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PRODUCTION OF SELECTED PACKAGING IN POLAND

This paper discusses the latest data on the production of selected paper and paperboard, plastic, glass, wood and metal packaging.

During the study period 2016-2020/2021, there was an increase in the production of selected paper and paperboard packaging compared to 2016. There has been an increase in the production of paper sacks and bags, cartons made of paper or paperboard other than corrugated and cartons made of paper or paperboard. Among plastic packaging, the production of plastic bags and sacks played a significant role and has been growing steadily since 2016. The production of glass packaging (clear glass bottles with a capacity of less than 2.5 liters for beverages and food) increased between 2016 and 2021. Flat pallets were the dominant product among wood packaging in 2020. The decline in box pallet production was significant not only relative to 2019, but also relative to 2016. In the group of metal packaging with a capacity not exceeding 300 liters, the highest production was recorded for barrels and similar containers for any material (excluding gas), made of aluminium. It reached 93228 tonnes in 2020 and was 2.4% higher than in 2019.

The packaging market in Poland and worldwide has been gradually increasing its value over the past years. The production of packaging in Poland in the coming years should grow dynamically, although not as fast as before. Undoubtedly, today the biggest challenge for the packaging industry is the rising prices of raw materials, which can negatively affect the profitability and liquidity situation of manufacturers. In particular, the prices of plastics have gone up considerably, but the costs of pulp, metals, wood and glass are also increasing, so the raw material pressure is now affecting the entire packaging industry.

Key words: packaging market, paper and texture packaging, plastic packaging, glass packaging, wooden packaging, metal packaging.

У цій статті розглядаються останні дані щодо виробництва добірної паперової та картонної, пластикової, скляної, дерев'яної та металеві тари.

Протягом досліджуваного періоду 2016-2020/2021 рр. відбулося збільшення виробництва добірної паперової та картонної упаковки порівняно з 2016 р. Відбулося збільшення виробництва паперових мішків та пакетів, картонних коробок з паперу чи картону, крім гофрованого. і картонні коробки з паперу або картону. Серед пластикової упаковки значну роль відіграло виробництво поліетиленових пакетів і мішків, яке стабільно зростає з 2016 р. Виробництво

скляної тари (прозорі скляні пляшки ємністю менше 2,5 л для напоїв та харчових продуктів) зросло в період з 2016 по 2021 р. Плоскі піддони були домінуючим продуктом серед дерев'яної тари у 2020 р. Зниження виробництва коробкових піддонів було значним не тільки щодо 2019 р., але й щодо 2016 р. У групі металевої тари місткістю не більше 300 л найбільше виробництво було зафіксовано для бочок та подібних контейнерів для будь-якого матеріалу (крім газу), виготовлених з алюмінію. У 2020 р. воно досягло 93 228 тонн і було на 2,4% вище, ніж у 2019 р.

Ринок упаковки в Польщі та в усьому світі за останні роки поступово збільшує свою вартість. Виробництво упаковки в Польщі в найближчі роки має динамічно розвиватися, хоча і не так швидко, як раніше. Безсумнівно, сьогодні найбільшим викликом для пакувальної галузі є зростання цін на сировину, що може негативно вплинути на рентабельність і ситуацію з ліквідністю виробників. Зокрема, значно зросли ціни на пластмаси, але також зростають витрати на целюлозу, метали, деревину та скло, тому тиск сировини зараз впливає на всю пакувальну промисловість.

Ключові слова: ринок упаковки, паперова та фактурна упаковка, пластикова тара, скляна тара, дерев'яна тара, металева тара.

Introduction

The packaging market in Poland and in the world over the recent years has been gradually increasing its value. Behind this trend are such phenomena as: the emergence of new companies in the market, the development of new technologies for the production of packaging and packaging of goods, research and implementation of new materials, structures, new types of packaging with increasingly advanced properties. (Kowanetz 2021).

The packaging market, like markets in other industries (both domestic and global), has been changing rapidly in recent years. It is conditioned by many different changes taking place in the aspects: economic, social, ecological (Kowanetz 2021).

Poland is one of the largest packaging markets in Europe. The packaging industry is equipped with modern means of production and the latest technologies, and the offer of packaging manufacturers is fully competitive on foreign markets. Poland is a country where the production of packaging is at the level of 6 million tons per year (157kg per capita) with an upward trend of about 10% per year. The main customer is the food industry which is responsible for about 60% of consumption. Another one - pharmaceutical industry ca. 7% share, cosmetic industry ca. 6% share, the remaining ones are at the level of ca. 22% (data of Polish Chamber of Packaging). Presently, plastic packaging prevails - ca. 40%. Paper packaging is about

37%. It has to be pointed out, however, that the changing regulations indicate that in the future paper will replace plastics (<https://spotdata.pl>).

The production of primary materials for packaging (plastics, paper, metals) is growing at a rate of about 1.9 percent, significantly below the rate of growth of the production of packaging itself, so that Poland has a growing trade deficit in this area (<https://spotdata.pl>).

Research method

The purpose of the study is to determine the changes in the packaging market during 2016-2020/2021. The production of selected packaging has been analyzed and the trend of the packaging market in the economy has been determined.

The presented results are based on statistical analyses of the Central Statistical Office. In addition, literature studies on the addressed issues have been used.

Research results

Paper plastics are the oldest type of packaging. For many years they have been the most popular material used in packaging of goods. The advantage of these packages is their low weight, good mechanical properties, ease of printing, and above all, susceptibility to processing and easy disposal of used packaging. On the other hand, the disadvantages of paper packaging are its strong water absorption, gas and fat permeability and also limited possibilities of combining paper materials. However, these

disadvantages are now commonly eliminated through the use of refining processes such as coating, laminating and impregnation. Paper packaging is suitable for packaging only certain types of food, because it is not resistant to moisture and does not provide a sufficient barrier to fats, odors and oxygen. In addition, they have low rigidity and stability (Muweis 2017).

During the period under review, there were large increases in the production of selected paper and paperboard packaging compared to 2016. The production of paper sacks and bags increased by 23.7%, cartons of paper or paperboard other than corrugated by 89.1%, cartons of paper or paperboard by 24.8%. In 2021, due to the epidemic and the growth of e-commerce, the production of cartons of paper or paperboard other than corrugated increased significantly (by 10.6%) and amounted to 730 thousand tons. In contrast, the production of paper sacks and bags decreased by 5.1% (Table 1).

In 2021, the COVID-19 pandemic significantly affected the volume of production of products due to sanitary restrictions and the need to adjust working conditions to the new requirements, disruption of the supply chain of raw materials, materials and components, and changes in demand for some products. In the paper industry, the production of paper for graphic purposes decreased, while the production of packaging paper and paper packaging increased. The pandemic had a positive impact on the production of packaging papers and paper packaging,

mainly cardboards, due to, among others, the growing importance of e-commerce in the period of intensified sanitary restrictions and reduced activity of stationary stores.

Plastic packaging is packaging based on substances obtained synthetically or from modified natural raw materials. Plastic packaging has many advantages: it is lightweight, strong, easy to form and provides a barrier to the passage of chemicals and microorganisms, as well as improving the visibility of food products. However, there is the potential for harmful compounds to seep from the packaging itself into the product. Restrictive regulations force manufacturers to take appropriate precautions in this regard. Another disadvantage of plastic packaging is the problem related to the threat to the components of the natural environment. Such packages take a long time to decompose, therefore they are no longer stored. The plastics that cannot be recycled in an economically and environmentally viable way are recovered. A range of new products can be manufactured from recycled plastics (Muweis 2017, Walecka 2010, Kozera-Szałkowska 2019).

The use of recycled plastics obtained by mechanical processing is regulated by Commission Regulation (EU) 2015/1906 on recycled plastic materials and articles intended to come into contact with food. According to this legal provision, such a recycling process must undergo a safety assessment by EFSA and must then be authorized by the European Commission.

Table 1

Production of selected paper and board packaging from 2016 – 2021*

Specification	Unit	Year						2021	
		2016	2017	2018	2019	2020	2021	2016=100	2020=100
Sacks and bags of paper	t	130919	157574	171139	188295	170682	162000	123,7	94,9
Cartons of paper or corrugated cardboard	th. t	2130	2389	2520	2615	2577	2659	124,8	103,2
Cardboards of non-corrugated paper or cardboard	th. t	386	447	473	567	660	730	189,1	110,6

* Source: own compilation based on (Production of industrial goods in 2016-2020. Central Statistical Office. Warsaw 2021; Production of major industrial goods in January 2022 Central Statistical Office. Warsaw 2022).

The most common plastics used in packaging include polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polyethylene terephthalate (PET), polystyrene (EPS), polystyrene (PS), and polyamide (PA) (Pawlicka et al. 2018).

Among plastic packaging, the production of plastic bags and sacks played a significant role, which has been steadily increasing since 2016. An increase in the production of selected plastic packaging was recorded during the study period.

The production of plastic bags and sacks increased by 34.4%, boxes, crates, cages and similar articles by 45.1%. In 2021 we observe a smaller increase compared to 2020 i.e. production of plastic bags and sacks increased by 7.7%, boxes, crates, cages and similar articles by 17.2% (Table 2).

Glass packaging has been used as food packaging for a long time. The main advantage of this type of packaging is that it does not affect the product, regardless of how long it has been stored. Glass packaging does not allow liquids, water vapor, odors or

gases to pass through. Moreover, they can be reused many times. The disadvantages are the high weight of this type of packaging, the possibility of mechanical damage and susceptibility to temperature changes. On the other hand, glass does not pose a threat to the environment, and cullet used in recycling pollutes the environment less than primary glass production (Muweis 2017).

Among glass packaging, the production of clear glass bottles with a capacity of less than 2.5 liters for beverages and foodstuffs plays an important role, accounting for 2917 million units of production produced in 2021. Between 2016 and 2021 there was an increase in the production of these products by 54.1%, while compared to 2020 there was an increase of 35%. Over the entire period under review, the increase in the production of bottles of clear glass with a capacity of less than 2.5 liters for beverages and foodstuffs (excluding, among others, bottles for infant feeding) was 91.7%. Production of these packages in 2021 increased by 37.6% relative to 2020 (Table 3).

Table 2

Manufactured production of selected plastic pack from 2016 – 2021*

Specification	Unit	Year						2021	
		2016	2017	2018	2019	2020	2021	2016=100	2020=100
Sacks and bags	t	254397	267860	309421	303214	317247	341784	134,4	107,7
Plastic boxes, cases, crates and similar articles	th. t	244810	382426	300508	301151	303235	355247	145,1	117,2

* Source: own compilation based on (Production of industrial goods in 2016-2020. Central Statistical Office. Warsaw 2021; Production of major industrial goods in January 2022 Central Statistical Office. Warsaw 2022).

Table 3

Manufactured production of selected glass packaging for beverages and foodstuffs*

Specification	Unit	Year						2021	
		2016	2017	2018	2019	2020	2021	2016=100	2020=100
Bottles of colourless glass of a capacity <2,5 liter for beverages and foodstuffs	mln units	1 893	2 001	2 066	2 290	2 161	2 917	154,1	135,0
Bottles of coloured glass of a capacity <2,5 liters for beverages and foodstuffs (excluding infant's feeding bottles)	mln units	851	1 075	1 016	1 017	1 185	1 631	191,7	137,6

* Source: own compilation based on (Production of industrial goods in 2016-2020. Central Statistical Office. Warsaw 2021; Production of major industrial goods in January 2022 Central Statistical Office. Warsaw 2022).

Spruce, pine, fir, oak, lime, poplar, beech, alder or birch are the most commonly used wood for wooden packaging. These packages are characterized by high strength and low weight. These packages protect against heat and gas flow, and are also a barrier to conductivity. Wood packaging is not suitable for some types of food, due to its hygroscopicity, i.e. susceptibility to moisture binding and difficulty in cleaning and decontamination, it has low resistance to external factors. Wood is sourced from renewable resources, but due to the long recovery time of forests and the high price of wood packaging, plastic packaging is more commonly used (Muweis 2017).

In 2020, flat pallets were the dominant product among wood packaging, with a production of 1806 thousand tons, 1.3% less than in 2019. The decrease in the production of box pallets was significant not only compared to 2019, but also to 2016, by 43.3% and 34.5%, respectively. The production of crates and boxes declined during the study period to reach its lowest level in 2018, followed by an increase in production that fell short of 2016 levels in 2020. (down 20.0%), but production was 22.5% higher than in 2019 (Table 4).

Metal packaging is most often unit packaging and transport packaging made of materials such as: tinned white steel sheets, tinless steel sheets, aluminum sheet and foil, steel sheets with other protective galvanic coatings (zinc, nickel), black steel sheets (varnished steel sheet without protective coating of other metal).

These packages are characterized by high durability, protection of the product from light, moisture and penetration of odors. The disadvantage may be the possibility of penetration of metal ions from the packaging into the packaged food, which may cause decomposition of vitamins and change of sensory characteristics of the product. Another disadvantage of metal packaging is its relatively high price. Metal can be reused, which is a big advantage. For example, recycling of aluminum contributes to a significant reduction in pollution of environmental components, saving bauxite ore and also reducing electricity consumption (Muweis 2017).

In the group of metal packaging with a capacity not exceeding 300 liters, the largest production was recorded for barrels and similar containers for any material (excluding gas), made of aluminum - in 2020 it reached 93228 tons and was higher than in 2019 by 2.4%. Also, a large production was recorded for tanks and similar containers for any material (excluding gas), made of cast iron or steel, with a capacity of more than 50 liters but not exceeding 300 liters - 66565 tons. Production of food cans, despite a slight decrease in 2017 by 3.0% compared to the previous year, grew steadily over the period under review and was 28.0% higher in 2020 compared to 2016. Production of cans other than for food, made of cast iron or steel, with a capacity not exceeding 50 liters in 2017-2019 oscillated at a similar level (28.1 thousand tons), and in 2020 decreased by 1.3% compared to the previous year (Table 5).

Table 4

Manufactured production of wood packaging from 2016 to 2020*

Specification	Unit	Year					2020	
		2016	2017	2018	2019	2020	2016=100	2019=100
Flat pallets	th. t	1 685	1 774	1 909	1 831	1 806	107,2	98,7
Box pallets	th. t	89,8	96,5	82,6	104	58,8	65,5	56,7
Cases, boxes	th. t	104	92,9	59,5	67,6	82,9	80,0	122,5

* Source: own compilation based on (Manufacturing of industrial products in 2016-2020. Central Statistical Office. Warsaw 2021).

Table 5

Manufactured production of selected metal packaging from 2016-2020*

Specification	Unit	Year					2020	
		2016	2017	2018	2019	2020	2016=100	2019=100
Tanks, casks and similar containers, for any material (excluding gas), of iron or steel, of a capacity ≥ 50 l but ≤ 300 l	t	76632	74634	78295	71292	66565	86,9	93,4
Tanks, casks and similar containers, for any material (excluding gas), of iron or steel, of a capacity < 50 l	t	18362	18789	18 303	20281	22621	123,2	111,5
Cans used for preserving food and drink of iron or steel, < 50 l, food cans	t	38356	36446	42143	45122	51101	133,4	113,3
Cans used for preserving food and drink of iron or steel, < 50 l, drinks	t	13577	13915	13233	13 536	15399	113,4	113,8
Cans other than for preserving food and drink of iron or steel, < 50 l	t	29021	28062	28048	28 078	27702	95,5	98,7
Aluminium casks and similar containers, for any material (excluding gas), of a capacity ≤ 300 l	t	97492	89874	89945	91016	93228	95,6	102,4

* Source: own compilation based on (Manufacturing of industrial products in 2016-2020. Central Statistical Office. Warsaw 2021).

Summary

Packaging production in Poland should grow dynamically in the coming years, although not as fast as it has been so far. According to SpotData's report for Santander Bank Polska, producer's revenues may increase by 6.8 per cent on average annually until 2025. The sales of paper packaging will grow the fastest, with other types of packaging growing slightly slower. The forecasts take into account the effects of new regulations, assuming a moderate scenario of their impact. The development of the industry until 2025 will require investments of about PLN 20-25 billion, out of which PLN 2-4 billion will be allocated for the adjustment of companies to the regulatory changes (<https://spotdata.pl>).

According to the estimates of the Polish Chamber of Packaging, the packaging market in Poland is worth PLN 45 billion. The Polish packaging industry owes its stable position and functioning during the crisis to a strong connection with the food, pharmaceutical

and cleaning products industries. These are the sectors that maintained a good position in the pandemic, providing access to the most essential and indispensable goods, and at the same time generated high demand for packaging (<https://www.pio.org.pl>).

Undoubtedly, today the biggest challenge for the packaging industry is the rising prices of raw materials, which can negatively affect the profitability and liquidity situation of manufacturers. In particular, the prices of plastics have gone up considerably, but the costs of pulp, metals, wood and glass are also increasing, so the raw material pressure is now affecting the entire packaging industry (Santander BP).

The packaging sector is one industry that has fared remarkably well in the pandemic. There has been increased demand for packaging for shipping goods ordered online, takeaway food or cleaning and hygiene products. The health of companies in the sector is also demonstrated by their low levels of debt.

The packaging industry is in a period of radical change, compounded and accelerated by pandemics and political conflicts such as the situation in Ukraine. Industry and trade are constantly facing new challenges. Sustainability, e-commerce and digitalization are the top 3 trends in packaging. Other issues are shortage of raw materials, supply bottlenecks and lack of skilled personnel (<https://www.plastech.pl>).

Thus, the demand for packaging depends on various long-term and short-term factors. The packaging market in Poland is constantly growing and changing. In addition to the increase in consumption, the change in lifestyle, the demographic factor (increased demand for medicines in an aging society), increased consumer demands (increased demand for packaging of luxury items), as well as the marketing factor (packaging

is associated with the product brand), environmental and technological factors are also responsible for the rate of growth. Increased customer demands, as well as a higher level of environmental awareness, are accelerating the production of packaging and investments in the development of this industry. New visually attractive products are being introduced and their packaging must be original, encouraging to buy and adjusted to market requirements. In Poland the plastic packaging market is still dominating. According to the reports the most profitable is currently the investment in the packaging made of cellulose materials, i.e. paper and cardboard packaging and to a lesser extent plastic packaging (plastic). This applies not only to the food industry, but also to the cosmetics and pharmaceutical industries, and in fact to any field that deals with the production or sale of goods (<https://kraften.pl>).