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DIGITIZATION OF BULGARIAN FURNITURE MANUFACTURERS DURING THE COVID-19

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Abstract: Main goal of the paper is to outline the state of digitization of Bulgarian furniture manufacturers in terms of the COVID-19 pandemic. The degree of digitization is studied based on: (1) the use of online-based applications and electronic catalogs; implementation of websites, 3D graphics, and devices to provide an interactive view; (2) the use of computers and Internet access; (3) use of office packages, inventory management systems, digital supply chain management, and supplier relationships. The adopted research methods are logical, deductive, and comparative methods. Primary data from a questionnaire survey among furniture manufacturing companies in Bulgaria is presented by the use of IBM SPSS-Statistics. Statistical relationships and dependencies are studied using the Chi-square test. The paper presents results from Project „Development and implementation of a model for assessing the innovation potential of global value chains as a basis for increasing regional competitiveness” financed by the National Science Fund, contract No КП-06-Н55/8 from 16.11.2021.

Keywords: digitization, questionnaires, furniture manufacturers.

INTRODUCTION

In the current global social, economic, and technological development, digitalization is a factor changing international business, by creating global markets while turning small businesses into micro-multinational companies.¹ According to Hanson (2008) digitization is not a sufficient condition for globalization². However, barriers to participation in the global economy are reduced

¹ Brennen, Scott and Daniel Kreiss. (2014). Digitalization and Digitization, September 8. Cited in: Орехов, М. (2020). Същност на процеса на дигитализация като нов етап в глобалната информатизация, XXX, кн. 1, 2020, Списание "Бизнес управление", стр. 75-95 (Orchov, M. (2020). Sashtnost na protsesa na digitalizatsia като nov etap y globalnata informatizatsia, XXX, кн. 1, 2020, Spisanie "Biznes upravlenie", str. 75-95)

² Hanson, E. (2008). The Information Revolution and World Politics, Rowman & Littlefield Publishers, Boston.

because of the ICT³. Even though “technological change alone cannot explain the acceleration of globalization⁴” it is believed that globalization is being driven by digitization⁵. In addition, You-Qun et al. (2021) state that digitization is conducive to enhance the competitiveness of manufacturing global value chains⁶. Still, the positive effect of digitalization is considered not significant in terms of low-knowledge-intensive industries. Drayse (2008) states that furniture manufacturers use the possibilities of information technology to manage their production process, logistics, and supply, which in turn helps to accelerate the process of globalization⁷. Even though according to the Digital Economy and Society Index (DESI)⁸⁹ Bulgaria is still in 26th place out of 27th countries, research regarding the level of digitization in the furniture industry shows better performance than that on the national average¹⁰. The development of COVID-19 additionally forced more and more furniture manufacturers in Bulgaria to operate in a digital environment and to implement appropriate software products¹¹. This however leads to new challenges for the industry¹².

The main goal of the paper is to outline the used digital tools and instruments by furniture manufacturing companies in Bulgaria. This will give opportunities for further analysis related to the changes in the level of digitization in the industry during the COVID-19 pandemic. The main object of the study are some indicators that measure digitization according to DESI and the conducted literature review. The adopted research methods are logical, deductive, and comparative methods. Primary data from a questionnaire survey among furniture manufacturing companies in Bulgaria is presented as well using IBM SPSS-Statistics.

LITERATURE REVIEW

In 2021 Bulgaria is ranked at the bottom of all EU member states that are compared based on the Digital Economy and Society Index¹³. Only in terms of "connectivity" (26th place) and "digital public services" (21st place) our country is showing better performance compared to the

³ Marshall Bricklin, "Tom Friedman's view of globalization", cited in: Hart, J. Globalization and Digitalization, Online available at: < https://www.researchgate.net/profile/Jeffrey-Hart-3/publication/277712506_Globalization_and_Digitalization/links/557100b108aee701d61cbcf3/Globalization-and-Digitalization.pdf>, p. 228.

⁴ Hart, J. Globalization and Digitalization, Online available at: < https://www.researchgate.net/profile/Jeffrey-Hart-3/publication/277712506_Globalization_and_Digitalization/links/557100b108aee701d61cbcf3/Globalization-and-Digitalization.pdf>, p. 237.

⁵ Yadong L. (2021). New OLI advantages in digital globalization, *International Business Review*, Volume 30, Issue 2, 101797, pp. 1-8, ISSN 0969-5931, <https://doi.org/10.1016/j.ibusrev.2021.101797>.

⁶ You-Qun W., Huai-Xin L., Xin-Lin L., Jia-Ming Z. (2021). Research on the Digitization of Manufacturing Will Enhance the Competitiveness of the Value Chain Based on Advantage Comparison, *Complexity*, vol. 2021, pp. 1- 15. <https://doi.org/10.1155/2021/9917772>

⁷ Drayse, M. (2008). Globalization and Regional Change in the U.S. Furniture Industry, *Growth and Change* Vol. 39 No. 2 (June 2008), pp. 252–282

⁸ DESI indicators are now structured around the four cardinal points – human capital, connectivity, integration of digital technology and digital public services.

⁹ DESI, 2021, <https://digital-strategy.ec.europa.eu/en/policies/desi>.

¹⁰ Popova, R., Georgieva, D. (2019). Digitisation in forest industry in Bulgaria - state and perspectives, *Digitalisation and circular economy: forestry and forestry based industry implications*, proceedings of scientific papers, Sofia: USB & WoodEMA, pp. 181-186.

¹¹ Slavova, P. (2021). Trends in business processes management in the furniture industry in Bulgaria, *SHS Web of Conferences* 120, 02012 (2021), Business and development, pp. 1-7. <https://doi.org/10.1051/shsconf/202112002012>, p. 6.

¹² Popova-Terziyska R. (2021) Digital marketing instruments at the furniture enterprises in Bulgaria, 14th International Scientific - International Association for Economics and Management in Wood Processing and Furniture Manufacturing WoodEMA, i.a, University of Ljubljana Biotechnical faculty, Department of wood science and technology - Proceedings of The Response of the Forest-Based Sector to Changes in the Global Economy, ISBN 978-961-6144-41-4 (PDF), p. 259-265.

¹³ DESI, 2021, Bulgaria, <https://digital-strategy.ec.europa.eu/en/policies/desi>.

other indicators under review by DESI (“human capital” and “integration of digital technology”). Still, Bulgaria’s performance is lower than the EU average. The level of enterprises’ digitization can be measured primarily by the “connectivity and digital skills”; “internal processes” and “relationship with customers, suppliers and third parties”¹⁴. Without belittling the significance of human capital, digital skills, and digital public services, a subject of more in-depth analysis will be the “connectivity”; “internal processes” and “relationship with customers, suppliers and third parties” (as part of the Integration of digital technology).

According to Jagjit and Lorentz¹⁵ connectivity is a basic form of digitization and could be measured using computers and Internet access. Data from the National statistical institute of Bulgaria (NSI) shows that in 2021¹⁶ the percentage of enterprises with access to the Internet is 96.1% while large entities have 100% access to the Internet. It should be noted that according to previous research¹⁷ the percentage of companies with access to the Internet has increased by 1.5 percentage points from 2018. Data from DESI 2021 shows that 8% of Bulgarian SMEs sell goods and services online while only 3% of the SMEs are selling across borders. The development of a website has a crucial meaning for online selling. Websites and social media marketing are having a significant role in terms of gaining visibility and promotion purposes. However, in 2021 only 51,9% of all Bulgarian companies have a website. 87,7% of which are large enterprises. Even though more than half of the Bulgarian businesses have a website, in 2021 the percentage of organizations that sells their goods and services online is 11,8%. This data shows slight improvement compared to 2018 when the percentage is 8,1%. In terms of large companies, the percentage in 2021 is 23,3% while in 2018 is 15,4%. This is indicative that there is an increase in the indicators under review in 2021 compared to 2018 – before the COVID-19.

The “internal processes” indicator is primarily measured by the percentage of enterprises with automated resource management systems (ERP); use of mobile technologies with internal organizational purposes; percentage of enterprises using software applications to manage their customer information (CRM) and enterprises using RFID technologies. According to NSI in 2021 21,8% of all Bulgarian companies and 65,2% of the large enterprises are using ERP software. For the large companies, the data shows an increase of 4,5 percentage points compared to 2019 (there is no available data for 2018) but at the same time, there is a decrease of 1,6 percentage points for all enterprises at the national level. Similarly, NSI data shows that there is an insignificant increase in the percentage of large enterprises using CRM software in 2021 (34,8%) compared to the last available data from 2019 when the percentage is 34,1%¹⁸. At the national level, there is a decrease of 0,3 percentage points in all Bulgarian companies that use CRM software in 2021 compared to

¹⁴ Monitoring the digital economy & society 2016 – 2021 (2015): European Commission, DG Communications Networks, Content & Technology, p.13.

¹⁵ Jagjit, S.; Lorentz, H. (2019). Developing design principles for the digitalisation of purchasing and supply management, Journal of Purchasing and Supply Management 25 (2019): pp. 78–98, p. 79.

¹⁶ NSI,

<https://nsi.bg/bg/content/2848/%D0%BF%D1%80%D0%B5%D0%B4%D0%BF%D1%80%D0%B8%D1%8F%D1%82%D0%B8%D1%8F-%D1%81-%D0%B4%D0%BE%D1%81%D1%82%D1%8A%D0%BF-%D0%B4%D0%BE-%D0%B8%D0%BD%D1%82%D0%B5%D1%80%D0%BD%D0%B5%D1%82>, last accessed on 04.07.2022.

¹⁷ Popova, R., Georgieva, D. (2019). Digitisation in forest industry in Bulgaria - state and perspectives, Digitalisation and circular economy: forestry and forestry based industry implications, proceedings of scientific papers, Sofia: USB & WoodEMA, pp. 181-186.

¹⁸ NSI,

<https://nsi.bg/bg/content/2887/%D0%BF%D1%80%D0%B5%D0%B4%D0%BF%D1%80%D0%B8%D1%8F%D1%82%D0%B8%D1%8F-%D0%BA%D0%BE%D0%B8%D1%82%D0%BE-%D0%B8%D0%B7%D0%BF%D0%BE%D0%BB%D0%B7%D0%B2%D0%B0%D1%82-%D1%81%D0%BE%D1%84%D1%82%D1%83%D0%B5%D1%80-%D0%B7%D0%B0-%D1%83%D0%BF%D1%80%D0%B0%D0%B2%D0%BB%D0%B5%D0%BD%D0%B8%D0%B5-%D0%BD%D0%B0-%D0%B8%D0%BD%D1%84%D0%BE%D1%80%D0%BC%D0%B0%D1%86%D0%B8%D1%8F%D1%82%D0%B0-%D0%B7%D0%B0-%D0%BA%D0%BB%D0%B8%D0%B5%D0%BD%D1%82%D0%B8-crm>, last accessed on 04.07.2022.

2019. Social media is one of the most commonly used instruments for advertising and communication with customers. In 2021 only 38,9% of all Bulgarian companies and 63,3% of all large companies use social media. Compared to 2019 there is an increase in the indicator by 5,1 percentage points for all Bulgarian companies and 10,9 percentage points for the large enterprises.

Because of that the degree of digitization of Bulgarian furniture enterprises will be studied based on:

- For the purpose of visibility and advertising- the use of online-based applications and electronic catalogs; implementation of websites, 3D graphics, and devices to provide an interactive view.

- For the purposes of connectivity - use of computers and Internet access.

- For the purposes of the management, work processes, and enterprise relationships with customers, suppliers, and third parties - use of office packages, inventory management systems, digital supply chain management and supplier relationships, electronic forms of orders, or other information systems between suppliers and businesses, unique and automated product identification throughout the supply chain, use of electronic signature. For example - CRM, SCM, CAD, ERP, and more.

Previously mentioned indicators are selected based on two main reasons: first, the author of the paper wants to make a comparison with previous studies on the topic before COVID-19. The main limitation of the study is that no relevant comparison with previous studies can be made because the surveyed methods and furniture manufacturers are different. However, it could show some tendencies or changes that should be further analyzed. And the second reason is that the selected indicators cover some of the officially reported indicators on the national and European levels by Eurostat, DESI, and the Bulgarian national statistical institute.

SURVEY METHODOLOGY AND COLLECTED DATA ANALYZES

Data collection

By the use of official data from the Bulgarian Commercial Register and register of non-profit legal entities it was identified that 3980 firms are registered with NCEA-2008 code 31 – Furniture manufacturing. Of those 330 were selected for the representative study. The selected companies are medium and large by size and innovative as factors related to the level of digitization¹⁹. The targeted respondents are managerial staff and owners of the companies. The survey was conducted in March-April 2022. A pilot questionnaire was introduced while the final version of the questionnaire consisted of 33 close and open questions and was distributed on the spot using interviewers in the territory of Bulgaria. The response rate of the selected entities is 23%. The study of statistical relationships and dependencies is based on the Chi-square test, and the measure of association is done by the use of Cramer (V) with the program IBM – SPSS Statistics.

Results

In terms of identifying the used digital tools and solutions for advertising their activities, the respondents were asked to point out their main marketing channels. 80% state that their official website is their main advertising channel, while electronic media (37%), social media (36%), and mobile applications (12%) are used less by the respondents. However, only 89% state that they have an official webpage. This in hand is in line with some previous results before the COVID-

¹⁹ Georgieva, V., D. (2020). A study of intangible assets disclosure as factor for sustainability: an evidence from Bulgarian furniture enterprises, Sustainability of forest-based industries in the global economy, Proceedings of scientific papers, WoodEMA, i.a., University of Zagreb, Competence Centre, pp. 221-225; Popova, R., Georgieva, D. (2019). Digitisation in forest industry in Bulgaria - state and perspectives, Digitalisation and circular economy: forestry and forestry based industry implications, proceedings of scientific papers, Sofia: USB & WoodEMA, pp. 181-186

19²⁰ where 88,2% of the large enterprises in Bulgaria and the majority of the big furniture manufacturers have a webpage for advertising their activities. However, only 41% of the respondents state that customers can make online purchases via the webpage while only 26% of the internet sites offer the opportunity for customers to pay online. The majority of the managers (57%) point out that they use the company's webpage only for sharing data related to the enterprise and updated news as well as sharing online catalogs (32%).

The use of social media by enterprises in 2021 is 10%²¹ (way below the EU average of 23%), which in hand is in line with the calculated low level of use in the current study. Even though the press media (18%), radio, and television (8%) are used rarely for advertising purposes, paper company's catalogs (57%) and exhibitions participation (40%) are still some of the main ways of promoting furniture. Virtual reality uses 3D graphics and devices to provide an interactive view, and it offers visual solutions and their correspondence with other items or accessories²². Of all respondents who have participated in the current study around 31% state that they use 3D software in their work for advertising purposes and to attract customers. However, only 20% of the managers that were surveyed stated that their webpage has the functionality to generate 3D views of the selected furniture.

71,90% of all respondents participating in the survey state that their company uses up to 10 pieces of computers, including laptops, for 9,50% it is up to 20 pieces, for 4,70% - up to 30 pieces, for 1,20% - up to 40 pieces, for 2,40% - up to 50 pieces and for 3,60% - more than 50 pieces. The calculated percentage is not 100% due to some respondents who rejected to answer. All managerial representatives state that the used computers and laptops are connected to the Internet. This data confirms previous research by Popova and Georgieva (2019) that large companies report a hundred percent access to the Internet.

In terms of the used software for the purposes of management and enterprise relationships with customers, suppliers, and third parties the collected and analyzed data show:

- 84% of the managers state that they use the provided by Microsoft Office - Excel and Word packages. Around 24% use an automated document management system, 23% - a system for project management, and 53% - accounting software.

- Warehouse software is used by 53%, while ERP system is used only by 17% of the respondents.

- Customer relationship management (CRM) system is used by 17%.

- Computer-aided design (CAD) system is used by 53% of the analyzed companies in the target group.

Discussion

According to previous research by Chobanova et al (2018), the main purpose of using the Internet by Bulgarian forestry companies is to interact with state institutions. Because of that relatively low percentage (17.1%) use web pages for online selling. 34.3% use social media for advertising purposes and only 25.7% of companies report that their business processes are automatically linked to their suppliers or customers²³. Another research by Popova and Georgieva (2019) states that “the level of digitization of forest sector enterprises in Bulgaria shows better

²⁰ Popova, R., Georgieva, D. (2019). Digitisation in forest industry in Bulgaria - state and perspectives, Digitalisation and circular economy: forestry and forestry based industry implications, proceedings of scientific papers, Sofia: USB & WoodEMA, pp. 181-186

²¹ DESI, 2021, Bulgaria, <https://digital-strategy.ec.europa.eu/en/policies/desi>

²² Popova, R. (2013). *Inovatsii v mebelnia sektor*, Izd. Intel Entrans, S., ISBN 978-954-2910-35-0, p. 174.

²³ Chobanova R., L. Kocarev, R. Popova, D. V. Georgieva, Z. Trayanov, D. Traychevska, R. Angelova (2018). *Forestry sector in Bulgaria and Macedonia (Forestry sector in Bulgaria)*, Bulgarian Academy of Sciences, p. 89.

performance than that on the national average²⁴. Still, both types of research made before the COVID-19, are indicative that companies in the sector show better results in terms of connectivity rather than in terms of internal processes and relationships with customers, suppliers, and third parties.

The current research is showing relatively similar results. In this respect, the companies under analysis are mainly investing in purchasing machinery. Because of that, they are not focused on implementing digital instruments for automated resource management systems, or software applications for managing customer information. In this respect, digitization in the sector involves the creation and use of websites, electronic catalogs, Microsoft office (primarily Excel and Word), and more.

The respondents were asked to point out the main factors for achieving competitiveness by their companies. The collected and analyzed results show that among the top 5 factors are:

- Quality of the products according to 88,2% of the respondents;
- Good price-quality ratio (65,9%);
- Good design of the products (54,1%);
- Image of the enterprise (49,4%);
- Well-trained experts (45,9%).

Information and communication technologies have an important role in organizing the furniture manufacturers' management and production by reducing the labor costs, time of operations, and optimization of technological processes. This in hand has a direct effect on the quality and the prices of the products as digitization is a way to optimize resources and processes in organizations²⁵. However, ICT and digitization were not among the respondents' answers for achieving competitiveness.

To study if there is a statistically significant relationship between the quality of the products as the main factor for gaining competitiveness stated by the respondents and the used digital instruments the author has formulated the following hypotheses:

(H1) There is a statistically significant relationship between the quality of the products and the use of Warehouse software.

(H2) There is a statistically significant relationship between the quality of the products and the use of Enterprise resource planning (ERP) software.

(H3) The quality of the products is statistically related to the use of Design and manufacturing systems - CAD/CAM.

Table 1. Chi-Square tests and Symmetric measures data

Variable	Pearson Chi-Square value	Level of significance	Degree of freedom	Asymp. Sig. (2-sided)	Cramer's V value	Approx. Sig.
Warehouse software	.039	$\alpha=0.05$	n=1	.843	.022	.843
ERP	.103	$\alpha=0.05$	n=1	.749	.035	.749
CAD/CAM	4.936	$\alpha=0.05$	n=1	.026	.241	.026

Source: own calculations, n=85.

²⁴ Popova, R., Georgieva, D. (2019). Digitisation in forest industry in Bulgaria - state and perspectives, Digitalisation and circular economy: forestry and forestry based industry implications, proceedings of scientific papers, Sofia: USB & WoodEMA, pp. 181-186.

²⁵ Prouchvane za nivoto na digitalizatsia v Bulgaria (2018) Siemens Bulgaria i Germano-Balgarska industrialno-targovska kamara, onlayn dostapno na:

https://bulgarien.ahk.de/fileadmin/AHK_Bulgarien/News/Digitalization_Survey_Bulgaria-BG.pdf; Inovatsii.bg (2018) Inteligentni politiki za inovatsionen rastezh, Fondatsia "Prilozhni izsledvania i komunikatsii, s.71-76.

As shown in table 1 only between the implementation and the use of design and manufacturing systems (CAD/CAM) and the quality of the products are calculated weak statistically significant relationships. However, not all conditions for the Chi-square test application are fulfilled which gives us a reason to be skeptical when accepting such a statistical relationship.

For the purposes of building a positive image of the enterprises among society, customers and businesses, advertising has an important role. In order to analyze if there is a statistical relationship between the image of the enterprise and the used digital tools and instruments by the target group, the following hypotheses are formulated:

(H4) *There is a statistically significant relationship between the image of the enterprise and the use of the company's webpage.*

(H5) *There is a statistically significant relationship between the image of the enterprise and the use of 3D software.*

(H6) *The image of the enterprise is statistically related to the use of Customer relationship management software (CRM).*

(H7) *There is a statistically significant relationship between the image of the enterprise and the implementation of online catalogs with full product specifications.*

Table 2. Chi-Square tests and Symmetric measures data

Variable	Pearson Chi-Square value	Level of significance	Degree of freedom	Asymp. Sig. (2-sided)	Cramer's V value	Approx. Sig.
Internet webpage	1.199	$\alpha=0.05$	n=1	.274	.119	.274
3D software	.756	$\alpha=0.05$	n=1	.384	.094	.384
CRM	.002	$\alpha=0.05$	n=1	.962	.005	.962
Online catalogs	.025	$\alpha=0.05$	n=1	.874	.017	.874

Source: own calculations, n=85.

Based on the analysis of the collected data (see table 2) no statistically significant relationships between the image of the enterprises and the selected variables were calculated. Such calculations could be explained based on the small number of respondents. Because of that future research by the use of individual interviews and case studies are needed to outline some relationships for further analysis.

CONCLUSIONS

The collected and analyzed data from the managerial staff of Bulgarian furniture manufacturers is indicative of the fact that enterprises have not yet reached the necessary level of digitization that is corresponding to the environment in which they operate. Very little progress has been made in terms of connectivity, especially in the implementation of online stores and 3D applications. However, manufacturers rely mainly on traditional methods of advertising - visiting fairs and exhibitions, paper catalogs, advertisements in print media and etc. Despite the fact that the COVID-19 pandemic required the introduction of innovative forms of communication with buyers and suppliers based on digital tools and instruments, Bulgarian furniture manufacturers have not yet taken advantage of all the functionalities of the digital environment to create competitive advantages.

It is believed that the competitiveness of the large and medium furniture manufacturers in Bulgaria is mainly due to the quality of the products which is corresponding to their price. Product design, corporate image, and staff expertise were identified as less important factors in building competitive advantages. However, no statistical relationships and dependencies were calculated between selected competitive factors and digital tools used by enterprises. The ability of furniture manufacturers to electronically share supply chain management information with customers and suppliers is not significantly developed as well.

The current study confirms data from previous studies in the field (made by Chobanova et al., Popova and Georgieva), which also report a lower rate of implementation of software applications for managing internal processes and enterprise relationships with customers, suppliers, and third parties. It should be noted that these studies were done in conditions before the COVID-19 pandemic. Further research is needed to establish the reasons for the low level of digitization of furniture manufacturers in the context of the environment in which they currently operate and new market demands.

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