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COMPETITIVENESS OF TEXTILE PRODUCERS IN DIGITAL BUSINESS ERA

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Abstract. Undoubtedly, the traditional sectors are in not competitive position with other sectors in Industry 5.0 conditions. Digital companies receive better staff and get more money from the bank and have better possibilities for projects. But, what could do they to be more competitive in the digital Era? The main hypothesis is that "traditional" producers has to change their main activities to be competitive in the digital era. Thus, the paper research possible elements of their competitiveness based on Intelligent specialization strategies. Thus, the main results of the paper are focused on summarizing roadmap to competitiveness by smart specialization. Main instruments used in the paper are: literature review and case-study approach for analyzing the competitive instruments that textile companies could accept. Findings in the paper could be connected with the competitive growth theories.

Keywords: competitiveness; industry 5.0; textile industry; competitive model

1. Introduction

Digitalization has undoubtedly become the only industrial development path and not just a fad. As numerous researchers have noted, digital tools are used in both traditional and emerging industries (e.g. food and beverage, textile and apparel, etc.). As a result, competition has changed faster than the individual industries. Therefore, it is crucial to examine how competitors are responding to the recently announced Industry 4.5/5.0 trends.

In addition, competition and competitiveness must shift their focus as the most important social and economic systems become increasingly digitally networked. Competitive analysis, as it evolved, began in the 1980s at the micro level with an examination of the primary competitive practices of industrial management (see value chain model, competition model, etc.) and then examined the macro-ecological circumstances in the 2000s (see, among others, Porter's diamond model). Today, the models that take into account the regional development of industries, particularly in the EU internal market, are far more complicated. As competition

shifts from a purely economic phenomenon to a social and political one, a different business approach to competition and competitiveness is required.

The convergence of these two popular approaches – regional development and competitive analysis – will provide important insights into how competition must change in Industry 5.0.

Industry 4.5/5.0 shift is characterized with exchange of human work with computers/smart robots AI-works. So, the competitiveness is not measured just with the production possibilities but with innovations and smart production technologies usage:

– **Industry 4.0**: Production-level implementation of *Internet technology*. They permit the utilization of diverse cloud technologies, resulting in the "big data" that serves as the foundation for organizational performance

– **Industry 4.5**: Presenting the *intelligent technologies* that enable the development of an online representation of the company. "Exporting" manufacturing from the physical world to the virtual one defines it.

– **Industry 5.0**: Production-level implementation of bionics and biotechnology. It makes it possible to organize and manage manufacturing using *biological sensors*. The difficulty is in developing a suitable open-source biological language that will permit the employment of synthetic and biological cells in industrial manufacturing.

Some of the examples of the recent development of textile industry in digital era are connected to fast growth of numbers of patents and start-up in smart design and smart fabrics (Van Den Berg & Almanza 2016; Negarandeh 2008; Malem 2008; Mills 2011, 2012, Ünay and Zehir 2012; Plieth et al. 2012; Kellogg et al. 2002; Gilsoo Cho et al. 2010 and others):

– Among the most groundbreaking advancements in the history of textile innovation were *smart or intelligent textile innovation*s. A new era based on the use of nanotechnology /resp. Industry 5.0/ has emerged because of introducing new materials as the fundamental components of intelligent or smart textiles. Using textile advances in the fashion industry will provide fashion enterprises a competitive edge in the twenty-first century.

– Additionally, less than 1% of the materials used to make apparel are recycled and utilized to make new apparel products. This will be the chance for the future generation to innovate in smart fibers that us based on utilized apparel products.

Nevertheless, the apparel and textile industries are labor-intensive ones and traditionally they are driven by costs minimization. So, it is very important to keep their competitiveness to find out how to change them inside-out.

2. State of art

Competition and competitiveness is one of the most important market approaches applied to the center of any economic system. In essence, since competitiveness is associated with a specific characteristic of a company that allows it to compete

successfully with other companies in the market, the concept of competition has not changed significantly over the past 200 years.

A product, service, company, nation, etc. is evaluated based on its competitiveness. in terms of their ability to compete profitably in the market. According to Kancs and Kielyte (2001) increasing competitiveness is the primary criterion for efficiency in the context of globalization at the world level and the internationalization of the EU market.

The statement that Adam Smith, David Ricardo, James Mill and J.P. Schumpeter and others still apply today even though they are enriched. Let us take the condition 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 ideas that still apply today, except that the "public" is now bigger (McConnell, Brue and Flynn 2011; Porter 1988, Sterev 2014 and others).

Furthermore, according to Porter (1988), prosperous markets attract new players and offer high returns, which explains why investors are attracted to high-tech companies and Industry 5.0 ideas. Many government agencies use this strategy and define competitiveness as the ability of companies, sectors, nations and regions to generate comparatively high levels of income and wages. Thus, the idea of competitive advantages is predicated on the notion that low-cost labor is widely available and that natural resources are not required to produce goods with a greater added value. Therefore, in order to command higher pricing, competitive advantage emphasizes maximizing scale economies in products and services (Stutz and Warf 2007).

Additionally, in order to propose measures for the development of the regions, especially the lagging regions in the new EU Member States, the Smart Specialization approach, based on digital instruments, was developed as part of the strategic documents of the EC Regional Development DG (Olah et al. 2022. Zhang et al. 2023). Three points of the business digitalization are related to the competitive approach:

– **Business capabilities**: The ability of individual companies or their networks to do business will increase as regional differences decrease.

– **Business development**: Small and slow-growing companies can be differentiated in business development by Industry 5.0 technologies and innovations.

– **Competitiveness**: maintaining and strengthening the respective economic roles of the various social and political systems.

Consequently, the modern perception of the competitiveness (Ivanova & Angelova, 2023) of textile and clothing industries is predicated on the ability of the area to drive textile innovations and the digital virtualization of apparel supply chains. According to Mikoláš & Wozniaková (2009), a company that "*uses computer technology; create a virtual (speciousness) image in virtual reality*" is

considered being further virtualizing the textile and clothing industry. These and other reasons suggest that the potential of virtual companies might expand rapidly.

Additionally, the virtualization is based on establishment a virtual supply chains in textile and apparel production that are adaptable, separate supplier chains with integrated control over chain nodes (Cooper 2010). 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 (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 because of the new software decisions for managing virtual supply chains, including cloud technologies.

Following, the competitiveness of the contemporary textile and apparel companies could be measured by:

– **Business capabilities:** creative, clever concepts based on novel, clever designs, clever textiles and fibers, clever manufacturing techniques, and so on characterize these.

– **Business development:** the potential for innovation in implementing Industry 4.5 and Industry 5.0 technologies. Originality, feasibility, application, and specificity serve as its pillars.

– **Competitive business model:** characterized by the competitive elements driving innovation in the textile and clothing industries.

3. Data

The dataset is based on 20 interviews conducted in 2021 in five countries (Belgium, Germany, Italy, Croatia, and Bulgaria) with general managers and managers of textile enterprises. The following details are included in the structured interviews (Sterev et al. 2021).

– How would you assess the innovative potential of your TCI business?
– Do your staff members exchange innovative ideas with you?
– How do you document their innovative concepts?
– How do you identify their innovative concepts?
– What sets their entrepreneurial venture apart?
– Have you implemented a new, creative approach for growth in your TCI business?

A 5-point Likert scale was used to collect the dataset.

GREAT	EXCELLENT	GOOD	BAD	SCARE	NA
5	4	3	2	1	0

4. Empirical findings

The analysis is based on research of 20 textile and apparel companies that declare their position according to the given 3 elements of contemporary competitiveness.

A. Business capabilities

As the business capabilities are measured by the appearance of new innovative business ideas, the competitiveness of the textile and apparel companies depends on the innovative success. A critical factor that drives the development of the entrepreneurial business at each stage is shaped by PERSONAL ATTRIBUTES and ENVIRONMENT. The attitudes of the people are those who are shaping their own surroundings, if an entrepreneur looks for the characteristics of successful people, their chances of success increase, especially if they belong to an entrepreneurial ecosystem. Entrepreneurial environment is based on the networks and institutions (Stam & Spigel 2016).

The competitiveness of the textile and clothing industries depends on the inventive success, as the emergence of fresh, creative business concepts serves as a barometer for company skills. Environmental factors and personal attributes have a major role in shaping the growth of the innovation at every level /resp. resources, technology, processes or products/. A businesses' chances of success rise if they seek for the traits of successful individuals, especially if they are a part of a global value chain ecosystem. Accordingly, business capabilities depend on individuals' attitudes on successful innovations that shape their own environment. Additionally, textile networks are the foundation of an innovation success environment as well (Stam & Spigel 2016).

Thus, the business capabilities are found in the period of innovation idea appearance (Fig. 1) that includes the individual attitude to innovation success and textile value chain appurtenance.

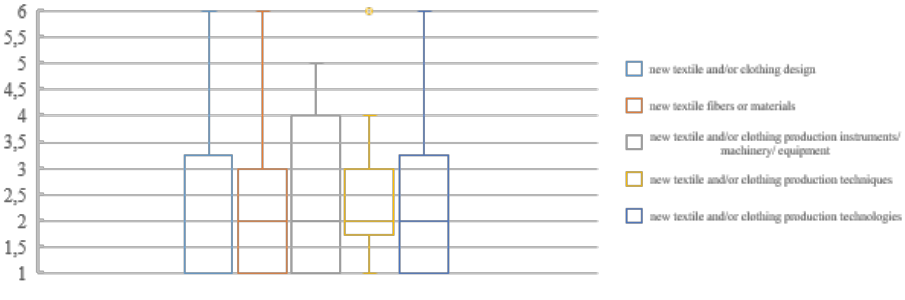


Figure 1. Textile innovation ideas appearance

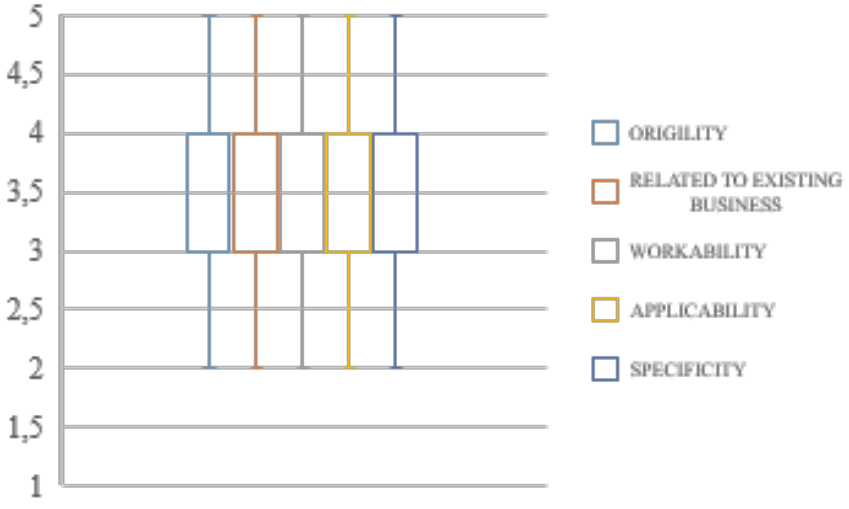
According to the figures, new fashion designs are implemented every one to two years, while new textile and apparel technologies are used every two to four

years, and other business concepts only arise once every three to five years. So, the business capabilities of textile and apparel companies are not good enough and they lose competitive advantage to other business that innovate annually or less.

B. Business development

The business development model focuses on innovative creativity for: 1) sourcing the right material, and 2) acquiring new knowledge to process reclaimed material. Based on Verhaegen et al. (2013) is something new and adapted, its innovative potential is inspired by the quality and novelty of the innovation divided into the four categories originality, workability respectively feasibility, relevance and specificity. (Dean et al. 2006).

The analysis of the business development is based on the distribution of values for the usage of those 4 factors (Fig. 2).



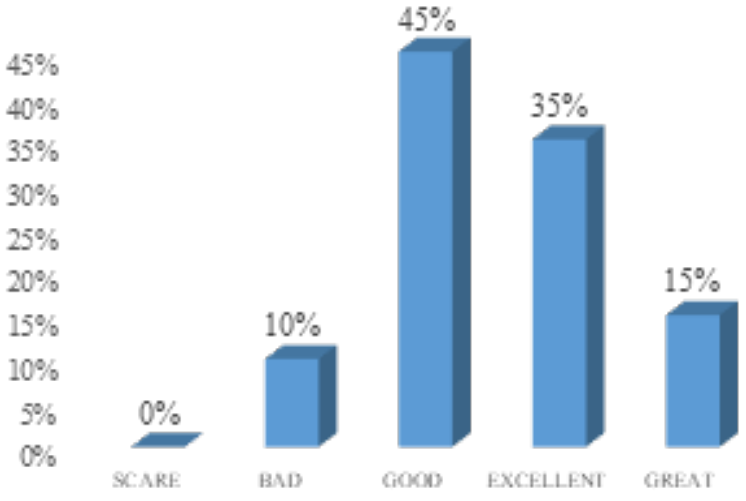


Figure 2. Sequence of innovation potential factors (left) and their appearance in practice (right)

The data indicates that TCI enterprises' entrepreneurial 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, 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 success. The uniqueness of the original concept has less of an influence on entrepreneurial potential (3.38 of 5.00).

The TCI enterprises exhibit unequal distribution of entrepreneurial 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.

In summary, the textile and apparel industries undervalue their capacity for innovation and entrepreneurship. 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.

C. Competitive business model

Based on Porter (1990) the competitive business model is based on business conditions factors that describe how the business environment elements are required

for the growth of the textile and apparel sectors. The system by which these elements are created, updated, and improved is more significant than their worth at any one time. This category consists of the following factors: business norms and rules, technological change, business values and identities changes, demographic changes, new customers' patterns, economy patterns and etc. (Fig. 3)

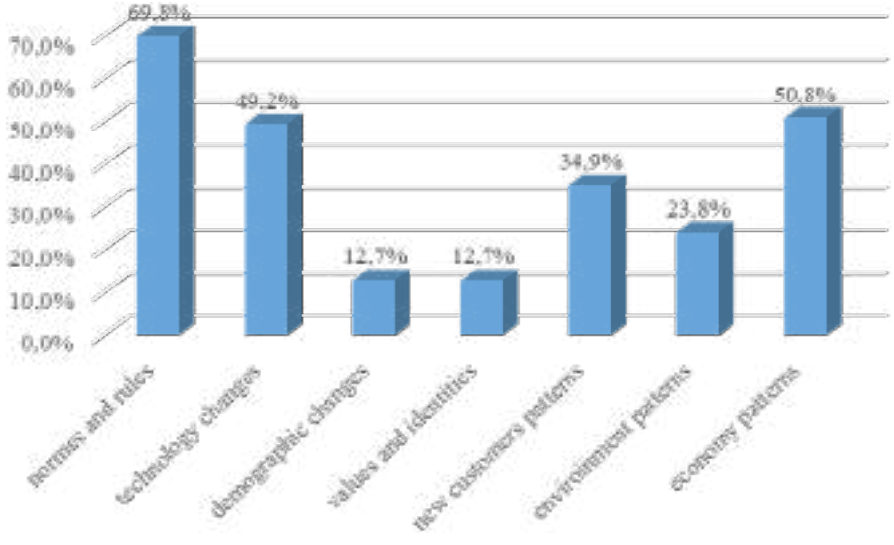


Figure 3. Competitive business models' factors

The figures show that 69.8% of the respondents responded that differences in "norms and rules" were the factor most influencing the firm with the primary drivers of changes having a big influence on the company's business model. "Globalization, economic trends, and technological advancements" also have high percentages of 50%. "new customer patterns" (34.9%) and "environmental changes" (23.8%) are credited as having a noteworthy influence. At last, we discover alterations in "values and identities" and "demographic changes," with a combined proportion of only 12,7%.

The given results could explain the decrease of textile and apparel companies within the fast change of technological and economy pattern change during and after the COVID-19 pandemic.

5. Discussion and conclusions

The smart and clever specialization of today's business-leaders should push-up them to be more competitive within the Industry 5.0 where the challenge is between machine (computer) efficiency and human intellect. Therefore, according

to contemporary innovative theory, the creative process of a (social) group of creative individuals, rather than the creativity of a single person, is what drives innovation creativity.

As a result, the emphasis shows the future potential to expand individual enterprise-focused innovation leadership on collective thinking. Two contemporary methods that enable current entrepreneurial leadership to be achieved can be identified based on how it manifests itself:

– Co-creation, first emerged in marketing in the 1990s, but its meaning soon expanded. Co-creation is essentially a collaborative space (or cyberspace) where many players combine their expertise to produce entirely new added value. These days, the reverse of the conventional innovation process is achieved by its application: open innovation. Co-creation can only be successful when knowledgeable individuals are ready to work together, honestly assess new concepts, products, and technology, and freely share their expertise and ideas with others. It may also be referred to as crowdsourcing when businesses leverage their stakeholders, or the public, to develop novel solutions or enhance the added value of current company procedures, technological advancements, or goods.

– Co-working is a term that first appeared in human resource management in the middle of the 2000s. It refers to a collaborative process where working persons gather in a designated location to generate new value while exchanging knowledge and insights. The goal of the collaborative work process is to balance each person's autonomy and teamwork with other participants.

In line with Yordanov (2023), we may emphasize the key attributes of a modern innovative leadership incl. in textile and apparel industry: creativity, visioning and opportunity identification, personal (innovative attitude) drive, and teamwork. Furthermore, it can be inferred that universities have a leading role in setting up the infrastructure and conditions required for the operation of leadership-managed enterprises with growth potential, based on the indicated leadership competencies and the research findings of Vutsova and Yalamov (2023).

Considering the aforementioned, it is advised that textile and apparel companies join OPEN ENTREPRENEURSHIP CENTERS. They will so fully conform to the prevailing public sentiments and sharing inclinations as articulated by the so-called sharing social economy. Simultaneously, the primary benefits to which they will construct their competitive potential are:

– The development of transferable skills is far more successful in physically active youth who have the chance to "share" their physical and mental energy with others;

– The taking down of barriers permits the decrease of aggression and the attainment of a higher empathy while learning;

– Breaking down walls enables people to become less aggressive and more empathic while developing their problem-solving and team-leading abilities.

– This kind of skill development promotes cooperation and teamwork, as well as the application of a range of communication techniques.

Considering the foregoing, implementing the following Entrepreneurship Roadmap can help textile and apparel businesses in Industry 4.5/5.0 become more competitive (Sterev et al. 2021, 2022).

The map outlines the assistance required for the creation and expansion of fresh, creative start-ups that rely on the commercialization of university-based technologies. The roadmap shows the "stops" of an innovative idea from conception to the expansion of the innovative business itself. For each company concept, regardless of where it originated—in an academy, a research institution, or a corporate organization—an entrepreneurship school or training program can serve as a common stop or crossroads (Fig. 4)

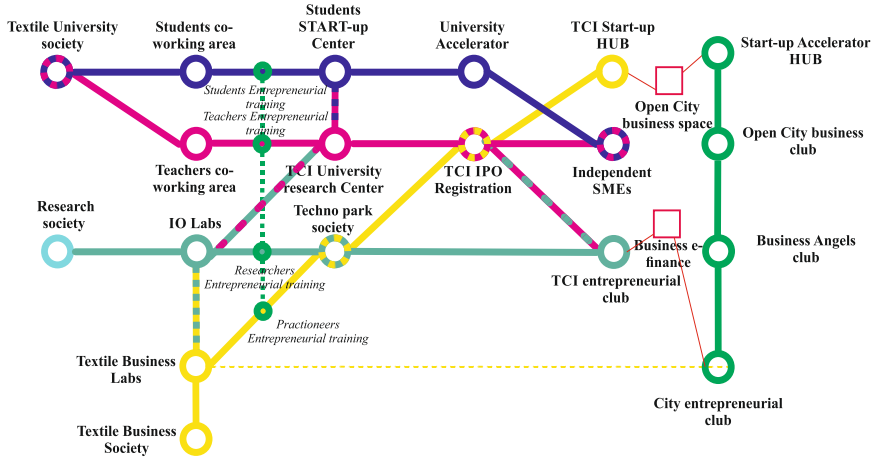


Figure 4. Textile and apparel Innovation Capacity Roadmap

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