Agronomy Research **17**(1), 220–233, 2019
https://doi.org/10.15159/AR.19.068

A systematic approach to exploring the role of primary sector in the development of Estonian bioeconomy

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Abstract. The aim of this paper is to provide a systematic overview of biomass production and the use of biomass for the production of key products, as well as to map businesses operating in the field of bioeconomy in Estonia. The importance of primary sector in Estonian economy has decreased over the last decade. At the same time, the competitiveness of primary sector has increased, which will, in the future, contribute towards a stable production of biomass. Therefore, bioeconomy and respective business models are some of the key ways of coping with climate change. Innovative ways to transform the use of natural resources in a conscious manner are being mapped in Estonia as well as in other member states of the European Union. Comprehending the current use of biomass is essential for finding new sustainable management solutions. Acknowledging these aspects, the study explores biomass production in Estonia. One of the aspects observed during the period 2014–2017 is the proportion of the primary sector in total gross value added and the use of biomass in the food and feed industry. The results of the paper are presented in the form of Sankey diagrams, which illustrate noteworthy connections.

Key words: bioeconomy, primary sector, biomass production, regional development, innovation.

INTRODUCTION

Different sectors of economy are usually highlighted whenever new developments arise. The emergence of bioeconomy is associated with sustainable management of the environment. In the next decade, the sustainability of economy will increasingly depend on bioresources and emerging technologies. Scientific research is applied at an increasing rate to explore the possibilities of bioeconomic sustainability. Numerous countries have also taken steps to map the potential of their bioeconomy. Since guidelines for mapping the prospects for developing bioeconomy have reached the level of European Union (EU) policy, most European countries are in the process of creating a strategic view of their bioeconomy. The Europe 2020 strategy defines bioeconomy as a key element of sustainable economic growth which reduces fossil fuel dependence (European Commission, 2012; European Commission, 2018). In OECD's strategic view, bioeconomy can increase the environmental sustainability of food, feed and fibre production, improve water quality, provide renewable energy and improve the health of animals (OECD, 2009).

Several studies – Vandermeulen et al., 2011; Bugge et al., 2016; Efken et al., 2016; D'Amato et al., 2017; Fuentes-Saguar et al., 2017; Ronzon, et al., 2017a; Ronzon, et al., 2017b; Dietz et al., 2018 – have compiled an overview of the use of the bioeconomy concept and provide solutions for aggregating the activities related to bioeconomy. Pfau et al (2014) have prepared a systematic review of scientific literature regarding bioeconomy and describe how authors address the concept of sustainability. The vision of sustainable economic development is of utmost importance in the concept of bioeconomy.

An increasing number of public and political debates are touching on the problem of potential competition between the use of bioresources for food or fuel production. Negative effects of the change of land use and the altering of existing consumer goods to incorporate more bioresources are among other frequently mentioned issues. Thus, one may observe that bioeconomy with its respective business models is one of the key ways to cope with climate change and ensure sustainable economic development (Scarlat et al, 2015).

The goal of this paper is to provide a systematic overview of biomass production and the use of biomass for the production of key products, as well as to map businesses operating in the field of bioeconomy in Estonia. As bioeconomy is widespread and encompasses different sectors, the primary challenge is to understand the current use and potential change of biomass use on the product level. In order to evaluate the size of Estonian bioeconomy, it is prudent to measure the volume of food and feed industry first. The novelty of the study consists in providing an overview of the relationship between biomass production and its use in the food industry while also mapping the primary products. Furthermore, we outline specific issues that have arisen in the process of mapping biomass production, as well as relationships between different sectors, providing focus points for further research and policy development.

The aim of mapping is also to identify underused resources and implement research at a more detailed level than biomass mappings have done thus far. The BERST project (BioEconomy Regional Strategy Toolkit for benchmarking and developing strategies, 2016) and DataM of the Joint Research Centre of the European Commission (Ronzon, et al., 2017a) have compiled large volumes of data on EU member states to illustrate biomass supply from the quantitative perspective. A recent systematic approach to understanding and quantifying the EU's bioeconomy was provided, for example, by Ronzon and others (Ronzon, et al. 2017b). They identified three main types of bioeconomy and categorized EU member states into three groups according to them. Estonia was placed in Group B together with Hungary, Cyprus, Malta, the Czech Republic and Slovakia. The bioeconomy in Group B states features below EU average labour productivity in bioeconomy and above EU average share of employment in sectors (partially) manufacturing biomass. In a nutshell, the following should be noted: in Estonia, 68.6 thousand employees were employed in bioeconomy and it generated 6 million euros of turnover or 2 million euros of value added in 2015 (Ronzon, et al., 2017a). Previous studies shed no light on the use of biomass at the product level, which this study will do. Sankey diagrams have rarely been used to present analytical results in earlier articles. Here the overview of biomass products has been presented using Sankey diagrams that illustrate bio-based raw material flows towards food processing and other industries. These diagrams are used as a reference for describing and characterizing

bioeconomy in Estonia, thus demonstrating the usefulness of such visual aids for a better understanding of production flows.

It is important to note that biomass production cannot increase significantly and that competition for bioresources between different sectors is increasing. The sustainability of the secondary sector depends on how well biotechnology-based products and sustainable management are developed. The primary sector's gross value added (GVA) and business links could increase significantly in the future, compared to the business model that is currently mainly tied to the food industry. In this study, we use data on GVA to measure the size of the agriculture and food industry.

The research outlook is dependent on the direction of the Estonian bioeconomy development study under preparation (project "Bioeconomy value chains in Estonia", duration 2018–2021). Bugge et al. (2016) have found that the vision of bioeconomy could be based on different characteristics. Biotechnology vision, bioresource vision or bioecology vision are prospective perspectives. Based on findings on the development direction of Estonian bioeconomy, this study is primarily aimed at evaluating the value of the resources, which hints at an aim towards economic growth and sustainability. The creation of value depends on the conversion and upgrading of bio-resources.

MATERIALS AND METHODS

In order to ensure transparency and reproducibility, the methodology relies on Estonian official statistics (SE), which is part of Eurostat data. It is used as secondary data, supplemented by authors' calculations to fill data gaps. Based on the European Commission's (EC) definition, the study defines a methodology for the quantification of four primary dimensions: (1) classification of activity sectors (NACE Rev. 2); (2) gross production and total output; (3) gross value added (GVA); and (4) product.

As a first step, we use the official definition of bioeconomy provided in EC's communication COM(2012) 60 and interpretations of related activities defined in earlier studies, which are reflected in the range of selected activity sectors from NACE Rev.2 (Eurostat, 2008). According to the EC's communication COM(2012) 60, bioeconomy includes 'the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy. It includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, biotechnological and energy industries'.

Various understandings of biomass exist due to the different characteristics of such resources. As explained by Zörb & Lewandowski (2017), biomass resources can be classified according to their (1) origin (plants, animals, microorganisms), (2) sector (agriculture, fishing, forestry, waste), (3) physical conditions (solid, liquid), and (4) major component (starch, sugar, lignocellulose, oil, protein). A broad definition of biomass would include 'all resources containing non-fossil, organic carbon, recently (< 100 years) derived from living plants, animals, algae, microorganisms or organic waste streams' (Zörb & Lewandowski, 2017). This paper considers as biomass such organic resources that originate from plants or animals and are produced in agricultural, fishing and forestry sectors. Processed food is also included in our definition of biomass.

Taking into account previous studies in the selection of activities (Rönnlund et al., 2014; Haarich et al., 2017; Mainar-Causapè et al., 2017; Ronzon et al., 2017a; Vitunskienè, et al., 2017), primary sector and its industry chain include 16 main fields

of activities that form the entirety of a bio-based economy. Several authors (Efken et al., 2016; Heijman, 2016) assume that primary sector belongs entirely under bioeconomy. This conclusion is logical because biomass production is traditionally dependent on natural resources, although some fossil inputs are used. It means that the production of biomass is covered by section A of NACE Rev. 2, which is comprised of agricultural (A01), forestry (A02) and fishing (A03) sectors. The study uses a three- or five-digit code from NACE Rev.2 through which it is possible to describe the links between companies in bioeconomy in more detail. The definition of sectors through the NACE Rev.2 codes allows to present a production volume, the value of output and GVA calculations based the National Accounts Statistics.

A definition of bioeconomy certainly includes the processing of biomass, which, in turn, requires defining the manufacturing industry and the selection of production activities. The choice of the latter is complicated by the fact that many industries use mineral and fossil components in addition to biomass. It has previously been assumed that food industry can be considered an industry falling under the definition of bioeconomy (NACE Rev. 2 section C, 12 downstream activity sectors (C10–12)). As it encompasses the production and manufacturing of biomass, following NACE Rev.2 classification, food industry can indeed be considered, fully or partially, a part of bioeconomy. The three- or five-digit code from NACE Rev.2 is important for monitoring the activities that use both bio-resources and fossil raw materials. The EU Bioeconomy Report 2016 (Ronzan et al. 2017a) identifies partially bio-resource based sectors, which we also use, and which are described in Fig. 1.

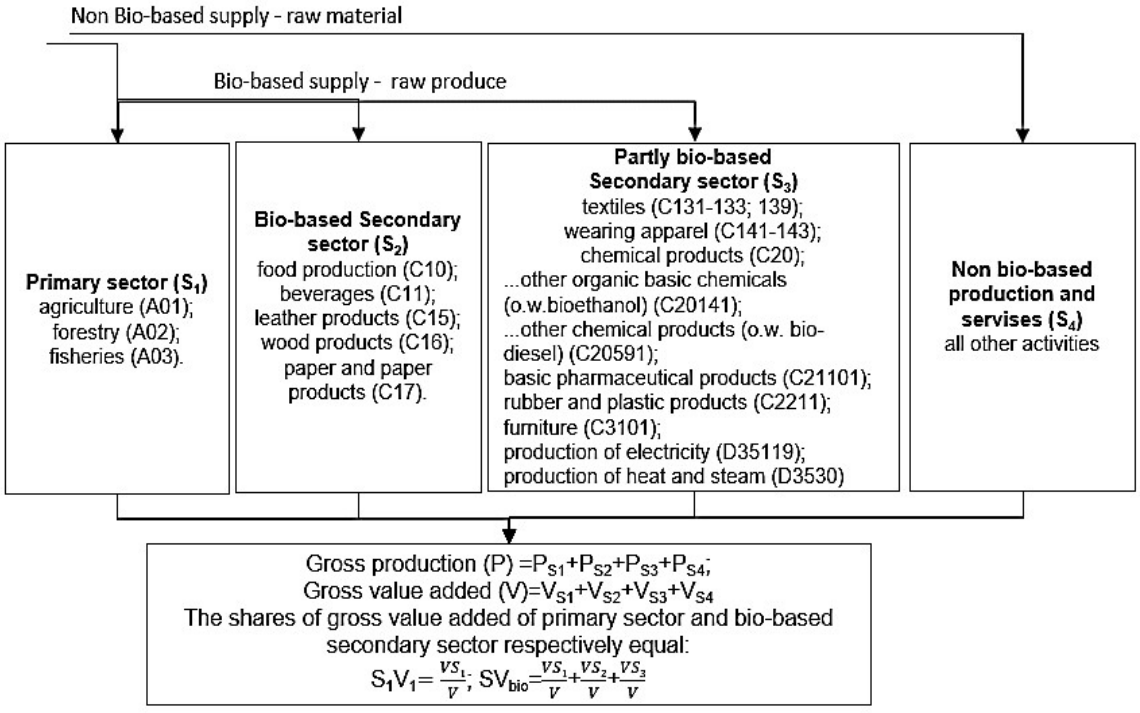

Figure 1. A simplified block scheme of selected sectors related to bioeconomy and indicators for calculations.

The indicators serving as the basis for calculations in this study are listed in Fig. 1. In order to identify the economic relevance of biomass-based products, gross production and GVA are calculated. Calculations of gross production are based on average figures from the period 2014–2016, which excludes the impact of a possible extreme year. Statistical data of GVA were recalculated according to the proportion of bioproducts fully or partly made of bio-materials. The statistics on the sale revenue (NACE C13-C14; C21 and C31) or production (NACE C20 and D35) of industrial products according to the PRODCOM list (Eurostat, 2018a) and Statistical Classification of Products by Activity was used to determine this proportion in partly bio-based manufacturing.

The main food and feed related products from the primary sector are considered when exploring the role of primary sector. The List of Products of the European Community (Eurostat, 2018a; PRODCOM list 2018) was used for product level analysis to describe biomass products.

RESULTS AND DISCUSSION

We will first take a look at the context indicators that characterize bioeconomy. The proportion of agriculture, forestry and fisheries in Estonian GVA was 2.5% in 2016, while the share of the aforementioned sectors in the GVA of other EU member states was on average 2.9% (Eurostat, 2018b), which is a markedly low level. Vásáry and Szabó (2018) discovered in the BIOEAST Initiative study that in the period between 2008 and 2015, there was a decreasing trend in the number of people employed in agriculture, forestry, fishing and aquaculture sectors, as well as in the food, beverages and tobacco sectors in the BIOEAST countries. After the global financial and economic crisis, the level of turnover and value added has remained stable since 2012. Similar changes have occurred in Estonia's labour market. The number of people employed in the above-mentioned sectors dropped from 31,361 in 2008 to 30,252 in 2015. The number of employees decreased by a further half a thousand by 2017. The fact also implies that labour productivity has increased significantly, but this is a relative presumption. It is worth pointing out that current emphasis on bioeconomy and negative changes in macro-statistics are contradictory. Conventional industry has thus far failed to develop and valorise biomaterials and it signifies the importance of innovative solutions for production in bioeconomy.

In order to provide a comprehensive overview of the main biomass production in Estonia, one must first focus on biomass production in the primary sector. The data are presented for the most important outputs of all the activities in primary sector, but it must be taken into account that part of the biomass is also used within the primary sector to produce the next level biomass (e.g. the production of milk from grass feed). The authors argue that it is necessary to know all the resources in order to find solutions for a better use of biomass. The biomass structure, production and value in Estonia are presented in Table 1 which demonstrates that the gross production of agricultural and fishery sectors is 6,348 thousand tonnes and forestry yield is 13,557 thousand m^3.

Biomass produced in agriculture is divided into two groups: the main products (cultivated crops such as cereals, potatoes or milk and meat) and the accompanying residues (e.g. straw, other plant residues or animal skins, wool, animal bristles). The analysis revealed that national statistics about accompanying residues are lacking. For a

more accurate mapping of biomass and bioeconomy, it is necessary to collect more data on biological resources mentioned in Table 1. There is no data on waste management (NACE E3821) or biological waste, so discussions from the bio-waste perspective are not fact-based.

Table 1. Biomass production and value 2014–2016 average in Estonia

Sector	Commodity	Gross production, thousand tonnes; * thousand m^3	Production value, million €	Share of production value, %
Agriculture	cereal	1,244	177	8.6
	legumes	78	14	0.7
	technical crops, including oil crops	178	54	2.6
	vegetables, potatoes	185	62	3.0
	berries and fruits	6	7	0.3
	fodder roots	0.9	0.1	0.01
	grazed biomass	3,763	75	3.6
	sheep and goat meat	0.7	2	0.1
	poultry	19	30	1.5
	pork	45	79	3.8
	beef	13	46	2.2
	egg	12	14	0.7
	raw milk	723	229	11.1
Fishery	ocean fishing	13	44	2.1
	aquaculture	3	3	0.1
	Baltic Sea and inland fishing	64	10	0.5
Agriculture and fishery	total	6,348	846	-
Forestry*	fuelwood and felling waste	3,796	73	3.5
	birch and aspen pulpwood	2,034	71	3.4
	conifer pulpwood	1,762	64	3.1
	soft- and hardwood log	1,220	91	4.4
	conifer log	4,745	921	44.6
Forestry	**total**	**13,557**	**1,220**	
Total		**-**	**2,066**	**100**

Source: Statistics Estonia, 2018; State Forest Management Centre 2018 (Average roadside prices in state forest in 2018); Ministry of Rural Affairs fishing catch and prices database 2018; Authors' calculations.

Comparing two different sectors – agriculture and fisheries – with forestry, it is apparent that the calculation units of biomass are different. The quantity of wood is measured in cubic meters, which hints at a need for conversion. The conversion would scientifically be necessary, but the sector's conventions are based on cubic meters, which calls the intelligibility of the data into question. Forest felling measurement and statistics are largely model-based, where a conversion of volumes would cause an increase in the margin of error. Based on the value of production, once can surmise that since wood biomass supply amounts to 59% of total biomass, it has a significant importance in Estonia. Considering the average raw milk production share 11% and cereal production share 8.6% of the total production value, it can also be deduce that agriculture plays an important role. Thus, we conclude that the role of agriculture and forestry sectors as suppliers of biomass in Estonia is of utmost significance. Such a result confirms the

results from a previous study, where Ronzon et al. (2015) exemplified that the turnover of bioeconomy is primarily generated by forestry and its downstream industries. In Finland, Sweden, Latvia and Estonia it generates more than 40% of the countries' bioeconomy. Kargytė et al. (2018) also revealed that four Norwegian regions and two Estonian regions share a high potential for developing knowledge-based circular bioeconomy. Of course, this potential can only be utilised if R&D specialisation matches the needs of identified bioeconomy sectors and if a regional business cluster takes the lead. Sweden and Finland also display an orientation towards bio-based chemical industry.

In terms of value chains, this primarily implies that the production of food and wood materials provides added value to the usage of biological resources. In order to explore the role of primary sector in ensuring food supply, product data is analysed at the level of the PRODCOM 2018 list. Due to the aforementioned results, we focus on a larger volume of resources such as the flow of cereals (1,244 thousand tonnes), raw milk (723 thousand tonnes) and oilseeds (178 thousand tonnes) (Table 1). Therefore, in order to get a realistic estimate regarding of the position of domestic production of biological resources, international trade (imports of biological raw products) as an input for downstream industries is also taken into account.

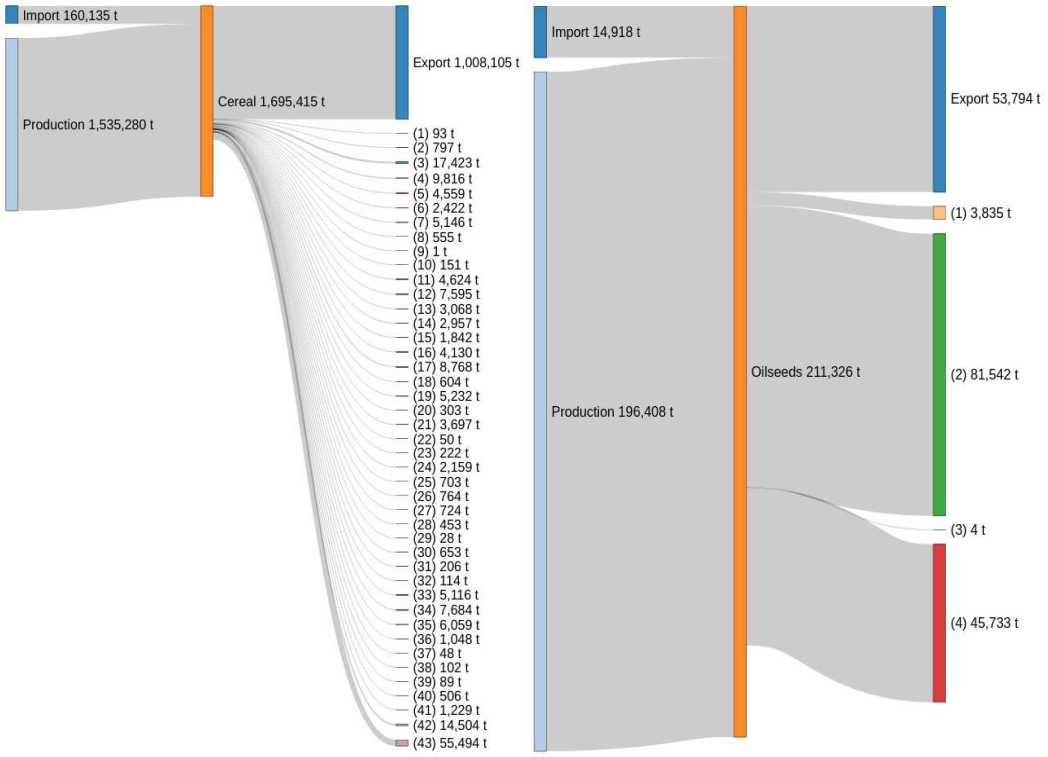

Figure 2. Cereal (on the left) and oilseeds (on the right) flows and total production in 2016. Source: Statistics Estonia, 2018 (see the meanings in Appendix A).

Compared to grain and oilseed products, the nomenclature is very different (Fig. 2; see the meanings in Appendix A) due to the characteristics of the raw material. In the case of raw materials for cereals, large quantities of cereals are imported into Estonia (160 thousand tonnes), while exports amount to more than 1 million tonnes. As the

example of grain industry highlights, the importance of raw material cannot be completely attributed to domestic production. Cereal processing is diverse, but it is still characterized by traditional cereal products like wheat flour ((43) 55 thousand tonnes), residues from the sifting of wheat ((3) 17 thousand tonnes), toast ((42) 15 thousand tonnes) and fresh white bread ((17) 9 thousand tonnes). Considering the large quantities of exported cereals, further development of grain processing could be a possible area for growth. Product development and production depend on innovation and export.

When it comes to evaluating oilseed industry, its primary products are refined rape oil and its fractions ((4) 46 thousand tonnes, excluding chemically modified), and oilcake and other solid residues resulting from the extraction of rape or colza seed fats or oils ((2) 81 thousand tonnes; Fig. (2)). Other oil fractions and chemically modified oils have a very low share, reflecting the level of development of the sector and its inclination towards traditional products.

In the comparison of milk products, drinking milk has the largest volume (Fig. 3; (11) 98 thousand tonnes), but from the perspective of dry matter content, cheese is definitely noteworthy. For instance, unripened or uncured cheese (fresh cheese, (27)) production quantity per year is 18 thousand tonnes, and the annual production of (9) grated, powdered, blue-veined and other non-processed cheese (excluding fresh cheese, whey cheese and curd) is 26 thousand tonnes.

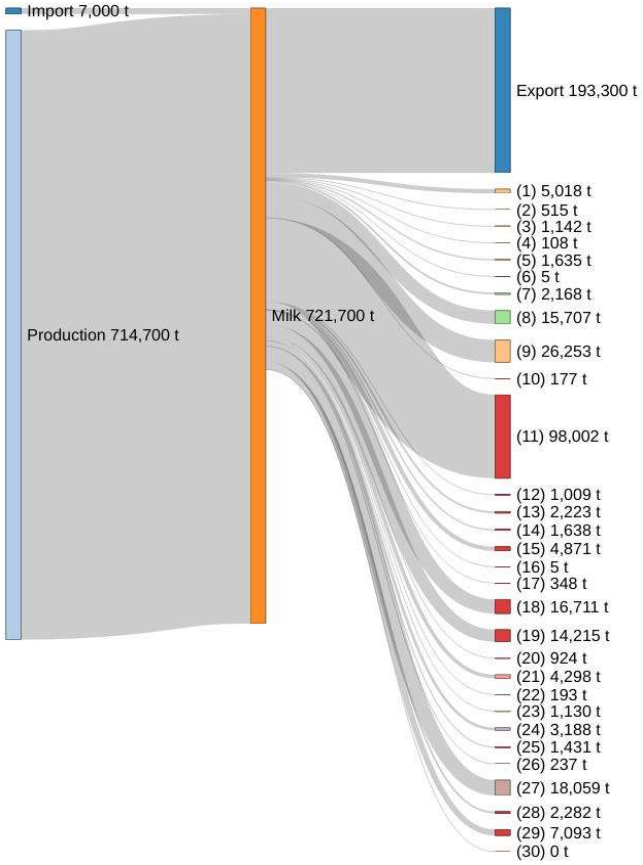

Figure 3. Milk flows and total production in 2016. Source: Statistics Estonia, 2018 (see the meanings in Appendix A).

Looking at marketing figures, it is evident that processed cereal, raw milk and oilseed products are mainly geared towards the domestic Estonian market, whereas export figures show that the primary sector is a raw material provider at the global level. The results underline that food production is still dominated by traditional products and it is possible to implement new technologies to produce biomaterials.Based on the performed analysis, it is possible to observe primary connections, but local impacts of bioeconomy can also be evaluated through participatory methods.

The above shows that successful product and process development within bioeconomy sectors is demanding and multidimensional since it has to take into

consideration societal concerns. Collecting data and information from local stakeholders enables recognising the value chains that complement the models (Paula & Birrer, 2006; Mattila et al., 2018).

Having identified possible product-based trends, the authors of the article with the opinion voiced in previous studies (Rönnlund et al., 2014; Ronzon et al., 2015) on Nordic countries. The largest innovation and growth potential of bioeconomy could lie in bio-based chemicals, biomaterials, biofuels, biorefineries, and certainly bioenergy.

Given the above, it can be stated that the proportion of primary sector and bio-based secondary sector in GVA is one of the basic values characterising the scale of biomass production. In Estonia, this indicator showed that the share of bioeconomy fluctuated between 12.7% to 13.7% (Fig. 4) in the period of 2014–2017. It is important to ensure the sustainable development of bioeconomy, given that the observed short-term period shows significant instability in the share of the selected sectors.

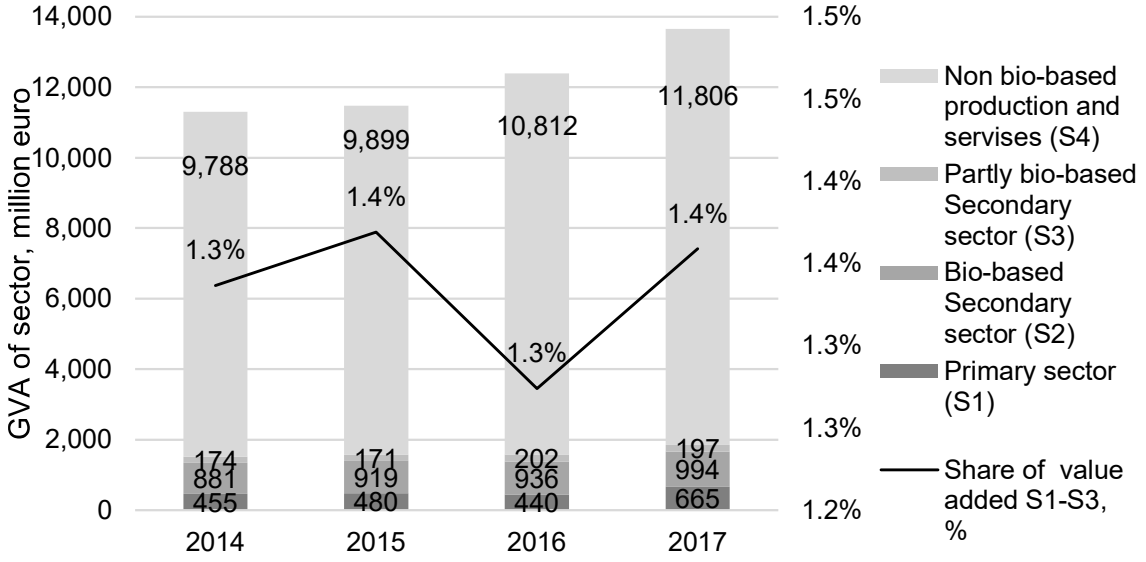

Figure 4. Development of gross value added within the selected sectors of bioeconomy in Estonia (Statistics Estonia, 2018).

It must also be stressed that despite the primary sector and food production (bio-based secondary sector) contributing only 11.8% and the primary sector separately 4.2% to the total gross value added of the entire Estonian economy, these sectors have a significant impact on the economy. At the same time, the major share of GVA of the bio-based sectors (S_1-S_3) was created in the bio-based secondary sector (S_2, 58%). The role of primary sector (S_1) is approximately 30% because one third of GVA came from all the bio-based sectors (S_1-S_3) in total.

In the period 2014–2017, gross value added increased reasonably slowly and the change has occurred in all analysed sectors. In 2014, the gross value added of bio-based and partly bio-based sectors (S_1-S_3) in total was 2,023 million euros and in 2017 the value was 2,360 million euros. This implies that the gross value added by bioeconomy is steadily improving. Non-bio-based sectors of the economy have apparently enjoyed higher growth rates than bio-economy. However, the primary aim of the study was not

to monitor the change, but to illustrate biomass production and the size of bioeconomy by analysing the interconnected sectors in Estonia which make up the value chain.

Thus, industries like retail, wholesale and catering are excluded from our study of bioeconomy. We believe that further research will necessitate establishing a more precise definition of the share of bio-resource use for the aforementioned industries.

CONCLUSIONS

The scope of this study was limited to giving a systematic overview of biomass production and the use of biomass for the production of key products, and mapping businesses related to the field of bioeconomy in Estonia. However, keeping in mind the limitations of a quantitative analysis based on national statistics, the results of the analysis illustrate major aspects regarding the role of the primary sector and its possible relations to bioeconomy. The analysis of financial indicators encompassed four components: gross production, total output, gross value added, and product.

The results of the study are decisively influenced by the selection criteria of bio-based sectors and the level of detail of the data. This poses a challenge, as it means that there are inherent discrepancies in the measurement of bioeconomy. Moreover, the definition of the concept of bioeconomy as such may differ from region to region. Therefore, it is also appropriate to use databases created at the European level. The mapping of a national development strategy and development needs must take place at a level that provides an overview of possible products and value chains. Based on the value of production, one could conclude that forestry and agriculture play an important role in Estonia. In terms of value chains, this primarily indicates that the production of food and wood materials is what mainly provides added value in the use of biological resources.

In exploring the role of primary sector in ensuring the supply of food, results indicate that cereal processing is diverse on the product level, but it is still characterized by traditional products. The same applies to the milk processing sector. Looking at marketing figures, it is evident that processed cereal, raw milk and oilseed products are mainly geared towards the domestic Estonian market, whereas export figures show that the primary sector is a raw material provider at the global level. It is certainly possible to find new technologies for the production of biomaterials in the food industry.

In the Estonia, gross value added is slowly increasing in the related sectors, yet the share of bioeconomy depends on the growth of all activities and on further development of bio-based sectors. In the period 2014–2017, the share of bio-based and partly bio-based economy was around 12.7% to 13.7% of GVA. The gross value added of bio-based sectors increased at a reasonable pace throughout the period 2014–2017.

As the article pointed out, several questions arose during the analysis, the most significant one of them being related to the future potential of biomass valorisation. In order bioeconomy to develop further in the future, it is crucial to involve different business sectors and find alternatives for adding value. It should be considered that if new opportunities for refinement in bioresource utilisation are found, steps must be taken to ensure that currently operating biomass users can continue developing their businesses. There is a possibility that those companies will develop new value chains for biomass valorisation, but food production sustainability must be guaranteed. There is always a need for greater cooperation between entrepreneurs, the private sector and

research institutions in analysing the potential of new value chains and developing business models. Bottlenecks in the enhancement of value chains and in bioeconomy are an outstanding target for additional research and international cooperation.

ACKNOWLEDGEMENTS. This study is a part of the research project 'Maximising added value and efficient use of raw materials in bioeconomy and its sectors in Estonia', financed under the 'Strengthening of sectoral R&D (RITA)' project by the Estonian Research Council (ETAg) and the European Regional Development Fund. We would also like to thank the Government of the Republic of Estonia for continuously fuelling our hopes about raising research funding to 1% of GDP.

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APPENDIX A

1. List of cereals, oilseeds and milk products based on PRODCOM 2018.

Grain products: 1 Barley meal; 2 Bran, sharps and other residues from the sifting, milling or other working of cereals (excluding maize (corn), rice, wheat); 3 Bran, sharps and other residues from the sifting, milling or other working of wheat; 4 Bread rolls (net weight less than 150 g); 5 Buns (net weight 100 g or more); 6 Cake and pastry products; other bakers' wares with added sweetening matter; 7 Cakes (in pieces, girdle-cakes); 8 Cereals in grain form, precooked or otherwise prepared (excluding maize); 9 Flour, meal, powder of edible vegetable, fruit or nuts; 10 Fresh bread containing fruit, vegetables etc.; 11 Fresh black bread (content of rye flour 50.1 – 89.9%); 12 Fresh black bread (content of rye flour more than 90%); 13 Fresh bread containing seeds or grain; 14 Fresh brown bread; 15 Fresh crusty bread; 16 Fresh fine rye bread (from pure white rye flour); 17 Fresh white bread (content of wheat meal at least 90%, weight more than 150 g (excluding toast); 18 Fresh white bread containing more than 2% of cereals, grain, fruit and vegetables, raisins etc.; 19 Fresh white bread from various meals (content of wheat meal more than 50%); 20 Groats of common wheat and spelt; 21 Meal of common wheat and spelt; 22 Meal of other cereals (excluding wheat, rye and barley); 23 Meslin flour; 24 Mixes and doughs for the preparation of bread, cakes, pastry, crispbread, biscuits, waffles, wafers, rusks, toasted bread and similar toasted products and other bakers' wares; 25 Muffins; 26 Oat flakes; 27 Other prepared foods obtained by the swelling or roasting of cereals; 28 Pastry products with added sweetening matter; 29 Pearl-barley; 30 Pies (baked, filled or covered, excluding strudels, pies baked in oil); 31 Pies baked in oil, doughnuts, chebureki etc.; 32 Pre-baked pastry goods; 33 Pure cream rye flour; 34 Pure white rye flour; 35 Rye whole grain meal; 36 Semolina; 37 Sponge cakes (excluding muffins); 38 Sponge, biscuit; 39 Strudels; 40 Swiss rolls; 41 Tarts; 42 Toast; 43 Wheat flour.

Oilseed products: 1 Crude rape, colza or mustard oil and their fractions (excluding chemically modified); 2 Oilcake and other solid residues resulting from the extraction of rape or colza seed fats or oils; 3 Other oils and their fractions, refined but not chemically modified, fixed vegetable fats and other vegetable oils (except maize oil) and their fractions; not elsewhere classified refined but not chemically modified; 4 Refined rape, colza or mustard oil and their fractions (excluding chemically modified).

Milk products: 1 Butter of a fat content by weight <= 85%; 2 Butter of a fat content by weight > 85% and other fats and oils derived from milk (excluding dairy spreads of a fat content by weight; < 80%); 3 Buttermilk; 4 Buttermilk powder; 5 Condensed or evaporated milk, sweetened; 6 Dairy spreads of a fat content by weight < 80%; 7 Flavoured liquid acidified milk (curdled milk, cream and other fermented products flavoured or containing added fruit, nuts or cocoa); 8 Flavoured liquid yoghurt; 9 Grated, powdered, blue-veined and other non-processed cheese (excluding fresh cheese, whey cheese and curd); 10 Milk and cream of a fat content by weight of <= 1%, not concentrated nor containing added sugar or other sweetening matter, in immediate packings of a net content <= 2 l; 11 Milk and cream of a fat content by weight of > 1% but <= 6%, not concentrated nor containing added sugar or other sweetening matter, in immediate packings of a net content <= 2 l; 12 Milk and cream of a fat content by weight of > 1% but <= 6%, not concentrated nor containing added sugar or other sweetening matter, in immediate packings of a net content > 2 l; 13 Milk and cream of a fat content by weight of > 21%, not concentrated nor containing added sugar or other sweetening matter, in immediate packings <= 2 l; 14 Milk and cream of a fat content by weight of > 21%, not concentrated nor containing added sugar or other sweetening matter, in immediate packings of > 2 l; 15 Milk and cream of a fat content by weight of > 6% <= 21%, not concentrated nor containing added sugar or other sweetening matter, in

immediate packings <= 2 l; 16 Milk and cream of a fat content by weight of > 6% <= 21%, not concentrated nor containing added sugar or other sweetening matter, in immediate packings > 2 l; 17 Non-flavoured curdled milk; 18 Non-flavoured kephir; 19 Non- flavoured sour-cream; 20 Non-flavoured curdled milk drinks (excluding kephir, curdled milk and yogurt); 21 Non-flavoured yogurt; 22 Other products containing milk fats and vegetable fats, milk fat content 10–80%; 23 Processed cheese (excluding grated or powdered); 24 Skimmed milk powder of a fat content by weight of <= 1.5%, in immediate packings of > 2.5 kg; 25 Solid skim milk (excluding for drinking); 26 Substitutes of whole milk powders, of a fat content by weight of > 1.5%), in immediate packings of > 2.5 kg; 27 Unripened or uncured cheese (fresh cheese) (including whey cheese and curd); 28 Whey and modified whey in liquid or paste forms; 29 Whey and modified whey in powder, granules or other solid forms; 30 Whole milk powder, of a fat content by weight of > 1.5%, in immediate packings of > 2.5 kg.