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Cooperation challenges among consumers, brand owners and bio-based industry

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Project Overview BIOBRIDGES is a 24 months action aiming at boosting the marketability of bio-based products - BBPs by establishing close cooperation and partnership between bio-based Industries - BBI, brand owners and consumers' representatives. The ultimate goal is to stimulate and support the active engagement of and interaction among all stakeholders (including local communities and local authorities) and improve market acceptance of BBPs.

BIOBRIDGES will design and implement replicable methodologies, procedures and good practices supporting multistakeholders' interaction, leading to new cross-sector partnerships. Main activities will be:

- Identify the cooperation challenges among consumers, brand owners and BBI
- Create a sustainable multi-stakeholder community involving consumer representatives, BBI and brand owners from different bio-based economy clusters and stimulate dialogue and cooperation
- Following a co-creation approach, increase consumers' and brand owners' awareness, confidence and trust on the benefits of BBPs compared to the fossil-based counterparts,
- Support the establishment of at least 2 new cross-cutting interconnections in bio-based economy clusters and define replicable procedures and good practices leading to the establishment of new cross-sector partnerships and business opportunities
- Stimulate the multi-stakeholder discussion toward pre-and co-normative research, new standardisation/labelling and emerging co-creation models (B2B and B2C).

At the end of the project, at least 2 new cross-sector interconnections in bio-based economy cluster will be established, while the foundations for the creation of new ones based on the arguments, best practices and recommendations deriving from the project will be formed.

The BIOBRIDGES consortium merges a variety of complementary expertise, aiming to build a consistent multi-actor approach integrating 9 partners already involve in other projects like BIOWAYS, BIOVoices and BIOSTEP.

Consortium	Estonia	Civitta Eesti As	Italy	FVA Sas Di Louis Ferrini & C
	Greece	Q-PLAN INTERNATIONAL ADVISORS PC	Germany	Ecologic Institut gemeinnützige GmbH
	Italy	Agenzia Per La Promozione Della Ricerca Europea	Croatia	Particula group d.o.o
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Budget 995.485 EUR **Contact** info@biobridges-project.eu

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1. Executive Summary

The establishment of cascading of resources in the bioeconomy impedes the development of cross-sectoral bio-based value chains which will be eventually integrated in value networks.

The development of new cross-sectoral bio-based value chains requires synergies and cooperation between various sectors, both along and across the value-chains, bringing all actors together, mobilizing the innovations and pulling the market by bringing new innovative products. However, the interaction among processes and stakeholders between previously unconnected sectors carries various challenges that in many cases constitute obstacles towards the development of new value chains and sustainable bio-based business models.

Moreover, each stakeholder occupies a dual position in the chain, both as a provider to each subsequent actor and as a client to each preceding one and thus the challenges posed in the interaction among them are determined by both their initial identity (i.e. industry, brand owner, retailer etc.) and their contextual role in the chain (i.e. provider or client).

In this report an analysis was made in order to provide insight into the cooperation between the key actors of the bioeconomy market landscape putting emphasis on mapping the factors that hinder the collaboration amongst them and investigate how trust and confidence between them can be enhanced towards the market uptake of bio-based products. To this end, an attempt was made to identify the challenges that exist in the interaction among industry stakeholders, brand owners and retailers and consumers from each stakeholder's point of view. The key challenges which seem to be faced by all stakeholders in their in between collaboration are presented below along with a rough categorization on the actors that need to be involved in order to successfully address them and suggestions on relevant actions to be taken:

Challenges:	Addressed through the:	Suggested actions:
Lack of standardized labelling and certifications	Involvement of policy makers	<ul style="list-style-type: none"> • Uniform standardization/labelling/certification system/reduce bureaucracy • Apply bioeconomy oriented legislation measures and regulations • Optimize infrastructure for biomass collection, storage and transportation/decentralization • Provision of financial incentives
High transferability costs		
Differences in prices per quantity per region		
IP and Patent issues		
Lack of knowledge about bioeconomy (products and practices) among potential feedstock suppliers, part of industry and businesses – differences in the level of bio-based sector development among EU Member States		

Challenges:	Addressed through the:	Suggested actions:
Functionality and performance of bio-based products	Strong collaboration among industry brand owners and retailers	<ul style="list-style-type: none"> • Networking activities, events, working groups and development of digital platforms/tools • Update communication and marketing strategies • Improve bio-based products functionality and performance by addressing existing technological barriers to meet the businesses' and end-user needs
Difficulties in networking with other key stakeholders of the value chain		
Absence of well targeted communication to consumers		

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2. Introduction

This report was prepared under Task 2.1 “Identification and analysis of the cooperation challenges among consumers, brand owners and bio-based industries” of the Biobridges project (www.biobridges-project.eu). The Biobridges project is funded by the Bio Based Industries Joint Undertaking under the European Union’s Horizon 2020 research and innovation programme (Grant Agreement No 792236). The project aims to foster cross-sector partnerships between Bio-Based Industries, Brand owners and Consumer representatives, for the improvement of the marketability of sustainable bio-based products.

The scope of this report is to provide insight into the cooperation between the key actors of the bioeconomy market landscape i.e. industry, brand-owners and consumers putting emphasis on mapping the factors that hinder the collaboration amongst them, catch on their level of awareness of the sustainability of bio-based products, as well as investigate how trust and confidence between them can be enhanced towards the market uptake of bio-based products. The results of this analysis will be validated by key members of the Advisory Board during the focus-group co-creation workshop (under T2.3).

Furthermore, the outcomes of this report will provide Biobridges partners with a knowledge base for the design of the Biobridges Platform and the development of key communication messages and material, as well as the preparation and implementation of the stakeholder engagement and co-creation activities (under WP4 and WP5).

The analysis was conducted primarily through literature review of relevant studies, market reports, results and conclusions derived from EU-funded projects. The findings of the literature review were reinforced by qualitative interviews with key stakeholders of the bioeconomy domain (industry, brand owners, consumers’ representatives) which elicited their perception and concerns about the collaboration challenges that they face and which eventually hinder the bio-based market uptake. To this end, the current document is structured, as follows:

- Chapter 5 presents the methodology followed for the analysis;
- Chapter 6 describes the bio-based value chain and the key stakeholders’ interactions in focus.
- Chapter 7 presents the main cooperation challenges within the key stakeholders of the value chain
- Chapter 8 concludes on the results and outline further actions and next steps
- Annex A: Includes the semi-structured qualitative questionnaire that was used to help structure the interviews

3. Definitions

Bio-based products: products derived wholly or partly from biomass, such as plants, trees or animals. The biomass may have undergone physical, chemical or biological treatments.

Biomass: material of biological origin excluding material embedded in geological formations and/ or fossilized. Examples: (whole or parts of) plants, trees, algae, marine organisms, micro-organisms, animals etc¹.

Bioeconomy: the set of economic activities relating to the invention, development, production and use of biological products and processes².

Value chain: integrated process scheme, from feedstock to end products and markets

4. Abbreviations

B2C: Business to consumers

B2B: Business to business

LCA: Life Cycle Assessment

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¹ CEN, 2014

² OECD, 2009

5. Methodology

In order to identify the challenges that exist in the collaboration between Industries, Brands and Consumers, as well as investigate how trust and confidence between them can be enhanced towards the market acceptance and uptake of the bio-based products, a two-stages analysis was carried out.

In a first stage, a literature review of studies, reports and results of relevant EU projects was conducted. In particular, leveraging the participation of most of project partners in BIOWAYS (BBI-JU-720762, 2016-2018)³, BIOVOICES (H2020-KBBE-774331, 2018-2020)⁴ and BIOSTEP (H2020-ISIB-652682, 2015-2018)⁵, the findings of these projects were further analysed in order to collect evidence on public perception of bio-based products, market trends of various bioeconomy sectors, market acceptance of bio-based products by industry, brands and consumers as well as insight on multi-stakeholder community engagement and interaction. Moreover, key outputs of projects such as the OpenBio (FP7-KBBE- 613677, 2013-2016)⁶, RoadtoBio (H2020-BBI- 745623, 2017-2019)⁷, Star-ProBio (H2020-BB- 727740, 2017-2020)⁸, Bio-TIC (FP7-KBBE- 312121, 2012-2015)⁹ shed further light on the acceptance of bio-based products in the business-to-business market and public procurement, the adoption of sustainable business innovation models in the bio-based products sector and the consumers' preferences and trends.

At a second stage, more than 60 semi-structured qualitative interviews were conducted with representatives from industry, brands, and consumers associations around Europe (Figure 1) aiming to collect insight on the challenges that each stakeholder faces in terms of collaboration with his providers and clients in the value chain, as well as suggestions on how to tackle the barriers and enhance their cooperation towards the market uptake of bio-based products.

The effective and meaningful implementation of the interviews that were foreseen in the framework of Biobridges called for the identification and selection of participants representing diverse stakeholders (industry, brands, consumers/end-users) from both the bio-based and non-bio-based field. The procedure to identify and invite participants to the interviews was based on purposive (as opposed to random) sampling. More specifically, the interviewees contacted were not chosen at random from a given population, but the selection was rather targeted and based on their role within the bio-based and bioeconomy sector, as well as on the objectives of the respective activity. Moreover, their selection derived from a list of stakeholders and respective contacts that was created by the project partners and integrated in the "Biobridges stakeholders' database and clustering". Following their identification and selection and prior to their participation in the interviews, the prospective interviewees underwent the informed consent procedure implemented in the framework of Biobridges and as guided in the Ethical Requirements of the project. Moreover, a semi-structured qualitative questionnaire was used to help structure the interviews and this is available in Annex: Interview semi-structured questionnaire.

³ <http://www.bioways.eu/>

⁴ <https://www.biovoices.eu/>

⁵ <http://www.bio-step.eu/>

⁶ <http://www.biobasedeconomy.eu/projects/open-bio/>

⁷ <https://www.roadtobio.eu/>

⁸ www.star-probio.eu/

⁹ <http://industrialbiotech-europe.eu/>

Last but not least, leveraging the presence and the participation of some of project partners in the Maker Faire event in Rome in October 2018¹⁰, discussions and small interviews were held with various bioeconomy stakeholders that were present at the Circular Economy panel, the key outcomes of which were also taken into consideration within the concept of the current work.

Finally, the findings and the results of the current analysis will be further discussed, validated and enriched during the focus group co-creation workshop involving members of the Biobridges Advisory Board. Overall, the insight gained will formulate the knowledge-base of the project and feed the foreseen co-creation activities aiming to motivate and engage all stakeholders towards addressing the challenges they face.



Figure 1: Countries the interviewees were based in

¹⁰ <https://2018.makerfairerome.eu/en/>

6. Bioeconomy value chains and stakeholders' interaction

Understanding cooperation challenges among bioeconomy actors means understanding their value chains.

The term value chain describes the full range of activities which are required to bring a product or service from conception to life, through the different phases of production, delivery to final consumers, and final disposal after use. A value chain begins with the extraction or production of a raw material and the logistics to transport it to the first point of processing and continues with the intermediate product until the final product is reached, marketed, sold to the customer and serviced over its lifetime (Figure 2). Moreover, value chains could be also called “value-added chains” reflecting the increase in value with each step applied¹¹.

In bioeconomy the concept of cascading use (i.e. optimizing the functional and consecutive use of biomass with respect to current conditions and future alternative applications), is of central focus¹². As such, the establishment of cascading of resources, impedes the development of cross-sectoral bio-based value chains which will be eventually integrated in value networks (Figure 3).

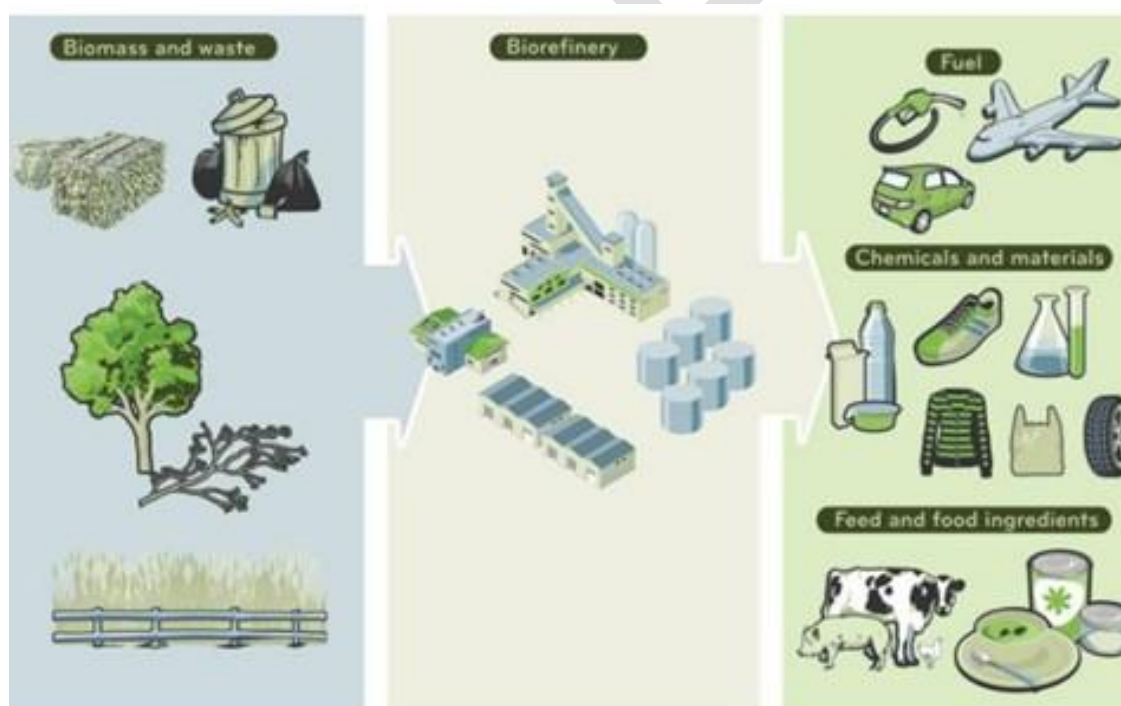


Figure 2: Bio-based value chain's concept

Source: Bio-based industries consortium -

https://www.ffg.at/sites/default/files/02_europeanpotential_neloemerencia.pdf

¹¹ Zörb C., Lewandowski I., Kindervater R., Göttert U., Patzelt D. (2018) Biobased Resources and Value Chains. In: Lewandowski I. (eds) Bioeconomy. Springer, Cham

¹² Zörb C., Lewandowski I., Kindervater R., Göttert U., Patzelt D. (2018) Biobased Resources and Value Chains. In: Lewandowski I. (eds) Bioeconomy. Springer, Cham

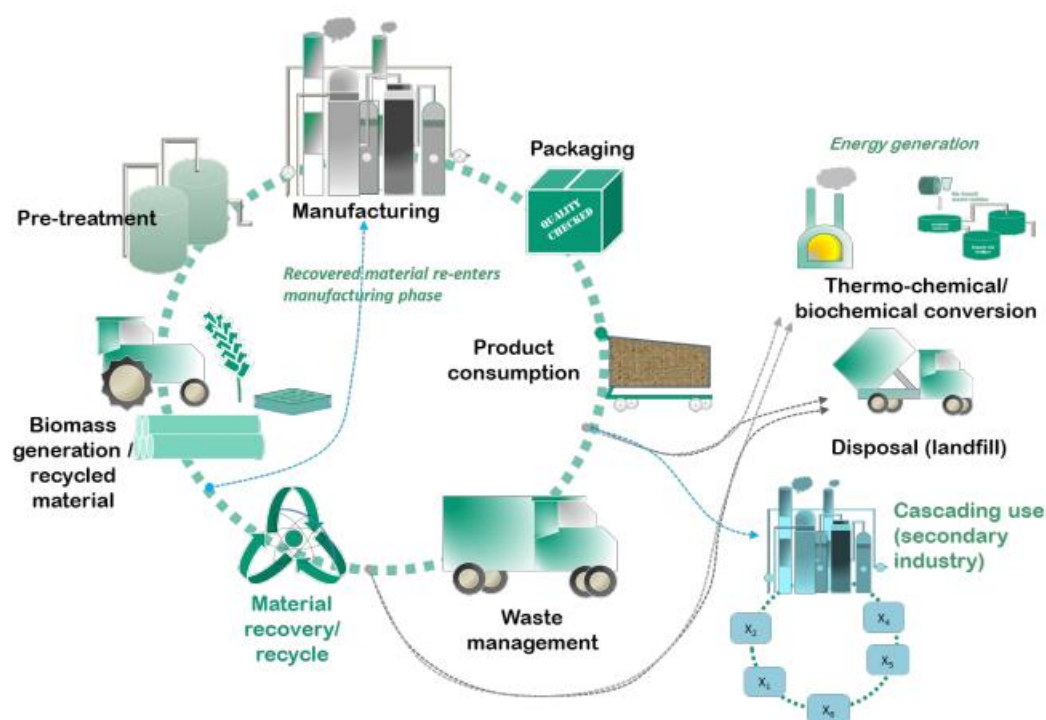


Figure 3: The bio-based value chain

Source: StarProBio - http://www.star-probio.eu/wp-content/uploads/2017/04/D1.2_Final-V1.0.pdf

A recent study undertaken by the DG Research and Innovation, European Commission¹³ revealed that from a value chain perspective, a majority of current bioeconomy strategies are dedicated to bioenergy and biofuel-based value chains, probably due to the EU's core aim to reach renewable energy consumption targets set in the Energy Strategy for 2030¹⁴. In this respect, EU bioeconomy calls for the development and establishment of new cross sectoral and innovative value chains.

The development of new cross sectoral bio-based value chains requires synergies and cooperation between various sectors, both along and across the value-chains, bringing all actors together, giving more visibility among sectors and to consumers, mobilizing the innovations and pulling the market by bringing new innovative products¹⁵.

Nevertheless, the interaction among processes and stakeholders between previously unconnected sectors carries various challenges that in many cases constitute obstacles towards the development of new value chains and bio-based business models. These challenges could be categorized in terms of feedstock, industry and market and may vary among the different stakeholders that represent suppliers, industry, brands and end users. Moreover, in the value chain each type of stakeholder could be both a provider and a client facing specific challenges per case. For instance, an industry stakeholder serves as a client

¹³ Spatial Foresight, SWECO, ÖIR, Nordregio, Berman Group, and Infyde, Bioeconomy Development in EU Regions. Mapping of EU Member States'/regions' Research and Innovation Plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014-2020, Information, DG Research & Innovation, European Commission, Brussels, 2017

¹⁴ http://www.star-probio.eu/wp-content/uploads/2017/04/D1.2_Final-V1.0.pdf

¹⁵ https://ec.europa.eu/research/bioeconomy/pdf/european_bioeconomy_stakeholders_manifesto.pdf

for the biomass suppliers and as a provider for the brands and the retailers. Likewise, brands and retailers participate in the value chain as clients of the industry, but they serve as providers for the consumers.

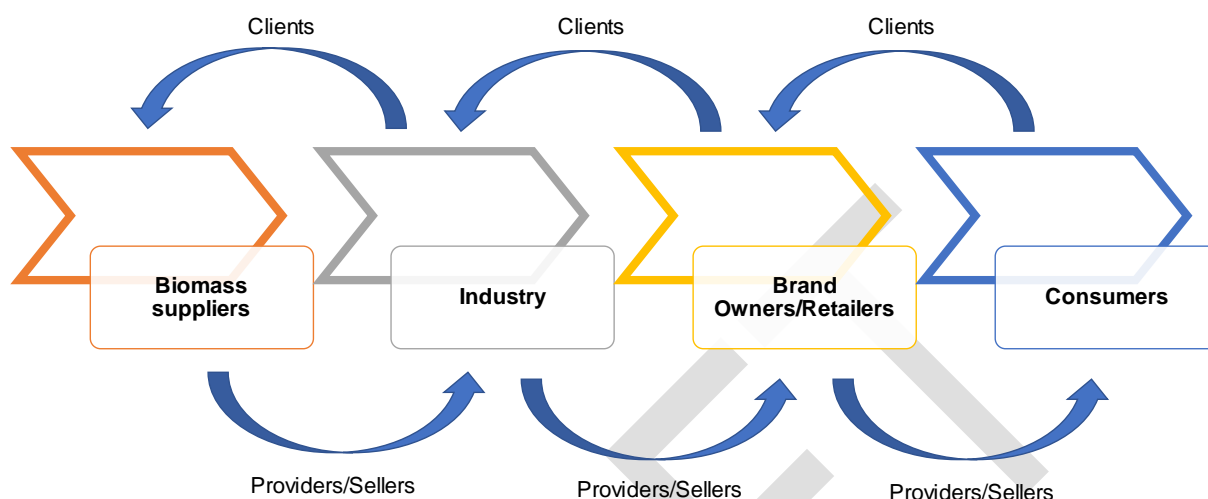


Figure 4: Interactions among the stakeholders in the value chain

All these complex interactions among the stakeholders in the value chain in conjunction with various industry and market related barriers further affect the adoption of bio-based products and practices as well as transfer any existing problem from one part of the chain to the other. Since each stakeholder occupies a dual position in the chain, both as a provider to each subsequent actor and as a client to each preceding one (Figure 4), the challenges posed are determined by both their initial identity (i.e. industry, brand owner, retailer etc.) and their contextual role in the chain (i.e. provider or client). Moreover, barriers in the collaboration between industry and feedstock suppliers at the beginning of the value chain such as the lack of uniform, standardized labelling, and certification of biomass feedstock may remain unresolved until the release of the final product to market, inevitably complicating the interaction between more stakeholders in the chain.

In the next sections, an attempt is made to identify the challenges that exist in the interaction between industry and brands and prevent the uptake of bio-based products and processes, as well as how consumers, as end-users, respond and could drive or not the development of this sector.

7. Challenges among the collaboration of stakeholders in the bio-based value chain

7.1. Industry

“Bio-based industries represent a key segment of the bioeconomy and they are usually defined as industries which use renewable biological resources (i.e. biomass) to produce bio-based products and bio-fuels. Production usually takes place in bio-refineries and often relies on bio-based processes”.¹⁶

The following sub-sections present in brief the level of acceptance (barriers and trends) of bio-based products and processes in the industry sector, as well as the subsequent challenges that exist in the interaction between industry stakeholders, their suppliers, brand owners and retailers from the industry’s point of view.

7.1.1. Level of acceptance of bio-based materials and processes in the industry sector

The overall bio-based industry trend is to focus on delivering products with similar or even better performance and technical characteristics than the conventional, fossil- fuel derived products, to counterbalance their higher cost. In terms of biomass feedstock, there is a huge potential in waste deriving from the agri-food value chain that could be valorised for bio-based production and inorganic waste in general. In the field of bio-based chemicals, the main market drivers are moving towards less petroleum dependency and feedstock diversification (multiple feedstock inputs) and aim to increase the environmental responsibility of the consumer, promote the idea of sustainability to manufacturers and offer innovative products. Regarding the bioplastics sector, several trends are identified, like the enhancement of compostable plastic material applications in the packaging sector and the development of completely new materials. The basic future trend in the field of bioenergy, is towards the production of energy along with the production of other streams/ products of high- value in the biorefinery context. Also, the increase of short rotation coppice, the increase of imports of pellets to the EU, the future importance of saw mills as a provider of by-products both for the bioenergy and material sector, CHP and electricity production through gasification and pyrolysis and the production of second-generation bioethanol are all future trends in the sector. In bio-based food and feed ingredients, it seems there is significant potential for animal feed production, using agro-based waste or the by-products from biorefineries and in applications in the nutraceutical food sector.

On the other hand, both BIOWAYS¹⁷ and BIO-TIC¹⁸ projects identified various industry related barriers that affect the adoption of bio-based products and practices, such as:

- Low technology readiness level and commercialization status for many bio-based products;
- High costs of feedstock and seasonability of biomass cropping versus need of continuous

¹⁶ http://www.eib.org/attachments/pj/access_to_finance_study_on_bioeconomy_en.pdf

¹⁷ <http://www.bioways.eu/download.php?f=150&l=en&key=441a4e6a27f83a8e828b802c37adc6e1>

¹⁸ <http://www.industrialbiotech-europe.eu/wp-content/uploads/2015/10/Summary-of-Hurdles-and-Solutions-BIO-TIC.pdf>

feedstock supply;

- Inefficient transport and distribution of biomass;
- Lack of cooperation between the stakeholders in the relevant value chains;
- Hurdles in establishing partnerships between academia and industry;
- Limited financial support for new production facilities;
- Lack of a trained workforce.

7.1.2. Challenges in the collaboration between industry and biomass suppliers from the industry's stakeholders point of view

The aforementioned industry-related hurdles have a direct impact and cause difficulties in the collaboration between industry and suppliers. In this respect, the identified challenges in their in between collaboration from the industry's point of view are the following:

- Differences in the level of bio-based sector development among EU countries / Low feedstock availability / High Transferability costs / Differences in prices per quantity per region

The high costs of biomass feedstock produced in EU along with the inadequate availability of biomass feedstock at the required quality, quantity and price throughout the year and the seasonality in biomass feedstock production are the main challenges that industry faces towards its sustainable collaboration with the suppliers. Furthermore, the differences in the level of bio-based sector development among EU countries leads to loss of feedstock and less market opportunities for industries and brands.

Moreover, for most of the feedstock, the costs of transport can be high over long distances and in some cases may require localised processing facilities for cost-effective production.

In addition, due to the variations in the taxation and labour and production cost of biomass among the EU, industry stakeholders deal with differences in prices per quantity and region.

This situation encounters many difficulties for industries in terms of organization of the production, as well as in deciding to invest (or not) resources and time in the production of a specific bio-based product, especially when they need to import biomass from different regions or countries.

- Lack of knowledge about bioeconomy practices and skilled work-force

The collaboration between industry and biomass providers is hindered also by the lack of knowledge of bioeconomy practices by the latter along with the lack of well-trained workforce. This reduces choices for the industry stakeholders and is further associated with the barrier of low quality and quantity of the available biomass.

- Difficulties in networking with relevant suppliers

Industry stakeholders find difficulties in networking with biomass suppliers around EU and seek for tools or activities that would give them access to a wide range of suppliers and feedstock alternatives.

- Lack of standardized labelling and certifications / bureaucracy

Last but not least, the lack of norms, standards and labelling, is identified as a key challenge to be addressed, because it is perceived by industry stakeholders as an important constraint to development, market diffusion or waste management of bio-based products. Moreover, it seems that some feedstock types are completely unregulated compared to others and when producers take actions towards its certification, this requires a lot of time and money and consequently delays to industries' initial business planning.

7.1.3. Challenges in the collaboration between industry and brands from the industry's stakeholder point of view

In the bio-based value chain, the industries are also in close interaction with brands for which develop and produce bio-based products or retailers to which promote their products in case the industry is B2C. The major identified challenges in their collaboration from the industries' point of view are the following:

- Lack of knowledge and trust vs high prices

Over the last two years significant steps have been made towards raising market awareness regarding bioeconomy and bio-based products. However, it seems that industry stakeholders confront difficulties in persuading brands and businesses towards the adoption of bio-based products. They feel that there is still lack of knowledge and trust from the firms especially regarding the quality of the bio-based alternatives they propose in conjunction also to their high cost. For instance, they experience difficulties when it comes to demonstrate a bio-based material and compete a fossil-based one in terms of quality, quantity and cost.

- Low market demand

The market demand is one of the main factors that can mobilize or halt the bio-based sector development. As such, when there is lack of demand in the market, it seems that brands and retailers hesitate to invest in bio-based products and therefore collaborate with bio-based industries.

- Lack of support to small industries

Many of the innovations occurred in the field of bio-based products come from small industries or even start-ups. However, small industries feel that brand owners and retailers often neglect them because of their size and lack of reputation.

- IP and patent

The collaboration between industries and brands in the bioeconomy sector is also hindered by

the absence of harmonized “intellectual Property” (IP) regulations and the high patent costs.

7.2. Brand Owners

A “brand owner” is considered an organization or company that is the registrant of a trademark and “retailers” are considered businesses that sell products to other businesses or to the public for use or consumption.

The following sub-sections present in brief the level of acceptance of bio-based products in the business sector, as well as the subsequent challenges that exist in the interaction among brand owners/retailers, industry and consumers from the brand owners and retailers’ point of view.

7.2.1. Level of acceptance of bio-based products by the business sector (brand owners and retailers)

Studies that investigated the acceptance of bio-based products in the past have shown that multiple drivers may lead to the adoption of bio-based products or practices by businesses. Central drivers are frequently environmental regulation and external pressures from the stakeholders-clients who demand environmentally friendly practices and products. In the absence of demand and immediate pressure from the client side or other regulatory incentives, businesses may decide to invest in this market sector drawn on the competitive advantage that may gain¹⁹. Moreover, it seems that the adoption of circular economy products and practices may be driven by strategic motives, such as cost- and performance related benefits which for the case of bio-based products may include the aim of supply chains diversification or to safeguard against oil price increases²⁰.

On the other hand, the barriers that may prevent the acceptance and promotion of bio-based alternatives are manifold and are related to the²¹:

- Low price of crude oil and natural gas that make the use of biomass feedstock and bio-based production processes economically unattractive;
- High cost of bio-based products compared to their fossil-fuel derived equivalents;
- Lower performance of many bio-based products compared to their fossil-fuel derived equivalents;
- No dedicated and detailed EU legislation framework, conflicts between sustainability goals and market needs, lack of uniform standardization and certified labelling for bio-based products;

¹⁹ Peuckert, Jan & Quitzow, Rainer. (2016). Acceptance of bio-based products in the business-to-business market and public procurement: Expert survey results. Biofuels, Bioproducts and Biorefining. 10.1002/bbb.1725.

²⁰ Peuckert, Jan & Quitzow, Rainer. (2016). Acceptance of bio-based products in the business-to-business market and public procurement: Expert survey results. Biofuels, Bioproducts and Biorefining. 10.1002/bbb.1725.

²¹ <http://www.bioways.eu/download.php?f=150&l=en&key=441a4e6a27f83a8e828b802c37adc6e1>

- Gaps in the policy and subsidy framework;
- Intellectual property related barriers;
- Low public awareness of the benefits of using bio-based products;
- Lack of reliable and sufficient information about bio-based products.

Furthermore, investment barriers and financial hurdles to the wider adoption of bio-based products are deriving from the limited availability of public R&D funding, the limited public support for scale-up activities, which makes also difficult the demonstration activities for up-scaling of products and processes, as well as the limited financial support for new production facilities. There are gaps at policy and subsidy level²².

Despite the aforementioned barriers, the results of recent studies reveal an increasing interest of business to invest in bio-based market or gradually redirect their business models and strategies to bio-based sector²³.

As a matter of fact, a recent extensive survey regarding the brand perspectives on bio materials²⁴ (71% of the participating brands were based in Europe) showed that there is a widespread uptake of bio-based materials while stakeholder pressure to increase the sustainability of supply chains has significantly increased in recent years. In addition, more and more companies are willing to investigate bio-based materials for their supply chain. In fact, it seemed that half of the brands surveyed have set targets for sourcing bio-based materials. Respondents from the household goods, personal care, as well as leisure equipment & toys sectors were most likely to have set bio-based targets.

7.2.2. Challenges in the collaboration between brands and industry from the brand owners' point of view

- Labelling and certification

The absence of labelling and certification appears to be the most common challenge that businesses face towards enhancing the collaboration with the industry and their suppliers.

There is no standardized recognized label or quality standard for them, uniformly accepted on EU or global level. In fact, there is a high risk of bio-based products falsification, which makes necessary the existence of certified labelling, that guarantees quality control performed as well as clear information about the origin and identifiable value chain of bio-based products. The introduction of a European label for bio-based products is considered to be a vehicle for enhancing their market acceptance. Such a label should, however, not only communicate bio-based content, but also address additional environmental issues and questions related to the sustainability of their feedstock²⁵.

²² <http://www.bioways.eu/download.php?f=150&l=en&key=441a4e6a27f83a8e828b802c37adc6e1>

²³ <https://www.biovoices.eu/download.php?f=34&l=en&key=6b75b921fe9a263e48ce727aad68bdba>

²⁴ <https://sustainabilityconsult.com/downloads-blanks/our-work/105-brand-perspectives-on-biomaterials-full-report-2017/file>

²⁵ Peuckert, Jan & Quitzow, Rainer. (2016). Acceptance of bio-based products in the business-to-business market and public procurement: Expert survey results. Biofuels, Bioproducts and Biorefining.

Brands need certification and labels from the industry in order to communicate about certain advantages of bio-based contents in their product. Brands are looking for more and certified information on certain aspects of bio-based alternatives. Feedstock suppliers need to communicate openly on the type of biomass used and its end-uses while industry should use Life Cycle Assessment (LCA) and third-party certification to promote responsible sourcing²⁶.

- Functionality and performance vs cost

The overall bio-based industry trend is to focus on delivering products with similar or even better performance and technical characteristics than the conventional, fossil- fuel derived products, to counterbalance their higher cost.

However, brands feel that more research on bio-materials is needed. Functionality of bio-based products is not sufficient for those producing end-products. The costs are still very high or technically not suitable. They have similar or inferior functionality to the currently used counterparts and in many cases, companies need to invest in terms of time and equipment in order to be able to use the provided bio-materials. As an example, bio-packaging materials must be usable in high-speed machinery. A company needs more than 2 years to test the machines and to make them pass recyclability tests. It is a complex process that requires continuous communication with industry.

Moreover, while cost is slowing the adoption of biomaterials, forward-thinking brands are investing to bring innovative products to the market. If biomaterial producers engage with the entire supply chain to identify performance benefits, this could offset concerns around higher costs and single suppliers²⁷.

- Connection with industry

Creating and maintaining new and novel networks and connections is an important part of the successful development of new more sustainable products and processes. In this respect, brands feel that there is a gap in the collaboration with industry. It seems that they need to have access to tools that allow them to connect with industry in order to communicate them the market and user needs towards the development of bio-based products that will totally address their needs and meet the desirable technical characteristics.

7.2.3. Challenges in the interaction between brand owners and consumers from the brand owners' point of view

- Communication of the product

Business stakeholders see the establishment of well-targeted communication of their bio-based products as of high significance since it's the main driver for increasing users demand. It seems there is a need to focus on demonstrating consumer benefits while communicating

10.1002/bbb.1725.

²⁶<https://sustainabilityconsult.com/downloads-blanks/our-work/105-brand-perspectives-on-biomaterials-full-report-2017/file>

²⁷<https://sustainabilityconsult.com/downloads-blanks/our-work/105-brand-perspectives-on-biomaterials-full-report-2017/file>

openly on brands' use of bio-based materials implying confidence in bio-based technology and products.

- Labelling and high cost

The absence of labelling and the lack of awareness of the production process make consumers wondering about the high price compared to fossil-based products.

7.3. Consumers

7.3.1. Level of acceptance of bio-based products by the consumers

During the last five years, an extended research has been carried out within various EU projects regarding the public opinion and acceptance of bio-based products. The results are very interesting since the level of public acceptance of bio-based products is a crucial driver of the market and the establishment and sustainability of the value chains.

In 2014, Open-Bio project²⁸ highlighted that consumers often seem to lack a full understanding of the term “bio-based”, as they do not know the term and they do not understand the concept. The unfamiliarity leads to mixed positive and negative associations. Consumers frequently associate in general the term “bio-based” with environmental friendliness but on the other hand some negative implications were noted, such as regarding the origin and disposal aspects of bio-based products. A more suitable term might be “based on renewable sources” or “based on plants”, which may be more easily understood and may be less susceptible to suspicions such as “green washing”. It was also concluded that although consumers might not know much about the term bio-based, they still do want a lot of detailed, technical information at product level. They assess labels as being helpful when purchasing a product. Therefore, the label should be simple and understandable, and it should be clear what a bio-based label adds to already existing labels.

A few years later, BIOWAYS project EU-wide online survey²⁹ (2018) revealed that there is still uncertainty and confusion among consumers regarding bio-based products. Interestingly, it appeared that even though some people still incorrectly associate the term “bio-based” with “organic”, consumers can easily recognize bio-based products that are used in everyday life, such as paper products, packaging, cleaning materials and cosmetics, for example. Meanwhile, however, the public seems to be unfamiliar with the bio-based applications used by industry and business and has a lack of understanding about the production processes involved in developing them.

Although respondents appeared to be well informed about the benefits of bio-based products, many expressed that they lack access to information about their performance, origin and production process. In general, it was observed that the public have a positive attitude towards and interest in bio-based products. Consumers find them trustworthy in terms of their content, they recognize the potentially positive environmental impact they have and are willing to pay

²⁸ Open-Bio, 2014 “D9.2. Acceptance factors for bio-based products and related information systems”, <http://www.biobasedeconomy.eu/media/downloads/2015/10/Deliverable9.2-20150925DEFINITIEF.pdf>

²⁹ <http://www.bioways.eu/download.php?f=307&l=en&key=f1d76fb7f2ae06b3ee3d4372a896d977>

more for a bio-based product of the same functionality and properties to a fossil-fuel derived one. Nevertheless, the survey does indicate that limited market availability and high prices are important factors that inhibit the wider use of bio-based products.

Likewise, interviews with civil society/users carried out within BIOVOICES project³⁰ (2018) revealed that for them in order to support bio-based products it is important to have more information available at schools and educational-driven events, as well as to raise proximity with these kind of products, as they become part of everyday life. Labelling, both concerning the information displayed and how to read them is considered one of the critical issues. Civil society/users in this case consider that it is through their individual choices that they can enforce their specific points of view.

7.3.2. Challenges in the interaction between consumers and brand owners/retailers from the consumers' point of view

It seems that consumers are becoming more aware about the bio-based applications that already exist in their daily lives (packaging, cosmetics, textiles, paper products, cleaning materials etc.) however, they raise concerns about the lack of availability of bio-based products, their insufficient labelling and cost.

All these results were reinforced during the interviews with representatives of consumer associations within the scope of the current document. In fact, it seems that consumers would prefer unified labelling for EU bio-based products in order to easily recognize and trust them. Moreover, based on the aspect that when it comes to purchase a product the consumer will usually look first the quality/price and then the sustainability impact that it may have, it seems that consumers need to be convinced that bio-based product can replace the fossil-based products in terms of functionality i.e. to be presented in the public as an alternative product that has the same performance but at the same time more beneficial to the environment.

As far as the direct interaction of consumers with other stakeholders in the value chain is concerned, RoadToBio highlighted that challenges exist in the interaction of consumers with retailers and brands. It seems that in order to tackle the lack of trust towards bio-based products, brands and retailers should focus on the personal benefits that bio-based products bring, communicated through a label giving information about the attributes that are of personal benefit for the consumer, about altruistic motives like environmental protection or resource conservation, and about the origin of the raw materials³¹.

Last but not least, although the increase of the production and availability of bio-based products depends on the market demand and consumers' choices, well-targeted promotion from the side of brands and retailers is a significant challenge. It seems that consumers feel that if it weren't for their own mentality to seek for bio-based alternatives, the market wouldn't push them towards this direction.

³⁰ <https://www.biovoices.eu/download.php?f=34&l=en&key=6b75b921fe9a263e48ce727aad68bdba>

³¹ www.roadtobio.eu/uploads/publications/deliverables/RoadToBio_D22_Public_perception_of_bio-based_products.pdf

8. Overview of the identified challenges and suggestions on enhancing collaboration

The following table presents the overview of the collaboration challenges identified among industry stakeholders, brand owners and consumers along with some suggestions on how the collaboration could be enhanced as they were identified during the interviews with the relevant stakeholders.

Table 1: Overview of the identified challenges and indicative recommendations

Stakeholder		Indicative Recommendations
Industry		
Challenges in collaboration with biomass suppliers	Low feedstock availability	<ul style="list-style-type: none"> Optimize infrastructure for biomass collection, storage and transportation/decentralization Training/Information activities/raise awareness of agricultural sector on bioeconomy practices Financial incentives Update regulations/Uniform standardization/labelling/certification system/reduce bureaucracy
	High Transferability costs	
	Differences in prices per quantity per region	
	Differences in the level of bio-based sector development in EU	
	Lack of knowledge about bioeconomy practices	
	Lack of skilled work-force	
	Difficulties in networking with relevant suppliers	
	Lack of standardized labelling and certifications	
Challenges in collaboration with brands	Lack of knowledge and trust	<ul style="list-style-type: none"> Networking activities, events, working groups and development of digital platforms/tools Co-creation activities and stakeholders engagement to build new value chains Introduce financial incentives for the use of bio-based products and practices Apply bioeconomy oriented legislation measures and regulations Promotion of Green public procurement
	High prices	
	Low market demand	
	Lack of support to small industries	
	IP and patent issues	

Stakeholder		Indicative Recommendations
Brand owners		
Challenges in collaboration with industry	Lack of standardized labelling and certifications	<ul style="list-style-type: none">• Improve bio-based products functionality and performance• Address existing technological barriers to meet the businesses' and end-user needs• Open database of bio-based solutions and products which can replace fossil-based ones• Collaboration with industry to develop innovative products• Uniform standardization/labelling/certifications
	Functionality and performance of bio-based products	
	Life Cycle Assessment	
	Connection with industry stakeholders	
Challenges in interaction with consumers	Enhance acceptance of bio-based products and communication of their benefits for the consumers	<ul style="list-style-type: none">• Update communication and marketing strategies• Develop a labelling/certification system
	Lack of standardized labelling and certifications	
	Low demand	
	High cost	
Consumers		
Challenges in interaction with brands	Lack of standardized labelling and certifications	<ul style="list-style-type: none">• Develop a labelling/certification system• Provision of financial incentives or apply environmental regulations• Reinforce communication and promotion from the businesses' side
	Level of acceptance of bio-based products in terms of safety and performance	
	Absence of well-targeted promotion of bio-based products	

Due to the range and complexity of the nature of the aforementioned challenges a classification into distinct categories is considered vital in order to successfully address them. Therefore, it would be suggestable to divide the identified challenges into two types:

- the ones which can be addressed through the involvement of the public sector or relevant policy makers (i.e. government, public and regional authorities etc.);
- and those which can be securely approached through the collaboration and initiative of

the various stakeholders involved in the value chain.

Hence, a rough categorization of the challenges could be as follows:

Table 2: Classification of the challenges based on the approach to address them

Challenges:	Addressed through the:
Lack of standardized labelling and certifications	Involvement of policy makers
High transferability costs	
Differences in prices per quantity per region	
IP and Patent issues	
Lack of knowledge about bioeconomy (products and practices) among potential feedstock suppliers, part of industry and businesses – differences in the level of bio-based sector development among EU Member States	
Functionality, performance and LCA of bio-based products	Strong collaboration among industry brand owners and retailers
Difficulties in networking with other key stakeholders of the value chain	
Absence of well targeted communication to consumers	

However, it is worth considering that those challenges requiring high level support to be addressed could be additionally approached by creating strong networks or communities of the interested parties aiming to cluster and having their interests represented in policy makers' decisions.

Moreover, the interviews and discussions with stakeholders from industry and business (brand owners and retailers) sectors have allowed us to draw some assumptions as far as their preferences in terms of collaboration are concerned. In particular, it seems that the majority of the industry stakeholders in question showed a prominent preference in further collaboration and networking with brand owners and policy makers. Furthermore, the discussions led to the elicitation of information on the preferences of the representatives of brand owners and retailers who would rather cooperate mostly with industry, research and end-users in order to elaborate on the development of innovative products that will meet consumers' needs.

All the information collected and the insight gained regarding the collaboration challenges between the key stakeholders of the bio-based value chain along with the review of multi-stakeholder and cross-sector interconnections in the bio-based economy clusters at national and regional level (elaborated within D2.2 "Framework and good practices for multi-stakeholder and cross-sector interconnections") will be further discussed and validated in the focus group co-creation workshop by Biobridges Advisory Board members. In this respect, preliminarily identified topics that are relevant to all stakeholders and could form the content base of the foreseen project activities are:

- Labelling/certifications, IP and patent issues
- Functionality, performance and LCA of bio-based products

- Networking and close cooperation with all the stakeholders in the value chain for the development of new value chains and innovative bio-based products
- Raise awareness and provide incentives not only to consumers but also to the industry and business sector

The final outcomes of the focus group will feed the content of the Biobridges co-creation events and activities that will engage and bring together representatives from the key stakeholders' group aiming to establish strategies and novel collaborations.

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Annex

Interview semi-structured questionnaire

A. GENERAL INFO

Bioeconomy sector:	
A.1 Description of organization/company/initiative/association	
<i>Name</i>	
<i>Country</i>	
<i>Webpage</i>	
<i>Description (2-3 lines)</i>	
A.2 Interviewee	
<i>Name</i>	
<i>Position</i>	
<i>Contact info (tel, e-mail)</i>	
Other participants	

B. DISCUSSION

(Industry)

B.1 Interviewee's full profile

At the beginning of the discussion it is important to collect info regarding what the interviewee's activity is, what exactly he produces and what is the use of the produced product/material i.e.:

- ✓ Market sector of activity.
- ✓ Type of bio-based product/material (B2B or B2C).
- ✓ Type of clients.
- ✓ Final product or intermediate?

B.2 Collaboration with customers (i.e. brand owners, retailers, other industry etc.). Opportunities and barriers.

In this section we need to identify the challenges that this stakeholder faces towards the cooperation with the other stakeholders in the bio-based value chain. Some of the questions were asked during the Maker Faire event.

Note: In the literature some of the challenges mentioned and identified so far are the cost of production, volatility of feedstock prices, lack of demand, labelling, regulation, high switching costs.

- ✓ What would you consider to be the opportunities in the collaboration with your providers or clients?
- ✓ What would you consider to be the barriers in the collaboration with your providers or clients?
- ✓ Do you address potential clients that already have a sustainability strategy on bioeconomy?
- ✓ What is the best way to approach a new potential client? What methods do you use when reaching out to new clients? Are you using intermediaries like agents/brokers/associations? If yes, is it working? If no, why? Are you using any incentives? If yes, which? If no, why?
- ✓ Can you give some examples of successful approaches? What are the typical problems that you face?
- ✓ From your experience, how potential buyers of your products respond to this market area? Are they familiar with this category of products? If no, what do you think could help raise their awareness about? Are you working with brand owners? If yes, how is it going? Are they willing to listen? If no, why?
- ✓ In your opinion how the cooperation with your biomass providers or clients can be enhanced? What actions should be taken?
- ✓ From your side with whom (which kind of stakeholder) and in which terms you wish to improve your collaboration and eventually improve the market uptake of your product?

B.3 Supporting framework

- ✓ What would you consider to be the gaps and the barriers in the existing legislation?
- ✓ Are there any national/regional/cross-border supporting political initiatives that you are aware of or that you already benefit from?
- ✓ Would you suggest any recommendations for improvement?

B.4 BIOBRIDGES support activities

In this section we need to present BIOBRIDGES actions and events, investigate what kind of activities they need or they feel could be benefit from and trigger them to participate.

- ✓ What kind of activities do you think would be beneficial for you towards enhancing the cooperation with the other stakeholders of the bio-based value chain and the establishment of more partnerships?
- ✓ Through BIOBRIDGES' European, National and Regional events, we will bring together actors coming from cross-cutting sectors of the bio-economy, with the aim of creating the momentum for the establishment of primary partnerships and exchange of good practices. Would you be interested in being engaged in BIOBRIDGES activities and seize the chance to have a voice, interact with more stakeholders and co-create potential sustainable solutions that will enhance the cooperation between you?

(Brand-owners)

B.1 Interviewee's full profile

At the beginning of the discussion it is important to collect info regarding what the interviewee's activity is and what exactly he brands/sells (only bio-based products? some bio-based products and he has a sustainability strategy? no bio-based products at all? and why).

- ✓ Market sector of activity.
- ✓ Do you sell any bio-based product? Which one? If not, why? Have you ever considered in branding/selling bio-based products and why?
- ✓ It's a final product or intermediate?
- ✓ Is there demand for this product or for other bio-based products? If not, why?

B.2 Collaboration with providers and clients. Challenges and barriers.

In this section we need to identify the challenges that this stakeholder faces towards the cooperation with the other stakeholders in the bio-based value chain.

Note: In the literature some of the challenges mentioned and identified so far are the lack of demand, labelling, regulation, high switching costs.

- ✓ What would you consider to be the opportunities and the barriers in the collaboration with your providers?
- ✓ What would you consider to be the opportunities and the barriers in the collaboration with your clients?
- ✓ What are typical problems when you attract new clients?
- ✓ What methods are you using when reaching out to new clients? Are you using intermediaries like agents/brokers/associations? If yes, is it working? If no, why? Are you using any incentives? If yes, which? If no, why?
- ✓ From your experience, how potential buyers of your products respond to this market area? Are they familiar with this category of products? If no, what you think could help raise their awareness about?
- ✓ In your opinion how the cooperation with your providers or clients can be enhanced? What actions should be taken?
- ✓ From your side with whom (which kind of stakeholder) and in which terms you wish to improve your collaboration and eventually improve the market uptake of the bio-based products?
- ✓ Do you have a sustainability/green/circular supply or selling strategy?

B.3 Supporting framework

- ✓ What would you consider to be the gaps and the barriers in the existing legislation?
- ✓ Are there any national/regional/cross-border supporting political initiatives that you are aware of or that you already benefit from?
- ✓ Would you suggest any recommendations for improvement?

B.4 BIOBRIDGES support activities

In this section we need to present BIOBRIDGES actions and events, investigate what kind of activities they need or they feel could be benefit from and trigger them to participate.

- ✓ What kind of activities do you think would be beneficial for you towards enhancing the cooperation with the other stakeholders of the bio-based value chain and the establishment of more partnerships?
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(Consumers associations)

B.1 Discussion about consumers awareness

- ✓ Do the consumers use bio-based products?
- ✓ Do the consumers prefer Brands that are using BBPs? Why?
- ✓ Do brand owners/SMEs etc. involve you/consult you in order to better identify consumer needs and in the development process of well-targeted bio-based products/services?

B.2 Discussion about the relevant market situation

- ✓ Can the consumers easily find (and identify) BBPs in your country? Are there in your country retailers (supermarkets) already selling BBPs? If yes, which ones?
- ✓ Can consumers easily recognize a bio-based product from its label? Do you think labelling of BBPs needs to be more transparent/ user friendly?
- ✓ Do the brand owners promote bio-based products in the same way as they promote the fossil-derived ones?
- ✓ Why consumers are NOT buying BBPs?
- ✓ Do the brand-owners give consumers any incentives in order to buy bio-based products?

B.3 What will trigger consumers to seek/demand/choose bio-based products?

B.4 BIOBRIDGES activities

- √ How the consumers can influence the Brands in increasing the use of BBPs? What is the role of consumer's associations?
- √ What kind of activities do you think would be beneficial for consumers towards raising their awareness on bioeconomy and bio-based products?

Through BIOBRIDGES' European, National and Regional events, we will bring together actors coming from cross-cutting sectors of the bio-economy, with the aim of creating the momentum for the establishment of primary partnerships and exchange of good practices. Would you be interested in being engaged in BIOBRIDGES activities and seize the chance to have a voice, interact with more stakeholders and co-create potential sustainable solutions that will enhance the cooperation between you?

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