



DELIVERABLE D.T2.2.2 REPORT BASED ON THE OUTCOMES OF THE BUSINESS SUPPORT SERVICE

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1. TRENDS IN EUROPE

1.1. BIOPLASTICS

According to the forecasts, there is an increasing demand for the use of bioplastics, so the market certainly could use a TPS or PLA production plant with a capacity of 100 to 130 tons per year. The production of TPS in any other Western European country exceeds this amount. During the production, TPS in itself is used rarely, usually mixed with other types of plastics, so the amount of produced raw material can be multiplied and be able to supply the local market. It is important to emphasize that there is no similar initiative in this region - for setting up PLA or TPS factory - and it cannot be expected in the catching-up countries, so the establishment of the factory is justified from several point of view.

1.2. PACKAGING MARKET

Consumer applications such as food, beverages and cosmetics account for the bulk of the global packaging market. In 2018, the consumer sector was worth almost \$511 billion, or 56.4% of the overall packaging market. Since 2013, the consumer sector has grown by a rather modest 1.4%, owing to factors such as the maturity of the packaging market and many leading end-user sectors across much of the developed world. The share taken by the consumer sector is expected to decrease slightly within the next decade at the expense of its industrial counterpart, shrinking to just under 56% by 2023 and 55.5% by 2028.

1.3. NEW POTENTIAL MARKETS OF PLA (HELPS TO SPREAD PAPER AND PLA COMBINED MARKET)

Method of processing: polylactide, in addition to its advantageous characteristics, still has a beneficial feature that can be processed with existing polymer processing technologies and equipment.

- extrusion,
- blow molding,
- injection molding,
- injection blow molding,
- thermoforming.

It can be used for producing extruded products with different profiles, injection molded parts, decomposable foils, biaxially oriented films, hollow objects, thermoformed trays, anti-cracking foams, fibers, textiles. Packaging and medicine industries are the main users of PLA. Syringes, sachets for blood storage, catheters, surgical catguts, implants, prosthesis, tissue engineering products for patients with burn injures, and also can be used in pharmacy, e.g. by controlled release drug delivery.

1.4. REGULATORY ENVIRONMENT

Sustainability issues are having a profound effect on regulatory activity within the packaging industry at present, driven by the growing desire for a truly circular economy. Europe and the EU appear to be at the forefront of much of the regulatory activity currently taking place as far as sustainability is concerned, via legislation such as the Packaging Waste Directive and the new law banning single-use plastic items such as plates, cutlery, straws and cotton buds stick by 2021.

An important driving force would be the propagation and impact of the EPR system at EU level. Extended Producer Responsibility (EPR) involves the extension of a producers' financial and/or physical responsibility for its product to the post-consumer stage of the product's life cycle.

2. COUNTRY SPECIFIC DATA – SLOVENIA

2.1. SLOVENIAN MARKET

Slovenia is a small country with a highly diversified economy, which is dominated by small and medium companies and a smaller number of large companies. Due to the small domestic market even medium companies, especially if operating in niches, export a significant part of their production. Slovenia's export is mainly oriented towards other EU countries, mainly Germany, Austria, Italy and France but also further afield. A consequence of high exports even in smaller enterprises are very active contacts with players in other economies, integration in international value chains and an understanding of sectoral trends. Exports of goods and services (% of GDP) in Slovenia was reported at 77.65 % in 2016.

2.2. MULTIMATERIAL PRODUCTS AND PAPER INDUSTRY

Multimaterial papers and products are the production domain of the paper value chain. Plastics converters do not produce such products. So the more important industry for this sector is the paper industry. Multimaterial products are mainly used in packaging, especially in retail (e.g. large quantities of windowed paper bags) and for food stuffs where they serve to display, protect and preserve the product. Other less specific and very varied products are also packaged in combined materials (pharmaceuticals, batteries ...). Products mainly consist of laminated papers for print, packaging or other products and of packaging and other products with added barriers, windows, plastic envelopes etc.

Packaging market trends are focusing on sustainable packaging solutions, growing popularity of flexible and lightweight packaging, consolidation of the packaging market, improving product recyclability, optimizing packs for ecommerce and on smart packaging solutions.

There is no actual existing raw material producers of bioplastics (this is the only missing actor in value chain in our country but it does not pose any problem due to possible imports) and just a small number of bioplastics packaging producers (no paper-bioplastics packaging producers) in Slovenia. There is no market developed for the paper-bioplastic packaging products yet, nevertheless, it has a good potential to develop as demand for such products is rising.

The paper industry has a long tradition and is organized through The Paper and paper converting Industry Association (PPCIA) which serves as a joint meeting point and is also part of labour negotiations and an industry representative in dealing with government and policymakers. It is associated with the Chamber of commerce and industry of Slovenia (CCIS) which provides essential services for enterprises operating in Slovenia, and it is the ideal local partner for foreign investor.

2.3. BIODEGRADABLE PLASTIC PRODUCTION

A share of 27% of the world production of bioplastics is produced in Europe, mostly from starch, and experimentally from whey and other renewable sources. The EkoPlastik d.o.o. is the only Slovenian company,

distributing biodegradable polymers within the European Union. There is no manufacture of biopolymers in Slovenia, because there is no market for such products in our country yet. Some companies just process bioplastics, making a few packaging products as biodegradable bags are. The latter is meaningful for us, knowing, there is available biodegradable foil in our country. There is also a company producing PLA (polylactic acid) bottles, but only for the purpose of export. Large retailers have expressed interest in using more sustainable packaging however the (higher) cost is normally a limiting factor. Producers that use combined paper/plastic packaging are a group with high potential for use of paper/bioplastic products. Especially in product lines for bio- eco- food products where they wish to complement the environmental product with sustainable packaging. Several attempts at finding such packaging have been mentioned however at the moment none are used commercially.

Bioplastics and packaging made of it have no specific regulations in Slovenia. Bioplastics undoubtedly brings a change in the market both for consumers and producers. The market is turbulent and the supply/demand system uncoordinated. Recently in European Union the biopolymer products in the rise are thermoplastic foil products. Slovenia has a potential for a development of bioplastics and paper-bioplastics products market

3. ASSESSMENT REPORT

3.1. COMPANY PROFILE

Industrial designer Andreja Pogačar, self-employed in culture (DodoPack), works as a structural packaging designer, generally with paper and corrugated cardboard, including lamination with plastic films. She works in cooperation with different manufacturers, so she offers her customers all kinds of solutions from a variety of materials, different techniques of printing and different quantities. For her foreign customers she mostly just develops the dielines for different kinds of packaging (from transport to gift), P.O.S. and P.O.P. materials. For domestic customers with her cooperators she finds and executes the desired solution from ideation to finished product, according to particular needs.

Innovation is a very important field of Andreja's work. Percent of annual investment budget on average for innovation investment in the last three years was around 20 to 30%. At present Andreja is upgrading her knowledge through her doctoral research about interactive sustainable gift packaging and actively participates in conferences and other activities within its industry.

3.2. SUSTAINABILITY, USING OF BIOMATERIALS

The sustainability focus is a priority, she has qualitative goals, however she doesn't have any sustainability report or certificate. Activities on sustainability are caused by internal factors and around 10% of the investment budget goes towards improved sustainability. The importance of end-of-life management of materials and products is very high. Sustainability is something a lot of her clients want, mainly because of the rising sustainable trend, but they neglect it for the sake of the price. They don't really understand the importance of its jet and see that this kind of changes will bring them an advantage on the market. At this point Andreja's sustainable efforts are directed into making packaging solutions made from mono materials or combining different materials in the way that they are easy reassembled and recycled.

To start using biocomposite material is important for her environmental sustainability strategy and she is not so much familiar with legislation for sustainable products (recycling, composting biocontent etc.). She didn't make any test trials with biomaterials jet, she needs more information about the material itself. Key

limitations to start using biomaterials follow from lack of knowledge in this field, customer awareness, demand, price and legislation.

3.3. PRODUCTION SPECIALITIES

Andreja's work is the end use packaging solutions, from primary to secondary packaging and also solutions for food (dry or wet) and non-food. The use of base material is mostly virgin, recycled and their mixture, different types of coated paper and different kinds of corrugated cardboard. The supplier provides her with technical data sheets (SDS) and declarations of conformity (certificates). Her end packaging products are in most cases printed. Main functionalities requested in the end product are mechanical resistance and that it is grease resistant. The main target of packaging design solutions is definitely aesthetics, then follows functionality and others as material efficiency, easier sorting of material and consumer level.

Her preferences about what happens to the packaging at the end of life follow in this order; recycling, reuse, thermo-valorisation and if it is inevitably as a last possible option landfilling. If the packaging is made for recycling then the goal is composting, if to reuse it needs to follow its own closed loop. Main sustainability goal on the production side is lower feedstock consumption and less use of material. At the end of life side she wants to favour local circular economy, promote renewable biobased products, LCA optimize the product and reduce carbon-footprint. A must is to be in compliance with standards and follow the clients' specifications.

3.4. SUMMARY AND SOLUTIONS

Considering the financial position and strategy of Andreja's vision and taking into account the Slovenian market, the best solution is to gain more knowledge how to integrate composites of biodegradable materials (e.g. paper with PLA - polylactic acid), to find out which materials are available in the market to actually start using them and to get the contacts of the companies which already use biocomposite materials for the packaging production. There is also an option to help her subcontractor to replace existing material combinations with new ones.

After the experience with biocomposite materials and new gained knowledge, she can transfer the knowledge onto her clients, tell them how to make smarter choices and use that as an advantage on the crowded market.