THE POTENTIAL OF BULGARIA AND THE WESTERN BALKANS TO SERVE AS A GLOBAL CENTER FOR INNOVATIONS AND INTERNATIONAL TECHNOLOGY TRANSFER

Simeon S. Stoilov
Economic Research Institute at the Bulgarian Academy of Science – Sofia, Bulgaria,
SimeonStoilovS@gmail.com

Abstract: This study aims to provide evidence for the good timing to forming a unity between Bulgaria and the countries of the Western Balkans in a coordinated effort for building strategic profile and capacity in the commercialization, brokerage and servicing of international innovation and technology transfer (IITT). The timing is right, especially in a post pandemic economic recovery of the world and the course of accession of the Western Balkans to the EU. The study justifies the need of a unified strategic framework, to avoid political and partisan momentary discourse, which might negatively affect the whole region politically, socially, and economically. All the arguments and reasoning in the study assume that the economic crisis of the COVID-19 pandemic is the crisis of the broken supply chains (GSC). Lives are lost, jobs are lost, and global governments are facing a thread that leaves the citizens of their respective countries with neither medical, not economic safety. It is a priority are to secure sustainability and resilience for each country and region. Countries do consider recovery through reposition on the new global value chains (GVC) structure. Globalization is inevitable and irreversible but at the same time proximity and regional sustainability are a critical factor in international trade and will continue to be on focus. The competitive advantages and even economies of scale in production are not sufficient for the contemporary global economy and international trade. Technologies are and will be more often the objects of international commercial transactions. Thus, more economies are and will continue trying to build economic capacity by implementation of innovations and new technologies. Timing is critical and internal national research and development (R&D) is often not adequate to the urgency of economic needs. Thus, national and corporate economic subjects are more likely to acquire technology capacity to satisfy their needs, rather than trading the demanded goods or services. In such cases, the IITT is the most efficient and justified approach, though it requires capacity to evaluate, adapt, integrate, monitor, and navigate through a solid scientific background. IITT management set of skills is unique and requires multidisciplinary protocols and scientific expertise. The paper is reasoning that the development of such specialization on the Balkans is well justified by the similarities in the economic background of countries in the region and the open cohesion and convergence programs. In addition to those, the accession process to the EU for the Western Balkans and the EU membership of Bulgaria are tools and access to additional funding sources and IP protection. The EU framework and the union infrastructure are also an engine to reposition Bulgaria and the Western Balkans on the EU markets with products of higher level of technology input and showcase the added value of a specialization of the region in knowledge transfer and application. The paper is advocating the conclusion that economic growth and sustainable development of Bulgaria and the Western Balkans is not possible through a simplified cohesion and convergence process only but through advanced specialization in IITT. The current study concludes, that by a targeted regional policy for industrial specialization in IITT, Bulgaria and the Western Balkans will have a chance to take a leading role in the European economy and in the GVC of the near future. Structuring of the economic profile with substantial dominance of IITT is an opportunity to achieve high level of sustainability, upgrading the social and demographic environment of all individual countries. The Research and Development of new technology as an immense consequence of the IITT specialization of the region is the second stage perspective, which all together with the new technology solutions implication in the region will build and advance proprietary capacity of each individual country and the region for the next decades.

Keywords: Innovation, International Transfer of Technology, Sustainable Growth, Economic Development, Globalization, Global Value Chains, New Economy.

1. INTRODUCTION

The Suez Crisis is the only one in the last 150 years, which has been caused by a turbulence in the global trade channels and supply chains, prior to the COVID-19 pandemic, while all the other crises have been affected by immediate discourse of either debt and liquidity, or an evaluation collapse and deficit of any of the production factors. COVID-19 shocked and weakened even those economies, which possess all necessary production factors by

breaking the supply chains on national and international level[3]. As a consequence of the stress over the GSC many countries imposed protective measures[4], though in some cases temporary, national economies experience the fear of falling of the GVC. The COVID-19 challenged the globalization by hitting the labor locally, by withdrawing the consumers from the market, by breaking the transportation channels. The pandemic changed the order on the priority list of consumer goods and services globally. While on the competitive global market speed and timing are always critical, competitors do vary, and they constantly upgrade their products or services, or the way they do deliver to the market, the pandemic is making it more obvious that the globalization is irreversible, though proximity and local sustainability of the supply are already of higher importance.

Consumers on the other hand do require more and better products and services, because they are well-equipped with communications and well-informed to demand the best available on the global market. Such a trend keeps high pressure on the small and medium manufacturers, especially in less developed countries. With the disturbance on the GSC the post-pandemic GVC will substantially differ from what they were prior to COVID-19. To be able to outpace their past status and advance to the estimated position of the future GVC, less developed countries need to react now, and they need to be ready for the long-term role of pro-active challengers on the international markets. To build this capacity, local manufacturers or service providers have two options: to innovate or to transfer technology.

Bulgaria and the Western Balkans are no different from the rest of the world, though they have their particularities. This paper aims to review them, to diagnose and provide evidence, that the IITT is the best alternative for the perspective of the Balkans and moreover it is an alternative, which will be available during the post-COVID recovery but not for a long time.

In **the Background and the Trends section** the study is presenting the analysis and the inevitable projection of the trend of international trade and the growing demand for applied technology and innovations. The section also present data about the GVC industrial specialization of Bulgaria and the Western Balkan countries.

The Perspectives section does a review of some empirical data about Bulgaria and the Western Balkans as a playground for the targeted economic development and refers to the current results in technology transfer and innovations of the region. The results are presented in comparison with evaluation of the good examples of high profile in the most advanced technological countries and regions aiming to extract a useful model for the thesis of the current report. In this section are presented analysis and projections, justified forecast for the future of the GVC, where Bulgaria and the Western Balkans have a potential to position.

The Results section refines the results of the research and presents the final thesis of this work.

The Conclusion section is presenting and effort to define a list of recommendations and a road map, based on the results and the overall analysis of the current work.

2. MATERIALS AND METHODS

The paper has been based on literature analysis and industry research. The industry research has been made by several case studies with discussions and interviews with multiple North American and Western European innovators and technology owners, to probe their potential interest among them to commit in eventual technology transfer and use Bulgaria and Western Europe as a platform to prove the concept, or upgrade, or simply commercialize their innovative technologies. Based on the positive feedback from innovators, the research in potential host countries, has been made as an evaluation of the readiness to welcome IITT and the level of capacity they need to be effective in the task.

3. THE BAKCGROUND AND THE TRENDS

The IITT is not only a tool in the international trade for multinational corporations to penetrate foreign markets and maintain control on the GVC, but an organic evolution of the international economics. Early economists do realize that international trade is an inevitable path to prosperity and integral part of each economic activity of people. Their theories about international trade, known as “mercantilism”, do emphasize that the critical factor of the international trade is the obtaining of assets and benefits, primarily precious metals, through excess in trade balance. The theory of “absolute advantage” comes as a broader vision for the international trade by Adam Smith and is the first referral of industrial specialization. The “comparative advantage” theory, introduced by David Ricardo and followed by

[3] Kostadinov, A., & Stoilov, S. S. (2020, May 28). Лични мнения | Промени при търговията с храни и продоволствената сигурност в света и България в следствие на пандемията COVID-19 | Институт за икономически изследвания. www.iki.Bas.Bg. https://www.iki.bas.bg/lichni-mneniia

[4] Kolikova, G. (2020, May 28). Лични мнения | Търговски мерки и пандемията COVID-19 | Институт за икономически изследвания. www.iki.Bas.Bg. https://www.iki.bas.bg/lichni-mneniia

neoclassicism, goes even further by adding more and better measurable criterion for industrial specialization in international trade and more specifically the factor endowment of a country.

With the progress of economic science and the broader understanding of international trade on the path to prosperity, the theory of "economies of scale"[5] and the theory of the "technological advantage"[6] do align with the relevant economic understanding at their time.

Vernon is the first to address the topic of the product cycle and defines the cycle course in three stages: new product is accessible in the country of origin until known and demanded in other countries, which is stage 1. Stage 2 is when the product is sold to another country of similar level of market development. Stage 3 is when the product is manufactured in less developed country. With the Product Cycle Theory in fact Vernon defines the differentiation in the IITT between the developed and developing economies.

Key to the Product Cycle Theory of Vernon is the Imitation Lag Hypothesis (1961) of Michael Posner and his theory of the work on technology diffusion between countries. He presents the vision, that a new product is initially in a status of "demand lag", which is the time until it creates awareness and demand in the country of origin and starts to be exported. The next period Posner names "imitation lag" and is the time until a foreign manufacturer is ready to duplicate the product.

The contemporary economy practice though, has many examples of shortened "imitation lag" and simultaneous product or service development of equal level by competitors. Survives and expands the one, which is more successful on the maturity and commercialization stage, or the one which has a more fertile market of origin[7].

As M. Porter concludes, the profile and quality of the consumers in the market of origin are substantial to the success of a new product or service. The more refine and sophisticated the customers are in the home marker, the better competitive qualities the product will have and the higher chance to expand globally it will possess.

Quicker and cheaper is not enough on contemporary market. Customers require innovations. They need to be challenged, they like it, and they need this. Only these challenging products and services will keep their hunger to consume and will keep the level of satisfaction higher when they gain the result.

However, all theories do review international commerce as a collective activity for the supply and provision of goods and services. Some theories do register the mobility of factors, but only the most recent ones try to give the credit to the advanced technology as qualitative and quantitative factors achieved by the specific production technology. Only the recent ones do acknowledge that international commerce is taking place among more than two or three countries and this makes the economic equations more complicated.

The World Bank Group McKinsey Global Institute[8] outlines five trends, which are currently reshaping the GVC:

1. A smaller share of good is traded across borders – Production value chains is less trade-intensive.
2. Services trade is growing faster than goods trade – the trade in services is 1/3 of the global trade and for a decade until 2017 has grown more than 60% faster than the goods trade.
3. Low labor costs have become less important – since in the 1990s and early 2000s most of traded goods have been manufactured in countries with low-labor cost, in 2020 the rate is about 18%. At the same time, the labor-intensive goods ratio to the overall trade has fallen to only 43% in 2017.
4. GVC have grown knowledge-intensive – the value capitalized on IP spent has almost tripled for 16 years to about 13.6%, for machines and equipment to over 36% ad in medical and pharmaceuticals it averages 80%.
5. Value chains are becoming more regional and less global.

The overall conclusions of the report almost repeat the ones from last year, which could conclude the trends are stable. The content is in coherence with the background stated above, and would bear the assumption, that the COVID-19 pandemic would not change the trend but would even accelerate some of it processes.

In reference to the above, is another trend to the European Union and could be treated in close reference to Bulgaria and the Western Balkans. It refers to the observation of the IP for innovations and technology and certain countries like China are notorious for disrespecting the IP and duplicating. The most recent evidence for that is the Council

[5] Vernon, R. (1966). International Investment and International Trade in the Product Cycle. Quarterly Journal of Economics, 80(2), 190–207.

[6] Porter, M. E. (1985). Technology and Competitive Advantage. Journal of Business Strategy, 5(3), 60-78.

[7] Porter, M. E. (1990). The Competitive Advantage of Nations. Harvard Business Review, 68(2), 73–91.

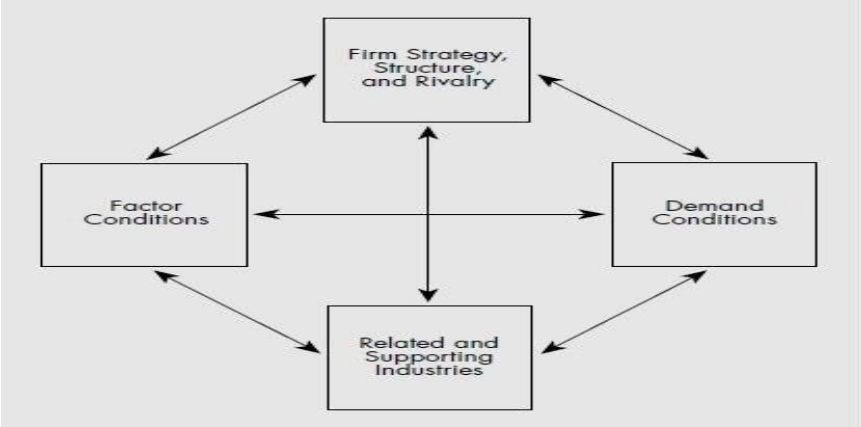
[8] McKinsey Global Institute. (2016, January). Globalization in transition: The future of trade and value chains. McKinsey Global Institute (World Bank Group).

Regulation (EC) No 428/2009[9] of the European Union, which sets up a Community regime for the control of exports, transfer, brokering and transit of dual-use items. Regardless of the fact it quotes "dual-use items", the regulation is addressing the "research and development (R&D), production and trade of typically high-tech, advanced products across a wide-range of civil industries, for example: energy, aerospace, security, lasers and navigation, telecommunications, life sciences, chemical and pharmaceutical industries, material-processing equipment, electronics, semiconductor and computing industries, medical and automotive."
At the same time developed economies will still need their targeted alternative less developed economies to transfer technologies after the exhausting of the demand lag and the necessity to achieve efficiency by moving to a less expensive manufacturing country.
As per the World Bank country GVC classification database Bulgaria and the countries of the Western Balkans (Albania, Bosnia & Herzegovina, Kosovo, Montenegro, North Macedonia, Serbia) do have similar economic sensitivity and tendency to specialization in: 1. Agriculture, 2. Food & Beverage, 3. Transport and transport equipment, 4. Chemicals and Non-Metallic Mineral Products, 4. Textile and Wearing Apparel, 5. Electrical and Machinery, and for Kosovo Water, Sanitation and Waste Management is an area of focus. Bulgaria is in advantageous position, because of the EU integration, though is needed to improve to convergence and to advance with the competitive specialization in its participation in the GVC.

4. THE PERSPECTIVES

In context of the background and the global trends in international economics it is relevant to pay special attention to the perspectives for Bulgaria and the Western Balkans and how to reposition on the GVC through IITT, especially in the post-coronavirus pandemic and the European Recovery Plan [10]of €1.8 trillion.
It is Michael Porter who stated in his "*The Competitive Advantage of Nations*" that national prosperity is not inherited but can be created. He claims that the capacity of a national economy depends on its capability to implement innovations and to upgrade. Porter is the economist who identifies the "diamond" of the National advantage.

Fig. 1. Determinants of National Competitive Advantage.



Source: Harvard Business Review (March-April 1990)

The Diamond of Porter is important for this research because it outlines the direction in which Bulgaria and the Western Balkan countries need to foster their collective focus so that they can gain mutual advantage on a coordinated strategy. The determinants do create a national or regional environment in which new corporations emerge and learn to compete on the market.
The geographic proximity, being a collective market of about 25 million citizens in population, a coherent strategic development under the structural EU cohesion programs, the regional mentality and interest to adapt to the Green European Deal and to preserve natural resources are a solid factorial ground base for the first tip of the diamond. The quoted above classification and sectoral capacity is the second tip of the diamond, as the related and supportive industries which on a regional level could be in an active competition. The severe local competition fosters the

[9] Explanatory note on the control of "export" for "dual-use items", including technology transfers, under Council Regulation (EC) No 428/2009 - http://ec.europa.eu/research/participants/portal/doc/call/h2020/h2020-drs-2015/1645163-explanatory_note_on_the_control_of_export_for_dual-use_items_en.pdf
[10] https://ec.europa.eu/info/strategy/recovery-plan-europe_en

development of unique groups of specialized factors, especially if the competitors are localized in proximity of a city or a geographic region. The third and the fourth tips are a subject of development.

The diamond does encourage the development of cluster industries and the positive development of one industry is a direct stimulus for related and supportive industrial sectors. The most successful industries do manage to create their own production factors (skilled labor, scientific and academic resources). Creating own factors, creates additional demand in the system and intense local competition. It stimulates the upgrade of all supportive industries as well. As a self-regulating system, according to Porter, a vigorous domestic competition, achieved by the local companies' development and progress on local marker, is the force to achieve a more intensive export interest in the competing companies.

Porter specifically addresses the role of the State as a leader to create conditions for the companies to profiling and specialization of the companies and the sectors, where the Government does not interfere but stimulates and encourages and challenges the companies to develop competitive advantages.

Mariana Mazzucato[11] also defines the role of the Government in the contemporary competitiveness as pro-active and highly needed. In her book "The Entrepreneurial State" she advocates for the Government, which is ready to invest and develop innovations and when a public interest is generated in the field of innovation to pass it on to the private sector. She justifies this position with multiple evidence of technologies developed by the US government and then commercialized or utilized by the private investors and investment funds.

The critical detail about all the evidence she presents is the fact that all these projects do take years and even decades to reach the point of commercialization. Nowadays the global economy is under tremendous pressure. Almost no supply chains are in or not even near to the status of where they were at the beginning of 2020. The national policies are under severe uncertainty and in a frantic search of a transformation.

The values of the positioning of Bulgaria and the countries of the Western Balkans from The Global Competitiveness Report 2019[12] of the World Economic Forum (WEF) are a good screenshot of how competitive each individual country from the region is through the unified matrix.

Fig. 2. The Global Competitiveness Report 2019 | Source: OCDE.org

	Albania		Bosnia & Herzegovina		Bulgaria		Montenegro		North Macedonia		Serbia	
Global Competitiveness Index 4.0 2019 edition												
Index Component	*Score **	*Rank/141*	*Score **	*Rank/141*	*Score **	*Rank/141*	*Score **	*Rank/141*	*Score **	*Rank/141*	*Score **	*Rank/141*
3rd pillar: ICT adoption 0–100	**52.9**	**75**	**51.6**	**80**	**0.0**	**73**	**0.0**	**0**	**57.6**	**70**	**52.6**	**77**
3.05 Internet users % of adult population	71.8	62	70.1	67	0.0	65	100.0	4	79.2	46	73.4	58
6th pillar: Skills 0–100	**69.0**	**50**	**60.0**	**82**	**0.0**	**68**	**100.0**	**1**	**59.8**	**83**	**68.2**	**55**
Domestic competition 0–100	**42.9**	**120**	**42.1**	**124**	**0.0**	**55**	**66.0**	**47**	**41.2**	**126**	**47.7**	**98**
Trade openness 0–100	**65.8**	**22**	**57.1**	**74**	**0.0**	**57**	**55.7**	**52**	**56.0**	**81**	**61.5**	**51**
8th pillar: Labour market 0–100	**65.3**	**38**	**53.3**	**107**	**0.0**	**65**	**57.3**	**69**	**58.3**	**82**	**62.1**	**54**
Administrative requirements 0–100	**81.2**	**35**	**61.8**	**102**	**0.0**	**73**	**65.7**	**76**	**82.9**	**31**	**78.8**	**42**
Entrepreneurial culture 0–100	**42.4**	**117**	**40.4**	**125**	**0.0**	**51**	**N/Appl.**	**135**	**39.5**	**129**	**47.4**	**92**
12th pillar: Innovation capability 0–100	**29.8**	**110**	**28.4**	**117**	**0.0**	**45**	**88.4**	**73**	**31.8**	**97**	**40.2**	**59**
Interaction and diversity 0–100	**32.5**	**114**	**29.4**	**129**	**0.0**	**43**	**53.8**	**41**	**30.7**	**125**	**41.8**	**59**
Research and development 0–100	**17.2**	**126**	**20.2**	**106**	**0.0**	**35**	**50.1**	**79**	**21.5**	**93**	**33.8**	**55**
12.05 Scientifc publications score	60.2	128	65.1	114	0.0	80	44.2	70	68.2	97	77.0	61
12.06 Patent applications per million pop.	3.6	89	7.8	77	0.0	31	38.3	69	5.1	81	22.9	54
12.07 R&D expenditures % GDP	5.1	98	6.7	93	0.0	26	43.5	51	11.8	75	31.0	38
12.08 Research institutions prominence 0–100 (best)	0.0	117	1.1	88	0.0	5	61.9	49	0.8	89	4.2	60
Commercialization 0–100	**49.2**	**95**	**42.6**	**112**	**0.0**	**68**	**44.8**	**80**	**54.4**	**73**	**49.7**	**92**
12.10 Trademark applications per million pop.	63.9	81	60.4	89	0.0	89	48.7	51	77.1	n/a	70.5	61

5. RESULTS

Provided that the scale does not present info for Kosovo, the relative equality of most of the countries is visible on some categories. If there is a bigger difference in the results among the countries, they still split in a couple of clusters, which as stated above is a factor of potential to coordinate on regional basis for the purpose of building a high level of regional innovation and imported technology diffusion.

On the other hand, the lower ranking of the countries and the region on areas like infrastructure, renewable energy cohesion and others are a good object of convergence through the instruments of the EU programs and cohesion programs, including funding and know-how. Also, it might be a very appropriate field to start implementation of IITT and best practices as a start of the transition.

From the case studies and direct research among innovative companies and technology holders, particular interest and firm intentions to commit with IITT has been received from multiple corporations. For the purpose of the report,

[11] Mazzucato, M. (2015). The Entrepreneurial State: Debunking Public vs. Private Sector Myths (Revised ed.). PublicAffairs.

[12] World Economic Forum. (2019). The Global Competitiveness Report 2019. World Economic Forum ISBN-13: 978-2-940631-02-5. https://www.weforum.org/gcr.

specific companies are ready to get involved in particular feasibility study in details and direct conversations with local partner(s) from one or more among the Western Balkan countries and Bulgaria. Interviewed were corporations, ready to license and pass on the rights for local representation, project development and further IITT in the following areas: - waste management (for agricultural residue and for auto tires), - food safety (full cycle production line for 100% biodegradable and biopolymer packaging), - food security (soil free and urban agriculture, shrimp and aquaculture farming), - water safety and purification, - decarbonization (hydrogen fueling burning processes for fossil fuel consumption and carbon emission decrease), - bioscience and pharmaceuticals.

Applying IITT is and may be a tool to integrate the scientific and industrial capacities together, both on national and regional level at the same time.

Even after being a member of the European Union for 13 years, Bulgaria is a market in a stage of continuous convergence and cohesion to the EU market. All the countries in the Western Balkans are also on the verge of starting the cohesion to the same market. All that means economic and structural reforms of a large scale, but all these countries do have the chance to choose direction and invest into specialization. Developing capacity in several industries, the Balkan countries will be able to focus on positioning at another level of market competitiveness.

6. CONCLUSIONS

Many innovators and technology holders are interested to license and be a supplier on a IITT to Bulgaria and/or the countries of the Western Balkans with the idea to scale up their global diffusion or simply to obtain a reliable partnership for further distribution of their technology to Eastern Europe and on some cases to the Middle East, where otherwise it will be difficult for them to penetrate. The Bulgarian membership to the EU is at least partial coverage against malpractice for the observation of the IP, and on the other hand many innovators do not wait the "imitation lag', but hurry to compete and take a market share with no delay.

The shift of the GVC caused by the COVID-19 pandemic and the consequent repositioning of economies to the new international trade and economic order, the resetting of the supply chains is a short-term course and a rare opportunity, which will not last for more than two or three years. The current events and circumstances do narrow the choice of Bulgaria and the countries in the Western Balkans to IITT as the quickest and most flexible alternative for a technological upgrade and development of an economic potential. The IITT has the advantage to provide a high probability success on a targeted result, since in most cases it has already had its proof of concept. Also, it is also a turnkey solution, which starts with no delay. The IITT is a high level of knowledge based economic activity which integrates the best of multidisciplinary national or regional capacity in a holistic development course. The successful execution of strategic IITT transactions is not limited to one case, object or subject and always does have a long-term positive consequence on a broad scale.

With the process of strategically specializing in IITT, Bulgaria and the Western Balkan countries have the perspective to gain proprietary position not only on the European value chains but on the GVC. More important, with strategically choosing to take the advantage of the pandemic and turn it in an opportunity, Bulgaria and the Western Balkan countries will secure their citizens a projection of sustainable and high added value economic perspective for decades ahead.

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