendation for a structural adjustment of 0.7% of GDP for the first year, 1.8% for the second, 1.7% for the third, and finally 1.5% for the last year, in parallel with reductions of governmental expenditures with 3.4% for the first year, 1.3% for the second, 0.9 for the third, and finally 0% in the last one.

Briefly, the plan for excessive government deficit procedure is depicted in the Table 2.

Table 2: The action plan for recovering the excessive government deficit

Action	2021	2022	2023	2024
Government deficit	8%	6.2%	4.4%	2.9%
structural adjustment	0.7%	1.8%	1.7%	1.5%
governmental expenditures	3.4%	1.3%	0.9%	0.0%

As an EU effort for economic and social recovering after Coronavirus crisis, Romania benefits of a 5-year financial support called National Plan for Resilience and Recovery with a total of 29.1 billion Euro divided in two sections:

- 14.2 billion Euro as grants
- 14.9 billion Euro as loans

NPRR is adjusted to each country challenges encountered during the COVID-19 crisis, and the financial support is create to remove any obstacle in front of regaining positions before the crisis with economic and social implications.

Despite ordinary financial support from European Commission, such as structural and investment funds, cohesion funds, social funds, or rural development funds, this support through NPRR consists of adopting structural reforms. It considers green economy, digital transformation, sustainable growth, job creation, etc

Commission forecasts for 2021 GDP growth rate was initially 5.1% then 7.0%. According to National Institute of Statistics (2022) (March 2022 communication), this rate was 5.9%. Particular for this time is the overlapping of four crisis:

- Pandemic crisis which is coming to an end but is quite uncertain the future development
- Energy crisis – price for energy, especially gas and petrol, increased 3-5 times
- War crisis – the conflict between Russia and Ukraine will have side effects on energy and other conjunctural expenses
- Food crisis – disruption in the supply side for crops, severe drying season consequences, and increasing prices, all these generates concerns regarding the availability of food products on the market

Now, the purpose of this research is to analyse the effects of health crisis over the economy, and if those four crises are overlapping, it is quite difficult to measure the impact of each driver with accuracy.

More important, to determine the impact of those four factors is to understand the dynamic of productivity and competitiveness during shocks, even though we cope with health influence, energy prices, or geopolitical turbulence.

All in all, partially for energy crisis, the other crises were totally unexpected, and the response of humanity, global institutions, alliances, and association of countries is customized according to the evolution of turbulences.

For example, the predictions for the oil prices were 54.2 US dollars per barrel in 2021 and 51.9 US dollars in 2022. In March 2022 the quotation was 122.5 US dollars per barrel, and the war could affect much more the trend, with pessimistic quotation of 300 US dollars per barrel. Now, in 2023, the situation seems to be more stable, but still unpredictable in the medium and long run. In a recent study, February 2023, researchers have estimated that starting with the energy crisis in September 2021, about 792 billion Euro were allocated by European countries to protect beneficiaries from the increasing costs of energy (Sgaravatti 2023).

7. Conclusion - recommendations

Main conclusion of this research consists of the finding that productivity and competitiveness during shocks is much more sensitive to strategic decisions instead of operational ones. The complexity of the context moves the focus from product, production flow and technical aspects to the ability to cope with restrictions, anticipation of long run perspective for demand-supply balance, involvement of government in partnership with business environment.

We can conclude that the pandemic crisis was a speed up driver for knowledge intensive sectors and facilitate a higher adaptability context for digitalization, research, innovation, and education.

According to these findings, our rationale consists of the statement that the most efficient way to face off adverse events like those encountered in 2020-2022, it is to improve the level of knowledge through specific levers: education, learning programmes, trainings, skills, qualifications. But this is just one side of the coin, improving knowledge at the level of human resources. The other side of the coin is to improve knowledge in the processes, to spread digitalization, to disseminate innovation, to amplify research, and to reorganize the education system itself. So, if we found that knowledge is the most efficient and effective recovery and resilient factor in time of adverse events, the other important finding is to consider both sides of knowledge, at human level and process level. In the theory of Knowledge Management, we can translate these findings in specific terminology, meaning the drivers for recovery and resilience are the transformation of human resources in what is called Knowledge Workers, and transformation of entities in what is called Knowledge Organizations.

Of course, investments in infrastructure, open markets, free trade, avoid global supply chain's breaches, facilitate access for financial support of SMEs, rethinking strategies, improve legislation, and many others actions, could help the process of recovery and resilience in time of turbulence.

References

- Batuk, S., & Özer Targalöz, A. (2021). Remote and Hybrid Working: Variants, Determinants, Outcomes, Edited Collection 418 Pages, Peter Lang Publishing.
- Belostecinic, G., Mogoș, R. I., Popescu, M. L., Burlacu, S., Rădulescu, C. V., Bodislav, D. A., & Oancea-Negescu, M. D. (2022). Teleworking—An Economic and Social Impact during COVID-19 Pandemic: A Data Mining Analysis. *International Journal of Environmental Research and Public Health*, 19(1), 298.
- Broughton, A., & Battaglini, M. (2021). Teleworking during the Covid-19 pandemic: risks and prevention strategies: literature review, European Agency for Safety and Health at Work Publications Office.
- Burlacu, S., Gutu, C., Marinela, F., Gombos, C. C., & Biner, M. (2021). Resilience In Public Administration And Sustainable Development. In *Proceedings of Administration and Public Management International Conference* (Vol. 17, No. 1, pp. 104-108).
- Burlacu, S., Patarlageanu, S. R., Diaconu, A., & Ciobanu, G. (2021). E-government in the era of globalization and the health crisis caused by the covid-19 pandemic, between standards and innovation. *Les Ulis: EDP Sciences*. doi:<http://dx.doi.org/10.1051/shsconf/20219208004>
- Burlacu, S., Profiroiu, M. C., Rădulescu, C. V., & Anghelută, S. P. (2020). IT Governance in Romania During the Covid-19 Pandemic. In *Proceedings of Administration and Public Management International Conference* (Vol. 16, No. 1, pp. 83-88). Research Centre in Public Administration and Public Services, Bucharest, Romania.
- Clar, G. (2015). Perspectives for Research and Innovation Strategies for Smart Specialisation (RIS3) in the Wider Context of the Europe 2020 Growth Strategy; Publications Office of the European Union: Luxembourg.
- Davis, S.J., Haltiwanger, J., Schuh, S. (1996). Small business and job creation: Dissecting the myth and reassessing the facts. *Small Bus Econ* 8, 297–315. <https://doi.org/10.1007/BF00393278>
- Djankov, S. & Panizza, U. eds (2020). COVID-19 in Developing Economies, CEPR Press, London. <https://cepr.org/chapters/developing-economies-after-covid-19-introduction>.
- Etzkowitz, H. (2008). The Triple Helix: University-Industry-Government. *Innovation in Action*, 1st ed.; Routledge: New York, NY, USA.
- European Commission (2021). Communication From The Commission - Assessment of action taken by Romania in response to the Council Recommendation of 18 June 2021 with a view to bringing an end to the situation of an excessive government deficit in Romania. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0915&from=EN>
- European Commission (2023). Winter Forecasts for 2022 - Economic forecast for Romania. https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/romania/economic-forecast-romania_en
- European Parliament and Council (2021). Official Journal of the European Union - Regulation (eu) 2021/241 of the European Parliament and of the Council, establishing the Recovery and Resilience Facility
- EUROSTAT (2023). GDP and main components (output, expenditure and income) https://ec.europa.eu/eurostat/databrowser/view/namq_10_gdp/default/table?lang=en and Real labour productivity per person employed - quarterly data <https://ec.europa.eu/eurostat/databrowser/view/tipsna71/default/table?lang=en>
- <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0241&from=EN>
- International Labour Office (ILO), (2020). Teleworking during the Covid-19 pandemic and beyond. Geneva: International Labour Office. https://www.ilo.org/wcmsp5/groups/public/---cd_protect/---protrav/---travail/documents/instructionalmaterial/wcms_751232.pdf.
- Jessop, B., Fairlough, N., Wodak, R. (2008). Education and the Knowledge-Based Economy in Europe. *Educational Futures* (Vol 24), E-Book, Sense Publishers.
- Joint Research Centre (JRC) (2021). Telework in the EU before and after the Covid-19: where we were, where we head to, Science for policy briefs, European Commission – European Union, JRC120945
- Ladaru, R. G.; Burlacu, S.; Guțu, C.; Platagea G. S. (2022) Human resources management - labor crisis. In: 30 years of economic reforms in the Republic of Moldova: economic progress via innovation and competitiveness. Vol.2, 24-25 septembrie 2021, Chișinău. Chișinău, Republica Moldova: Academia de Studii Economice din Moldova, 2022, pp. 187-194. ISBN 978-9975-155-60-1. DOI: <https://doi.org/10.53486/9789975155649.29> CZU: 005.952(498)
- National Institute of Statistics (2022). GDP forecasts – Communication from March 2022. <https://insse.ro/cms/ro/content/produsul-intern-brut>

- Negescu, M. D. O., Burlacu, S., Biner, M., Gombos, S. P., Kant, A., & Troacă, A. V. (2021). Paradigms of Public Administration Digitalization in The Context Of The Covid-19 Pandemic. In *Proceedings of Administration and Public Management International Conference* (Vol. 17, No. 1, pp. 109-115).
- Parker, R. (2005). Fostering Smart Growth Through Long-Term Partnerships. In *Partnerships for Smart Growth: University—Community Collaboration for Better Public Places*; Wiewel, W., Knaap, G., Eds.; Routledge: London, UK, 2005; pp. 131–173.
- Popescu, M. L., Gombos, S. P., Burlacu, S., & Mair, A. (2021). The impact of the COVID-19 pandemic on digital globalization. In *SHS Web of Conferences* (Vol. 129, p. 06008). EDP Sciences.
- Rădulescu, C. V., Bran, F., Burlacu, S., Dobrea, C. R., & Diaconu, S. (2020). Challenges Regarding Food Resources in the Context of Globalization and Population Growth. In *Proceedings of the International Conference on Economics and Social Sciences* (pp. 1041-1052). Sciendo.
- Rădulescu, C. V., Burlacu, S., Bodislav, D. A., & Bran, F. (2020). Entrepreneurial Education in the Context of the Imperative Development of Sustainable Business. *European Journal of Sustainable Development*, 9(4), 93-93.
- Radulescu, C.V.; Ladaru, G.-R.; Burlacu, S.; Constantin, F.; Ioanăș, C.; Petre, I.L. (2021) Impact of the COVID-19 Pandemic on the Romanian Labor Market. *Sustainability* 2021, 13, 271. <https://doi.org/10.3390/su13010271>
- Romer P.M. (1990). Endogenous Technological Change. *The Journal of Political Economy*, Vol. 98, No. 5, Part 2: The Problem of Development: A Conference of the Institute for the Study of Free Enterprise Systems. (Oct., 1990), pp. S71-S102. University of Chicago Press., USA.
- Romer, P.M. (1986). Increasing Returns and Long-Run Growth. *J. Political Econ.*, 94, 1002–1037.
- Rossato, C., Castellani, P. (2020). The contribution of digitalisation to business longevity from a competitiveness perspective. *The TQM Journal*, 32(4), pp. 617-645.
- Samek Lodovici, M. (2021). The impact of teleworking and digital work on workers and society. Publication for the committee on Employment and Social Affairs, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg.
- Sarbu, R., Alpopi, C., Burlacu, S., & Diaconu, S. (2021). Sustainable urban development in the context of globalization and the health crisis caused by the covid-19 pandemic. *Les Ulis: EDP Sciences*. doi:<http://dx.doi.org/10.1051/shsconf/20219201043>
- Schumpeter, J.A. (1942). *Capitalism, socialism and democracy*. New York: Harper and Brothers.
- Șerban, O. (2019) *Knowledge Economy Pyramid - Transforming Knowledge Value in Increasing Productivity and Competitiveness*; Korea Institute for International Economic Policy: Sejong, Korea.
- Sgaravatti, G., Tagliapietra, S., Trasi, C., Zachmann, G. (2021). 'National policies to shield consumers from rising energy prices', Bruegel Datasets, first published 4 November 2021, updated February 2023, available at <https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices>
- Solow, M.R.,A. (1956). Contribution to the Theory of Economic Growth. *Q. J. Econ.*, 70, 65–94.
- Stankovic, J., Marjanovic, I., Drezgic, S., Popovic, Z. (2021). The Digital Competitiveness of European Countries: A Multiple-Criteria Approach. *Journal of Competitiveness* 13(2): 117-134. <https://doi.org/10.7441/joc.2021.02.07>.
- Stiglitz, J.,E.; Greenwald, B.,C. (2014). *Creating a Learning Society: A New Approach to Growth, Development, and Social Progress*; Columbia University Press: New York, NY, USA.
- UNIDO (United Nations Industrial Development Organization) (2021). *Competitive Industrial Performance Index (CIP)* <https://stat.unido.org/cip/>
- UNIDO (United Nations Industrial Development Organization) (2022) *World Manufacturing Production Statistics for Quarter III 2022 - Growing at a modest pace on unstable ground*. <https://www.unido.org/resources-statistics/quarterly-report-manufacturing>