

The Food Value Chain of Buckwheat in Czechia

CROPDIVA – 5.1

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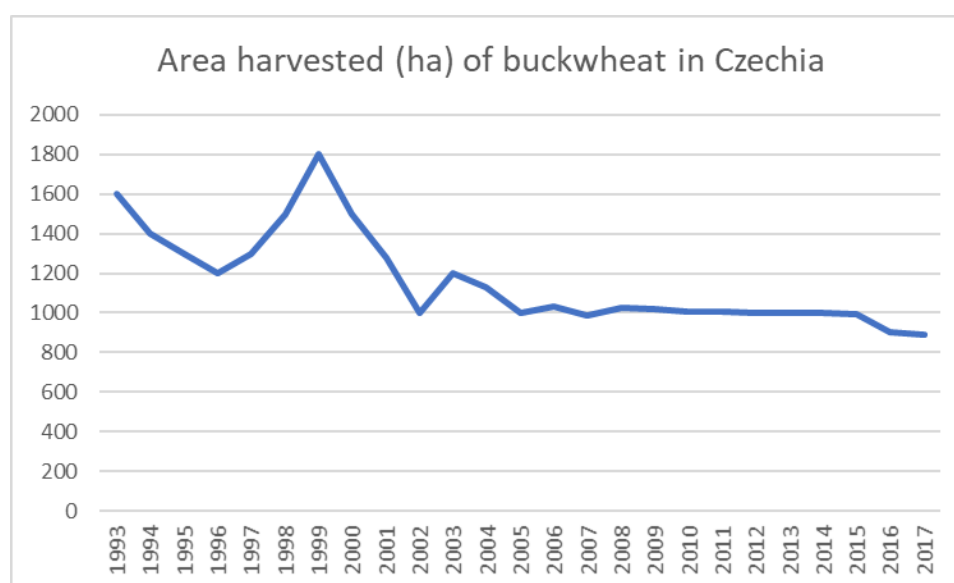
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1. THE VALUE CHAIN OF BUCKWHEAT IN THE CZECH REPUBLIC

1.1 Buckwheat in the Czech Republic

Historically, buckwheat was a very important crop in Europe. In many regions, buckwheat was very popular and it was included in many daily meals. But its importance was subsequently decreased. The buckwheat renaissance has come since 90 s of 20th century with the suitability in low-input systems. The main reason is the good nutritional and dietetic value, but also unpretending cultivation (Janovská et al., 2008). Buckwheat is highly valued for its high nutritional value, which is due to its rich protein content (8.8 - 18.9%). More than half of these proteins are albumins and globulins and a minimum of prolamins. This composition is close to the protein composition of legumes. The almost absence of gluten proteins makes buckwheat a naturally gluten-free food. In buckwheat, 18 out of a total of 20 known amino acids are represented. In the foreground are arginine, methionine and lysine together with aspartic acid. The presence of starch and fiber plays an important role. (Konvalina, 2012 p. 114). An important role is played by the representation of minerals, which is much better than wheat, especially the high utilization of zinc, copper, manganese. Buckwheat is the only pseudocereal containing rutin (Rysova, 2018).

Buckwheat is one of the minor crops in the Czech Republic, its harvest area is not monitored separately and belongs to the group "Other cereals". Data from FAOSTAT (2022) shows a declining trend of harvest area.



Graph 1. Development of the buckwheat harvest area in the Czech Republic during 1993 and 2017

Source: Own elaboration based on FAOSTAT data (2022).

The reason for the low-interest in growing buckwheat can be seen in the lower yield. Another factor is the energy intensity of storage, as buckwheat is prone to mold, it must be dried (Pexová-Kalinová, 2011). As a result of these factors, it is difficult to compete with lower prices of buckwheat imported especially from Poland.

Buckwheat, due to its composition and the absence of gluten, is one of the basic crops used for a gluten-free diet. However, strict rules must be observed during its processing mainly to prevent contamination with allergen and mold. There are two main ways how to avoid a contamination. The first is to shorten produce chain and the second is to choose appropriate method of production. Buckwheat must be peeled, the skins protecting the awnings are tough. Peeling is performed by a mechanical method that is gentle to preserve nutritional values and taste characteristics. For a routine substance that is thermolabile, this method is more gentle. The peeling process is based on the repeated grinding

of the unpeeled buckwheat grains between the millstones or discs with a rough surface. During mechanical grinding, a by-product is formed, buckwheat hulls, which are further used, for instance as a tea. This approach to buckwheat processing is implemented in the only buckwheat mill in the Czech Republic and it is the Šmajstrla family mill. Only buckwheat is processed in the mill, so the risk of contamination is minimized.

The second more industrially used method is thermal method, based on steaming the unpeeled buckwheat grains and drying them quickly. However, this process is more energy-intensive and affects the nutritional content of hulled seeds (Moudrý, 2005 p. 206).

The leading Czech manufacturers using more the thermal method include Lagris, Nominal, Natural Jihlava, Pro Bio (they use mechanic method too), and Country Life. Unlike the Buckwheat Šmajstrla Mill in Frenštát pod Radhoštěm, large producers very often process imported buckwheat (Poland, Ukraine and China).

The end product of researched buckwheat value chain in Czechia is a buckwheat pasta produced by Šmajstrla family mill. The main products of this producer are buckwheat groats, buckwheat flour, buckwheat porridge, buckwheat pasta and other products made only from buckwheat.



Source: Šmajstrla Family Mill <https://www.pohankovymlyn.com/produkty/>; NOMINAL [https://www.nominal.cz/bio-cerealni-kase-nomina-pohankova-\(bez-lepku\)](https://www.nominal.cz/bio-cerealni-kase-nomina-pohankova-(bez-lepku)); PRO-BIO <https://www.probio.cz/pohanka-lamanka-400-g-bio-probio>; COUNTRY Life <https://www.countrylife.cz/pohanka-loupana-kroupy-500-g-bio-country-life> (2022)

In recent years, buckwheat has been used in seed mixtures that meet the conditions for the Greening program, which is financially supported by the EU. Buckwheat is also added to the mixtures for the so-called nectar-bearing biozones within agri-environmental-climate measures, which is also financially supported by EU-funds. In recent years, Czech seed companies have focused on the sale of these mixtures, which also contain buckwheat, and farmers use them for land that is not very good in terms of yields of major crops.

1.2 Overview of the interviews completed

The primary research has begun by interviewing three umbrella organisations, namely Faculty of Agrobiology, Food and Natural Resources of the Czech University of Life Sciences in Prague, Central Institute for Supervising and Testing in Agriculture and The Crop Research Institute. The last named organisation belongs to the research group of European project ECOBREED supported by HORIZONT2020, where buckwheat is also included. Then the Šmajstrla Family Mill was interviewed as the producer of the final product and provided as well contacts to backward and forward entities within the researched buckwheat value chain. As shown in the Table 1., 14 interviews were conducted face to face.

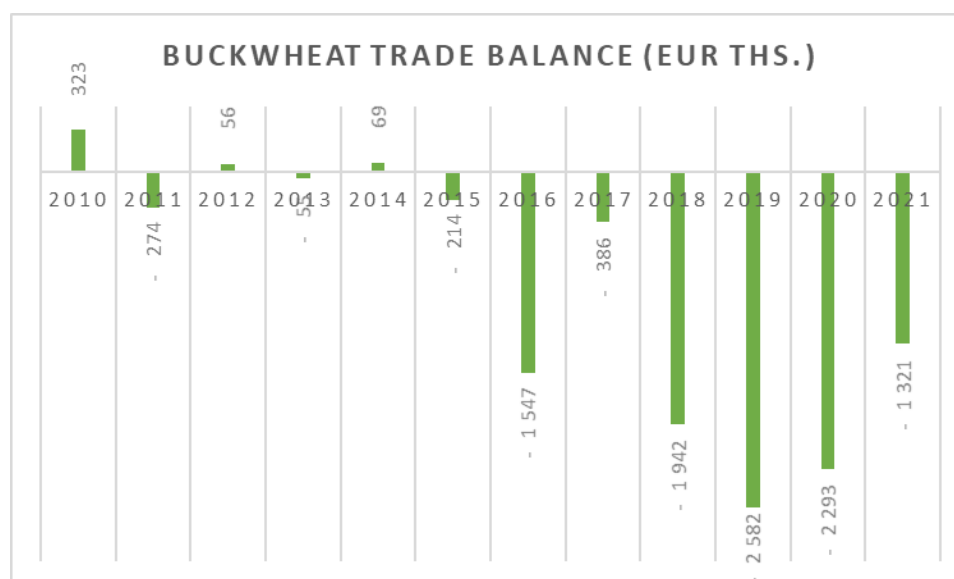
Table 1. Overview of the number of interviews performed for each VC actor

VC actor	Numbers of interview
Organisation (extension, research, etc.)	3
Breeder, Seed supplier, seed multiplier	3
Producer (farmer)	4
Processor (buckwheat mill)	2
Wholesaler	1
Seller	1

1.3 Results

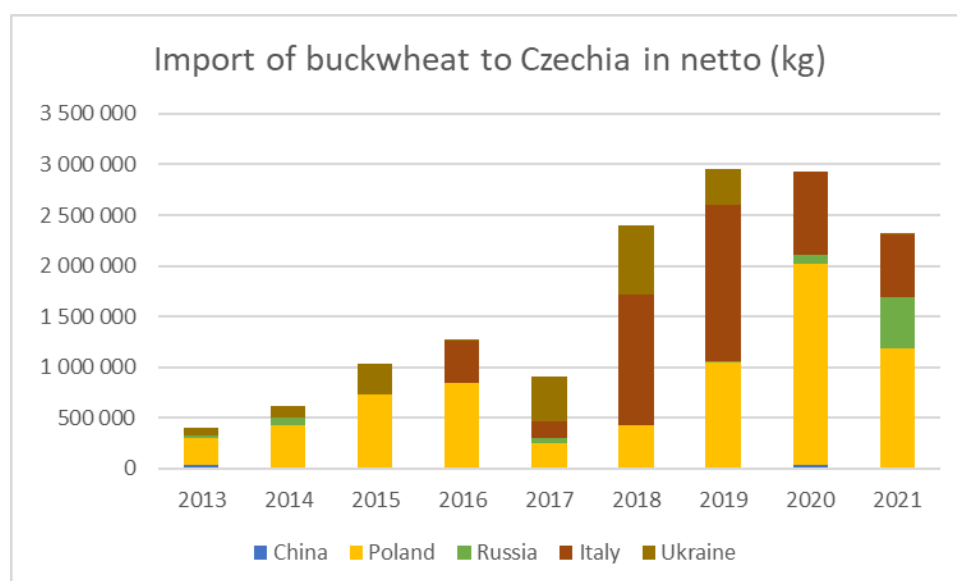
1.3.1 Description of the buckwheat value chain

The buckwheat value chain is significantly connected with the international market. Czech Republic has negative trade balance of buckwheat as is shown in Graph 2.



Graph 2 Development of trade balance of buckwheat in the Czech Republic from 2010 to 2021 According to CZSO (Czech Statistical Office, 2022)

Czechia imports buckwheat mostly from Poland, Italy, Russia and Ukraine. In 2020 and 2021, some countries (such as Ukraine or Russia) banned the export of certain commodities, including buckwheat. This is the cause of zero or very small import, which can be seen in the next Graph 3.



Graph 3 Import of buckwheat to Czechia between 2013 – 2021 according to the TOP countries
According to CZSO (Czech Statistical Office, 2022)

Although two companies are involved in the breeding of the Czech buckwheat variety. ELITA is the first company which maintain the old Czech variety of buckwheat named PYRA, but this variety is lowly used by the farmers. OSEVA PRO Ltd. produces 4 varieties in total but mainly two variety ZOE and ZITA are mostly demanded from the side of producers.

Producers (farmers) of buckwheat are located mainly in Morava (mountain area), east part of the Czech Republic, where are very good conditions for buckwheat cropping and also there is a tradition in buckwheat cropping and consuming buckwheat products.

Buckwheat products are distributed through two main distribution channels. The first channel is from foreign markets, that means that the products are imported (including buckwheat pasta) through the wholesaler or directly to the shops (shops with healthy products as well as the retail chains). The second channel includes the Czech products made by Czech companies listed above (Lagris, Nominal, Natural Jihlava, Pro Bio, Country Life, and Šmajstrla Family Mill). When we are talking about the final product for researched value chain within CROPDIVA project – buckwheat pasta- then there are only two Czech processors, and they are Šmajstrla Family Mill and Country life, which produces buckwheat pasta in bio quality.

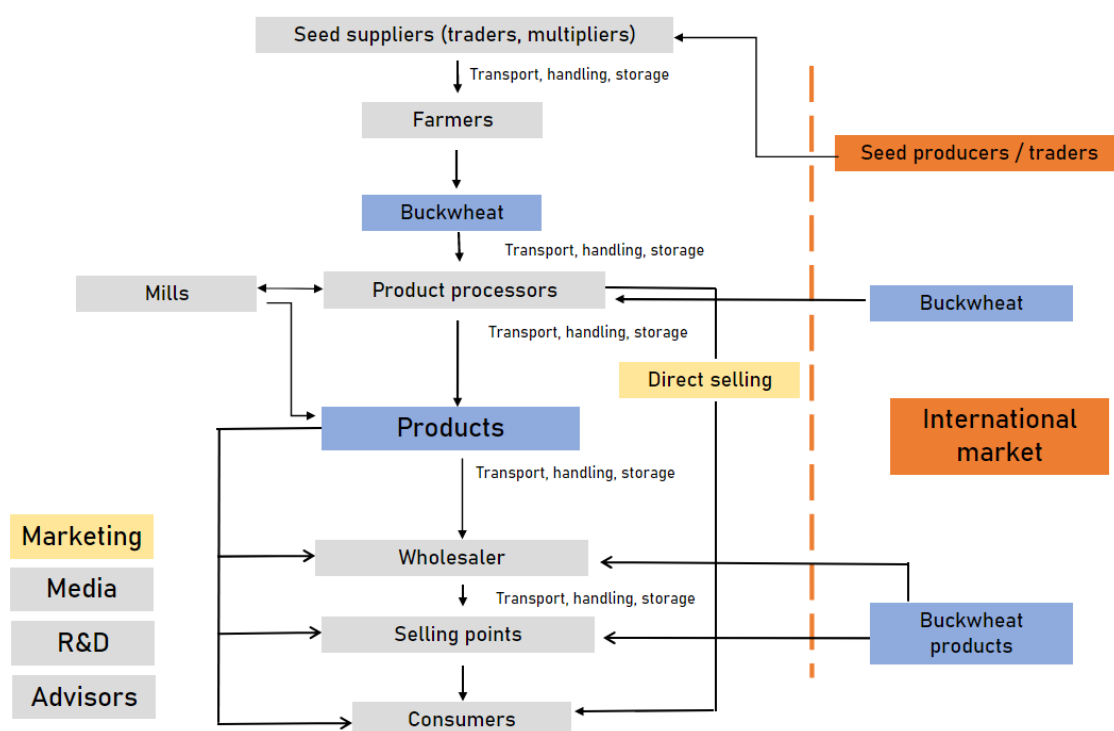


Figure 1. Buckwheat food value chain in the Czech Republic

1.3.2 Input suppliers

The main supplier of Czech varieties of buckwheat seeds is the company OSEVA PRO Ltd., which has 4 registered varieties of buckwheat, however, the variety ZOE and ZITA are the best-selling. The company is also conducting research on buckwheat varieties, in which it worked in 2020 on the project: Creation of genotypes of buckwheat (*Fagopyrum esculentum* Moench) with increased tolerance to abiotic stress and better technological processing of seeds. The research focused on the creation of several phenotypically different populations of buckwheat with increased tolerance to low temperatures and higher yield stability, with a high content of rutin in the seed and with a minimal proportion of seed hulls. OSEVA PRO Ltd is a member of the Czech-Moravian Breeding and Seed Association, which is a member of the International Seed Federation and also a member of Euroseeds.

Another seller of buckwheat seeds is OSEVA UNI Ltd, which offers the original Czech variety PYRA, mainly due to the fact that the company ELITA, which maintains this variety, is a subsidiary of OSEVA UNI. Other companies offer buckwheat seeds without noting a specific variety (might be Czech seeds or seeds from international market mainly from Poland and Ukraine). Buckwheat seeds in mixtures, that meet the conditions of the EU subsidy policy (greening, honey belts), are most often offered.

VC capacities & organization

Vertical and diagonal linkages

Seed trading companies are in contact with growers not only as a supplier of inputs, but also as a buyer, where the producer ensures the propagation of seed material for seed suppliers. Business relationships are based on experience and personal relationships. The seed producer is represented by a sales representative, usually an agronomist, who is responsible for a particular region in whose territory he has established personal relations with farmers. Seed propagation takes place on the basis of predetermined demand, experience from previous years and trade takes place on the basis of contracts.

Knowledge and technology of actors

Buckwheat is one of the less demanding crops for soil preparation, fertilization and treatment during the growing season. Cultivation and processing of buckwheat does not give rise to any special knowledge or technology requirements.

On the part of the maintainer (ELITA company) of the old Czech variety PYRA, negotiations are now underway with Central Institute for Supervising and Testing in Agriculture regarding the preservation of the variety, when the license to multiply it was purchased more than 20 years ago. One of the options for extending the license is to insert the PYRA variety into the Czech Crop Gene Bank.

Entry barriers

Foreign varieties of buckwheat are mostly large-grained, which means that they are harder to clean and Czech processors prefer Czech buckwheat, which has medium or smaller grains and better suits the settings of processing machines.

Resource and infrastructure

Inputs availability

Buckwheat sowing material is available, both Czech and foreign varieties. Customers (farmers) buy seed based on the price and properties offered. The interviews showed that buckwheat seed is mostly a supplementary material and the contract between seed producer and farmers determines the conditions of the majority of purchased seeds such as wheat, rape and others.

Existing and required infrastructure

The current infrastructure is stable, there are no requirements or gaps.

Market conditions

Market trends and demand

Seed traders said they are responding to demand that had been stable in recent years. They also stated that they could not assess the impact of the war in Ukraine, both in terms of possible interruptions in seed imports and in terms of increasing the number of Ukrainian citizens in the Czech Republic. Buckwheat dishes are widely represented in the diet of Ukrainians.

Market size

The buckwheat seed market is small and limited for Czech seed traders. The Czech Republic is not the main buckwheat grower or exporter in the region.

Distribution channels

Seed sellers supply seed material directly to their clients. In terms of distribution, no problems were mentioned. Buckwheat seeds make up a small part of growers' purchases in large seed companies. Buckwheat seed transport is usually part of the main deliveries (wheat, rape, corn). Both the seed company and the customer are able to provide transport. It depends on capacity, business relationships and personal relationships.

Framework conditions

Regulatory and institutional environment

Buckwheat is not separately included in the Czech List of Plant Varieties under Act 92/1996; nevertheless, it is subject to quality control by the state authority. According to an employee of Central Institute for Supervising and Testing in Agriculture, this is an exception in the legislative regulations within the EU, which, however, does not prevent the export of buckwheat seeds. There are five registered Czech buckwheat varieties (Pyra, Zoe, Zita, Zamira, Rose).

Buckwheat is grown in conventional and in ecological agriculture too. Each seeding company monitors the quality of the seed material at its own expense and sends it to Central Institute for Supervising and Testing in Agriculture.

Role of public sector (support, policies, etc.)

The cultivation of buckwheat is supported within the 'green direct payment' (or 'greening') which supports farmers who adopt or maintain farming practices that contribute to EU environmental and climate goals.

1.3.3 Producers (farmers)

The motivations for buckwheat cultivation were different: business relationship with the processor (2 respondents out of 4), diversification of crop rotation, landscape quality (follow-up to EU subsidies) and / or as seed multipliers.

VC capacities & organization

Horizontal and diagonal linkages

The interviewed producers know each other. Although the horizontal link works well, farmers do not work closely together. Buckwheat growers in the food value chain are connected to the main processors and respond to their demand for buckwheat grain. Two of the three large processors are located in Moravia and one in Central Bohemia. The buckwheat market in the Czech Republic is small. Farmers know each other in a nearby region, providing each other with services such as buckwheat cleaning and drying.

Knowledge and technology of actors

Farmers reported no need for added machinery, knowledge or technology to cultivate buckwheat. They need the technology for drying. No each of farmers has it.

Entry barriers

The barrier is clearly low purchase prices of buckwheat and another barrier is the need to dry the harvested material.

Resource and infrastructure

Inputs availability

Buckwheat seed is available to farmers, they choose it according to the yields of individual varieties, price and sowing time. According to one of the respondents, he sowed too early last year and had very low yields. Buckwheat must be sown until the end of May.

Existing and required infrastructure, logistical issues

The leading buckwheat processor Šmajstrla Family Mill has a small storage and production capacity. This was mentioned by one of the interviewed farmers as a problem and also a reason why he sold buckwheat to someone else last years. The Šmajstrla Family Mill is currently expanding its storage capacity.

Farmers who grow and sell organic quality buckwheat have it dried and cleaned by organic product processors. In the case of buckwheat, it is only the company PRO BIO, which either buys it straight away or returns it to the farmer.

Market conditions

Market trends and demand

Three out of four respondents reported that they grow buckwheat in BIO quality. According to them, growing buckwheat in organic quality is not difficult and with lower yields they get a better price for organic quality. The yield is around 1.7 - 1.9 tons.

Market size

The size of the market is small, however, one interviewed farmer mentioned that he sells buckwheat to abroad, namely to Poland and Austria. He also mentioned the situation when he sold the buckwheat to the Czech processor, and he resold it abroad because of its high bio quality.

Two out of the four respondents said they deliver all of their harvest to the Šmajstrla Family Mill, but they also had a request from other processors, which they rejected. The reason is long-term friendships and a higher price. This stems from the fact that there is no other link in the chain - an intermediary - that would increase the price by its margin.

Distribution channels

Distribution is mostly cover by customer that means by a processor.

Framework conditions

Role of public sector (support, policies, etc.)

As mentioned above, buckwheat is added to mixtures that support the ecological and climatic aspects of farming and it is financially supported by the EU. It is also added to mixtures that are sown as nectar-bearing biozones supported too. There are not any other motivation or subsidies from the side of Czech authorities supporting buckwheat cropping.

1.3.4 Product processor

We interviewed two buckwheat processors. The first of them was the only buckwheat mill in the Czech Republic - Šmajstrla Family Mill, which processes only buckwheat. The second was a company which, on the one hand, takes products from the Šmajstrla buckwheat mill, but at the same time buys

buckwheat from abroad and further processes it itself (it is more about the unpackaged sale of grains, or products that are easy to process).

Šmajstrla Family Mill processes buckwheat grains into a wide range of products, including buckwheat pasta. On the one hand, he sells buckwheat products in his own stone shop directly in the mill or via the e-shop. At the same time, it organizes tours and educational meetings in the mill. It also supplies buckwheat products to 5 wholesalers.

VC capacities & organization

Horizontal and diagonal linkages

Buckwheat mill directly cooperates with selected farmers in the region, where it buys buckwheat grains from them. It has 5 large suppliers who supply more than 100 tons and then other smaller ones. The processor itself is actively looking for new suppliers. The business relationship is mainly based on personal relationships and is usually not contracted. However, this has been changing since this year, as Czech farmers have started exporting harvested buckwheat to greening mixes in Germany over the last 2 years, where they will give them a higher price.

The buckwheat mill also supplies buckwheat flour to wholesalers in the bakery industry. They deliver it to bakeries, where pure buckwheat bread is baked from pagan flour or buckwheat flour is added to bread mixes.

Knowledge and technology of actors

Buckwheat grains which are further processed must be dry and of good quality. This means that proper storage precedes this, as buckwheat is prone to mold. The processor removes buckwheat (which it then uses in tea blends or as a filling for pillows) and further processes the cleaned and mechanically peeled grains. The processor has the technology set to a certain grain size, which means that he prefers certain varieties of buckwheat, especially Czech.

Most other processors offer basic buckwheat products such as grain, buckwheat porridge, buckwheat flakes and instant porridge.

The Šmajstrla Family Mill product portfolio is the most diverse and has more than 100 years of tradition. The owner of the mill states that, from the point of view of capacity utilization, they have year-round operation covered by one daily shift, except for the month of January, when they have two shift operations. It considers the capacity to be sufficient and there is room to increase production.

The Šmajstrl family is engaged in education and knowledge transfer through the media and educational events. It focuses its promotion and education primarily on the customer, emphasizing the beneficial effect of buckwheat on the human body, but notes that there is a lack of awareness of growers, in terms of the benefits of growing buckwheat for the soil and agrobiodiversity.

Entry barriers

Barriers are insufficient storage and production capacity. The processor has decided to solve this problem and is currently investing in the construction of a storage hall. The second processor, who is also a wholesaler purchasing Šmajstrla Family Mill products, buys buckwheat mainly from abroad and, as he states, has a shortage.

The owner of Šmajstrla Family Mill sees the barrier precisely in the fact that thermally processed buckwheat from abroad is transported to the Czech Republic, which the end customer buys for half the price compared to Czech buckwheat processed mechanically.

Resource and infrastructure

Inputs availability

Buckwheat processors have stated that they would be able to buy and process more quantities than they currently process. According to them, the problem is either their insufficient storage capacity (see information above) and the insufficient offer in price and quality that processors would like. Šmajstrla Family Mill does not buy buckwheat from abroad (except for one supplier from neighbouring Slovakia) and takes care of the quality of the grain. It buys buckwheat both in organic quality and from conventional agriculture. The wholesaler buys buckwheat from abroad, which is treated with the thermal method and is cheaper.

Market conditions

Market trends, market size and demand

Buckwheat, due to its composition and the absence of gluten, is one of the basic crops used for a gluten-free diet. However, strict rules must be observed during its processing to prevent gluten - allergen contamination, from the moment of harvest to distribution. Therefore, processing in a place where other cereals are not processed is ideal. The disadvantage of buckwheat can be considered its slightly bitter taste, which discourages many customers from buying buckwheat products.

In the case of the final product, buckwheat pasta, it is possible to mention the insufficient knowledge of the population about the very existence of this product and its preparation. Buckwheat pasta is cooked differently than wheat. If the customer does not know this method, it limits him in repeated purchase. However, the owner of the mill states a progress in the amount of pasta produced, stating that: "... 20 years ago we produced pasta once every 2 months, today we produce it once a week. I still see a reserve. "

In addition to Czech buckwheat growers, buckwheat mill also cooperates with one Slovak buckwheat grower, however, this is due to historical family relations. The processor does not buy buckwheat from abroad otherwise. It exports its products to Slovakia and Poland. The biggest competitors are retail chains that import roasted buckwheat from abroad, but it is of lower quality. However, the Czech customer usually buys according to the price.

Distribution channels

Šmajstrla Family Mill provides product transport, both in the Czech Republic and Slovakia. The regional wholesalers import the products at their own expense, while more distant customers pick up the products themselves. It also cooperates with a courier service that ensures the transport of products ordered on their e-shop. The customer cannot choose a carrier, there is only one and he does not have collection boxes. Which turned out to be a certain weakness, which was used by another company, which set up its own e-shop and re-sells buckwheat mill products under better transport conditions.

Framework conditions

Regulatory & institutional environment

The owner of the Šmajstrla Family Mill company states that the subsidies (mainly the EU ones for the greening mixes) have a negative impact on the functioning of the market.

1.3.5 Food sellers

The group "food sellers" includes all actors in the value chain, who in some way mediate the sale of buckwheat products. These are wholesale and retail stores mostly specialized with an emphasis on healthy eating and a healthy lifestyle.

VC capacities and organization

Vertical linkage

Processors and traders know each other, some have established business relations, which they apply especially when ordering a larger volume of a certain product from a distant foreign country (for example, organic maple syrup from a carpenter from Canada). Processors also know buckwheat suppliers if they are Czech farmers.

Market conditions

Market trends, market size and demand

Although there are no statistics on the consumption of buckwheat and buckwheat products in the Czech Republic, the results of the diploma thesis focused on the use of buckwheat in Czech gastronomy from 2020 can be used for illustration. The survey was conducted in a regional Czech town with a population of less than 100,000 (an area without a tradition of growing and consuming buckwheat). Primary data were collected among customers of the health food store. Thus, a group of respondents (313) who are expected to increase their consumption of healthy products, including buckwheat products. The survey concludes with the following conclusions:

- 97% of respondents know buckwheat as a food
- Respondents mainly know buckwheat porridge, flour and groats
- 36% of respondents do not use it in the kitchen at all and 25% use it only as an insert in soup
- 43% of respondents do not know how to cook buckwheat
- 40% of respondents consume buckwheat once a month and only 22% 2 to 3 times a week, of which 52% are celiacs (Doležalová, 2020).

Interviews with sellers showed that buckwheat products are not at the top of the range of healthy products. Their consumption is small and stable compared to other products.

The interviewed wholesaler, who processes buckwheat himself in a simple way and has dozens of buckwheat products from Šmajstrla Family Mill and other suppliers in his product portfolio, stated that he only supplies healthy products to specialized stores. His philosophy does not allow him to supply products to retail chains. This makes it different from its largest competitor on the Czech market.

The mill has 3 groups of typical direct customers, namely "BIO" mothers, elderly people from the nearby region and celiacs. The owner of the mill states that he does not see an increased demand for organic products.

1.4 Discussion

Based on the interviews conducted in all parts of the value chain, the basic characteristics of this chain were discovered and described.

There is a total of 5 Czech varieties of buckwheat in the Czech Republic and other varieties are imported mainly from Poland and Ukraine. The Czech varieties that are the best-selling (ZITA, ZOE) are medium to low grain. The assessment of the quality of the sowing material falls under the control of the state authority that issues the seed quality certificate.

Buckwheat growers are all over the Czech Republic, but mostly in the foothills of Moravia, where there is a long tradition in growing and consuming buckwheat. Buckwheat growers buy seeds mainly from Czech companies and orient themselves according to the price and yield of the given variety. As buckwheat is usually a supplement to other major crops, the price of another crop often determines the choice of seed supplier. Buckwheat growers export buckwheat both abroad (Germany, Poland and

Austria) and supply it to Czech processors, but there are not many of them. Buckwheat groats, crushed grains, flour and porridge are mostly produced. Buckwheat pasta is a unique product.

Farmers have developed relationships with each other, some of them cooperating in the field of cleaning and drying, as well as providing transport (if their businesses are geographically close).

The barrier to buckwheat cultivation is its lower and unstable yield and lower purchase price compared to mainstream crops. Farmers see support for buckwheat cultivation in greening subsidies and in buckwheat benefits in terms of soil improvement and sowing. A clear benefit is the simple growing of buckwheat, which affects its easy inclusion in organic farming.

Warehouses where buckwheat would only be dried, cleaned and stored do not figure in the chain. Harvested buckwheat is used either directly for export or for processing. The most important processor in the Czech Republic is Šmajstrla Family Mill, which has more than 100 years of tradition in buckwheat processing. He himself fulfils the function of a processor and a final seller through his stone shop and e-shop. It also supplies 5 large wholesalers and a number of smaller ones. The processor is expanding its storage and production capacities, which it would still be able to increase. Unfortunately, it has not had enough buckwheat harvested in the last two years, also due to buckwheat exports to blends within the EU-supported greening. Based on this trend, the processor is currently switching to contracted buckwheat deliveries. The processor buys organic buckwheat at a higher price than buckwheat from conventional agriculture. The biggest competitors are retailers, which buy foreign buckwheat modified by the thermal method and sell it at a lower price.

Buckwheat products are sold mainly in specialized stores for healthy nutrition or over the Internet directly from the processor. According to the processor and the retailer, the company lacks education on the health benefits of buckwheat consumption, emphasis on Czech products and education of farmers.

Research and breeding of new varieties is still ongoing.

1.4.1 Past challenges & successes of the value chain

Buckwheat has a long tradition in the Czech Republic, especially in Moravia, and Czech varieties are bred here. Although, buckwheat products are very little consumed in Czech society, raising awareness of a healthy lifestyle and consuming healthy foods, including buckwheat, can be considered a success. Over the last 30 years, a permanent network of health food stores has been built in the Czech Republic, where buckwheat products have their place. However, their consumption is still low compared to other healthy products.

Buckwheat sowing area in the Czech Republic itself is still declining. One of the reasons is the low competitiveness against the main crops grown (wheat, rape, corn). Another reason is that buckwheat is grown in the foothills, where subsidies for meadows and pastures have been available for the last 20 years. This forced farmers to convert less good-value land, which is sufficient for buckwheat, into grassy areas due to subsidies.

1.4.2 Current and foreseen challenges and chances of the value chain

The food value chain of buckwheat in the Czech Republic has several current problems and challenges.

Breeding and seed availability

Currently, negotiations are underway to extend the license of the original old Czech variety PYRA and at the same time research and breeding of an improved buckwheat variety is being carried out, especially in terms of resistance to low temperatures, higher rutin content, less husks and higher yields. Higher yields in relation to the size of the sown area, low cultivation costs and the purchase price could support better competitiveness of buckwheat.

Czech varieties are in demand by the main traditional buckwheat processor in the Czech Republic due to its quality and grain size.

Certification and public sector

On the one hand, support for the cultivation of buckwheat from EU sources is perceived positively by growers who are financially supported if they grow it in greening and honey belts, where buckwheat is one of the crops of the final blends. On the other hand, this aid is not well perceived by processors because it does not motivate growers to grow buckwheat for its further processing.

Under Czech law, buckwheat is not included in the variety list. Although the quality of seeds is fully monitored and certified by the state authority, this is discrimination from the point of view of seed companies, and it would help if it was included in the same group as wheat, rape, rye, triticale and barley.

Processors

Processors have free capacities and do not have enough quality Czech buckwheat. On the other hand, even here in the Czech Republic, there is a sale on the market of buckwheat imported from abroad (China, Poland, Russia), which is of lower quality but at a lower price.

Sales opportunities, promotion and marketing

The knowledge of the Czech population about the benefits of consuming buckwheat and buckwheat products is low. Mothers with young children and people on a gluten-free diet are more aware. The reason is that buckwheat products are largely sold only in specialized shops, except for the classic buckwheat, which is the above-mentioned lower-quality buckwheat from abroad. Buckwheat tastes bitter and people do not know how to cook buckwheat. Presentation of cultivation even the consumption of buckwheat would significantly benefit its production.

Table 1. Summary of the challenges, strategies and potential benefits

VC actor	Main challenges/opportunities (order: most important first)	Strategies undertaken/to undertake	Potential & benefits for the actor in the VC chain
Input suppliers (Breeders, researchers, seed producers, seed traders)	<ul style="list-style-type: none"> Research of new Czech varieties of buckwheat Support the inclusion of buckwheat into the official variety list 	<ul style="list-style-type: none"> Subsides for research Negotiation with the state authority 	<ul style="list-style-type: none"> Better yield characteristics could help attract new clients Improving the image of buckwheat as an equivalent cereal
Producers	<ul style="list-style-type: none"> Increasing yield Higher purchased prices Solve the lack of equipment for drying Subsides for food buckwheat cropping 	<ul style="list-style-type: none"> Find best variety for sales opportunities and be sure that the varieties are adapted for what is planned Put pressure on customers supported by higher quality Czech buckwheat Networking of Czech farmers cropping Czech varieties Negotiation with state authorities about financial support of buckwheat production 	<ul style="list-style-type: none"> Improving soil quality Increasing yields Increasing of sales Low-input crop Increasing of demand in Czechia and abroad too Increasing number of producers
Processors	<ul style="list-style-type: none"> Expansion of storage and production capacities Ensuring a stable supply of harvested buckwheat Intensive marketing about the benefits of buckwheat Quality maintenance Education of farmers 	<ul style="list-style-type: none"> Investments to storage and production capacities Negotiating relationships within a chain Support marketing activities Cooperation with schools, association of celiacs, etc Penetration into new markets 	<ul style="list-style-type: none"> Increase in production, sales Stable buckwheat supplies New products development Penetration into new markets
Wholesaler	<ul style="list-style-type: none"> Increasing the supply of buckwheat for further processing Education of society 	<ul style="list-style-type: none"> Increasing of supply and products differentiation Higher demand from the selling points side 	<ul style="list-style-type: none"> Increase in sales Supply stabilization
Sellers	<ul style="list-style-type: none"> Education - Consumers do not know buckwheat products and buckwheat pasta at all, and how to cook it New distribution channels 	<ul style="list-style-type: none"> Marketing, propagation, education New selling points 	<ul style="list-style-type: none"> Diversity of products offered might attract new clients Increasing demand

1.4.3 Limitations

The interviews were conducted at all levels of the value chain, when we proceeded with the snowball method.

The cultivation, processing and sale of buckwheat as food has many aspects that have influenced the attitudes and perspectives of the respondents. The main perspective on the part of farmers was the economic yield of buckwheat cultivation and its competitiveness vis-à-vis the main crops. The processor's perspective was a traditional family affair, pride and emphasis on Czech buckwheat, Czech products and their quality, especially in comparison with foreign cheaper and lower quality competitors. The perspective of wholesalers and retailers was that buckwheat products are an additional range in their offer, and demand for products is stable but low.

1.5 Synthesis

Buckwheat cultivation in the Czech Republic has a long tradition, but the sown areas of pure buckwheat are declining. The consumption of buckwheat products is a slightly increasing trend (within last 20 years), however, buckwheat products are still a minor group of products in the range of healthy food products.

The main obstacles to growing buckwheat for the production of food products are subsidies for non-food use of buckwheat, low awareness of the population about the benefits of buckwheat consumption and its import from abroad at low prices.

Although it might seem that the food value chain of buckwheat in the Czech Republic is at a stage of maturity, such changes are currently taking place on the market that the question of whether the life cycle of buckwheat as food enters a phase of decline price competitiveness vis-à-vis crops or to a phase of re-growth on the basis of breeding new varieties, education, war in Ukraine.

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