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RESULTS OF THE INNOVATION ACTIVITY OF THE WOOD SECTOR

The article contains part of the results of research on the innovativeness of the wood sector in Poland and focuses on the effects of the innovation activity. The research was carried out within the framework of the project entitled “Foresight in the wood science and industry - research development scenarios in Poland till 2020”¹.

Keywords: innovativeness, measures, innovation activity effects, wood sector

Introduction

Companies whose innovation activity is effective constitute an innovativeness generator. In few recent years the percentage of companies which outlayed on the innovation activity was decreasing in the wood sector, while the lowest activity in this matter was characteristic of wood industry producers, and the highest of furniture producers². It should be added that the downward trend and distinct decrease, in the share of wood sector companies investing in innovation which occurred in 2007, is a situation similar to the situation in the whole Polish industry. In general, relatively low susceptibility of the wood sector to innovation stems from the specificity of processing processes in particular industries. This concerns mainly industries based on solid wood, a natural raw material that

¹ Project “Foresight in the wood science and industry – research development scenarios in Poland till 2020” (POIG 01.01.01-30-022/08) has been carried out since June 2009 in the Wood Technology Institute in Poznan within the framework of the Operational Programme Innovative Economy 2007–2013. The Programme is co-financed by the European Regional Development Fund (ERDF).

² A comprehensive and up to date analysis of the issue of innovation in the wood sector is presented in the monograph [Innowacyjność ... 2009].

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does not require significant modifications, and thus involvement of very modern techniques and technologies.

The subject matter of the innovation activity encompasses many issues. One of them is devoted to the effects of the innovation activity. In research on that issue a set of the following measures was used: production improvement index, inventive activity index, and extent of equipment with production process automation means.

Characteristics of the measures of innovation activity effects

The main measure of innovation activity effects, i.e. in principle of its commercialisation, is production improvement index that presents the share of value of sold production of new and upgraded products launched in the last three years³ to total value of sold production of goods in the investigated year. The important feature of that approach is a possibility of identification of the structure of sold production of innovative products according to their degree of novelty, i.e. sold production is divided into sold production of new products and sold production of products that were only upgraded (modernised). At the mesoeconomic level the production improvement index indirectly indicates these industries that are the most modern and active in the sphere of innovation. However, that measure refers only to technical innovation, and especially to products. Hitherto the international and Polish methodology of research on innovativeness lacks a similar measure of effects of process innovation (introduction of new and improved processes) and organisational innovation. This is because such effects of those types of innovations as reduction of production costs, reduction in labour consumption and material intensity are unusually difficult to quantify in unambiguous way [Ratajczak, Szostak, Bidzińska 2005].

An indirect measure of innovation activity effects in the scale of an industry branch or particular industry consists of indices concerning the inventive activity: number of inventions, number of patents granted in an industry, and number of licences sold abroad. The number of inventions encompasses both inventions applying for patent in the country and inventions applying for legal protection abroad⁴. Similarly, the number of patents comprises all patents obtained in the country and abroad. Especially the latter type of patents proves the activity of an

³ Until the beginning of 1990s in accordance with the Polish methodology of research on innovation, this index meant the share of value of sold production of new and modernised products launched in a given year to total value of sold production of goods in the same year. In Poland, research based on the presented international Oslo methodology was carried out for the first time in 1996. [Działalność innowacyjna... 2002].

⁴ An invention may apply for protection in many countries. However, the official statistics in Poland are based on applications filed in the country. [Nauka i technika 2009].

industry in creating novelties at the world scale, while degree of invention diffusion, as a relation of patent applications abroad in a given year to their number in the previous year, determines the rate of an industry's invention dissemination in the world.

In the mesoeconomic depiction a measure of innovation activity effects is also the extent of equipment with production process automation means (automatic production lines, computer-controlled production lines, processing centres etc.). This measure is a numerical reflection of the investigated phenomenon.

Innovation activity effects – research results

In the wood sector companies the production improvement index achieved in the period 2004–2007 did not show a stable upward trend and was different in particular industries (table 1).

It should be emphasised that product innovations are conducive to market extension, production diversification, and sector development. They can also influence the development of new methods for marketing, distribution or production.

Compared to production processing with the production improvement index of 16.3% in 2007, the best situation was observed in furniture production (19.9%), and a similar one in production of pulp, paper and paper products, whereas the worst situation characterised production of wood products (8.0%).

In the field of inventiveness, the activity of the wood sector companies does not differ from the average in processing industries (10%). In the period 2004–2006 wood product manufacturing companies that were active in the inventiveness area amounted to around 8% of the total number of firms in this industry. In the case of companies producing pulp, paper and paper products that ratio was approximately 11%, and in the case of furniture producers over 10%. The wood sector companies, like firms from other branches of industrial processing, concentrated their actions concerning protection of intellectual property first of all on trademark registration (manufacturers of wood products – around 6% of the total number of companies, producers of pulp, paper and paper products – approximately 8%, and furniture producers – 6%). Companies that filed applications for patents for inventions amounted to, respectively, 0.7%, 0.8%, and 1.8% of the total number of enterprises.

An important measure of innovation activity effects (and at the same time a condition for it) is equipment with production process automation means, especially high-tech means, including devices automatically controlling and regulating the course of technological processes. In the period 2004–2007 in the wood sector companies, like in the whole industrial processing, automatic and computer controlled production lines were dominant (table 2).

Table 1. Sold production of new and modernised products in the wood sector companies in the period 2004–2007**Tabela 1. Produkcja sprzedana wyrobów nowych i zmodernizowanych w przedsiębiorstwach sektora drzewnego w latach 2004–2007**in business entities with employment higher than 49 people, current prices
w podmiotach gospodarczych o zatrudnieniu powyżej 49 osób, ceny bieżące

Type of activity (The Polish Classification of Activities, PKD) <i>Rodzaj działalności (PKD)</i>		2004	2005	2006	2007
		products whose production was launched in the period: <i>wyroby, których produkcję uruchomiono w latach:</i>			
		2002–2004	2003–2005	2004–2006	2005–2007
		in % of sold production of goods <i>w % produkcji sprzedanej wyrobów</i>			
Industrial processing <i>Przetwórstwo przemysłowe</i>	D	23.8	25.1	20.2	16.3
Production of wood and wood products <i>Produkcja drewna i wyrobów z drewna</i>	20	9.2	5.9	8.0	8.0
Production of pulp, paper and paper pro- ducts <i>Produkcja masy włók- nistej, papieru oraz wyrobów z papieru</i>	21	14.5	22.4	17.8	16.9
Furniture production ^a <i>Produkcja mebli^a</i>	36	21.6	15.8	16.1	19.9

^a And production activity that is not classified elsewhere.^a I działalność produkcyjna, gdzie indziej niesklasyfikowana.

Source: An own study based on: [Nauka i technika 2009].

Źródło: Opracowanie własne na podstawie: [Nauka i technika 2009].

Table 2. Means of automation of production processes in the wood sector companies in the period 2004–2007
Tabela 2. Środki automatyzacji procesów produkcyjnych w przedsiębiorstwach sektora drzewnego w latach 2004–2007

in business entities with employment higher than 49 people
 w podmiotach gospodarczych o zatrudnieniu powyżej 49 osób

Type of activity Rodzaj działalności	Years Lata	Production lines Linie produkcyjne		Processing centres Centra obróbcze	Robots and industrial manipulators Roboty i manipulatory przemysłowe		Computers ^a Komputery ^a
		automatic automatyczne	computer controlled sterowane komputerem		total razem	of which: robots w tym: roboty	
Industrial processing Przetwórstwo przemysłowe	2004	9333	7104	3859	4082	2369	19051
	2005	10064	7447	4712	4297	2540	20420
	2006	11378	8854	5974	5357	3000	22871
	2007	11737	9874	6872	5803	3514	24496
Production of wood and wood products Produkcja drewna i wyrobów z drewna	2004	300	214	157	12	9	452
	2005	321	234	197	16	7	541
	2006	359	283	201	36	16	577
	2007	412	300	251	45	21	641
Production of pulp, paper and paper products Produkcja masy włóknistej, papieru oraz wyrobów z papieru	2004	308	259	16	15	15	497
	2005	323	281	18	20	17	567
	2006	399	370	18	15	15	614
	2007	443	386	31	18	18	638
Furniture production ^b Produkcja mebli ^b	2004	272	265	466	213	130	599
	2005	357	349	826	190	141	623
	2006	389	391	652	210	150	808
	2007	363	463	634	183	124	734

^a Big computers, minicomputers and microcomputers for control and regulation of technological processes.

^b And production activity that is not classified elsewhere.

^c Komputery duże, minikomputery i mikrokomputery do sterowania i regulacji procesami technologicznymi.

^d I działalność produkcyjna, gdzie indziej niesklasyfikowana.

Source: [Działalność innowacyjna... 2008; Nauka i technika 2009].

Zródło: [Działalność innowacyjna... 2008; Nauka i technika 2009].

The attention should be given to the fact that in few recent years the number of production process automation means in the wood sector companies has been ever growing. In the case of production lines their number rose by 46%, the number of processing centres increased by 43%, of computers controlling and regulating technological processes by 30%, and of robots and industrial manipulators by 2%. The biggest changes in equipment of production processes were made in the case of manufacturers of wood products who increased the number of automation means by 45%. In the case of producers of pulp, paper and paper products the increase was 38%, and in the case of furniture producers 31%. Furniture producers made the greatest changes in equipment with production lines (their number increased by 53%), producers of pulp, paper and paper products in equipment with processing centres (an increase by 93%, when the significance of this type of devices in this industry is relatively less) and production lines (a growth by 46%), and manufacturers of wood products made considerable changes in their equipment with processing centres (a rise by 60%) and various types of computers (an increase by 41%).

Conclusions

Creating innovativeness and taking care of the innovation potential is the basic condition for competitiveness on domestic as well as international markets. In few recent years in the wood sector the percentage of companies outlaying on the innovation activity demonstrated downward trends and it was a situation similar to the situation in the whole Polish economy.

In the wood sector (but also compared to other processing industries) the most modern and active in the area of innovation are furniture companies. Producers of pulp, paper and paper products achieve a level of innovation similar to the average level characteristic of processing industries. The lowest production improvement index, and thus the least innovation activity, is demonstrated by manufacturers of wood products.

In the field of inventiveness the wood sector companies do not differ from the average level achieved by all processing industries.

Positive changes in the wood industry are observed as regards equipment with technological process automation means, especially high-tech means. Their number has been ever increasing in recent years. The greatest changes were made by manufacturers of wood products (mainly producers of agglomerated wood-based panels).

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Streszczenie

Istotnym elementem badań innowacyjności sektora drzewnego w Polsce, prowadzonych w projekcie „*Foresight* w drzewnictwie – scenariusze rozwoju badań naukowych w Polsce do 2020 roku”, była analiza efektów działalności innowacyjnej. Posłużono się w niej zbiorem takich mierników, jak: wskaźnik odnowienia produkcji, wskaźnik działalności wynalazczej oraz skala wyposażenia w środki automatyzacji procesów produkcyjnych. Badania wykazały, że w sektorze drzewnym najbardziej innowacyjne, także na tle innych przemysłów przetwórczych, są przedsiębiorstwa wytwarzające meble. Wskaźniki zbliżone do średnich w kraju uzyskują producenci masy włóknistej, papieru oraz wyrobów z papieru. Natomiast najniższy stopień odnowienia produkcji, a tym samym najmniejsze efekty w sferze innowacyjności, wykazują producenci wyrobów drzewnych. Przedsiębiorstwa sektora drzewnego nie odbiegają od średniego poziomu osiąganego przez wszystkie przemysły przetwórcze w dziedzinie wynalazczości. Korzystne zmiany w tym sektorze następują pod względem wyposażenia w środki automatyzacji procesów, zwłaszcza wysoko zaawansowanych technologicznie. Największe zmiany miały miejsce wśród producentów wyrobów z drewna (głównie producentów płyt drewnopochodnych aglomerowanych).

Słowa kluczowe: innowacyjność, mierniki, efekty działalności innowacyjnej, sektor drzewny