

DETERMINATION ASPECTS OF POSSIBLE PURCHASING PRICES FOR BLUE MUSSEL PRODUCTS FROM THE BALTIC SEA¹

ZAIGA OZOLIŅA
BIRUTA SLOKA

Abstract

Demand for marine products has been relatively high and is increasing in most of countries. With higher demand for higher-value and protein-rich products population is looking for other sources that could be protein-rich products and might be substitute for fish products. Blue mussel contains proteins and minerals therefore it might become as food and feed ingredient and supplement product for food. Experience in many countries world-wide where mussel production is more developed has indicated that important aspect in realisation of the production is effective marketing. The following research methods were used in the research: studies of scientific publications on blue mussel price and factors influencing the price, survey of different stakeholders in mussel farming – public administrators, entrepreneurs and researchers; expert interviews. The data obtained from the study were analysed by indicators of descriptive statistics, cross – tabulations, testing of statistical hypothesis with t–test and analysis of variance – ANOVA, as well as correlation analysis and one of the most applied multivariate analysis methods – factor analysis. Based on experts' survey the results indicated that experts are ready to pay more for fresh mussel rather for than for frozen mussel. The most of expert's answers indicated the purchase price 5 euros for kilogram of frozen blue mussel.

Key words: price; blue mussel; survey of stakeholders; marketing; the Baltic Sea

JEL codes: M31; M32

INTRODUCTION

The European Union is creating favourable market conditions for industries which are based on sustainable and smart growth what is indicated by the European Commission in 2012 and in 2014 (European Commission, 2012; European Commission, 2014). In European policy documents, marketing is mentioned as important aspect to realize future trends and to compete in global market.

Knowledge and innovation have been indicated as main drivers of European economy, and “the sea and the coasts are drivers of the economy”, therefore it is

¹ This article is supported by National Research Program INTERFRAME-LV

necessary to unlock the potential of the blue economy (European Commission, 2012) to achieve smart and sustainable growth of Europe (European Commission, 2010).

In the Baltic Sea region several aspects have been researched to analyse its potential, and mussel farming is one of the fields in the Baltic Sea which potential is being researched in last decades. Mussel farming is a new field in the Baltic Sea region and many aspects are being researched.

Price is the key part of the marketing mix and the consumer considers the value of the product. Pricing decision plays an important role in the profit generation and for the new field it is important aspect.

THEORETICAL FINDINGS

Consumers' demand for healthy and ecological food has increased the sales volume of organic sector. Organic food market has rapidly increased in last decade what is confirmed also by researchers Cottingham (Cottingham, 2014); Marian and his colleagues (Marian, et al., 2014). It has affected demand for fish and fish products. Blue mussel is a high protein source researcher Lindahl and his colleagues (Lindahl, et al., 2005) already in 2005 have stressed that and it lives in the Baltic Sea as well, however this industry has not been developed. Consumers link organic food to a healthy and environmentally friendly rather than conventional food what has been concluded in Tregear and his colleagues (Tregear, et al., 1994) research results; Magnusson and his colleagues (Magnusson, et al., 2003) research results; Hughner and his colleagues (Hughner, et al., 2007) research results and organic foods perceived to be more expensive, but high price is as deterrent what is stressed by Magnusson and his colleagues research results; by Hughner and his colleagues research results.

Roddy and her colleagues' research paper in 1996 (Roddy, et al., 1996) highlighted the consumers' negative attitude regard organic product due to lack of availability, price and lack of promotion. Mussel farming has not been well presented on webpages and social networks concluded by Ozolina, Sloka in 2018 (Ozoliņa & Sloka, 2018) and promotion activities might stimulate customer interest to buy the product. Mussel is marine product and marine products are some the most traded food items in the world what is indicated in FAO in 2018 published material (FAO, 2018). Demand for marine products has been relatively high. With increasing demand for high-value and protein-rich products, the population is looking for other sources that could be protein-rich product and might be substitute for fish product.

Price is the amount of money to exchange the product. Customers perceive that in a farmers' market it is possible to obtain a higher-quality product, a better value for the money, more reasonably priced is stressed in McGarry-Wolf and his colleagues (McGarry-Wolf, et al. 2005) research results.

EMPIRICAL RESEARCH RESULTS

An expert survey was organised to analyse development aspect of mussel farming in the Baltic Sea Region (Denmark, Estonia, Finland, Germany, Latvia and Sweden). Experts were selected by their working experience and were invited to answer questions regarding their habits by habits of blue mussel consumption. Experts were invited to answer about mussel consumption frequency over the last 12 months, evaluation scale was set from 0–10, where zero time was consumed mussel and 10 – ten and more time consumed mussel. Experts could not specify frequency of mussel consumption if they had no opinion on respective analysed aspect – there were one to two percent of responses and they were not included in this analysis.

Table 1

Main statistical indicators of evaluation by experts of frequency to consume mussel over the last 12 months

Statistical indicator	
Mean	3.44
Standard Error of Mean	0.376
Median	2
Mode	1
Standard Deviation	3.097
Range	10
Minimum	1
Maximum	11

Source: Zaiga Ozoliņa conducted survey, $n = 68$

The results indicated that the majority of experts have not consumed mussel in last the 12 months (mode 1). Averagely the experts have consumed 2.44 time mussels over the last the 12 months (statistical indicator mean is 3.44, median 2).

Table 2

Distribution of expert evaluations on frequency regard mussel consumption over last 12 months – the Baltic Sea Region countries expert survey results in 2018

Evaluation	Frequency	Percent	Valid Percent	Cumulative Percent
0	24	35.3	35.3	35.3
1	14	20.6	20.6	55.9
2	8	11.8	11.8	67.6
3	6	8.8	8.8	76.5
4	2	2.9	2.9	79.4
5	2	2.9	2.9	82.4
6	3	4.4	4.4	86.8
7	1	1.5	1.5	88.2
8	2	2.9	2.9	91.2

Evaluation	Frequency	Percent	Valid Percent	Cumulative Percent
9	1	1.5	1.5	92.6
10 and more	5	7.4	7.4	100.0
Total	68	100.0	100.0	

Source: Zaiga Ozoliņa conducted survey, 0 – has not consumed; 10 – 10 and more times consumed mussel

The arithmetic mean of the expert evaluations on mussel consumption over last the 12 months indicated that 35.3% of surveyed experts have not consumed mussel over last the 12 months. 20.6% of surveyed experts consumed mussel once over last the 12 months. Cumulative percent of both answers is 55.9%.

8 experts have consumed mussel more than two times and 6 experts have consumed mussel 3 times over last the 12 months.

Scientific research in many fields investigate differences in evaluations by expert's gender even considering that expert is expert and gender characteristic attitudes have not influenced the evaluation results.

Table 3

Distribution of evaluations on frequency regard mussel consumption over last 12 months – the Baltic Sea Region countries expert survey results in 2018 by gender

Scale	Gender		Total
	Woman	Man	
0	16	8	24
1	9	5	14
2	7	1	8
3	5	1	6
4	1	1	2
5	1	1	2
6	2	1	3
7	0	1	1
8	0	2	2
9	1	0	1
10 and more	3	2	5
Total	45	23	68

Source: Zaiga Ozoliņa conducted survey, 0 – has not consumed; 10 – 10 and more times consumed mussel

Cross tabulation analysis did not show significant difference of obtained answers of experts when comparing the answers between man and woman.

Experts were invited to answer about willingness to pay for one kilogram fresh/frozen mussels in the shop/trading sites in free form.

Table 4

Main statistical indicators of evaluation by experts for paying for 1 kilogram fresh/frozen mussel in the trading site/shop

Statistical indicator	Fresh mussel	Frozen mussel
Mean	7.80	5.19
Std. Error of Mean	0.616	0.455
Median	7	5
Mode	10	5
Std. Deviation	4.040	2.986
Range	19	14
Minimum	1	1
Maximum	20	15

Source: Zaiga Ozoliņa conducted survey, $n = 43$

The results indicated that the experts are ready to pay more for fresh mussel rather than for frozen mussel, covered with arithmetic mean 7.80 and mode 10 (most often used evaluation) and median 7 for fresh mussel. Arithmetic mean for frozen mussel is 5.19, median 5 and mode 5.

Table 5

Distribution of evaluations on frequency to pay for 1 kilogram fresh / frozen mussel in the shop/trading site – the Baltic Sea Region countries expert survey results in 2018 by educational level

Scale	Fresh mussel		Frozen mussel	
	Master's degree of equivalent level (EQF level 7)	Doctoral degree of equivalent level (EQF level 8)	Master's degree of equivalent level (EQF level 7)	Doctoral degree of equivalent level (EQF level 8)
1	1	0	2	0
2	2	0	4	0
3	2	0	6	1
4	1	0	4	1
5	5	1	5	5
6	4	2		
7	3	0	1	0
8	2	1	4	1
10	5	3	1	1
11	0	1		
12	1	0	1	0
14	0	0		
15	2	1	1	0
20	1	0		
Total	29	9	29	9

Source: Zaiga Ozoliņa conducted survey, 0 – has not consumed; 10 – 10 and more times consumed mussel, $n = 38$

Five experts have lower than master's degree and these experts' answers were not included in this cross-tabulation analysis.

The majority of experts, which have obtained the highest education level – doctoral degree, would be ready to pay 5 euros for one kilogram of frozen mussel, whereas in favour of fresh mussel the answers were more dispersed.

Experts, which have obtained the highest education level – doctoral degree, did not pointed following numbers – 6, 9, 11, 13 and 14 at all.

Experts who's the highest obtained education level is master's degree, answers on willingness to pay for 1 kilogram fresh/frozen mussel in shop/trading site, were spread in scale. Most of the answers were received 5 euros and 10 euros per kilogram of fresh and frozen mussel.

Six experts, who's the highest obtained education level is master's degree, are willing to pay 1 kilogram for frozen mussel in the shop/trading site 3 euros per kilogram.

Experts, who have obtained the highest education level – master's degree, did not pointed out the following numbers – 9 at 13 at all.

Certain numbers might be less attractive for the customers.

Table 6

Results of analysis of variance (ANOVA) on expert evaluations on willing to pay for fresh/frozen mussel – the Baltic Sea Region countries expert survey results in 2018 by expert's age groups

Analysed aspects		Sum of Squares	df	Mean Square	F	Sig.
Fresh mussel	Between Groups	77.510	4	19.377	1.211	0.322
	Within Groups	608.060	38	16.002		
	Total	685.570	42			
Frozen mussel	Between Groups	37.001	4	9.250	1.041	0.399
	Within Groups	337.510	38	8.882		
	Total	374.512	42			

Source: Zaiga Ozoliņa conducted survey, $n = 42$

One-way analysis of variance (ANOVA) was performed to determine statistical differences. The results have not showed significant difference between age groups.

The average assessment by the Baltic Sea Region (representing countries – Denmark, Estonia, Finland, Germany, Latvia and Sweden) experts of analysed aspects on factors affecting development of mussel farming were compared by the use of analysis of variance (ANOVA) and the main results were included in Table 4.

Table 7

Results of analysis of variance (ANOVA) on expert evaluations on willing to pay for fresh/frozen mussel – the Baltic Sea Region countries expert survey results in 2018 by expert's country

Analysed aspects		Sum of Squares	df	Mean Square	F	Sig.
Fresh mussel	Between Groups	105.900	3	35.300	2.375	0.085
	Within Groups	579.670	39	14.863		
	Total	685.570	42			
Frozen mussel	Between Groups	33.071	3	11.024	1.259	0.302
	Within Groups	341.440	39	8.755		
	Total	374.512	42			

Source: Zaiga Ozoliņa conducted survey, $n = 42$

The experts represent different countries around the Baltic Sea; therefore the ANOVA analysis was applied by experts' representing country. The results revealed that the experts have different viewpoint regarding fresh mussel purchase price for one kilogram of mussel.

Experts who live in Germany would be ready to pay 10 or more euros for one kilogram of fresh mussel (average 11 euros per kilogram, mode – 10).

Experts who live in Sweden did not set one certain price. Average price could be 7.5 euros per kilogram (mode 5).

Experts who live in Estonia indicated different prices (average price – 9 euros for one kilogram of fresh mussel).

Experts who live in Latvia would be ready to pay 6 or more euros (mode 10) for one kilogram of fresh mussel.

To check experts' viewpoint on fresh/frozen mussel price the One-Sample test was carried out by expert gender statistical hypothesis testing on average evaluations of analysed aspects. H_0 was stated: average evaluations of experts by expert gender do not differ statistically significant and respectively alternative hypothesis: average evaluations of experts by expert gender differ statistically significant.

Table 8

Results of analysis of t-test on expert evaluations on willing to pay for fresh/frozen mussel – the Baltic Sea Region countries expert survey results in 2018 by expert's country

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Fresh mussel	12.406	45	0.000	7.946	6.66	9.24
Frozen mussel	10.398	45	0.000	4.848	3.91	5.79
Age	29.729	45	0.000	4.370	4.07	4.67

Source: Zaiga Ozoliņa conducted survey, $n = 45$

The results of t-test did not show significant difference.

Table 9

Results of correlation analysis based on expert evaluations on willing to pay for fresh/frozen mussel and mussel consumption over last 12 months – the Baltic Sea Region countries expert survey results in 2018

		1. Frequency to consume mussel	2. Fresh mussel	3. Frozen mussel
1. How many times over the last 12 months have you consumed mussels?	Pearson Correlation	1	0.145	-0.054
	Sig. (2-tailed)		0.342	0.724
	N	45	45	45
2. How much would you be willing to pay for 1 kg fresh mussels in the shop/trading sites?	Pearson Correlation	0.145	1	0.714**
	Sig. (2-tailed)	0.342		0.000
	N	45	46	46
3. How much would you be willing to pay for 1 kg frozen mussels in the shop/trading sites?	Pearson Correlation	-0.054	0.714**	1
	Sig. (2-tailed)	0.724	0.000	
	N	45	46	46

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Zaiga Ozoliņa conducted survey, $n = 46$

Taking into consideration that some of experts have not consumed mussel over the last the 12 months correlation analysis was applied, and the results indicated that there is correlation between mussel purchase price and consumption.

Those experts who have not consumed mussel or consumed mussel once over last the 12 months set the price lower rather than those who used mussel more.

CONCLUSION

As the European Union is creating favourable market conditions for industries, which are based on sustainable and smart growth, and blue economy potential, should be researched and analysed in further periods to reveal opportunities and to develop new industries. In certain areas mussel farming is well known field, however in the Baltic Sea region this field is being researched to find out its potential in this region.

The expert survey revealed, that some of experts have not consumed mussel in last the 12 months. The cross tabulation analysis did not reveal difference on frequency regarding mussel consumption over last the 12 months by gender.

The results did not indicate difference on frequency by gender consuming. Averagely the experts have consumed 2 times mussel within a year.

Experts are ready to pay more for fresh mussel (mean 7.8) rather than for frozen mussel (mean 5.19). Experts, who have obtained masters or doctoral degree, would be ready to pay 5 euros per kilogram of frozen mussel. Experts, who have obtained the highest education level – master’s degree, did not pointed out the following numbers – 9 at 13 at all.

Certain numbers, which experts have not chosen at all, might be less attractive on price tag. This aspect requests further analysis.

One-way analysis of variance (ANOVA) showed significant difference between age groups regarding mussel price.

Experts in Germany would be ready to pay more than 10 euros for one kilogram of fresh mussel. Experts, who live in Latvia, would be ready to pay 6 and more euros for one kilogram of fresh mussel.

Those experts who have not consumed mussel or consumed mussel once over last the 12 months set the purchase price lower rather than those who consumed mussel more than once.

REFERENCES

- Cottingham, M. (2014). Organic market report 2014. Soil Association, Bristol.
- European Commission (2010). EU Strategy 2020, A European strategy for smart, sustainable and inclusive growth. Viewed in 10.10.2019. Retrieved from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>.
- European Commission. (2012). Communication from the Commission to the European Parliament, the Council, the European Economic and Social committee and the committee of the regions. Viewed in 18.10.2019. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52012DC0494>.
- European Commission. (2014). Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth. Viewed in 10.10.2019. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=COM:2014:254:REV1&from=EN>.
- FAO – Food and Agriculture organization of the United Nations. (2018). The state of the world fisheries and aquaculture 2018: meeting the sustainable development goals. FAO. Retrieved on 20.10.2019 from <http://www.fao.org/3/i9540en/i9540en.pdf>.
- Hughner, R. S., Mcdonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour*, 6(2–3), 94–110.
- Lindahl, O., Hart, R., Hernroth, B., Kollberg, S., Loo, L.-O., Olrog, L., Syversen, U. (2005). Improving Marine Water Quality by Mussel Farming: A Profitable Solution for Swedish Society. *AMBIO: A Journal of the Human Environment*, 34(2), 131–138.
- Magnusson, M. K., Arvola, A., Hursti, U.-K. K., Åberg, L., & Sjöden, P.-O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite*, 40(2), 109–117.
- Marian, L., Chrysochou, P., Krystallis, A., & Thøgersen, J. (2014). The role of price as a product attribute in the organic food context: An exploration based on actual purchase data. *Food Quality and Preference*, 37, 52–60.

- McGarry-Wolf, M., Spittler, A. & Ahern, J. J. (2005). A profile of farmers' market consumers and the perceived advantages of produce sold at farmers' markets. *Journal of Food Distribution Research*, 36(1), 192–201.
- Ozoliņa, Z., & Sloka, B. (2018). Challenges in Promoting Mussel Farming Industry in a Digital Environment. *Humanities and Social Sciences, Latvia*, 26(2), 89–101.
- Roddy, G., Cowan, C. A., & Hutchinson, G. (1996). Consumer Attitudes and Behaviour to Organic Foods in Ireland. *Journal of International Consumer Marketing*, 9(2), 41–63.
- Tregear, A., Dent, J., & McGregor, M. (1994). The Demand for Organically Grown Produce. *British Food Journal*, 96(4), 21–25.