Open-BIO

Opening bio-based markets via standards, labelling and procurement

Work Package 9: Social Acceptance

Deliverable N° 9.2 / Annex II

Acceptance of Bio-Based Products in the Business-to-Business Market

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prepared by:

Jan Peuckert, Rainer Quitzow

Technische Universität Berlin

Project website: www.open-bio.eu

2. Survey results

The core question of the first survey asked the respondents to assess the importance of both drivers and barriers for the future development of the B2B market for bio-based products. Based on the average of all responses, market drivers and market barriers have been ranked according to their importance.

The resulting rankings were subject to validation in the second survey round. In the principal parts of the survey, participants were asked whether, considering their personal experiences, they agreed or disagreed with the main findings from the first survey round regarding the importance of drivers and barriers for the future development of the B2B market for bio-based products. In case of disagreement, respondents were given the opportunity to create an alternative ranking.

2.1. Importance of market drivers

2.1.1. First round results

Figure 10: First round results – Importance of market drivers

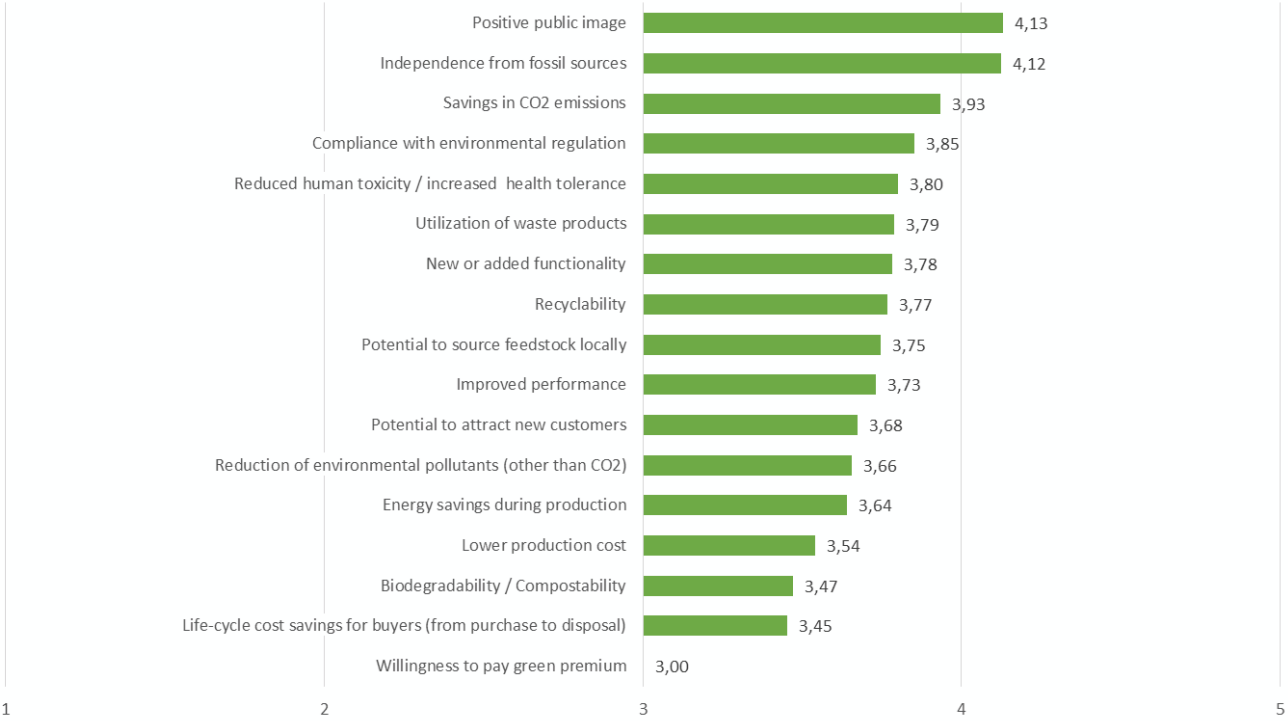
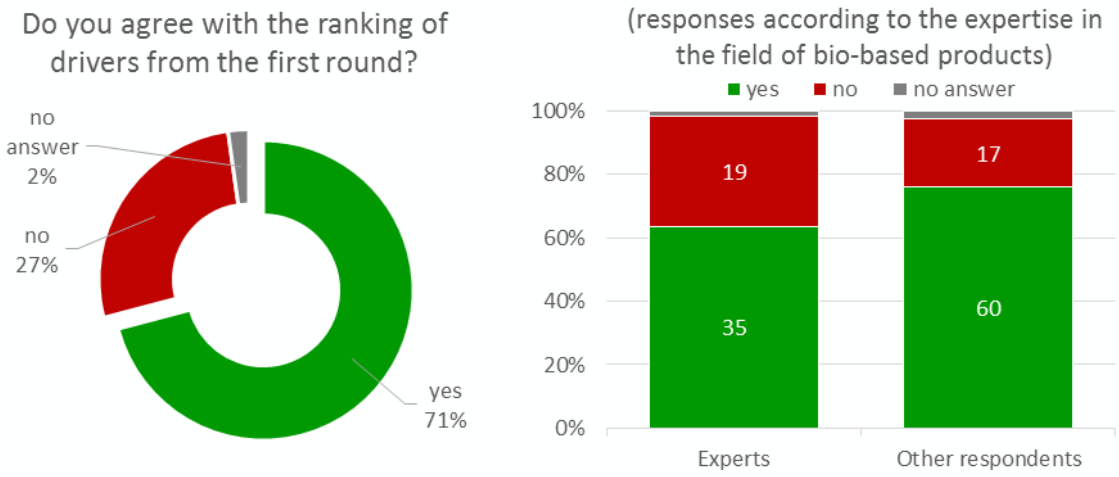


Figure 10 presents the first round results regarding the perceived drivers of bio-based products in the B2B market. The items are ranked in descending order according to the average importance attributed to them by the experts in the first survey round.

2.1.2. Second round results

At the beginning, respondents of the second survey were confronted with the results of the first round (see Figure 10) and then asked whether they agreed or not that this ranking correctly reflected the relative importance of these items as drivers of the future development of the B2B market for bio-based products. Figure 11**Fehler! Verweisquelle konnte nicht gefunden werden.** displays the corresponding results.

Figure 11: Agreement with the first round ranking of market drivers



A large majority of respondents (71%) agreed with the presented ranking of drivers. Only three respondents did not answer the question. More than one fourth of respondents (27%) however expressed their disagreement with the presented order. When checking for the profiles of these respondents, we found that the rate of disagreement was significantly higher among the 55 self-claimed experts in the field of bio-based products, whereas the rate of disagreement was not significantly different in the group of respondents from the business sector. Nevertheless, more than 60 percent of the experts approved the results. The 36 respondents, who disagreed with the first round results, were given the chance to create an alternative ranking.

Table 1 presents the average position of each item in the alternative rankings next to the original ranking that resulted from the first round. The positions of some market drivers change considerably: “improved performance” (+5), “new or added functionality” (+3), “potential to attract new customers” (+2) and “lower production costs” (+2) step up various positions, whereas “reduced human toxicity” (-5), “utilization of waste products” (-3), “recyclability” (-3), “compliance with environmental regulation” (-2), “potential to source feedstock locally” (-2) and “energy savings during production” rank considerably lower.

Table 1: Alternative rankings of market drivers

	Market drivers	First round results	Alternative rankings		Overall results (132 experts)
		Average importance (Rank)	Average position (Rank) / change		Total weighted average position (Rank)
1	positive public image	4.13 (1)	5.5 (1)	=	2.2 (1)
2	independence from fossil sources	4.12 (2)	6.0 (2)	=	3.1 (2)
3	savings in CO2 emissions	3.93 (3)	6.1 (3)	=	3.8 (3)
4	compliance with environmental regulation	3.85 (4)	7.9 (6)	-2	5.1 (4)
5	reduced human toxicity	3.80 (5)	9.3 (10)	-5	6.2 (5)
6	utilization of waste products	3.79 (6)	9.2 (8)	-3	6.9 (6)
7	new or added functionality	3.78 (7)	6.7 (4)	+3	6.9 (7)
8	recyclability	3.77 (8)	9.5 (11)	-3	8.4 (8)
9	potential to source feedstock locally	3.75 (9)	8.8 (7)	-2	8.9 (9)
-	local employment creation	-	-	-	(9.4)
10	improved performance	3.73 (10)	7.3 (5)	+5	9.3 (10)
11	potential to attract new customers	3.68 (11)	9.3 (9)	+2	10.5 (11)
12	reduction of environmental pollutants (other than CO2)	3.66 (12)	10.1 (13)	-1	11.5 (12)
13	energy savings during production	3.64 (13)	11.1 (15)	-2	12.5 (13)
14	lower production cost	3.54 (14)	10.1 (12)	+2	12.9 (14)
15	biodegradability / compostability	3.47 (15)	10.8 (14)	+1	13.8 (15)
16	life-cycle cost savings for buyers (from purchase to disposal)	3.45 (16)	11.4 (16)	=	14.8 (16)
17	willingness to pay green premium	3.00 (17)	12.7 (17)	=	15.8 (17)

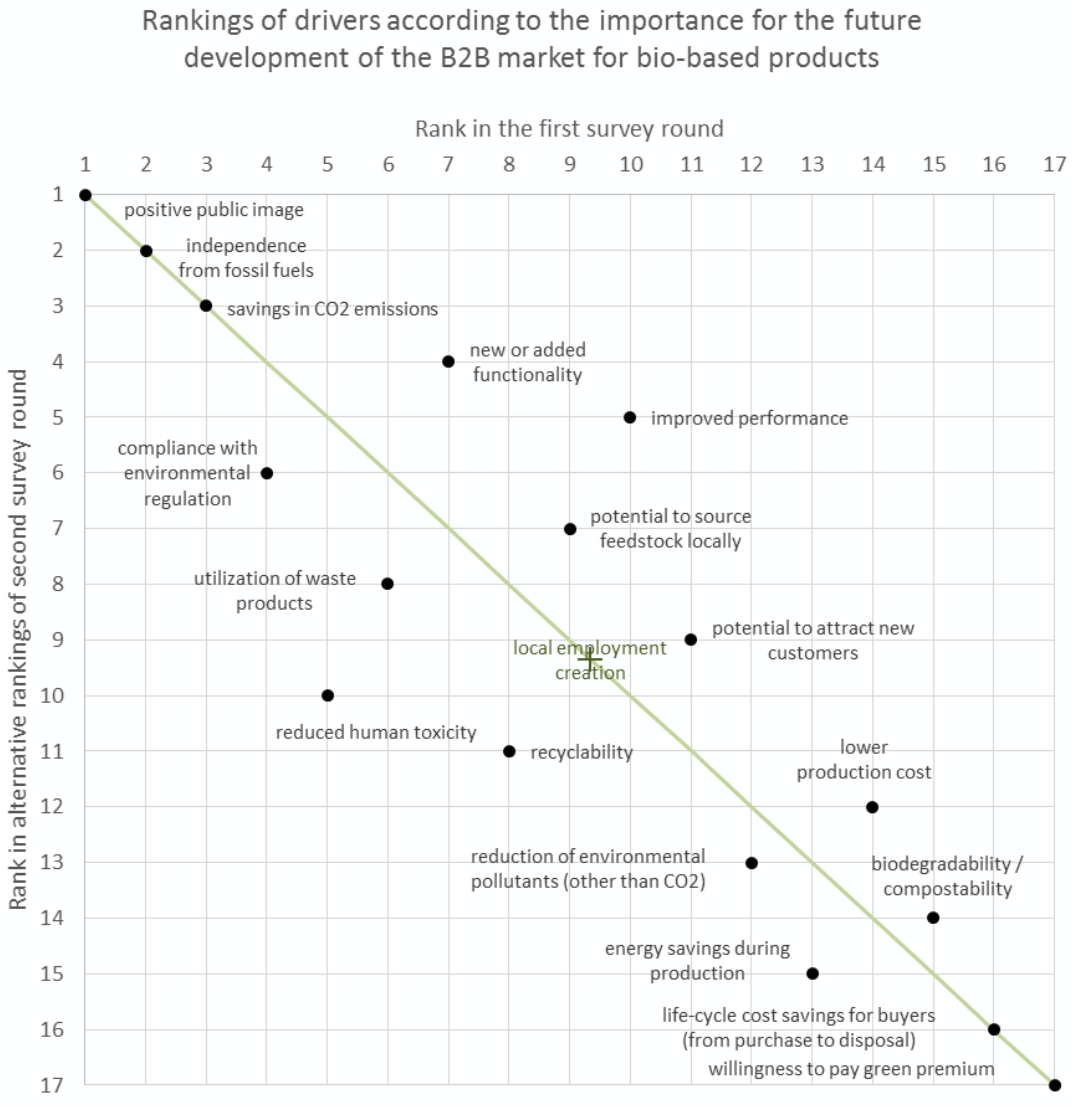
On average, those respondents who disagree with the presented ranking of market drivers stress the importance of economic driving factors (related to performance and costs) and ascribe lower importance to sustainability-related driving factors compared to the ranking of drivers implied by the first round results.

When however considering all survey responses of the 132 experts participating in the second round by calculating the total weighted average position attributed to each item, the resulting ranking of market drivers (last column of Table 1) clearly confirms the preliminary findings of the first survey round.

The highest ranked market driver is „Positive public image". This is closely followed by "Independence from fossil sources". The following four items all relate to environmental issues, most importantly the need to reduce CO2 emissions and comply with environmental regulations. "Willingness to pay green premium" is considered to be the least important among the listed items. Among performance- and cost-related items, "New or added functionality" ranked the highest, followed by "Improved performance". The two cost-related items received some of the lowest rankings.

Since in the first survey round a number of respondents indicated that "local employment creation" represented an additional important market driver for the future development of the B2B market for bio-based products, experts were also asked to indicate which position (from 1. to 18.) they would give this item among the other driving factors. Answers varied strongly from first to last position, resulting in a middle position with an average rank of about 9.4.

Figure 12: Alternative rankings of market drivers



In Figure 12, the rank of items according to the average positions in the alternative rankings is plotted against the first round results to visualize the differences. Furthermore, the graph also illustrates the average position assigned afterwards to the additional driving factor “local employment creation” by the second round respondents.

2.1.3. Conclusions

The second survey clearly confirms the findings of the first round with regard to the importance of drivers for the future development of the B2B market for bio-based products. Therefore, the preliminary conclusions of the first round remain valid.

A large majority agrees with the proposed ranking of drivers. In average, the alternative rankings created by respondents who disagree with the first survey results leave the top three items and the last two items unchanged. When considering the average response of all survey participants of the second round, the ranking of items remains completely unchanged. The new item “local employment creation” that had been suggested by some respondents of the first survey round as an additional driver, ranks at a middle position.

As the top-ranked driver clearly indicates, business experts are confident that bio-based products enjoy a positive public image. The importance of “independence from fossil sources” and environment-related items, such as “savings in CO2 emissions” or “utilization of waste products”, as main drivers of the market uptake of bio-based products suggests that this positive image is related to the expectation of a superior environmental performance. Nevertheless, we find that business experts do not consider the “willingness to pay a green premium” as an important market driver.

New functionalities or improved product performance represents additional factors that are supposed to contribute to the future market uptake of bio-based products. Nevertheless, these potential drivers rank lower than the before mentioned environmental aspects. A broad market acceptance of bio-based products will therefore depend on the ability to offer the required functional product performance at competitive prices with conventional substitutes.

The positive public image of bio-based products and the importance placed on compliance with regulatory measures suggest that additional regulatory support would be well-received by the general public and effective for accelerating the market acceptance of bio-based products.

2.2. Importance of market barriers

2.2.1. First round results

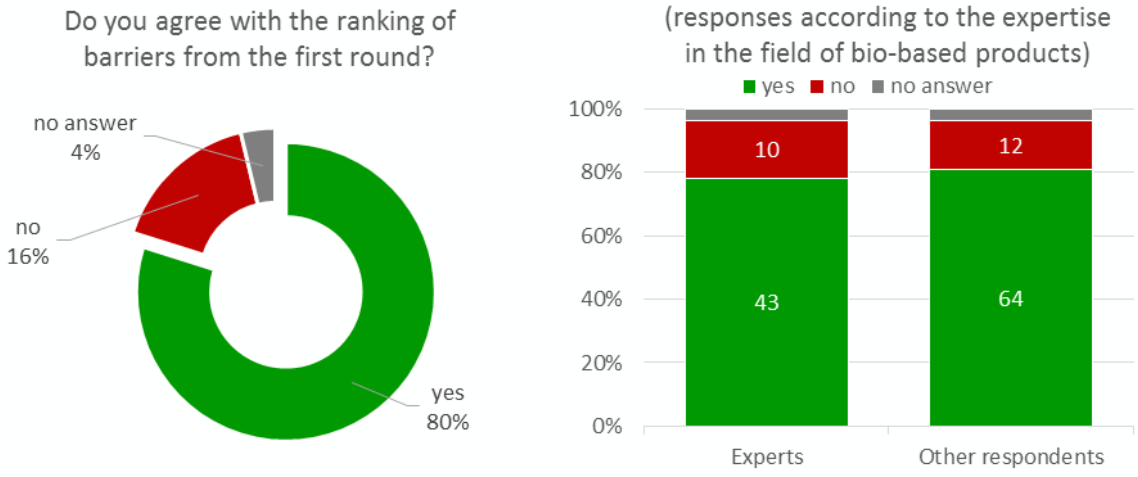
Figure 13 presents the first round results regarding the perceived barriers for bio-based products in the B2B market. The items are ranked in descending order according to the average importance attributed to them by the experts in the first survey round.

Figure 13: First round results – Importance of market barriers

2.2.2. Second round results

In a second step, respondents were confronted with the ranking of market barriers and then asked whether they agreed or not that this ranking correctly reflected the relative importance of these items as barriers to the future development of the B2B market for bio-based products. Figure 14 displays the corresponding results.

Figure 14: Agreement with the first round ranking of market barriers



The overall agreement with the ranking from the first survey round (80%) was even higher for the market barriers than regarding the B2B market drivers. Only about one sixth of respondents (16%) disagreed with the presented order, whereas the rate of disagreement was not significantly different neither in the group of experts in the field of bio-based products nor among respondents from the business sector. These respondents were then given the chance to create an alternative ranking of market barriers. Five experts did not answer the question.

Table 2: Alternative rankings of market barriers

	Market barriers	First round results	Alternative rankings		Overall results (129 experts)
		Average importance (Rank)	Average position (Rank) / change		Total weighted average position (Rank)
1	higher cost of production	4.13 (1)	3.6 (1)	=	1.4 (1)
2	uncertainty about future regulation	4.12 (2)	4.9 (2)	=	2.5 (2)
3	volatility of feedstock prices	3.93 (3)	4.9 (2)	+1	3.3 (3)
4	unsupportive regulatory environment	3.85 (4)	5.6 (4)	=	4.3 (4)
5	low performance or uncertainty regarding performance	3.80 (5)	6.5 (6)	-1	5.2 (5)
6	uncertainty about available feedstock quantity and quality	3.79 (6)	5.9 (5)	+1	6.0 (6)
7	lack of public awareness about bio-based products	3.78 (7)	8.2 (7)	=	7.2 (7)
8	incompatibility with existing supply arrangements or high replacement costs	3.77 (8)	8.5 (8)	=	8.1 (8)
9	higher life-cycle costs to buyers (from purchase to disposal)	3.75 (9)	10.2 (12)	-3	9.2 (9)
-	difficulty in obtaining finance	-	-	-	(9.6)
10	difficulty in communicating environmental benefits	3.73 (10)	9.3 (10)	=	9.9 (10)
11	limited local feedstock availability	3.68 (11)	10.0 (11)	=	10.8 (11)
12	uncertainty regarding environmental benefits	3.66 (12)	9.0 (9)	+3	11.5 (12)
13	environmental impacts of feedstock production	3.64 (13)	10.3 (13)	=	12.5 (13)
14	incompatibility with existing recycling schemes	3.54 (14)	12.1 (14)	=	13.7 (14)
15	concenrs regarding GMOs in feedstock production	3.47 (15)	14.0 (15)	=	14.8 (15)
16	increased ecotoxicity and negative effects on the eco-system	3.45 (16)	15.2 (17)	-1	15.9 (16)
17	social impacts of feedstock production	3.00 (17)	14.8 (16)	+1	16.6 (17)

Table 2 presents each item's average position in the alternative rankings next to the original ranking that resulted from the first round. Market barrier positions hardly change, except for "uncertainty of environmental benefits" (+3) and "higher life-cycle costs to buyers (from purchase to disposal" (-3). Consistent with the previous interpretation, experts that disagree with the ranking from the first round seem to have a more positive view on economic factors (downplaying life-cycle costs as barrier) and a more problematic view on the role of sustainability-related factors (stressing the uncertainty of environmental benefits as barrier) when compared to the first survey results.

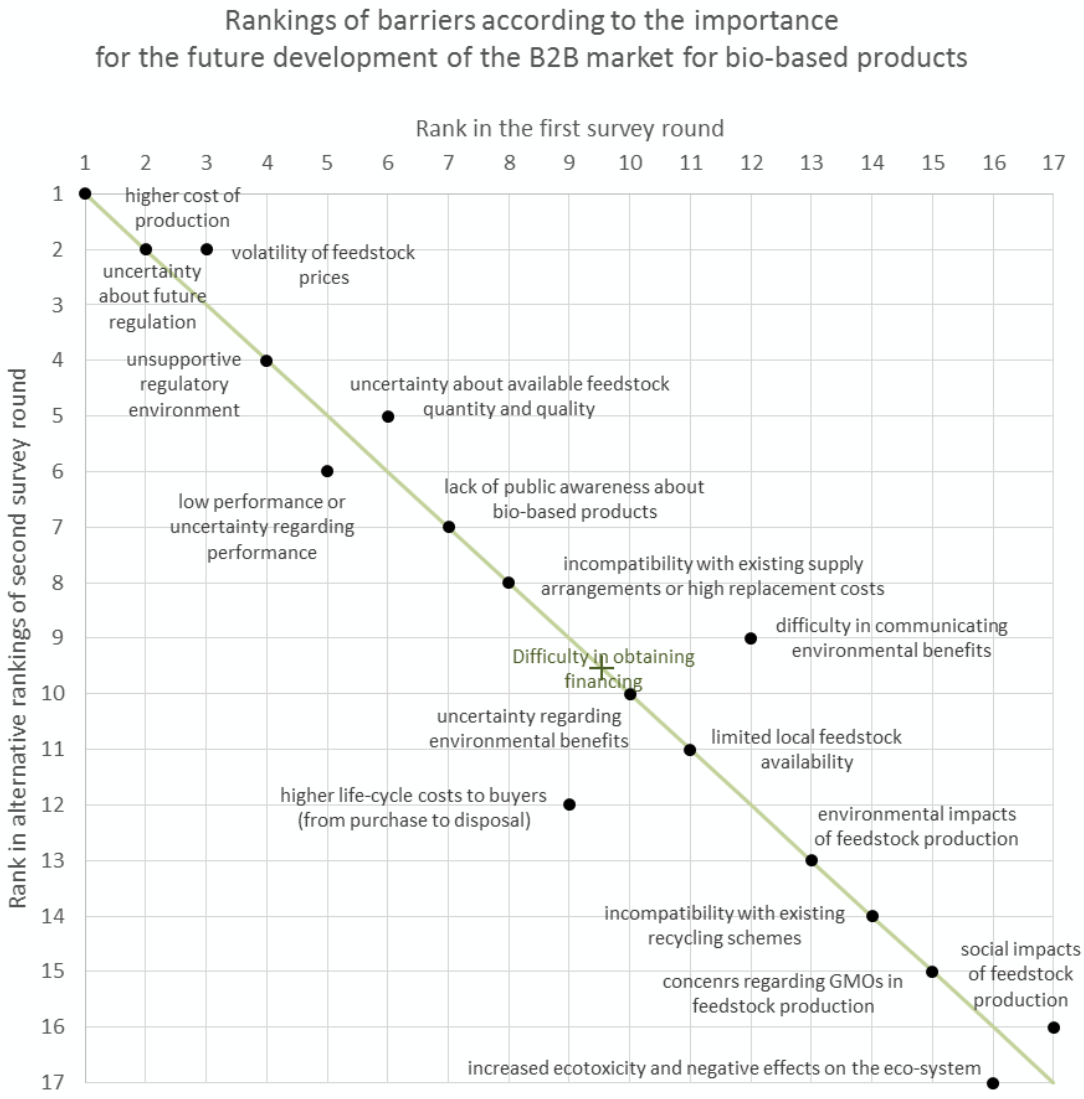
Using the total weighted average rank positions of the items to assess the overall opinion of all business experts who evaluated the ranking of market barriers in the second survey round, the first round results are clearly corroborated.

The item "Higher cost of production" is considered the single most important market barrier. In addition, "Uncertainty about future regulation" and "Unsupportive regulatory environment" both figure among the top-ranked items. "Lack of public awareness about bio-based products" also ranks relatively high. Among feedstock-related issues, only the "Volatility of feedstock prices" figures among the top market barriers. The highest ranked environment-related item is "Difficulty in communicating environmental benefits". Concerns about social and environmental impacts of feedstock production and the use of GMOs in feedstock production are among the least important market barriers.

Since in the first survey round some respondents had indicated that "difficulty in obtaining financing" represented an additional market barrier to the future development of the B2B market for bio-based products, participants of the second survey round were asked to indicate which position (from 1. to 18.) they would give this item among the other hampering factors. The answers vary strongly from the first to the last position, resulting in a middle position with an average rank of about 9.6.

In Figure 15, the rank of items according to the average position in the alternative rankings is plotted against the first round results to visualize the differences. Furthermore, the graph also illustrates the average position assigned afterwards to the item "difficulty in obtaining finance" by the second round respondents.

Figure 15: Alternative rankings of market barriers



2.2.3. Conclusions

The second survey clearly confirms the findings of the first round with regard to the importance of barriers for the future development of the B2B market for bio-based products. A large majority of 80 percent approves the proposed ranking. The overall ranking of items remains unchanged even when considering the responses of all survey participants of the second round. The additional barrier “difficulty in obtaining finance” ranks at a middle position. Therefore, the preliminary conclusions of the first round have been confirmed.

The fact that higher production costs represent the most important market barrier fits well with the previous assessment that “Willingness to pay a green premium” does not represent a key driver. The combination of a positive public image, identified in the previous section, and the importance of low public awareness suggests that awareness-raising activities to promote bio-based products may offer significant returns.

2.3. Differences across countries

2.3.1. First survey results

The analysis of first round survey responses regarding market drivers revealed a number of statistically significant differences across countries. Most importantly, Italian respondents placed a higher importance on the items “biodegradability / compostability” and “recyclability” than respondents from other countries, suggesting that end-of-life options are of particular importance as market drivers in Italy.

For French respondents, the items “potential to source feedstock locally” and “independence from fossil sources” both ranked higher than for other respondents, suggesting that the acceptance of bio-based products in France is strongly linked to efforts to gain independence from foreign fossil resources and to develop domestic supply chains.

Finally, Dutch respondents attributed a lower level of importance to a number of environment-related items, while performance- and functionality-related items (i.e. “improved performance” and “new or added functionality”) ranked relatively higher among Dutch respondents than overall. This may suggest that the Dutch bio-based economy is currently more strongly technology-driven than in some of the other countries, in particular Italy, where environment-related considerations figure more prominently.

2.3.2. Second survey results

In order to validate the results from the first survey round, participants of the second survey were asked to indicate on a scale from -2 (“strongly disagree”) to +2 (“strongly agree”) to what extent they agree or disagree with each of the following statements about country differences regarding driving factors of the bio-based economy:

- “Compared to other European countries, end-of-life considerations (i.e. biodegradability, compostability, recyclability) are of particular importance for the future development of the B2B market for bio-based products in Italy.”
- “Compared to other European countries, efforts to gain independence from fossil resources is of particular importance for the future development of the B2B market for bio-based products in France.”
- “Compared to other European countries, efforts to promote domestic supply chains are of particular importance for the future development of the B2B market for bio-based products in France.”
- “Compared to other European countries, environmental considerations (apart from CO2 savings) have a relatively low level of importance for the future development of the B2B market for bio-based products in the Netherlands.”

Figure 16: Country differences regarding driving factors

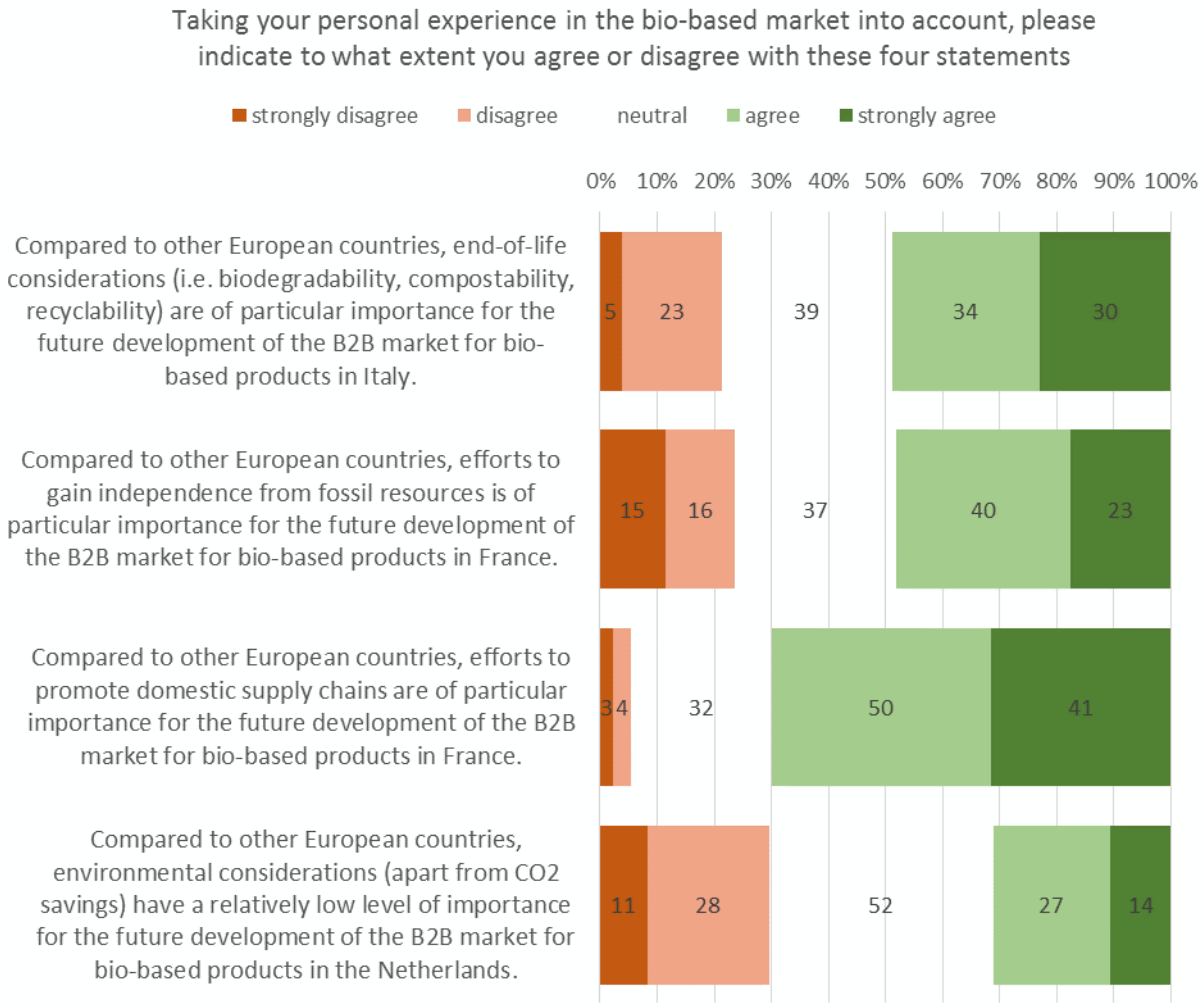
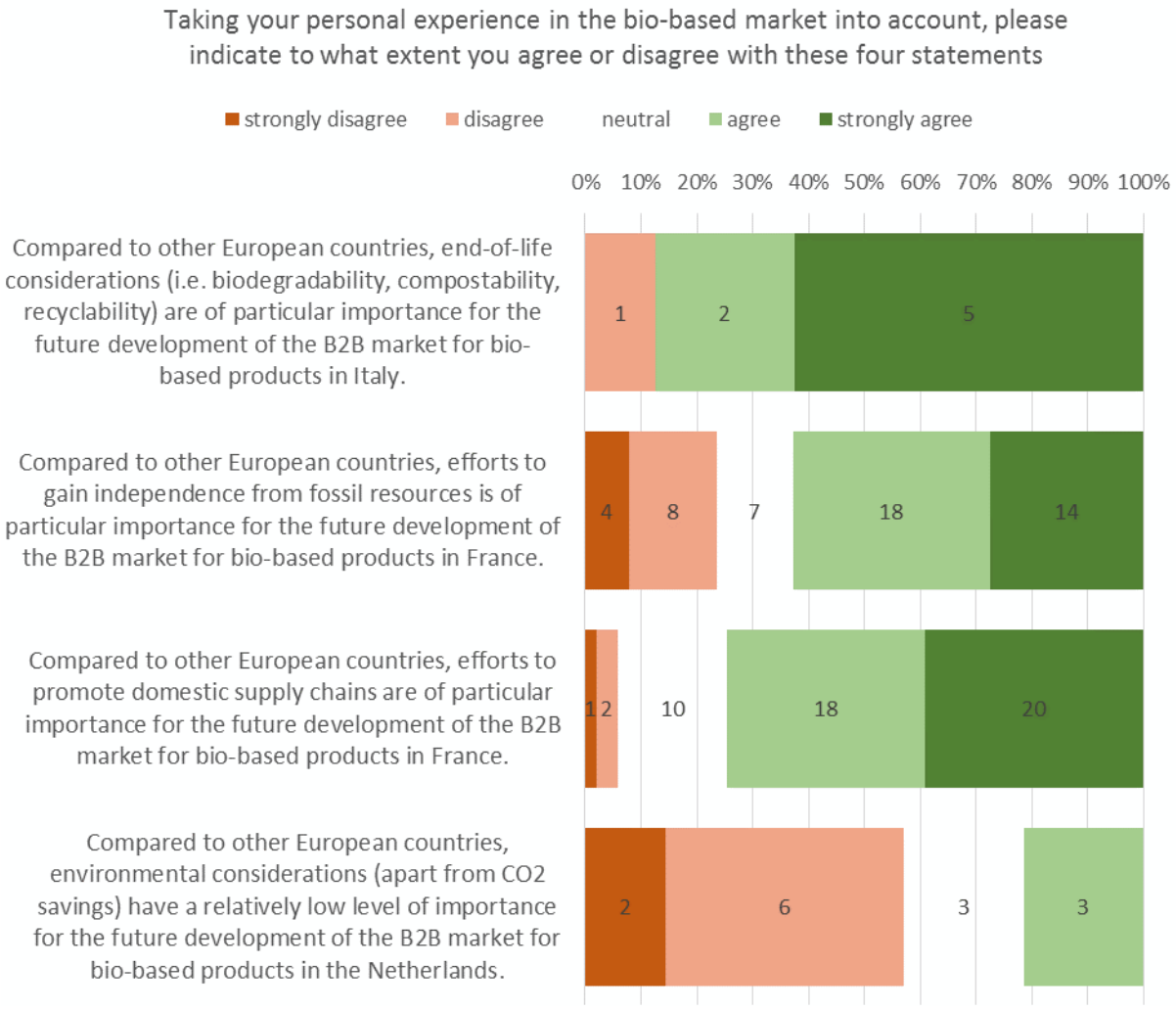


Figure 16 presents the results with regard to these questions. While the reaction to the first two statements is predominantly positive and to the last statement rather ambiguous, it turns out that a majority of respondents (about 70%) agrees with the third statement stressing the importance of promoting domestic supply chains for the future development of the B2B market of bio-based products in France.

Figure 17: Country differences regarding driving factors, responses from local experts only



The previous findings are confirmed when only the responses of local experts that actually work at the respective country are considered (see Figure 17). Except for one Italian expert, all agree with the statement about particular importance of end-of-life-considerations for the Italian B2B market for bio-based products. The particular importance of promoting domestic supply chains is confirmed by about 75 percent, and the particular importance of gaining independence from fossil resources by more than 60 percent of the French experts.

In contrast, more than 55 percent of the Dutch business experts more or less strongly reject that environmental considerations were of particularly low importance in Dutch B2B market compared to other European countries. None of the Dutch experts does strongly agree with this statement. Accordingly, we conclude that this interpretation of the findings from the first survey round is too far-fetched.

2.3.3. Conclusions

The respondents of the second round mostly confirm the national patterns identified in the responses to the first survey. Overall, the results of the second survey thus show that the country-specific response patterns detected in the first survey can be traced back to national particularities in the evaluation of different policy objectives.

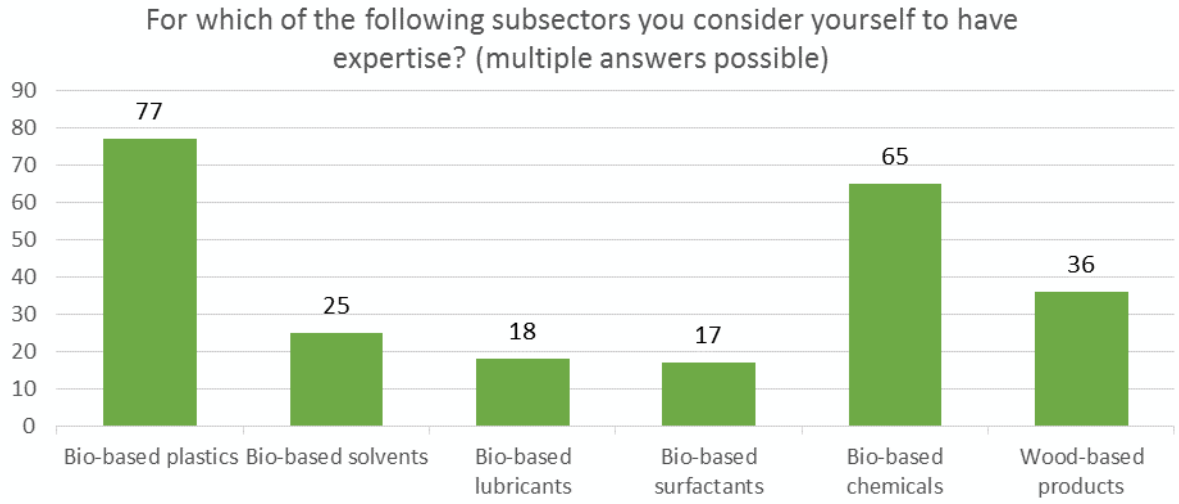
The interpretations of the French and Italian particularities with regard to the special importance of local supply chains and the independence from fossil resources in France and the special importance of end-of-life-considerations in Italy find wide agreement, whereas the majority rejects the suggested relative unimportance of environmental considerations in the Netherlands. A separate analysis based on the opinions of local business experts makes these results even more evident.

Consequently, the proposition that country differences play a considerable role in the European B2B market for bio-based products holds and ongoing policy and standardization processes at the European-level therefore need to take these trends into account. In addition to building a single European market for bio-based products, European initiatives should aim to reinforce and diffuse concurrent national movements by addressing dimensions of particular importance in individual markets.

2.4. Differences across product sectors

Although in the responses to the first survey no statistically significant differences across product sectors were detected, many stakeholders, when presented with the results of the first survey, raised the concern that the rankings of market drivers and barriers would considerably vary according to the sub-sector of bio-based products. In order to refine the information on relevant acceptance factors for bio-based products, the second survey examined the particularities in a number of market segments of the bio-based economy.

Figure 18: Sector expertise



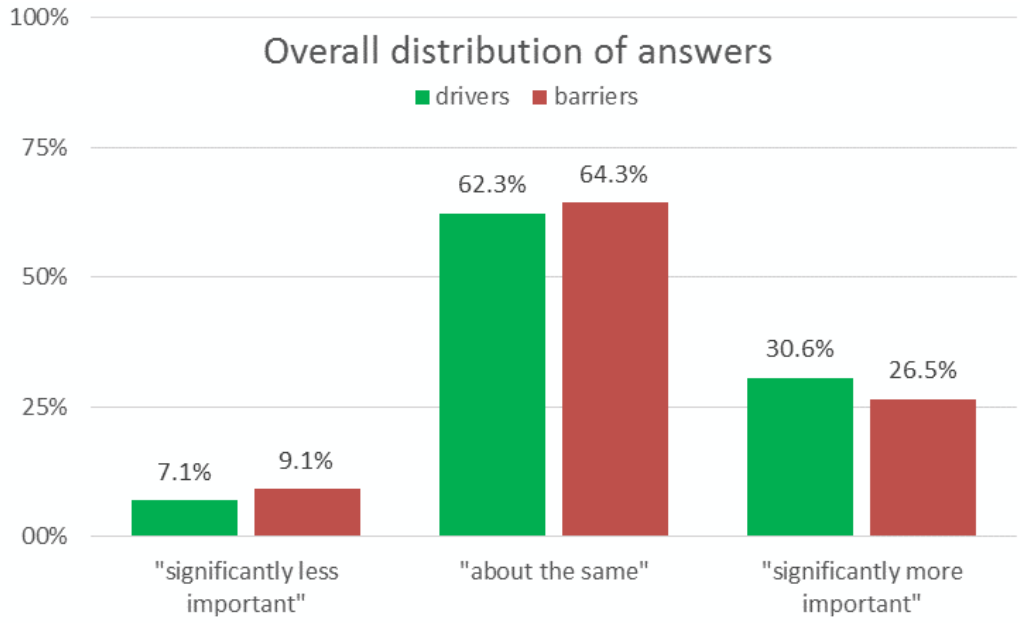
In a first step, respondents were asked for which sub-sectors they had sufficient expertise to indicate significant differences with regard to the factors that shape the future development of the specific B2B market compared to the overall B2B market for bio-based products. Figure 18 gives an overview of the sector expertise of the respondents.

For the chosen sectors, experts were given a list of market drivers and a list of market barriers for which they were asked to compare the importance for the specific sub-sector to the overall B2B market for bio-based products. For each of the presented items in the two lists, experts were asked to indicate whether it was “significantly more important” or “significantly less important”, in case they disagreed with the assumption that the importance was “about the same” as for bio-based products in general.

Since the market of bio-based products are almost completely covered by the sub-sectors, positive and negative deviations would expected to be in balance. However, the skewed distribution of answers (see Figure 19) shows that disagreeing respondents tended to more readily identify factors that are “significantly more important” in driving or hampering a specific sub-sector of bio-based products than factors that are “significantly less important”. The overestimation of the importance by the experts in the field they are working in is a commonly observed phenomenon known from psychological research, which is related to the individual’s subjective bias towards his field of expertise.

The largest share of experts (about two thirds) usually agrees on the importance to be “about the same” for the specific sector as for bio-based products in general. Nevertheless, the results offer further insight into the differences across sub-sectors with regard to important factors for the acceptance of bio-based products in the B2B market. In the following, the particularities of each sub-sector are discussed.

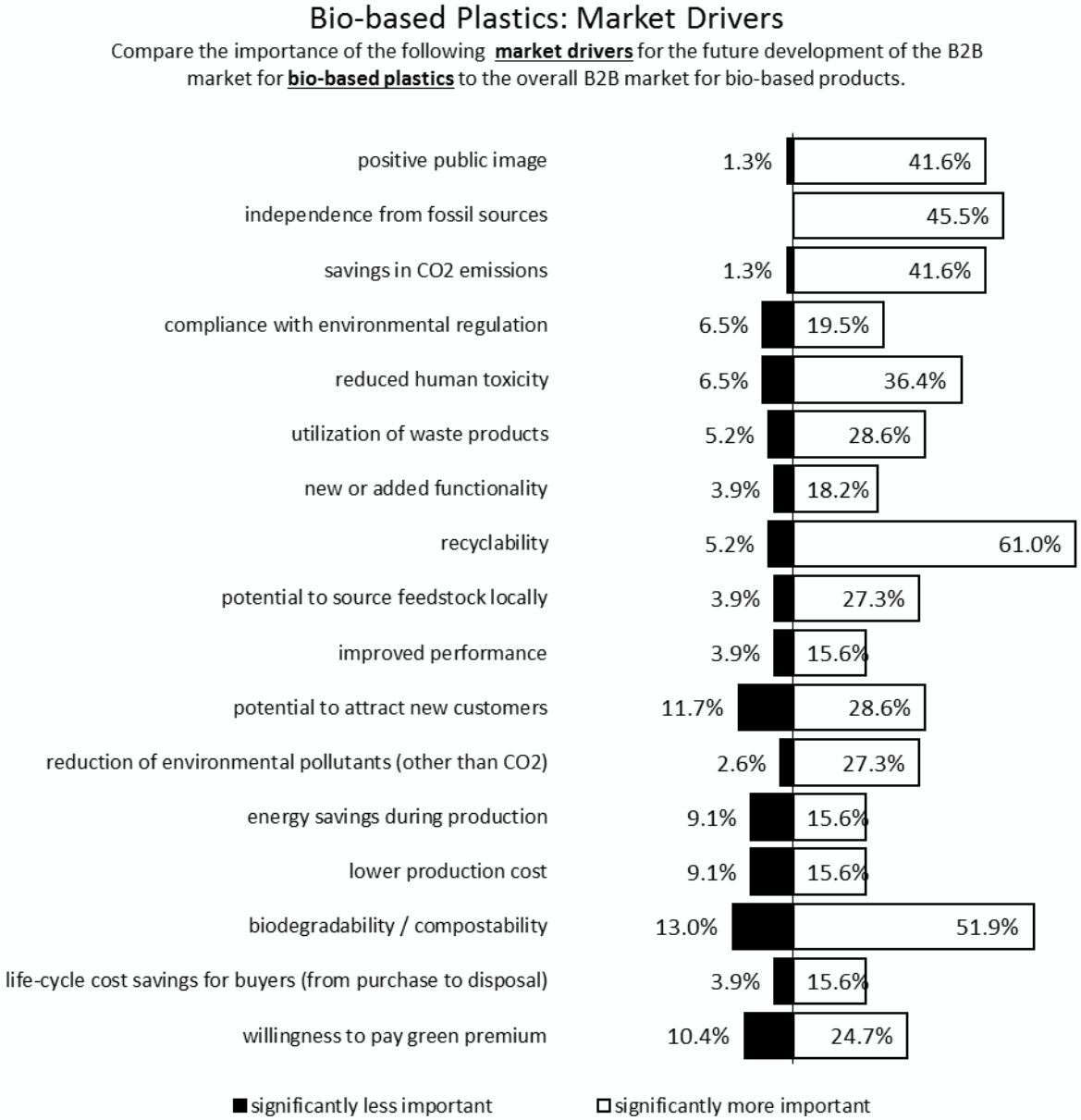
Figure 19: Overall distribution of answers with regard to sector differences



2.4.1. Bio-based plastics

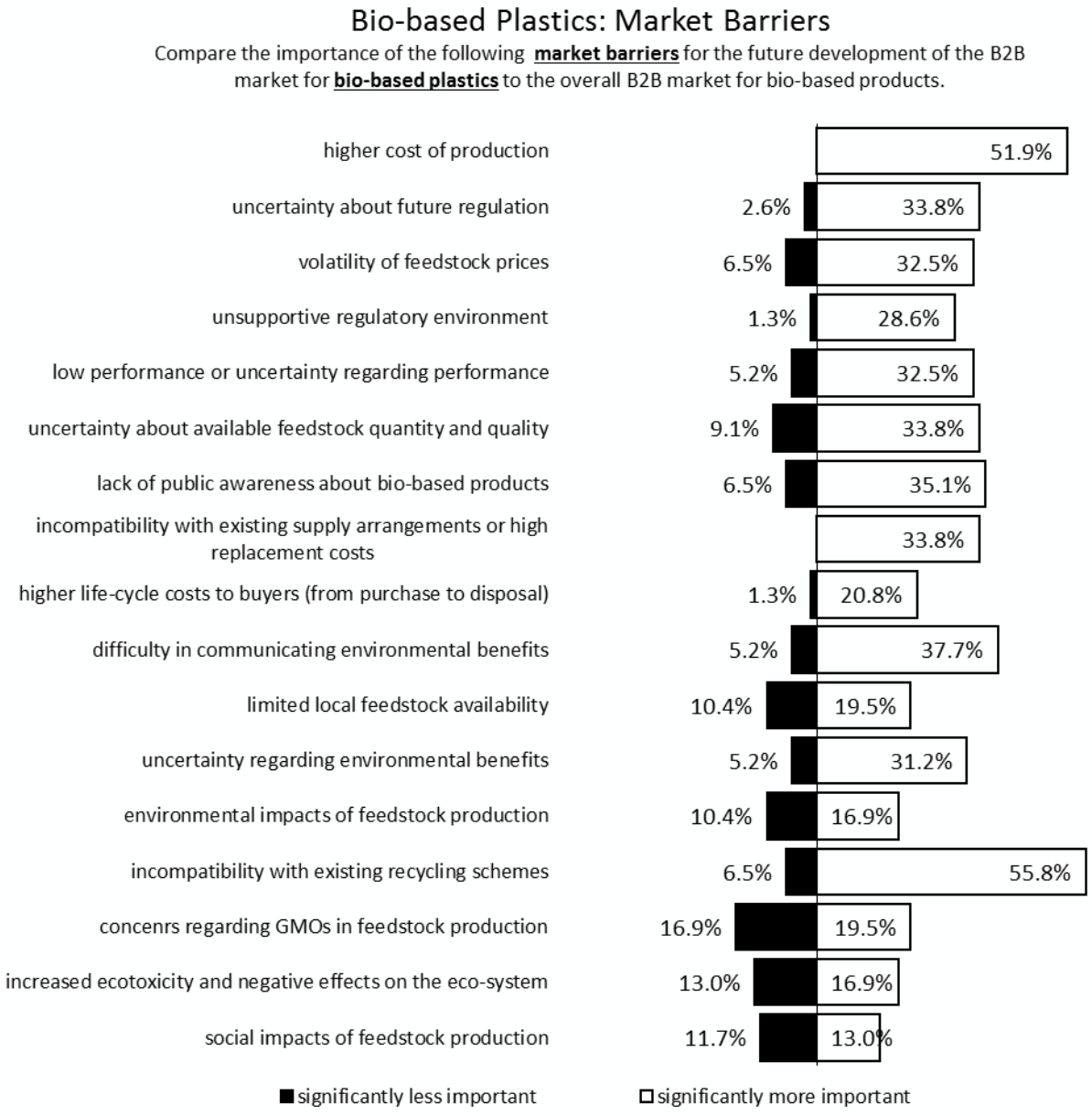
Figure 20 and Figure 21 present the results with regard to the drivers and barriers of the B2B market for bio-based plastics, ordered according to the overall importance for bio-based products in general. For the sub-sector of bio-based plastics, end-of-life considerations seem to be particularly important, as a majority of sector experts (>50%) considers “recyclability” and “biodegradability / compostability” to be “significantly more important” as market drivers.

Figure 20: Drivers for the future development of the B2B market for bio-based plastics



A majority of sector experts (>50%) considers "incompatibility with existing recycling schemes" and "higher cost of production" to be significantly more important as market barriers for bio-based plastics than for bio-based products in general.

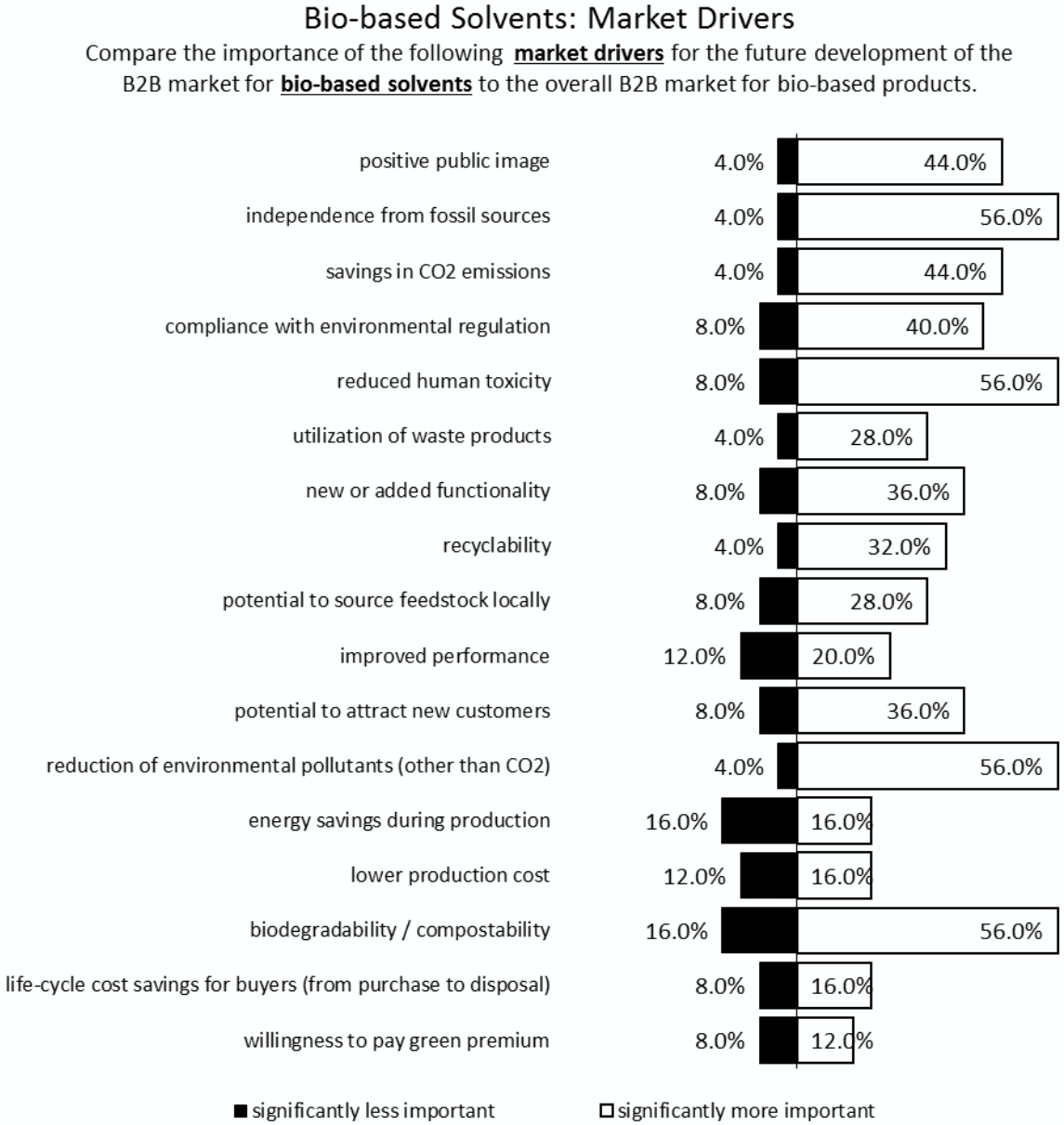
Figure 21: Barriers to the future development of the B2B market for bio-based plastics



2.4.2. Bio-based solvents

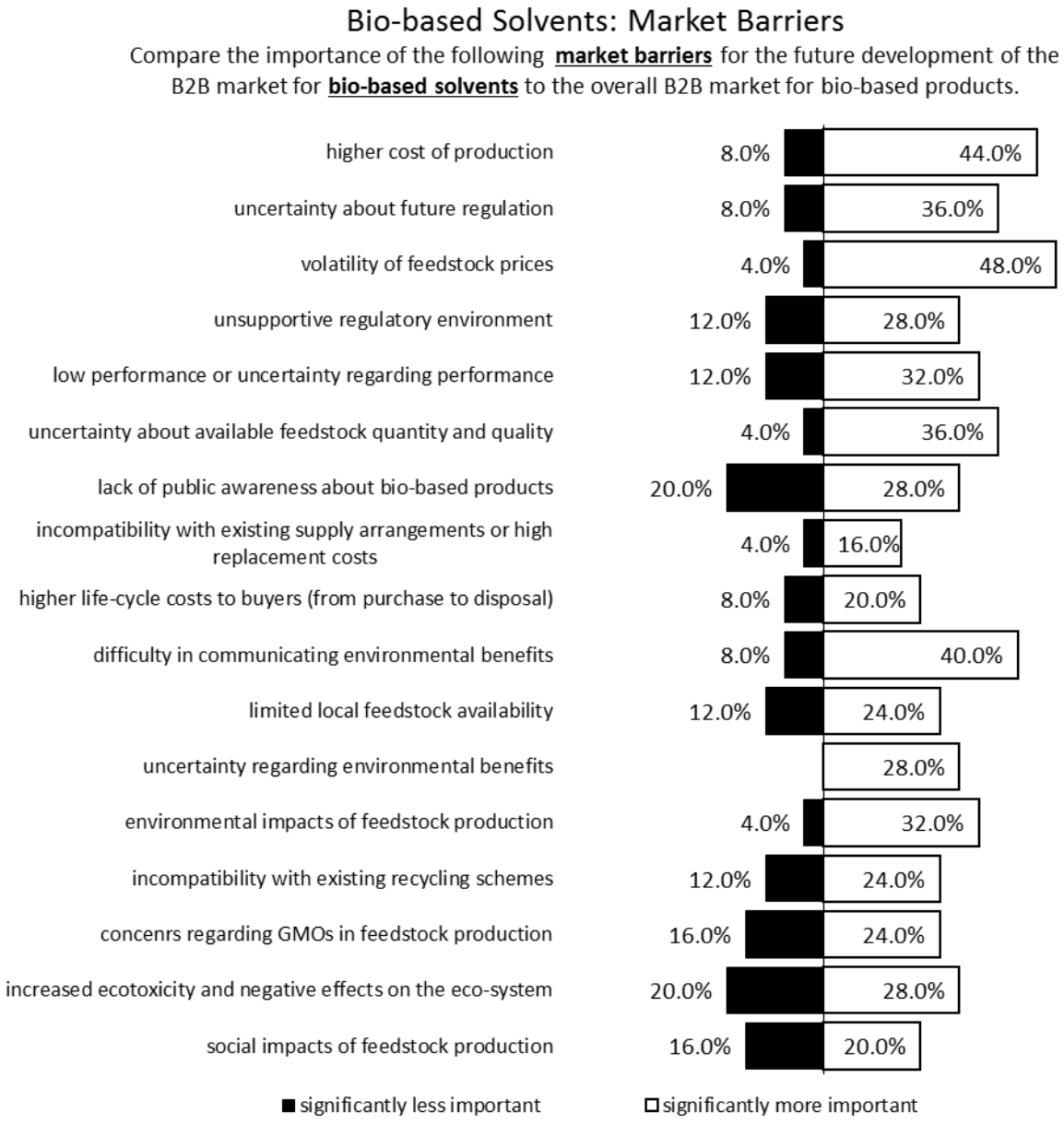
Figure 22 and Figure 23 presents the results with regard to the drivers and barriers for the sector of bio-based solvents. Four favourable aspect are considered by a majority of sector experts (>50%) to be particularly important market drivers when compared to bio-based products in general: “independence from fossil sources”, “reduced human toxicity”, “reduction of environmental pollutants (other than CO2)” and “biodegradability / compostability”.

Figure 22: Drivers for the future development of the B2B market for bio-based solvents



A relatively large share of sector experts (almost 50%) considers “volatility of feedstock prices” to be a “significantly more important” market barrier for bio-based solvents than for bio-based products in general. For all other items in the list, the majority of sector experts considers the importance for the future B2B market development to be “about the same” as for bio-based products in general.

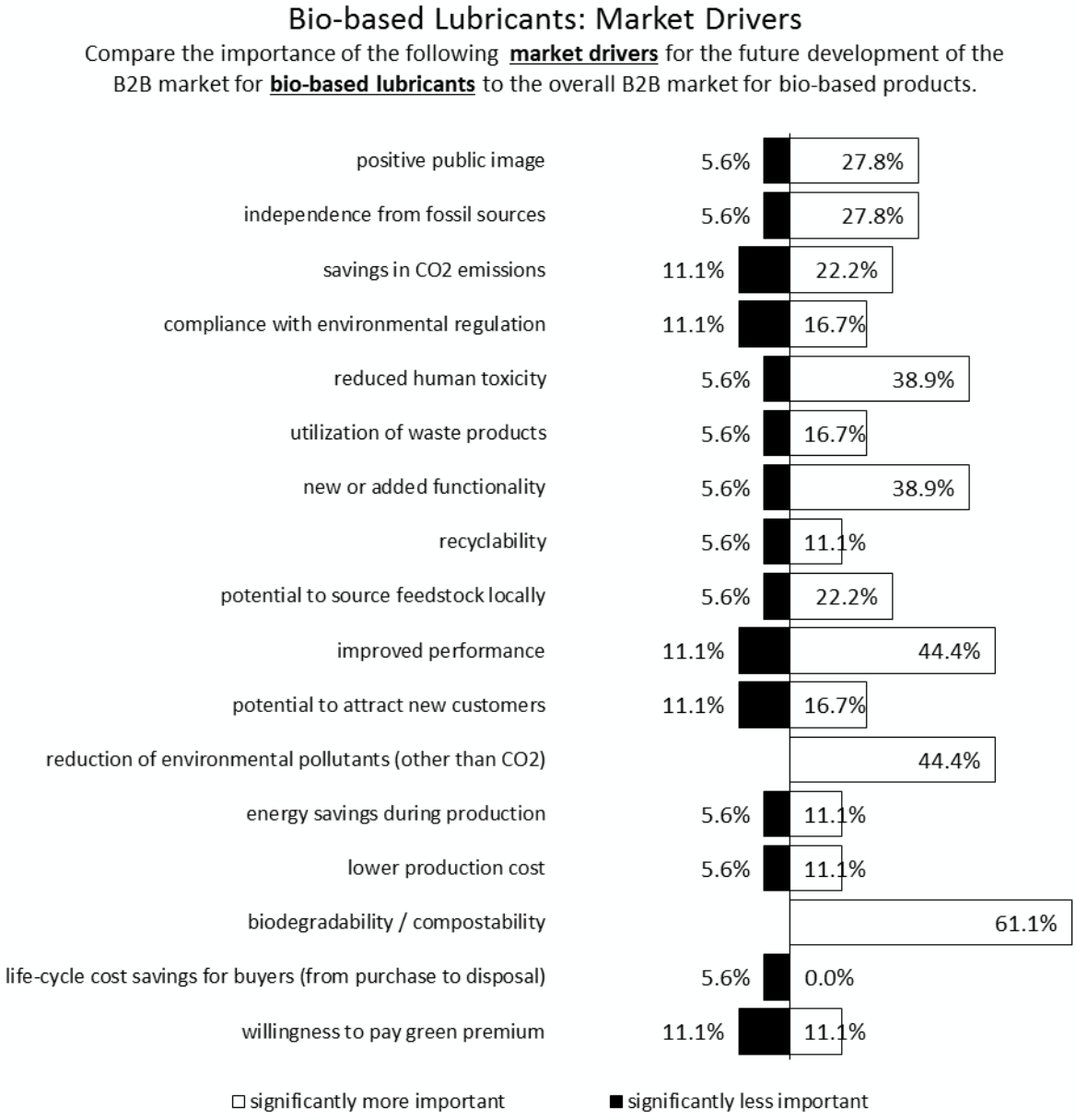
Figure 23: Barriers for the future development of the B2B market for bio-based solvents



2.4.3. Bio-based lubricants

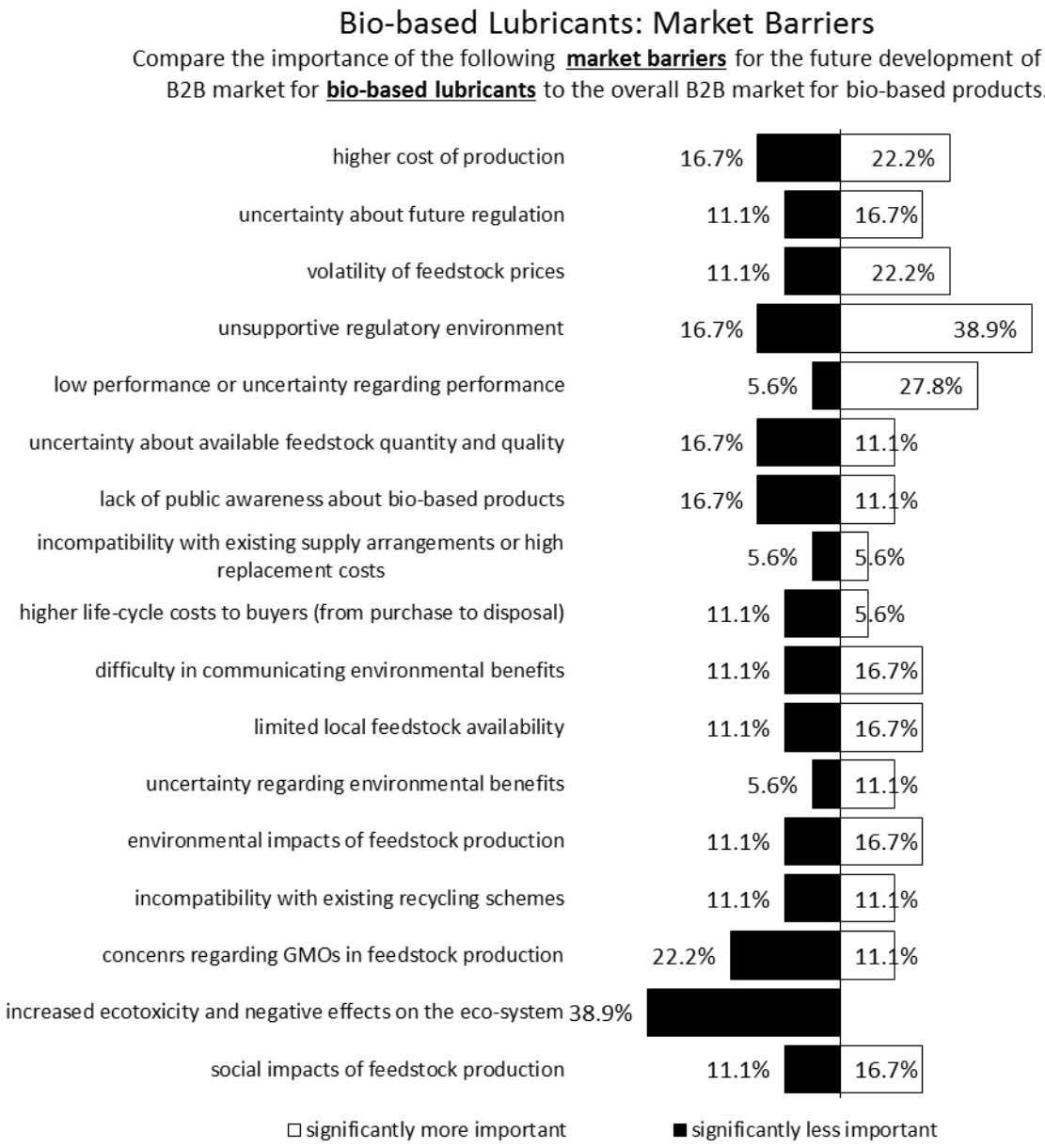
Figure 24 and Figure 25 depict the results for the sector of bio-based lubricants. The aspect of "biodegradability / compostability" is of particularly high importance to this sector, according to more than 60 percent of the sector experts.

Figure 24: Drivers for the future development of the B2B market for bio-based lubricants



Already ranking relatively low as a market barrier for bio-based products in general, "increased eco-toxicity and negative effects on the eco-system" plays an even less important role for the sub-sector of bio-based lubricants according to more than a third of the sector experts. Although the other two thirds agree that the importance of this barrier was "about the same", this is a remarkably high share considering the skewed distribution of answers.

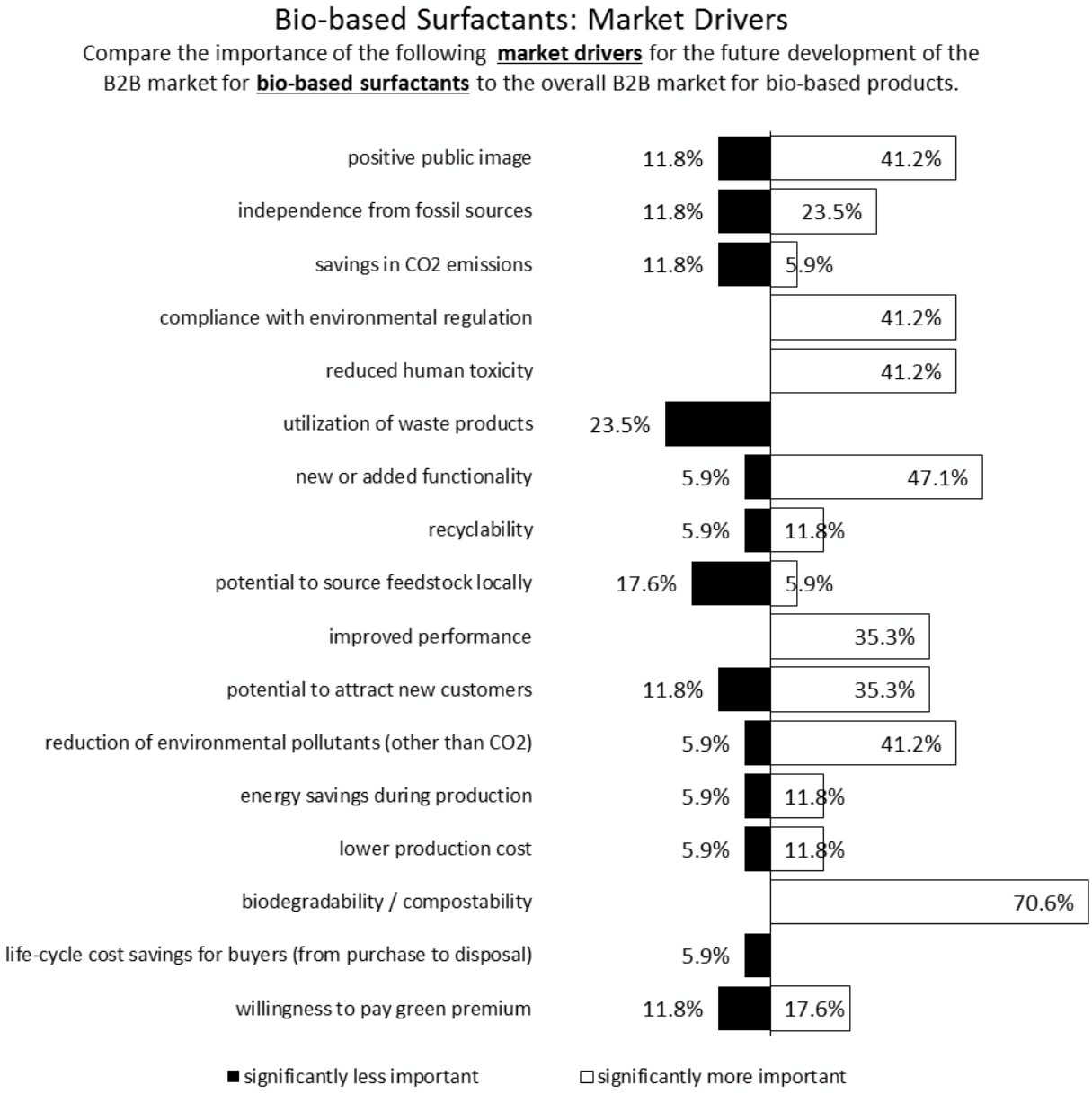
Figure 25: Barriers for the future development of the B2B market for bio-based lubricants



2.4.4. Bio-based surfactants

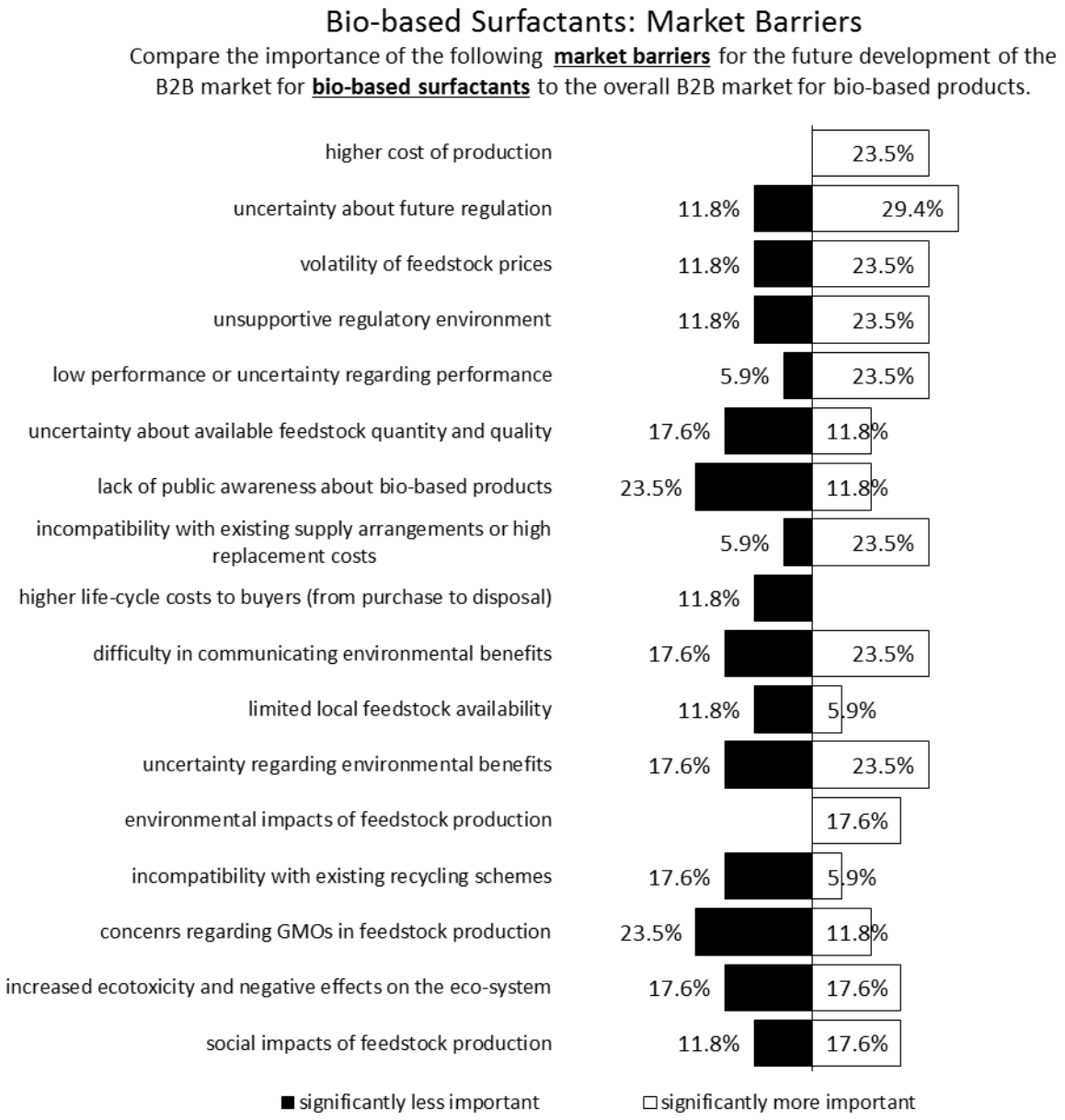
The results with regard to the sub-sector of bio-based surfactants are illustrated in Figure 26 and Figure 27. According to more than 70 percent of sector experts "biodegradability / compostability" is "significantly more important" for the future development of bio-based surfactants compared to bio-based products in general. About half of the experts believes that "new or added functionality" is particularly important. On the other hand, a relatively large share of experts agrees that the "utilization of waste products" plays a "significantly less important" role as market driver for bio-based surfactants.

Figure 26: Drivers for the future development of the B2B market for bio-based surfactants



There are no barriers that stand out as particularly important for bio-based surfactants, since for all items more than half of the experts agree that the importance is “about the same” as for bio-based products in general. Nevertheless, a remarkably high share of experts (almost one fourth) considers the “lack of public awareness about bio-based products” and “concerns regarding GMOs in feedstock production” to be “significantly less important” as market barriers for bio-based surfactants.

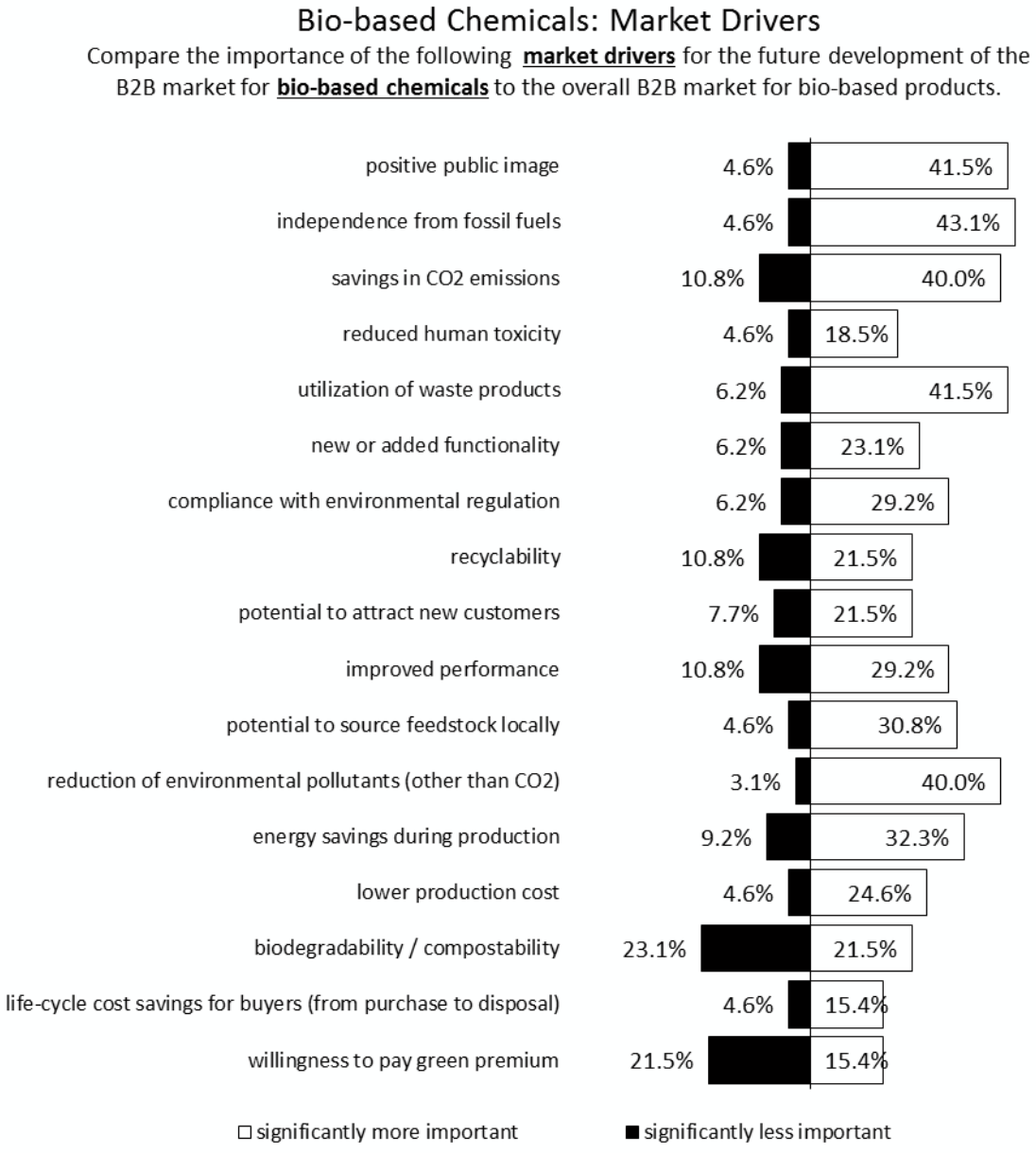
Figure 27: Barriers for the future development of the B2B market for bio-based surfactants



2.4.5. Bio-based chemicals

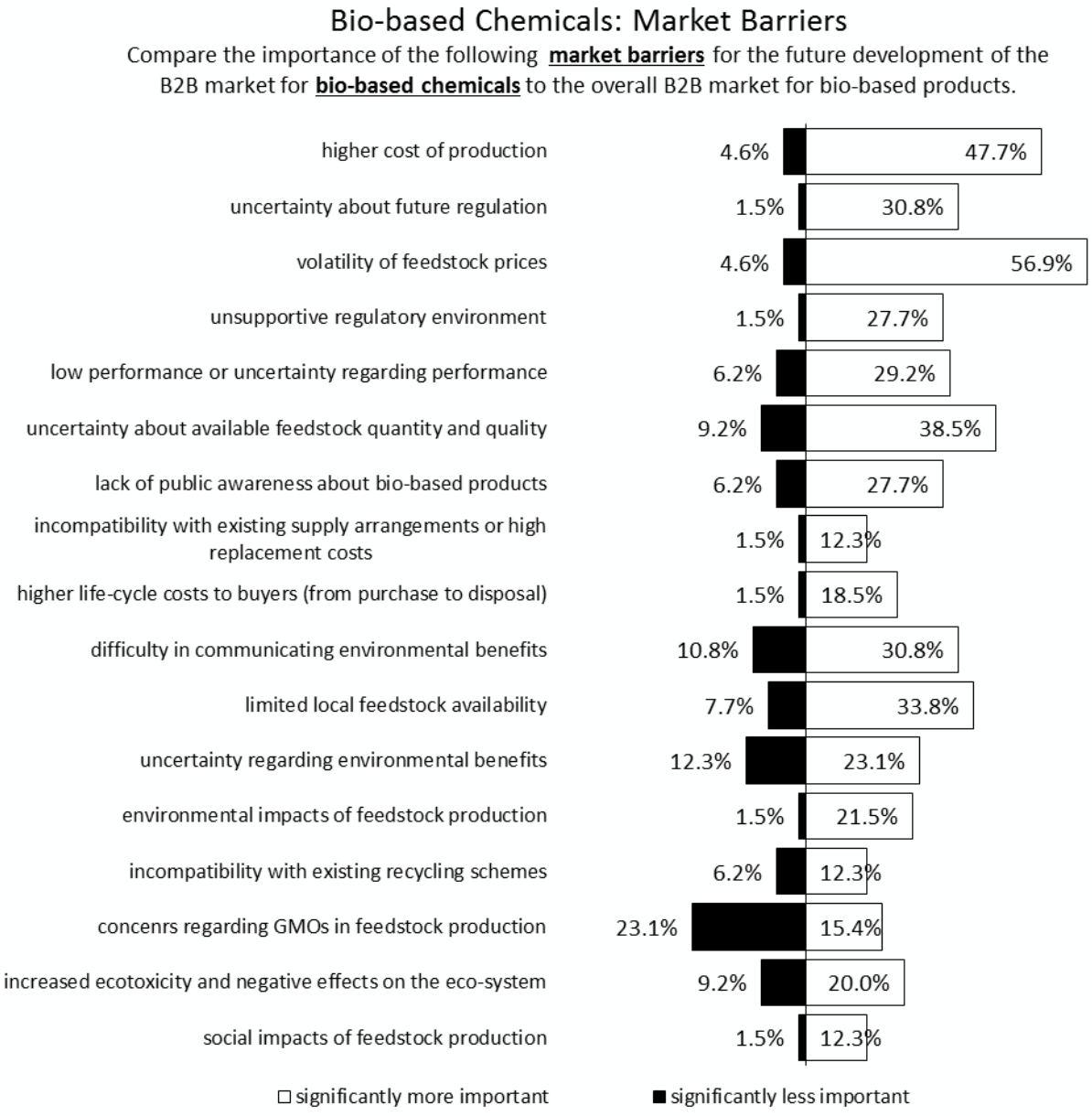
Figure 28 and Figure 29 refer to drivers and barriers in the B2B market of bio-based chemicals. For all items, the largest share of experts agrees that the importance was "about the same" as for bio-based products in general. In contrast to all the other sub-sectors of bio-based products, the number of experts who consider "biodegradability / compostability" and "willingness to pay green premium" to be "significantly less important" aspects in the sector of bio-based chemicals is higher than the number of experts who consider them to be "significantly more important".

Figure 28: Drivers for the future development of the B2B market for bio-based chemicals



"Higher cost of production" and "volatility of feedstock prices" seem to be market barriers of particular importance to the sector of bio-based chemicals, as about half of the experts consider these items as "significantly more important" compared to bio-based products in general. On the other hand, "concerns regarding GMOs in feedstock production" are considered to be "significantly less important" by a remarkably large share of experts.

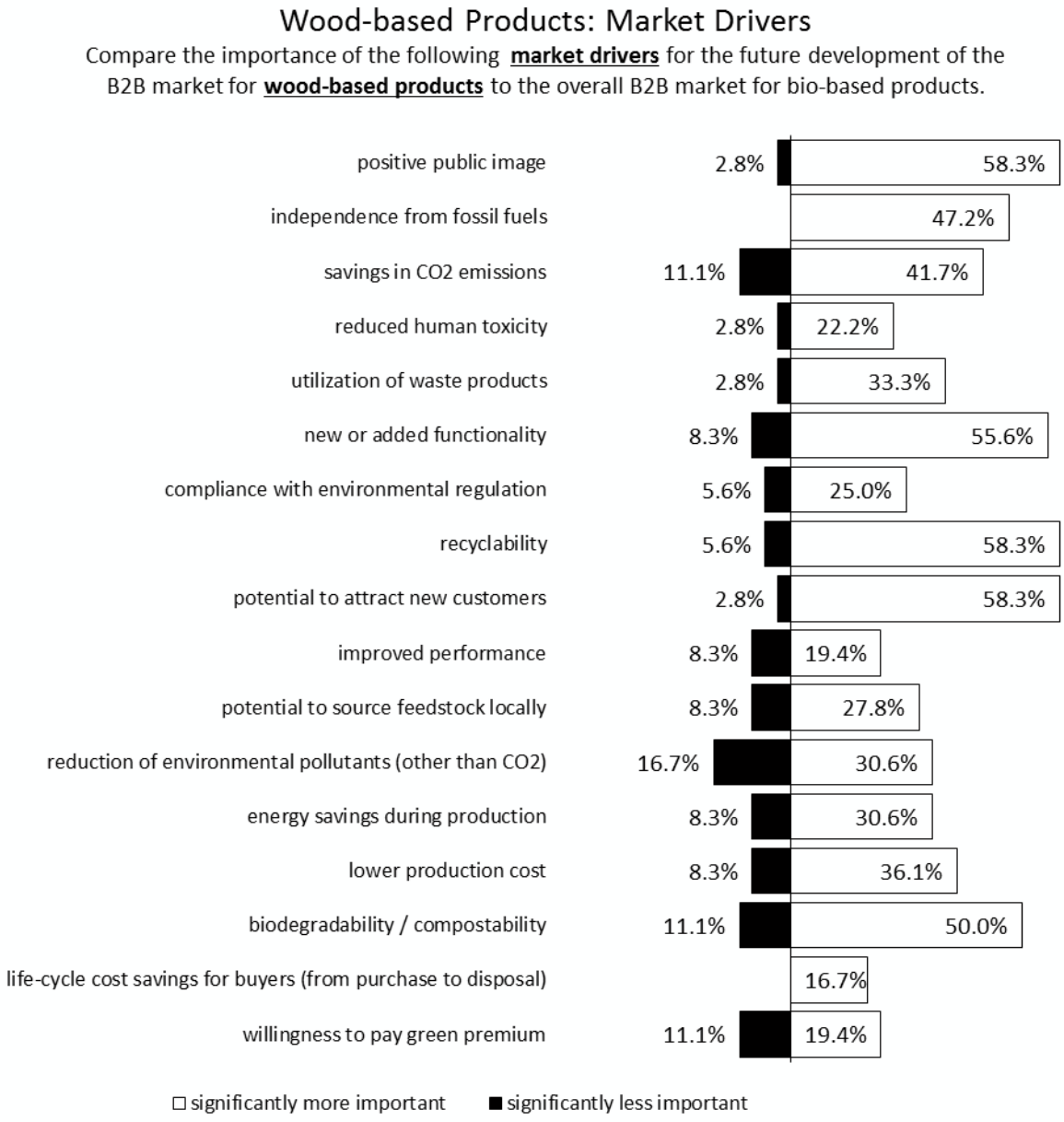
Figure 29: Barriers for the future development of the B2B market for bio-based chemicals



2.4.6. Wood-based products

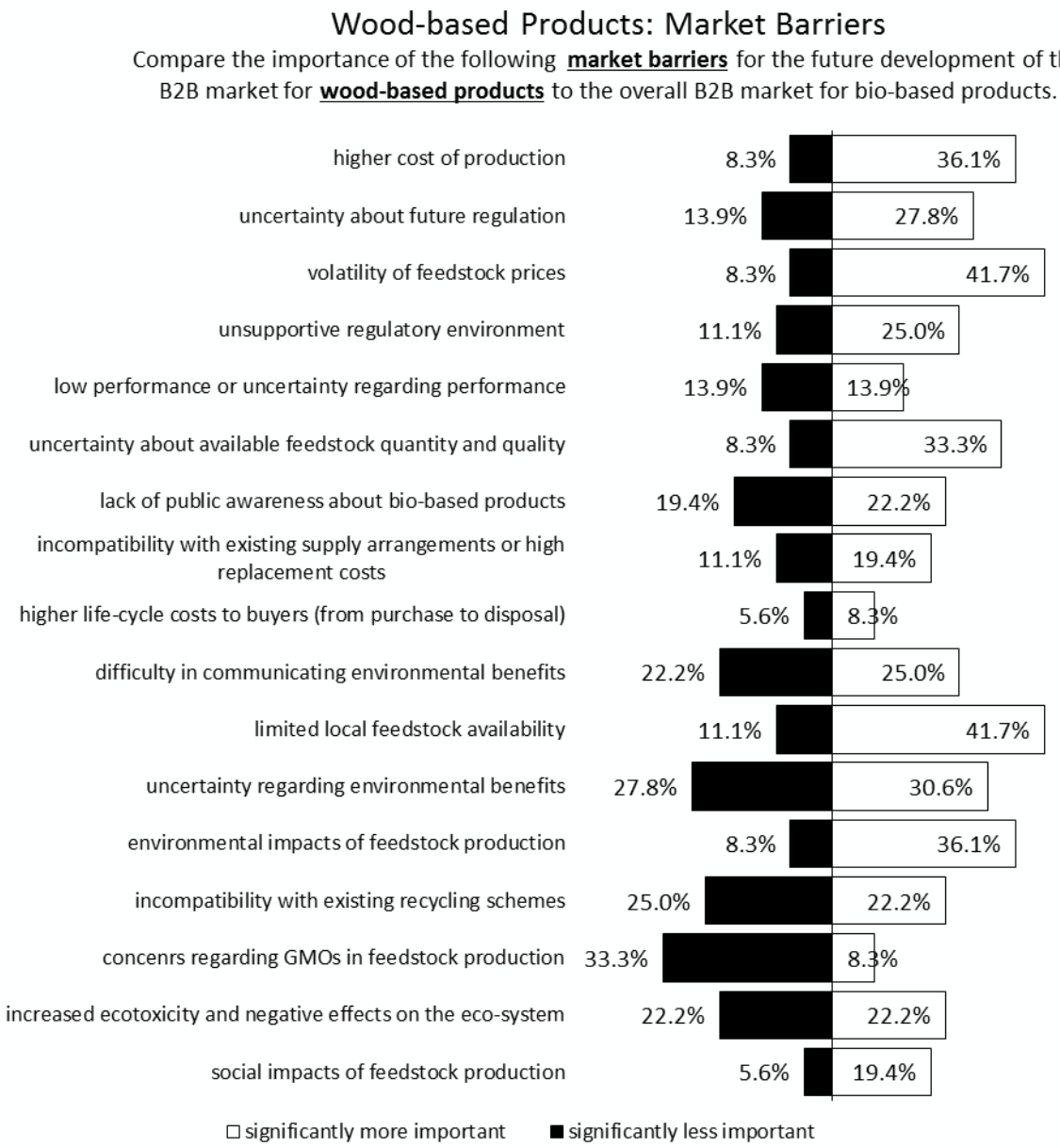
Figure 30 and Figure 31 depict the results with regard to the sector of wood-based products. This sector enjoys a number of particularly important market drivers, as the majority of sector experts agrees that "positive public image", "utilization of waste products", "recyclability" "potential to source feedstock locally", and "biodegradability / compostability" are "significantly more important" for the future development of the B2B market for wood-based products than for bio-based products in general.

Figure 30: Drivers for the future development of the B2B market for wood-based products



Moreover, the sector of wood-based products escapes a number of market barriers that hamper the acceptance of bio-based products in general. A remarkably large share of experts agrees that “concerns regarding GMOs in feedstock production” and the “incompatibility with existing recycling schemes” are “significantly less important” as barriers to the future market for wood-based products.

Figure 31: Barriers for the future development of the B2B market for wood-based products



2.4.7. Conclusions

Table 3 and Table 4 summarize significant differences across sectors with regard to drivers and barriers for the future development of the B2B market. Acceptance factors are flagged ("+") when the largest share of experts considers it "significantly more important" for the specific sub-sector than for bio-based products in general. To somehow correct for the skewed distribution of answers (i.e. the overall tendency among respondents to choose the answer option "significantly more important" than "significantly less important"), items are already highlighted when the share of experts choosing "significantly less important" exceeds the share of experts choosing "significantly more important".

Table 3: Differences across sectors with regard to market drivers

Drivers	Plastics	Solvents	Lubricants	Surfactants	Chemicals	Wood-based
positive public image						+
independence from fossil sources		+				
savings in CO2 emissions				–		
compliance with environmental regulation						
reduced human toxicity		+				
utilization of waste products				–		+
new or added functionality				+		
recyclability	+					+
potential to source feedstock locally				–		+
improved performance			+			
potential to attract new customers						
reduction of environmental pollutants (other than CO2)		+				
energy savings during production						
lower production cost						
biodegradability / compostability	+	+	+	+	–	+
life-cycle cost savings for buyers (from purchase to disposal)			–			
willingness to pay green premium					–	

Legend: +) The share of experts that consider this item to be "significantly more important" is larger than the share of experts that consider this item to be "significantly less important" and larger than the share of experts that consider the importance of this item to be "about the same" for this sub-sector, compared to the importance of this item as a driver of the overall market of bio-based products. -) The share of experts that consider this item to be "significantly less important" is larger than the share of experts that consider this item to be "significantly more important" for this sub-sector, compared to the importance of this item as a driver of the overall market of bio-based products.

For all sectors except for bio-based chemicals a majority of experts believes that "biodegradability / compostability" is "significantly more important" than for bio-based products in general. In fact, for the chemical sector experts that consider "biodegradability / compostability" and "willingness to pay green premium" to be "significantly less important" outnumber those that consider these aspects to be "significantly more important".

The items "positive public image", "utilization of waste products" and the "potential to source feedstock locally" are particularly important drivers for the sub-sector of wood-based products, when compared to the overall sector of bio-based products. "Independence from fossil sources", "reduced human toxicity", "reduction of other pollutants (other than CO2)" drive the sector of bio-based solvents in particular. Bio-based surfactants benefit particularly from "new or added functionality". The market acceptance of bio-based lubricants is particularly driven by the "improved performance".

Table 4: Differences across sectors with regard to market barriers

Barriers	Plastics	Solvents	Lubricants	Surfactants	Chemicals	Wood-based
higher cost of production	+				+	
uncertainty about future regulation						
volatility of feedstock prices		+			+	
unsupportive regulatory environment						
low performance or uncertainty regarding performance						
uncertainty about available feedstock quantity and quality			−	−		
lack of public awareness about bio-based products			−	−		
incompatibility with existing supply arrangements or high replacement costs						
higher life-cycle costs to buyers (from purchase to disposal)			−	−		
difficulty in communicating environmental benefits						
limited local feedstock availability				−		
uncertainty regarding environmental benefits						
environmental impacts of feedstock production						
incompatibility with existing recycling schemes	+			−		−
concerns regarding GMOs in feedstock production			−	−	−	−
increased ecotoxicity and negative effects on the eco-system			−			
social impacts of feedstock production						

Legend: +) The share of experts that consider this item to be "significantly more important" is larger than the share of experts that consider this item to be "significantly less important" and larger than the share of experts that consider the importance of this item to be "about the same" for this sub-sector, compared to the importance of this item as a barrier of the overall market of bio-based products. -) The share of experts that consider this item to be "significantly less important" is larger than the share of experts that consider this item to be "significantly more important" for this sub-sector, compared to the importance of this item as a barrier of the overall market of bio-based products.

Only a few barriers demonstrate significant differences with regard to specific product sectors. “Higher cost of production” seem to be particularly important as barriers for the sub-sectors of bio-based plastics and bio-based chemicals. “Volatility of feedstock prices” is a particularly important barrier for the sectors of bio-based solvents and bio-based chemicals. A majority of sector experts believes that the “incompatibility with existing recycling schemes” is “significantly more important” for the sector of bio-based plastics than for bio-based products in general.

3. Overall conclusions

The Open-Bio project used a two-stage Delphi survey approach to analyse the acceptance of bio-based products by the business sector. The focus of the study has been the identification of key factors and their relative importance in driving or hampering the future development of the business-to-business market for bio-based products. The term acceptance in this context refers to the willingness to purchase products made from bio-based materials or intermediates by other businesses.

Following this definition, the first survey round has provided a preliminary list of acceptance factors, which has been contested and validated in the second survey round. Furthermore, the second survey provided further insight into country-specific and product sector differences with regard to the importance of these drivers and barriers.

3.1. Key factors for acceptance of bio-based products in the B2B market

The second survey validated the findings of the first round with regard to the drivers and barriers for the future development of the B2B market for bio-based products. The preliminary list of key determinants of the market acceptance of bio-based products in the business sector was consolidated. A large majority of second round participants confirmed that the first round rankings correctly reflected the relative importance of drivers and barriers in the business sector. Therefore, the preliminary conclusions of the first round with regard to key factors of acceptance remain valid.

A main driver of the market acceptance of bio-based products is their positive public image. This positive image mainly roots in the perceived environmental performance. Environmental benefits figure as important drivers of bio-based products. The compliance with environmental regulation ranks among the most prominent market drivers. Correspondingly, uncertainty about future regulation or an unsupportive regulatory environment represent important market barriers.

The dependence on regulatory measures for the uptake of bio-based products in the B2B market is further underlined by the fact that higher production costs figure as the most important market barrier, while at the same time the willingness to pay a green premium is not considered a key driver in the B2B market. Rather, new functionalities of bio-based products, improved product performance or the potential to attract new customers represent factors that contribute to the uptake of bio-based products in the B2B market. This suggests that in the absence of additional regulatory incentives broad market acceptance of bio-based products will remain dependent on offering novel functionalities or similar cost compared to existing equivalents.

The combination of a positive public image and the importance of low public awareness suggests that awareness-raising activities to promote bio-based products may offer

significant returns. Finally, the positive public image of bio-based products and the importance placed on compliance with regulatory measures suggests that additional regulatory support may represent an additional, politically feasible option for accelerating the market acceptance of bio-based products.

3.2. Differences in acceptance factors

A large majority of experts agrees that “compared to other European countries, efforts to promote domestic supply chains are of particular importance for the future development of the B2B market for bio-based products in France.” This example shows that national trends retain a considerable role in driving markets for bio-based products. Ongoing policy and standardization processes at the European-level therefore need to pay attention to these country-specific trends. In addition to building a single European market for bio-based products, European initiatives should aim to reinforce and capitalise on national policies by addressing dimensions of particular importance in the individual markets.

Although the analysis has identified a robust ranking of drivers and barriers according to the relative importance for bio-based products, the absolute importance of acceptance factors may vary significantly depending on the actual type of product. The second survey round identified particularities of sub-sectors of the bio-based economy that need to be considered when designing policy instruments to promote bio-based products. The uptake of bio-based products in the B2B market may be more effectively stimulated by relying on a disintegrated strategy based on product categories rather than measures targeted at bio-based products in general.