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SMART SPECIALIZATION AND COMPETITIVENESS WITHIN INDUSTRY 5.0*

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Abstract: *As the business world survived after the COVID -19 pandemics, according to “traditional” Porters’ competitiveness models, the traditional industrial sectors lose their competitive advantage. So, they have to do “some” virtualization in order to be more competitive at common economic world. The paper aims to discuss possibilities of smart specialization for increasing competitiveness of traditional industrial sectors. The bases for analysis is the needed of traditional industries for smart change under the Industry 5.0 in order survive at digital business world. But, how such digital and smart specialization to be done is the key problem discussed at the paper. The main results of the desk and practical research in the paper are found in the next points: 1. Application of Industry 5.0’ competitive approach to the “old” traditional industries and 2. Introduction of competitive roadmap based on smart specialization and social platforms.*

Keywords: *smart specialization, (digital) competitiveness, Industry 5.0.*

JEL: *D20, L26, O33*

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PAMETNA SPECIJALIZACIJA I KONKURENTNOST U OKVIRU INDUSTRIJE 5.0

Sažetak: Pošto je poslovni svet izdržao pandemiju COVID-19, prema Porterovom modelu konkurentnosti tradicionalni industrijski sektori gube svoju konkurentsku prednost. Dakle, neophodno je preduzeti izvesnu virtuelizaciju u kako bi se unapredila konkurentnost u globalnom, ekonomskom svetu. Cilj ovog rada se odnosi na istraživanje mogućnosti pametne specijalizacije radi unapređenja konkurentnosti tradicionalnih industrijskih sektora. Osnovu analize čini težnja tradicionalnih industrija ka pametnim promenama u okviru Industrije 5.0, a sve radi opstanka u digitalnom poslovnom svetu. Ključni problem o kom se raspravlja u radu jeste kako sprovesti takvu digitalnu i pametnu specijalizaciju. Osnovni rezultati desk i terenskog istraživanja podrazumevaju sledeće: 1. Primeniti konkurentni pristup Industrija 5.0 na “stare” tradicionalne industrije i 2. Uvesti konkurentne mape puta zasnovane na pametnoj specijalizaciji i socijalnim platformama.

Ključne reči: pametna specijalizacija, (digitalna) konkurentnost, Industrija 5.0

1. INTRODUCTION

Undoubtfully, the digitalization become not the trend but the only industrial path for development. As many researchers report, digital instruments cover not just a new industries but also the traditional ones (for example, food and bevetage, textile and clothing and etc.). Accordingly, the competition has been changing faster than the single industries did. So, its is very important to research how the competition and competitors react to the newly Industry 4.5/5.0 trends.

Additionally, the digitalization of the main societal and economic systems need to change the focus of the competition and competitiveness. As it has been developed, the competitive analysis started on the micro level with the analysis of the main competitive practices of Industrial management in 1980s (see, value chain model, competition model and etc.) followed by the analysis of macro conditions in 2000s (see, Porter’s diamond model and etc.). Nowadays, we have much more complicate model that covers the regional development on the industries, especially on the EU common market. But, the competition transfers from a pure economic phenomenon to a social and political one, that need a different business approach to competition and competitiveness. Following, the intersection between these trending two approaches: competition analysis and regional development will give main points how the competition has to change within the Industry 5.0.

2. STATE OF SCIENCE

The competition and competitiveness are one of the major market approaches that is recently given to the core of any economic system. Basically, the understanding on competition is not much more changed for the last 2 centuries as the competitiveness is associated with a given characteristic of the company that allows it to compete effectively with other companies on the market.

Competitiveness evaluates a given product, service, company, country, etc. in terms of their ability to compete successfully in the market. In the conditions of worldwide globalization and EU market internationalization, the priority criterion for its efficiency is higher competitiveness (Kancs & Kielyte, 2001).

It could be easily found that the A. Smith, D. Ricardo, J. Mill, J. Robinson, J. M. Keynes, J. Shumpeter, P. Heine, F. Hayek and others definitions are valid nowadays as well. For example, the state of Adam Smith (1932) that "In general, if any branch of trade, or any division of labour, be advantageous to the public, the freer and more general the competition, it will always be the more so" explains the same principles valid today, just the "public" is bigger today.

Additionally, following Porter (1998) profitable markets yield high returns and they will attract new entities that explain the investment interests in high-tech companies and Industry 5.0 technologies. This approach is adopted by a number of official organizations that explain competitiveness as an ability of companies, industries, regions and countries to create a relatively high level of income and wages.

The Smart Specialization approach was developed as part of the strategic documents of the DG Regional Development of the European Commission with the main aim of proposing measures for the development of the regions, especially the backward regions in the new EU member states (Oláh, Novotná, Sarihasan, Erdei & Popp (2022) and Zhang, Qiu & Cao (2023)). The connection with the Competition approach is found in three points:

- **Business capabilities:** by reducing regional inequalities business capabilities of single companies or their networks will increase.
- **Business development:** innovations and Industry 5.0's technologies are capable to overcome the differences within the fast and slow growing businesses.
- **Competitiveness:** preserving and strengthening the economic role of different social and political systems.

Additionally, smart specialization approach break-up the traditional competitors – competition networks and is focus of establishment a new value chain models based on:

- **Encouraging innovation and investment**, especially in unattractive industries and/or regions.
- **Promotion of business digitalization**, social innovation and transition to a regenerative economy within industries and regions that are looking not capable for Industry 5.0 digitalization /for example, agri-business (see Sharma, 2021); food and beverage production, textile and clothing production and etc./
- **Promoting a fundamental transformation** of the business and competition environment based on continuous interaction between business, society, educational and research institutions, and state/local institutions.
- **Encouraging distribution** of social changes within competition towards increasing co-sharing values and increasing co-working activities.

3. METHODOLOGY

Intersection between Competitiveness approach and Smart specialization approach could be summarized in the next few points which were taken from the research “Roadmap for fostering intelligent specialization in Bulgaria” (Kostadinov, Sterev & Yorgova, 2020):

1. Competitiveness approach could be summarizing in Porter’s diamond approach (Figure 1):

- **Factor conditions** – includes: human resources – quantity, qualification and remuneration costs; natural resources – quantity, quality, availability, costs of land, water, minerals, wood stocks, sources of hydropower, etc.; knowledge base – this is the national stock of scientific, technical and market knowledge, resources; capital – amount of capital available for financing the branches and its acquisition costs; infrastructure - availability, type and costs of its use. Includes transport scheme, communication system, postal delivery, payment and transfer system for funds, health care system, housing, cultural institutions, etc.;
- **Demand conditions** - it affects the speed of implementation of innovations based on possible market size.

- **Supporting industries** – based on different value chain models that affects the competitiveness. Supporting industries affect competitiveness by providing access to modern and cheap resources, facilitating coordination and innovation.
- **Strategy** – explains the single companies' quality management, respectively company strategy and structure, the achievement of competitiveness would be random (invention, technological changes, sharp changes in resource prices, sharp increase in demand, political decisions, wars and etc.).

2. Smart specialization approach could be summarizing as the common DNA of the regional development approach (Figure 1) and it is based on the next principles:

- **Introduction of model of “sharing knowledge”** - this implies a two-way exchange of information between all interested parties. In this case, the following is taken into account:
 - a. The educational system should share their knowledge beyond traditional book publishing. Knowledge sharing is related to building a list of intellectual property rights owned by Universities and Research Centers to be marketed on the business services market. Secondly, it is necessary to make Applied knowledge more accessible to society. For example, chemistry is a basic science, but its applied dimensions are part of everyone's daily life without even knowing it. Analogous examples can be given with physics, mathematics, etc. "fundamental sciences" that have a social status of complex and unusable, but at the same time are part of everyday life. Thirdly, shared education means fostering networks of educators and networks of researchers who, working in different fields, can further contribute to the promotion of science and its marketing.
 - b. The business system (or business) should be more responsible in terms of sharing "good practices". Business information sharing has 2 essential dimensions: The first dimension is the creation of "big data" sets of information to be used for educational purposes. Education "on principle" does not create appropriate skills among young people, but directs educational institutions to teach mainly "theoretical knowledge". The second dimension and the possibility of publishing examples, good and not so good practices, in textbooks and teaching materials. Acquiring intellectual property rights to photos, logos, etc. associated

with the creation of certain learning cases would only facilitate the use of the case approach in educational services and create opportunities for Research Institutes to better market themselves by sharing successful joint projects with the business.

- c. The political system, resp. national and local government, to mediate the exchange of knowledge between the remaining 4 groups in the model. This includes creating and providing for use the necessary infrastructure for this, as well as supporting the financing of priority projects for development smart specializations.
- **Development "sharing of innovative ideas" as co-creation and co-working approaches**, including:
 - a. Knowledge demonstrations should show the applied results of the research work in the Universities and Research Centers.
 - b. Know-how marketing involves creating an opportunity to sell intellectual property rights.
 - c. Academic entrepreneurship growth is achieved by securing suitable financial schemes or finding financial instruments for an academic entrepreneurs. An example of this from the Balkan countries is the use of the World Organization of Business Angels, through which to market innovative products that have the potential for growth.

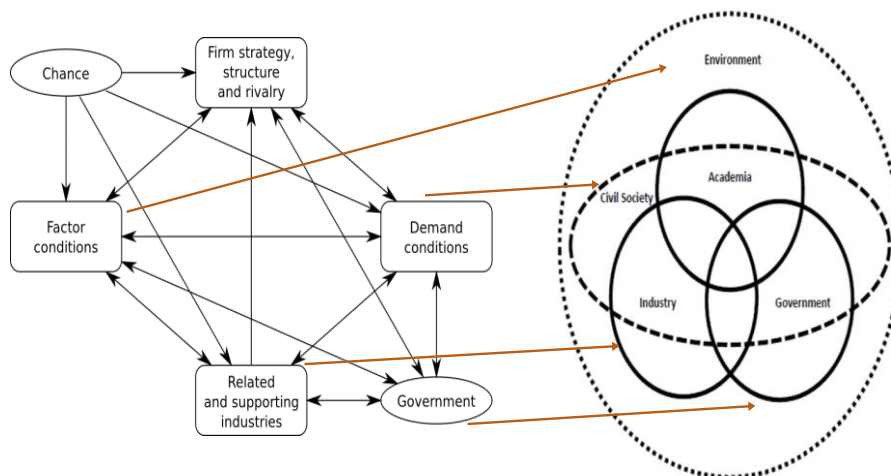


Figure 1. A shift from the Porter's Diamond model (left) to the Quintuple Helix smart specialization model (right)

Note. Author's presentation.

The shift between models could be summarized in 2 points:

1. Government: the role of the state/local government should be focused on 2 main points:

- creating and promoting the development of supporting institutions; creating and sustaining the demand for innovative ideas. In terms of supporting industries, these are economic agents: business entrepreneurs, national research institutes, universities. The creation and maintenance of supporting industries is related to the creation and maintenance of appropriate conditions for the generation, use and development of innovative ideas based on the principles of sharing, cooperation and collaboration. All this is related to creating publicity of significant theoretical and applied developments that have the potential for market realization.
- promoting building public registers for innovative ideas; creating registries of registered patents, utility models and other intellectual property rights from supporting industries; and creating registries of quality scientific publications. In terms of demand conditions, the support is linked to promoting the use of innovative ideas that achieve the main objectives of the European strategy for smart specialization: the digitalization of business; social innovation; and a regenerative economy (i.e. using advanced materials and smart technologies).

2. Supporting institutions (resp. business entrepreneurs, research institutes and universities) should create appropriate environmental conditions by supporting the modification of business strategies for their most effective use. In doing so, Supporting Institutions make the connection between favorable environmental conditions and business capabilities. The role of supporting institutions should be considered in 3 directions:

- opportunities of the competitive environment and business capabilities. In terms of realizing the opportunities of the competitive environment, the supporting institutions should develop scientific research that will lead to the implementation of the priority directions: development of smart technologies, development of smart materials, development of smart applications for business management. At the same time, the emphasis should be reoriented from "development of fundamental science" to development of "applied science".
- promotion of cooperation and cooperation between different scientific institutions. In terms of building business capabilities, supporting

institutions are responsible for "training" businesses to use innovative technologies and exploit the opportunities of the competitive environment. In this direction, it is necessary to promote of business, entrepreneurship and management training. Training should be mainly "application-oriented" and related to the creation of sufficient knowledge and, above all, skills to use the business opportunities of the environment related to innovation and innovative ideas.

- promotion of joint initiatives between different supporting institutions regarding the training of business entrepreneurs, incl. and by creating joint "open spaces / open classrooms / open classrooms" in which the basic principle of sharing is embedded.

4. DATA ANALISYS AND DISCUSSION

The next example might illustrate the significance of SMEs in the textile and apparel industries in Europe and the necessity to support their formation and expansion (MacCormick & Schmitz, 2001). Given the significance of textile SMEs for the EU economy, there are a few critical roadblocks to the competitiveness of smart specialization (Shterev (2020); Shterev & Biolcheva (2023); Ocampo, Hernández, Márquez & Vizán (2020)).

1. Centers for new material research.

As mentioned, the European textile sector under significant pressure to innovate its products because of fierce competition from low-wage nations. Since SMEs make up a large portion of the textile and apparel sector, they typically outsource research and development, which results in a fragmented landscape of TCI innovation overall. However, in order to combat: the fashion SMEs require innovation.

2. Textile and apparel business learning.

Planning for business education on fashion and clothing design must take into account education provided by, for, and on behalf of the firm.

3. Clothing design and fashion.

It is necessary to design entrepreneurial education for the enterprise, via the enterprise, and in connection to the enterprise's education.

Enterprise-specific business education: This entails teaching the information and abilities needed to launch and expand a business. It incorporates entrepreneurial education via an action learning program that addresses real-world issues and embraces several entrepreneurship education tenets (Kirby, 2005).

Business education via the business: Using the new venture creation process in education is part of this. This would assist the students in gaining the knowledge and abilities in business needed to manage a specific organization.

Business education for the enterprise: This entails teaching the information and abilities needed to launch and expand the firm.

4. Start-up centers.

TCI's competitive business development requires assistance from other linked sectors, such as digitalization. The other allied sectors must assist in the growth of TCI enterprises. The primary environmental shift that the leading textile and clothing startups track is digitization. The following are therefore some of the primary obstacles to assisting TCI start-ups (Cooper, 2010):

- *Virtual supply chains:* these are adaptable, separate supplier chains with integrated control over chain nodes. The primary structure of the virtual chains is based on major fashion shops. The primary outcome of creating virtual supply networks is prize-off. The primary driver behind the creation of those virtual chains is the use of contemporary information technologies such as APS (Advance Planning and Scheduling) and ERP (Enterprise Resource Planning). Additionally, as a part of the rapidly evolving virtual chains, new technology-based TCI firms are being forced to develop themselves due to the new software decisions for managing virtual supply chains, including cloud technologies.
- *Green clothing and textiles:* TCI technology remained steady for a considerable amount of time; for instance, looms utilized for manufacturing in the late 1970s were mostly made in the 1900s. Subsequently, technology for textiles and clothing began to advance in response to the demand for quicker processes in the cutting of fibers, the stitching of thermoplastic yarn for knitting, etc. These days, the manufacturing of fiber and textiles is expanding, which lowers pollution and combats climate change. Therefore, the manufacture of clothing as well as the substantial consumption of textile finishing and advanced automated textile factories should encompass not merely.

For understanding possibilities for smart competitive specialization of Textile companies 20 deep interviews were done. According to main results we could summarize (Figure 2 and Figure 3):

- New fashion design is applied every 1 – 2 years as the new textile/clothing technologies are applied every 2 – 4 years and the other entrepreneurial ideas appeared once for 3 – 5 years.
- The data indicates that TCI enterprises' smart competitive potential is nearly uniform across all domains, falling somewhere between a good and an exceptional level. Less than 0.2 separates the various components of entrepreneurial potential.
- However, the degree of relevance to the current industry (3.57 out of 5.00) and the idea's applicability (3.52 out of 5.00) determine the likelihood of fashion innovation's success. The uniqueness of an inventive concept has the least influence on entrepreneurial potential (3.38 of 5.00).
- The TCI enterprises exhibit unequal distribution of smart competitive potential. According to the data, 15% have great potential across all domains, 35% have excellent potential, 45% have fair potential, and 10% have poor potential for effectively innovating their ideas.
- The TCI firms don't realize how innovative and enterprising they can be. They deduct at least one point for their comparatively poor entrepreneurial potential. Given that the Originality values are nearly identical, the areas of workability and application have the greatest gaps.
- However, 25% of fashion enterprises believe that their entrepreneurial potential exceeds what the fashion industry can support, 30% believe that the potential is equal, and 45% believe that the potential is less.

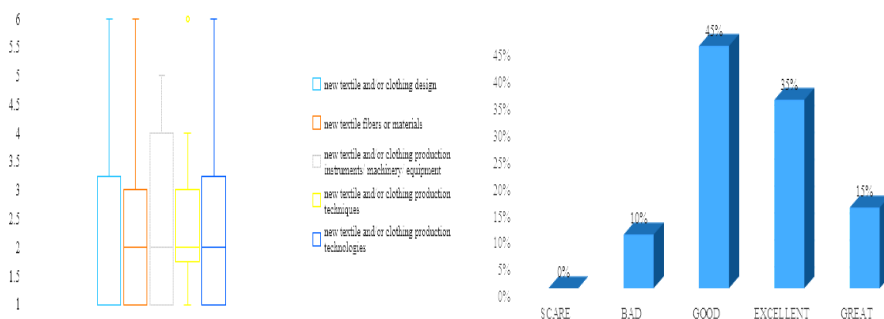


Figure 2. Sequence of innovative idea appearance (left) and Quality of smart competitive potential factors' appearance (right)

Note. Sterev, N., Milusheva, P., Hertleer, C., Saeed, H., & Guagliumi, V. (2021). *Entrepreneurial process in Textile and clothing industry: Technical Report*. Sofia, Bulgaria: Publishing House of Technical University in Sofia.

- The statistics are satisfactory since 24% of fashion inventions have led to the establishment of a TCI start-up, and between 40 and 45 percent of innovations are transmitted to outside or newly affiliated enterprises. However, 86% of TCI firms created their ideas within the current organization.
- On the other hand, 32% of the discovered TCI companies have only innovated within their business, 9% of the companies have never innovated themselves, 9% of the companies have founded new fashion start-ups, and 50% of the companies use multiple methods to transfer their innovation outside of the current company.

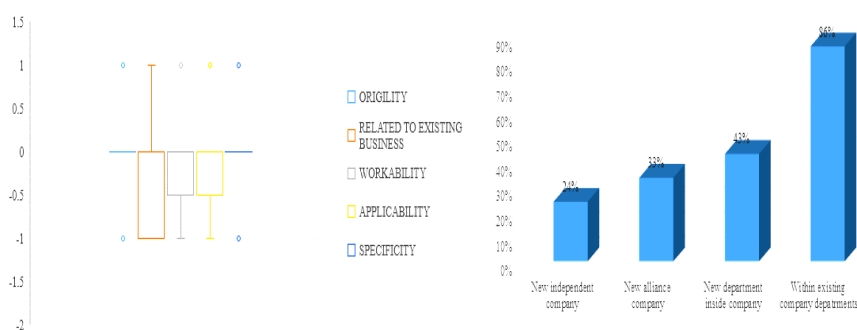


Figure 3. Sequence of innovative idea manifestation in fashion business

Note. Sterev, N., Milusheva, P., Hertleer, C., Saeed, H., & Guagliumi, V. (2021). *Entrepreneurial process in Textile and clothing industry: Technical Report*. Sofia, Bulgaria: Publishing House of Technical University in Sofia.

5. CONCLUSION

The adoption of the Smart Competitive Specialization approach as a tool to foster competitive growth is unquestionably one of the most significant turning points in the Industry recent days. At the national and regional levels, strategic papers for smart specialization are now being established.

Nonetheless, more funding must be used and the required policies must be created in order to support:

- The exchange of information between research facilities and institutions;
- Orienting scientific research in universities and research centers toward solving applied business problems by establishing networks of these institutions for training and research;
- Aligning priority sectors with primary industries and promoting the integration of applied findings from basic sciences like chemistry, physics, mathematics, material science, etc. for the growth of Industry 4.5 and 5.0;
- Increasing the state and municipal governments' capacity to mediate disputes between various parties.

REFERENCES

- Cooper, W. D. (2010). Textile and apparel supply chains for the 21st century. *Journal of Textile and Apparel, Technology and Management*, 6(4).
- Kancs, D. A., & Kieleyte, J. (2001). Analysing sectoral competitiveness: A framework of strategic management. *Journal for East European Management Studies*, 169-188.
- Kirby, D. A. (2004). Entrepreneurship education: can business schools meet the challenge?. *Education+ training*, 46(8/9), 510-519.
- Kostadinov, K., Sterev, N., & Yorgova, T. (2020). Roadmap for fostering intelligent specialization in Bulgaria. In *Industrial Growth Conference* (357-366). Sofia, Bulgaria: University of National and World Economy.
- MacCormick, D., & Schmitz, H. (2002). *Manual for value chain research on homeworkers in the garment industry*. Brighton: IDS.
- Ocampo, J., Hernández, J., Márquez, J., & Vizán, A. (2020). The Effect of Process Improvement Practices on Manufacturing Competitiveness of Apparel Factories. *Journal of technology management & innovation*, 15(1), 15-26.
- Oláh, J., Novotná, A., Sarihasan, I., Erdei, E., & Popp, J. (2022). Examination of The Relationship Between Sustainable Industry 4.0 and Business Performance. *Journal of Competitiveness*, 14(4), 25–43.
- Porter, M. (1988). *Competitive Advantage: Creating and Sustaining Superior Performance*. NY: Free Press.

- Sharma, S., Gahlawat, V. K., Rahul, K., Mor, R. S., & Malik, M. (2021). Sustainable innovations in the food industry through artificial intelligence and big data analytics. *Logistics*, 5(4), 66.
- Shterev, N. (2020). Guidelines for promoting intelligent specialization in Bulgaria, Burgas Free University press, 2020
- Shterev, N., & Biolcheva, P. (2023). Intelligent systems in the circular economy. In *ESG Standards and Securing Strategic Industries* (54-63). Burgas Free University, Bulgaria.
- Stere, N., Milusheva, P., Hertleer, C., Saeed, H., & Guagliumi, V. (2021). *Entrepreneurial process in Textile and clothing industry: Technical Report*. Publishing House of Technical University of Sofia, Bulgaria.
- Zhang L, Qiu P, Cao P (2023) Does digital transformation enhance the core competitiveness? —Quasi-natural experimental evidence from Chinese traditional manufacturing. *Plos one*, 18(11), e0289278.

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