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Article

Participation of Bulgarian Furniture Manufacturing in Global and Local Value Chains as a Factor Supporting Their Innovation Activities

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Abstract: Innovations can offer key advantages to companies, but in some EU regions, the design and development of innovation measures are still relatively novel concepts. The aim of this study was to analyze the collaborations of innovative Bulgarian furniture manufacturers with external stakeholders and the used information channels as factors for the development and implementation of innovation and participation in global value chains over their innovation activities. Out of 3890 Bulgarian companies, the number of companies included in the target group was further reduced to 85 firms due to missing information on some variables. The data for the present study were collected using a large-scale questionnaire distributed on the spot during the months of March and April 2022. Logistic regression was used to reveal the real contribution of the collaborations and the information sources to the ability of companies to innovate. The research results indicated that in Bulgaria, the furniture sector is not considered very innovative, and Bulgarian furniture manufacturing companies do not rely on collaboration with the IT and mechatronics sectors. These companies do not want to participate in GVCs, as they refer to them in relation to supply chains. Therefore, they are less dependent on chain shocks. Companies prefer to hide their innovations for further protection, which might be the reason for the lack of cooperation between the furniture manufacturing companies and academia, NGOs, and other relevant institutions. The findings of the study contribute to new insights into the literature on the participation in GVCs as a factor for collaboration with different stakeholders and hence for product and process innovation development within the furniture industry companies.

Keywords: forest-based sector; innovation; global value chains; furniture manufacturers



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1. Introduction

Under the pressure of globalization and dynamic technological processes, national and regional economies are putting in increasing efforts in an attempt to improve their competitive positions. The analysis of foreign investment flows and the concentration of production processes at the international level show that the innovation capacity and technological competencies, once concentrated at the head offices of multinational enterprises, are increasingly being outsourced towards their peripheries and are being performed by companies located outside major economic centers. In this context, global value chains (GVCs) are attracting the attention of both the academic community and political organizations as a factor for economic transformation and growth of local economies. According to OECD studies [1], global value chains can generate significant economic benefits for the participating companies, as well as for the national and regional economies where they are located. Due to the COVID-19 pandemic, the concentration of suppliers or customers along

the chain may make some firms more vulnerable to shocks from the crisis. Additionally, for industries with high concentrations of exports or imports, fewer possibilities for suppliers or buyers to be replaced exist in the event of a break in the chain [2].

In the literature, the measurement and evaluation of global value chains' innovation potential where global value chains are considered as original innovation systems remain largely unstudied. The most common subject of analysis is the "supply-side" factor led by the indicators of foreign investors (size, corporate governance, technological assets). Other studies focus on the "demand-side" factor, which pays central attention to local businesses and their absorptive capacity, i.e., their capacity to acquire, utilize, transform, and apply technology-driven external knowledge. The analysis of the isolated impact of one factor or another is not sufficient to reveal the complex nature of the impact of global value chains. A comprehensive scientific study that builds conceptually on the symbiosis between geographical location, sectoral affiliation, and innovation potential was not found by the authors of the current research. When applied to global value chains, the analysis of the innovation potential will combine the effects of those factors and will suggest new opportunities to support national and regional competitiveness. Because of that, further study of the interactions between foreign and domestic firms, NGOs, academia, and other stakeholders at different stages of the value chains is needed.

The paper aims to analyze the collaborations of innovative Bulgarian furniture manufacturers with external stakeholders and the use of information channels as factors for (1) the development and implementation of innovation and (2) participation in global value chains over their innovation activities. The subjects of the research are global value chains in the furniture industry in Bulgaria. They will be examined within the context of their impact on the innovation development of furniture enterprises. The adopted research methods are logical, deductive, and comparative methods. Primary data from a survey conducted among innovative furniture enterprises in Bulgaria are presented. To check the authors' hypotheses, logistic regression was used. The logical construction of the study begins with a literature review related to the innovation potential of GVCs, where specific variables are outlined. The articles continue by presenting information on the used methodology, collected data, results, and conclusions.

2. Literature Review and Hypothesis Development

The concept of the "global value chain" refers to the idea that an organization is not considered per se but as part of a common "supply chain", i.e., it is linked to other organizations [3]. Thus, global value chains are seen as a series of stages in the production of goods or services, where each stage adds value. At least two of the stages should be implemented in different countries [4]. An efficient global value chain may have a positive impact on businesses [5] and corporate growth [4]. Competitiveness is linked to the chains in which the companies participate, and, in this respect, the competition is between chains of organizations contributing to the satisfaction of customers [3].

Innovation potential, including in the GVCs, is generally studied at a national level, where sets of indicators have been designed and widely used to capture the specifics of national economies in terms of inputs and outputs of the innovation system performance [6]. With some modifications, these methods have been applied at the sector and regional levels, taking into consideration the technological or local specifics of the countries [7]. However, the indicators used to measure the innovation potential are not appropriate on a country/regional level, or an inappropriate methodology to collect the data is used. Additionally, Bulgarian companies refrain from accounting for their innovation and apply for patents, leading to the phenomenon of "hidden innovation".

The forestry-based sector is considered "low-tech" and less innovative [8–11]. For instance, Pirc and Vlosky [10] showed that applying innovation is becoming more and more important in Croatian furniture companies. Barčić and Motik [2] revealed that, along with small traditional companies, innovative companies in the Croatian furniture industry exist, but due to excessive market opportunities and possibilities, managers, directors,

and executive staff still do not recognize which way will take them to one step ahead of the competition.

However, of all the forestry industries in Bulgaria, the most innovative are furniture design, manufacturing, and sales companies. The Bulgarian furniture industry is extremely export-oriented, and because of that, it is very vulnerable to disruptions in external markets. The increase in the prices of basic and auxiliary materials during COVID-19 and the outbreak of the war in Ukraine, as well as problems with the supply of materials, led to a serious delay in orders and hence affected the supply chain. At the same time, during those periods, an increase in house furniture orders occurred as a result of the increase in home purchases in the country. Currently, due to the stagnation of Western markets, turbulences are also expected in the Bulgarian furniture sector, which should significantly affect the GVC. It is thought that to minimize the negative effects on the value chains and their expansion, there is a need to restore “the predictability” of governmental policies. Commercial conflicts and the absence of reforms along the chain also have negative effects on its development and resilience. In addition, the uneven distribution of results along the chain and the risks posed to it by the new technologies and digitalization are among the issues yet to be addressed. For industries with high concentrations of exports or imports, fewer possibilities exist for suppliers or buyers to be replaced in the event of a break in the chain. Furthermore, in some cases, the restructuring of suppliers is not only resource-intensive but also impossible in the context of the specifics of their business [1]. The rational way of choosing products among buyers in the context of COVID-19 reflects on the production of lower-tech and non-innovative products [12]. However, those issues have still not been addressed in the context of the Bulgarian furniture industry.

According to Fagerberg et al. [13], innovation potential is a factor for better participation in the global value chain leading to economic development. Vivek et al. [14] stated that outsourcing some of the production activities benefits the development of innovation, hence helping leading firms optimize their costs and invest more in research and development (R&D). In this way, businesses gain access to new knowledge, ideas, and technology transfer, creating innovation [15,16]. Under the pressure of globalization, national and regional economies focus on improving their competitive positions in the GVC through investments in scientific research and innovation. However, the furniture industry is considered labor-intensive, with fragmented supply chains and a predomination of SMEs [17].

According to Chiu, Hastig, and Sodhi [18,19], the diversity of suppliers in the value chain contributes to businesses when searching for new products. Thus, it will enable the use of new knowledge and technologies. Based on the idea of Humphrey and Schmitz [20], the following economic benefits for companies’ participation in GVCs can be outlined: (a) the creation of process innovations, which reduce the cost of the manufactured product or the delivered service by more efficiently converting the input materials and resources into the final product (service); (b) the development of product innovations for higher-quality products and services; (c) the creation of organizational innovations that increase the added value of human labor; and (d) the expansion of the product portfolio by entering into intensive and high-tech industries.

Pisano and Shih [21] considered the idea that the territorial separation of a firm’s production and R&D in other countries can limit the creation of micro-level innovations. Outsourcing R&D leads to the creation of dependence on third parties, limitations over the control of the innovation development and management process [22], and worsening communication between stakeholders in non-innovation and innovation activities along the chain. When R&D and production are interdependent, or when production technologies are “immature”, outsourcing production is associated with higher costs for the company and a reduction in the added value of innovation. Participating in GVCs can help manufacturers, including furniture ones, to learn from global supply chain leaders [23]. However, global leaders can minimize the transferred knowledge and technology to product information

and production techniques, thus limiting the transfer of competencies and R&D along the chain.

Forest product companies can use partnerships and collaborative relationships with other companies to increase their competitiveness. This can be done through developing new value-added products and technologies [24], entering new markets [25], and increasing productivity while decreasing production costs [26]. Hence, essential for the improvement of the value chains is the establishment of new partnerships by identifying the existing and intended partnering practices [27]. Partnerships in the forest product industry can be divided into operational partnerships (partnerships with suppliers and logistics customer service firms), technology partnerships (with technology providers), and financial partnerships [24,27]. Without belittling the importance of all those partnerships for the current study, only financial partnerships with state institutions and technology partnerships with representatives of the ICT (The Information and Communication Technology) sector and mechatronics will be under analysis. The Information and Communication Technology (ICT) sector is indeed one of the most innovative sectors globally. ICTs act as an enabler of innovation, particularly for product and marketing innovation. Additionally, it reduces the barriers to participation in the global economy and hence supports development within GVCs [11]. The selection is based on the stated assumptions that first, the level of digitization of Bulgarian furniture manufacturers shows better performance than that of the national average [28], and second, the sector's innovations are primarily incremental [29,30]. In this respect, the main investments are made for purchasing machinery and equipment [31] and technologies that support marketing and furniture sales. Because of that, clients' demands and financial resources are the main "triggers" for innovations in furniture manufacturers. Additionally, the restricted access of the furniture companies to the market and the lack of cooperation with the main supplier are stated as restrictions to the innovation development in the sector [32]. However, foreign and local customers and suppliers are significant sources of ideas for new projects and technological innovations. Widespread digitalization leads to the establishment of so-called Smart Factories. Hence, companies need to prepare for radical changes attributable to several factors—namely shortened delivery time, flexibility in the volumes produced, the unpredictability of customer demands, the further "branching" and "fragmentation" of the supply chains, and the value added [33,34]. According to Drayse [35], furniture manufacturers use information technology to manage their production process, logistics, and supply. This helps to accelerate the process of globalization and hence participation in GVCs, as it is believed that globalization is being driven by digitization [36]. Jagjit and Lorentz [37] argue that connectivity as a basic form of digitization can be measured by the use of computers and Internet access.

Popova and Georgieva [28] state that a relatively low percentage of Bulgarian furniture companies have web pages even though more than 90% of the companies use computers and the Internet. Predominately Bulgarian furniture companies use the Internet for online interaction with government institutions, suppliers, and customers. ICT and digitization are not seen as factors for achieving competitiveness by furniture manufacturers [38]. However, the stated research does not focus on furniture companies' innovation potential (in terms of different kinds of innovations) and states of digitization as factors for participation in the global value chains, and inversely, processes of optimization, automation, and robotization of production and searches for new raw materials, new energy sources, and energy efficiency improvement have started. Hence, companies will pay more attention to innovation and human capital.

Based on the previously cited literature, three hypotheses were developed as follows:

H1. *The inclusion of furniture companies in Bulgaria in various information channels led to the development of product and process innovations.*

H2. *Furniture companies introduced innovations because of agreement contracts with value chain participants like companies and institutions.*

H3. *The need for process and product innovations motivates furniture companies to collaborate with local value chain participants like companies from the mechatronics and IT sectors for the mutual development of processes and products.*

3. Materials and Methods

3.1. Sampling and Data Collection

For the purposes of the study, 3980 Bulgarian companies with NCEA-2008 code 31—furniture manufacturing were identified. Available data from the Bulgarian registry agency were used. Three hundred and thirty of all 3980 furniture manufacturers were selected as a target group. The number of companies included in the target group was further reduced to 85 firms due to missing information on some variables. The target group consisted of representatives of the management of only furniture manufacturers that had implemented innovation during the past 12 months before the survey. A pilot questionnaire was conducted at the beginning of the survey. The data for the present study were collected using a large-scale questionnaire distributed on the spot during the months of March and April 2022.

Based on Boer and Doring [39], the suggested division of innovation was divided further into product innovation—related to the introduction of new or enhancement of existing products—and process innovation—related to the introduction of new or improving existing activity in the manufacturing process.

Questions were grouped into six sections. Section 1 examined the types of innovations that companies implemented in the last 12 months until April 2022. Sections 2 and 3 explored the collaborations that companies entered with firms from the IT sector. Section 4 explained the common venture with Bulgarian firms from the sector “mechatronics”. Section 5 revealed the information sources that questioned companies used to endorse the innovations. Section 6 included questions about the different types of collaborations the companies got into to support the innovation processes. The total number of questions in the questionnaire was 41.

3.2. Data Analysis

For the current study, logistic regression was used to reveal the real contribution of collaborations and the information sources on the ability of companies to innovate. It also analyzed the role of participation in GVC of the target group companies over their innovation activities. Logistic regression is commonly used to analyze innovations in business companies. This methodology was quite appropriate for the current research regarding the categorical data available. Nor et al. [40] used logistic regression to assess the profanities for innovation creation and implementation according to the type of business and various barriers to resource availability. Gerstlberger et al. [41] through logistic regression assessed the role of innovations and efficiency in improving energy efficiency. Świadek and Gorączkowska [42] examined with a logistic regression model the institutional support given to innovation cooperation in the industry. Collaborations that were examined in the current research also included the cooperation of different types, which corresponded to the topical research of these two Polish authors. Collaborations are vital for product innovations according to Odei and Stejskal [43], who again implemented logistic regression to derive empirically based results.

The idea behind the logistic regression model is to calculate the natural logarithm of the odd ratio [44]. The main value of interest could be the probability P of the event Y to have value of $Y = 1$. The odd ratio, $\text{Odd} = P/(1 - P)$, is chance for an event to happen, which means chance for the value of the dependent binomial variable to be $P\{Y = 1\}$ i.e., chance for an innovation to be introduced or collaboration to be built; otherwise, it is the opposite probability $(1 - P)\{Y = 0\}$, and there is no innovation or certain type of collaboration. It

measures the effect of explanatory or predictor variables on the outcome or dependent variable [45]. The classical logistic regression model is as follows [44]:

$$\ln\{P/(1 - P)\} = b_0 + b_1x \quad (1)$$

where the $\ln\{P/(1 - P)\}$ is the natural, b_0 is the intercept, and b_1 is the regression coefficient of the variable x . If the model includes numerous variables, each one has its own coefficient denoted by b_i , where i is the number of the variable.

The probability of certain events happening is calculated as follows:

$$P = e^{b_0+b_1x}/(1 + e^{b_0+b_1x}) \quad (2)$$

The odds for the appearance of innovation in a certain type and for the collaborative development of processes and new products are calculated as follows:

$$Odd = e^{b_i} \quad (3)$$

where the b_i is the coefficient of the explanatory variable.

The increase of the odds as a result of the explanatory variable positive value of 1:

$$\Delta = |1 - odd| \quad (4)$$

Dependent variables include the companies, which have implemented innovations under hypotheses H1 and H2 and are presented in Table 1. The models developed for the purpose of the current research are the logistic regression–logit models (see [42]) with binary outcomes and binary explanatory variables [14,16] in the context of the survey and the questionnaire sections. The events of interest are variables presented in Tables 2 and 3. If the variable appears as an event, it has a value of one ($Y = 1$), or otherwise zero ($Y = 0$).

Table 1. Dependent variables of the logistic regression for H1 and for H2 and independent for H3 (n = 85).

| Variable Abbreviation | Description | Questionnaire Part |
|-----------------------|--|-----------------------|
| NPRD | New product development | Introduced Innovation |
| INSIDE | New processes developed inside the company | |
| INCOLLAB | New processes developed in collaboration | |

Table 2. Explanatory variables for testing the hypotheses H1 and H2 (n = 85).

| Variable Abbreviation | Description | Questionnaire Part | |
|-----------------------|---|--|--------------------|
| CGROUP | Companies from the corporate group | Information Sources and general agreements | |
| CUST | Customers | | |
| VEND | Vendors of raw materials and services | | |
| COMP | Competitors | | |
| CONS | Consultants | | |
| PRESC | Private research institutes | | |
| UNI | Universities | | |
| ASECT | Associations, trade, or sectoral | | |
| SINST | Stated owned institutions | | |
| EUINST | Institutions of the EU | | |
| TRDSHW | Trade shows | | |
| PRNTD | Printed materials | | |
| INT | Internet | | |
| EMEDIA | Electronic media | | |
| OTHER | Other companies from the furniture sector | | General agreements |
| GLOBE | Global companies | | |
| PINST | Private institutions | | |
| FINANC | Financial companies | | |

Table 3. The dependent variables for testing the H3 hypothesis (n = 85).

| Variable Abbreviation | Description | Questionnaire Part |
|-----------------------|--|---|
| MAUTO | Collaboration with companies from mechatronics sector in production automation | Collaboration with companies from mechatronics sector |
| MLOG | Collaboration with companies from mechatronics sector in logistics | |
| MNEWPROD | Collaboration with companies from mechatronics sector in development of new products | |
| ITSALES | Collaborating with IT companies in the sales | Collaboration with IT companies |
| ITRECRUIT | Collaborating with IT companies in the recruitment of personnel | |
| ITACCOUNT | Collaborating with IT companies in the accounting | |

The variables in Table 1 are dependent on investigating the relationships between sources of information and the introduced innovations. When the collaborations for mutual innovation development are examined, the variables in the table are explanatory. Independent variables for H1 and H2 are included in Table 2.

For the testing purposes of hypothesis H3, the dependent variables are presented in Table 3.

Table 3's variables reveal the decisions of companies when creating innovations. They interact and develop joint solutions with companies from the IT or mechatronics sectors. In the case of general agreements, collaboration with these companies could be a result of the intentional behavior of the furniture companies to create innovation together with others.

The model for the H1 hypothesis, which investigates the role of the information sources in innovation development, is derived by including the dependent variables from Table 1 and explanatory variables from "Information Sources and general agreements" part of the questionnaire from Table 2. The model is as follows:

$$\ln\{P/(1-P)\} = b_0 + b_1CGROUP + b_2CUST + b_3VEND + b_4COMP + b_5CONS + b_6PRESC + b_7UNI + b_8ASECT + b_9SINST + b_{10}EUINST + b_{11}TRDSHW + b_{12}PRNTD + b_{13}INT + b_{14}EMEDIA, \quad (5)$$

where $1/(1 - P)$ is the odds, P is the probability of appearance of the dependent variables NPRD, INSIDE, or INCOLLAB, and b_i are the regression coefficients.

Model (5) investigated the probability of the companies introducing innovations (NPRD = 1, INSIDE = 1, or INCOLLAB = 1) as result of the influence of explanatory variables related to the "Information Sources and general agreements" part of the questionnaire.

For the H2 hypothesis, which tested the role of general agreements in innovation development, we developed a second model (6). The model included dependent variables from Table 1 and explanatory variables from "General agreements" part of the questionnaire from Table 2. The model is as follows:

$$\ln\{P/(1 - P)\} = b_0 + b_1CGROUP + b_2CUST + b_3VEND + b_4COMP + b_5CONS + b_6PRESCUNI + b_7SINST + b_8PINST + b_9OTHER + b_{10}GLOBE + b_{11}FINANC, \quad (6)$$

where $1/(1 - P)$ is the odds, P is the probability of appearance of NPRD, INSIDE, or INCOLLAB, and b_i are the regression coefficients.

Model (6) investigated the probability of the companies introducing innovations (NPRD = 1, INSIDE = 1, or INCOLLAB = 1) as result of the influence of explanatory variables related to the "General agreements" part of the questionnaire.

For hypothesis H3, model (1) was transformed with the dependent variables from Table 3, and herein, different from the previous models, the explanatory variables are the dependent ones from Table 1. The model is as follows:

$$\ln\{P/(1 - P)\} = b_0 + b_1NPRD + b_2INSIDE + b_3INCOLLAB \quad (7)$$

where $1/(1 - P)$ is the odds, P is the probability of the appearance of MAUTO, MLOG, MNEWPROD, ITSALES, ITRECRUIT, or ITACCOUNT, and b_i are the regression coefficients.

Model (7) investigated the probability of the investigated enterprises collaborating with mechatronics or IT companies in different fields of the enterprise's activities. The probability P is for dependent variables (MAUTO = 1, MLOG = 1, MNEWPROD = 1, ITSALES = 1, ITRECRUIT = 1, or ITACCOUNT = 1). These variables are considered a result of the influence of explanatory variables (NPRD, INSIDE, and INCOLLAB) related to the "Collaboration with companies from mechatronics sector" part of the questionnaire and the "Collaboration with IT companies" part of the questionnaire.

For all calculations, the product IBM SPSS version 23 was used.

4. Results and Discussion

For this research, the respondents in the innovation survey were 85 furniture-producing companies. Many of them have made at least one type of innovation. The number of companies that have introduced product innovation is 80 (94.1%). As for process innovations, 53 (62.4%) of the companies have developed new and improved production methods and technologies. Out of those, 41 (77.4%) have implemented new process practices with their own resources, and the rest, 12 (22.6%), created process innovations together with IT companies or companies from the mechatronics sector. The percentage of product innovations in the total number of positively answered companies is 94.1%; for process innovations developed inside each company, the share is 62.4%, and the share of the innovations developed with collaboration is 22.6%. The results for model (5), or the information influence model, are presented in Table 4.

Table 4. Results for model (5)—regression coefficients (n = 85).

| | NPRD | INSIDE | INCOLLAB |
|--------|-------|---------|----------|
| GROUP | −1.35 | 2.63 | −0.61 |
| CUST | −0.02 | 1.24 | −0.016 |
| VEND | −1.49 | 0.51 | 1.31 |
| COMP | 0.52 | −1.17 | −0.26 |
| CONS | 19.73 | 1.85 | −1.85 |
| PRESC | −1.28 | 2.21 | 1.18 |
| UNI | 1.82 | 4.60 | 0.15 |
| ASECT | 18.04 | −1.97 * | −2.32 |
| SINST | 20.56 | 27.14 | −23.64 |
| EUINST | 16.72 | 3.54 | −0.48 |
| TRDSHW | 0.55 | 1.72 | −0.18 |
| PRNTD | 19.17 | 0.73 | 0.45 |
| INT | −0.44 | −1.82 | 0.73 |
| EMEDIA | 0.06 | −2.66 | 0.97 |

* Significant at 0.05 level.

The hypothesis H1 was partly proved. Table 4 reveals that the only significant source of information is sectoral association. The influence of such an association is negative on the development process of innovations inside the companies. The coefficient of -1.97 means that there was an 86% reduction of innovations created inside the furniture companies, without any external help. None of the other information sources have contributed to the creation and the introduction of innovations. The general agreements model (6)'s logistic regression coefficients are presented in Table 5.

Table 5. Regression coefficients of model (6) for general agreements (n = 85).

| | NPRD | INSIDE | INCOLLAB |
|--------|---------|--------|----------|
| CGROUP | 16.92 | 1.23 | 2.59 |
| CUST | −2.28 | 1.67 | −0.32 |
| VEND | 19.27 | −0.25 | 2.06 * |
| COMP | 17.82 | −21.09 | 24.01 |
| OTHER | −0.51 | −1.98 | −1.64 |
| CONS | −2.76 * | 0.37 | 2.97 * |
| GLOBE | −14.23 | 40.61 | −47.12 |
| SINST | −0.81 | −61.62 | 67.48 |
| PINST | 2.76 | −0.37 | −2.97 |
| FINANC | −1.45 | 21.56 | −20.46 |

* Significant at 0.05 level.

The hypothesis H2 can be considered proven according to certain significant variables. The results for the coefficients show that for new products (NPRD), consultants (CONS) have a significant influence but with a negative sign ($b_5 = -2.76$). Transforming this number into odds means that the usage of consultants leads to a 93% reduction of the possibility of introducing product innovations. Comparing this result with the influence of consultants on the creating process of innovation in collaboration (INCOLLAB), it appears that they increase ($b_5 = 2.97$) the odds, or in other words, the possibility of that by more than 18 times. Vendors (VEND) are also very important. They increase the odds of the introduction of process innovations by more than six times. Regression coefficients for model (3) that tested the collaboration between furniture companies and IT firms for innovation development are presented in Table 6.

Table 6. Regression coefficients of model (7) for the collaboration between furniture-producing companies and IT firms (n = 85).

| | ITSALES | ITRECRUIT | ITACCOUNT |
|----------|---------|-----------|-----------|
| NPRD | 17.96 | 17.42 | 1.03 |
| INSIDE | 0.21 | −0.62 | −0.05 |
| INCOLLAB | 0.80 | 0.09 | −0.14 |

The results in the table reveal that none of the coefficients is significant. The hypothesis H3 was not proven for IT companies i.e., the furniture enterprises do not collaborate with them in innovation development and do not enter into any collaborations related to product or process innovations. The results for the collaborations with mechatronics sector companies are different and are shown in Table 7.

Table 7. Regression coefficients of model (7) for the collaboration between furniture-producing companies and firms from mechatronics sector (n = 85).

| | MAUTO | MLOG | MNEWPROD |
|----------|--------|-------|----------|
| NPRD | 21.00 | −0.79 | 19.92 |
| INSIDE | −0.27 | −0.50 | 1.232 |
| INCOLLAB | 2.49 * | 0.29 | 2.99 * |

* Significant at 0.05 level.

Regarding these results, the H3 was proven regarding mechatronics companies as collaborators. The results in Table 7 show only two statistically significant coefficients. These are the new automated processes (dependent variable MAUTO) introduced in intentional cooperation with companies (explanatory variable INCOLLAB) from the mechatronics sector and the new commonly developed products (dependent variable MNEWPROD) introduced as a result of process improvement in cooperation with mechatronics companies (explanatory variable INCOLLAB). For the first variable, the results for model (7) presented

$b_3 = 2.49$, which led to $\text{Odd} = 12.13$. That means $\Delta = 11.13$, so it is 11.13 times more likely for furniture companies that want to introduce process innovation to collaborate with mechatronic firms for automation than those that do not plan for process innovation to be developed in collaboration. For the second coefficient from the model (7) $b_3 = 2.99$, the Odd ratio was 20. That means that furniture companies that want to introduce new products are 20 times more likely to collaborate with mechatronics companies regarding the common development of a new product than those that do not plan for process innovation to be developed in collaboration.

In terms of diversifying the supply chain and achieving strategic autonomy, the analyzed companies from the furniture industry do not participate in complex chains that would make them dependent on market shock and changes. The implemented innovations are primarily market-driven and seek ways to optimize the products. None of the companies have outsourced their R&D activities outside the country; hence, the data cannot confirm or reject the idea of Vivek et al. [14] claiming that doing so can benefit the development of innovation and reduce production costs. The research data are indicative that the selected companies have a low level of cooperation with companies from other essential sectors such as IT or mechatronics, or with NGOs and other research organizations. Because of that, we cannot confirm the statements of other scholars [24,26] claiming that partnerships and collaborative relationships with other companies can increase furniture manufacturers' competitiveness. The results in Table 7 revealed that furniture companies rely on firms in the mechatronics sector for automation development. The problem of ensuring that there are enough labor forces pushed the manufacturers to find alternatives. It is interesting to see from the results that the surveyed companies view the innovations as a product of collaboration with mechatronics and associate them with new, exact manufactured products. Manufacturers perceive partnerships with companies from mechatronics as an important source of process and product development. Furniture companies are looking for easily implementable solutions, but in the future, IT companies will be the sources to provide services that keep these solutions up to date. We can accept this process of developing a culture of innovation in the early stages of the Bulgarian furniture sector. The next possible reason why the results in Table 6 are insignificant is the furniture manufacturers' understanding of the role of IT companies. They perceive these companies as supporters of everyday activities. This contributes to the results of Radziwon and Bogers [46], who found that the understanding of innovation and knowledge-based collaboration can differ widely. Still, the current findings show that there is a low share of innovations developed with collaboration, which confirms the statement by Biolcheva [32], which claimed that the lack of cooperation is a restriction to innovation development. Despite the limited scope of the general agreements (Table 5), as sources of innovations, they appear to have some positive relationships with the intensity of innovations in furniture manufacturing. Manufacturers use the agreements to improve their processes. This is an interesting result when compared to the results for agreements with mechatronics and IT companies. General agreement with consulting companies is negatively related to product innovations. This result is in line with the research of Benčíková et al. [47], which proved that inclusion in a global corporate environment will increase cultural intelligence as well as internal processes like controlling [48,49] investigated enterprises. Manufacturers introduce new processes because of knowledge transfers from consultants and vendors. The results (Table 5) show that manufacturers are cornered on the supply channels. They take into account the consultations along with vendors' recommendations. In this way, the companies improve the operations inside manufacturing on account of developing new products after collaborating with consultants. Comparing the results in Table 5 and those in Table 7, it is obvious that manufacturers develop new products based on process automation. The Internet and electronic media do not contribute to the creation of innovations, which confirms Georgieva's [38] idea that ICT and digitalization [42] are not seen as factors for achieving competitiveness by furniture manufacturers. However, it is not in line with the findings of

Pirc Barčić et al. [50], who stated that that furniture industry companies can benefit from using the Internet in their production process innovation and human resource innovation.

Manufacturers in the Bulgarian furniture industry do not elaborate on innovation solutions themselves. The results in Table 4 contribute to those in other tables. They prove the desire for easiness in implementing innovations. The negative impact of the information coming from sectoral associations can be explained by the role of these associations as mediators between manufacturers and companies for consulting vendors and mechatronics.

However, this study has some limitations that need to be addressed. The main limitation of the study is the fact that no reliable statistical data for the innovation potential of furniture enterprises from the Bulgarian National Statistical Institute could be used for validation or comparison purposes, as the collected and generated data from the institute cover the whole agriculture, forestry, and fishing sectors. A further limitation is the low response rate of the companies, as generally, the Bulgarian forestry sector, including the furniture industry, is considered a closed one and not externally oriented. Still, the current research is a keystone for future analyses of GVCs' impact on the innovation potential of Bulgarian regional competitiveness. Furthermore, the current study does not focus on the vision of the companies regarding the benefits and possibilities of participation in a GVC. This gives the idea that the majority of the surveyed companies refer to the global value chains as supplier chains, not as a method of conducting technology transfer, diffusing production activities, engaging in R&D collaboration, and sharing new knowledge and ideas outside the country of the entity's origin.

5. Conclusions

Innovation goes beyond technology and requires collaboration from many areas to achieve success. Still, innovations can offer key advantages to companies, which can lead to a reduction in prices along the chain. GVCs are a channel for the dissemination of technological knowledge, entrepreneurial culture, and innovation capacity.

- The aim of this study was to analyze the collaborations of innovative Bulgarian furniture manufacturers with external stakeholders and the use of information channels as factors for the development and implementation of innovation and participation in global value chains over their innovation activities.
- The results of the research showed that 94.1% of the researched companies have introduced product innovation, and 62.4% of companies have introduced process innovation, which means that they have developed new and improved production methods and technologies. Out of the companies that have introduced process innovation, 77% have implemented new process practices with their own resources, while 22.6% created process innovations together with IT companies or those from the mechatronics sector.
- An important source of information was sectoral association, which was found to be negative regarding the development the process innovations inside the companies. Regarding the inclusion of furniture companies in Bulgaria, various information channels led to the development of product and process innovations. In terms of respondents introducing innovation because of agreement contracts with value chain participants like companies and institutions, the results showed the influence of consultants on creating process innovation in collaboration. On the other hand, this was not found to be the case when introducing the new products into the company.
- The results showed that furniture manufacturing companies that want to introduce process innovation collaborate with mechatronics firms for automation 11.13 times more than those that do not plan process innovation to be developed in collaboration. However, furniture manufacturing companies that want to introduce new products are 20 times more likely to collaborate with mechatronics companies regarding the common development of a new product than those that do not plan for process innovation to be developed in collaboration. In terms of diversifying the supply chain and achieving strategic autonomy, the analyzed companies from the furniture

industry do not participate in complex chains that would make them dependent on market shock and changes. On the other hand, the results indicated that the companies from the furniture manufacturing sector do not enter into any collaborations with IT companies that are related to product or process innovations.

- The findings of this study contribute to new insights into the literature on participation in GVCs as a factor for collaboration with different stakeholders and hence for product and process innovation development within the furniture industry. Even though the topic cannot be considered new, the Bulgarian case shows that innovative furniture companies do not participate in GVCs and have a low level of cooperation with NGOs, academia, and other essential sectors such as IT and mechatronics. Therefore, they are less dependent on chain shocks. Such data are essential primarily for policymakers, academia, and the EU, as EU policies, regulations, and program frameworks rarely consider national and regional specifics, leading to ineffective and non-sustainable outcomes. According to these results, (the H3 hypothesis failed), national policies are crucial to enforcing collaboration with IT companies for two reasons: the improvement of the information role in innovations and the improvement of the optimality of administrative activities. The policies of the Bulgarian Ministry of Economy and Industry (MEI) are mainly focused on supporting manufacturing processes but not much on the business model creation. In this way, furniture manufacturing enterprises have limited capabilities for cost optimality and competitiveness. The MEI should focus its SMEs Guidance Policy on improving the awareness of the furniture manufacturing enterprises about the benefits they can get from the IT companies in process innovations.
- In Bulgaria, the furniture manufacturing sector is considered not so innovative. Still, because of the phenomenon of hidden innovations, we cannot confirm this statement. Companies prefer to hide their innovations for further protection, which might be the reason for the lack of cooperation between furniture manufacturing companies and academia, NGOs, and other relevant institutions. In this respect, further analysis related to the motives of Bulgarian furniture companies to participate in global value chains is needed, and the lack of cooperation must be further studied. The Bulgarian Ministry of Economy and Industry does not consider the Sectoral associations appropriately. The results from this analysis revealed that only these associations are involved with information sources for innovations. The National Strategy for Small and Medium-sized Enterprises (2014–2020) [51] failed to define the role of sectoral associations in the innovativeness of the enterprises. This is the reason for the enterprises only using them regarding innovations. At the same time, the Bulgarian Branch Chamber of Woodworking and Furniture Industry [52] alone is not capable of orienting entrepreneurs in the external environment. The policies related to furniture manufacturing need to be better implemented by improving the Bulgarian Ministry of Innovation platforms [53].
- The findings of this study indicate several specific policy recommendations to enhance innovation within Bulgaria's furniture sector. Firstly, promoting collaboration among innovative companies, academic institutions, and the IT and mechatronics sectors through incentives and support programs can facilitate knowledge exchange and technological progress. Secondly, encouraging transparency in innovation by developing frameworks that encourage companies to disclose innovations for intellectual property protection can enhance collaboration with academia and stakeholders. Thirdly, creating incentives to participate in global value chains can provide companies access to foreign markets, technological knowledge, and innovation opportunities. Additionally, initiatives promoting knowledge exchange among companies, industry associations, academia, and the IT and mechatronics sectors can drive interaction and cooperation. Adapting existing industrial policies to the furniture sector's needs and sharing experiences through workshops and platforms can further boost collaboration, innovation, and integration into global value chains. Moreover, refreshing research and develop-

ment incentive programs can offer financial support for innovative projects within the furniture sector. Collectively, these policy measures can strengthen collaboration, innovation, and competitiveness in Bulgaria's furniture industry, using research results as guidance for future strategies.

We hope that furniture sectors in other EU member countries may also benefit from aligning overall activities regarding global and local value chains as important segments in supporting the furniture manufacturing companies in their innovation activities and will encourage considerable government support for the furniture sector companies and forest-based sector in Bulgaria and in other EU countries. Additionally, according to the New European Innovation Agenda [54], a key European Union (EU) priority is to generate regional innovation, innovation performance, and innovativeness. However, in some EU regions, the design and development of innovation measures is still a relatively novel concept. It is necessary to strengthen the work between universities and furniture enterprises. Collaboration between science and business for the period of research was left to the initiative of universities and industry associations, which has not led to good results, as the analysis in the present study revealed. Now, the state for the first time supports the enterprises through an integrated policy. The "Research, Innovation, and Digitization for Smart Transformation" national program, which was recently approved by the EU Commission, is a great opportunity for Bulgarian authorities to help furniture companies develop and implement innovations. The program will be able to achieve a significant effect on furniture enterprises if its measures are addressed regarding the issues revealed by the analysis in the current research.

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