

Sebastian Jarzębowski, Agnieszka Bezat

Warsaw University of Life Sciences – SGGW, Poland

THE INTEGRATION IN THE POLISH GRAIN SUPPLY CHAIN: A CRITICAL ANALYSIS¹

INTEGRACJA W POLSKIM ŁAŃCUCHU DOSTAW ZBÓŻ: KRYTYCZNA ANALIZA

Key words: grain supply chain, integration, SWOT analysis

Słowa kluczowe: łańcuch dostaw zbóż, integracja, słabe strony i zagrożenia w łańcuchu dostaw zbóż

Abstract. The article presents the structure and organization of selected stages of the Polish grain supply chain. The analysis was conducted for three stages of the supply chain, namely: the production, purchase and trade as well as processing. The critical assessment of the chain integration was conducted using the modified SWOT analysis identifying the weaknesses and threats of Polish grain supply chain.

The main weakness of the analyzed chain is a low level of integration and weak formal relationships with recipients of raw materials. Another weakness of the first stage of the chain is the strongly fragmented production of cereals. A decline in demand for grain products may be a threat for grain flow channels. A danger affecting the supply volume is an increase in production input prices (fertilizers), while the domestic demand for raw materials may be limited due to an increase of competition from Ukraine and Russia.

Introduction

The relationship between individual stages of the supply chain is an important issue in the market organization. With traditional management processes, the goal of business activities was to maximize the efficiency of an individual functional unit by achieving competitive edges based on cost reduction [Lee 2000]. Nowadays SCM needs renewed attention. A strong competition coming from other market participants requires cooperation among the supply chain. It is a need for reduced profit margins due to pressure from increasing competition, needs for administrating multisite manufacturing, cut-throat marketing channels, maturation of the world economy, customer service demands for quick and more reliable delivery, and pressure to reduce inventories [Davis 1993]. The successful integration in the supply chain leads to reduction inventory investment in the chain, increasing customer service, and competitive advantage for the channel [Cooper, Ellram 1993]. An important aim of vertically-oriented integration in food chain is an ensuring a guarantee of chain's wide quality. In accordance with the requirement 172/2002 farmers, as the first step of food supply chain, should warrant the traceability of their products, as well as withhold unsafe products² [Bezat 2008].

Nevertheless in Poland, integration between stages of the grain industry is poorly developed. In general, no grain contracting develops for a variety of buyers [Stańko 2007] which was a premise for the research.

Structure of Polish grain supply chain

In the study three selected stages of supply chain were analyzed, namely the production, purchase and trade as well as processing. The grain supply chain consists of several stages connected together by complicated flow of material streams (Fig. 1). In Poland in 2007, there were 2.4 million farms [The cereal... 2011]. An average farm size in Poland is about 10 ha [ARiMR 2008]. The share of farms involved

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² It is significant that farms make up the first step of food supply chain and they have a big influence on the product's quality in the whole chain. Besides, farmers wishing to become suppliers in the more demanding retail markets, either locally or globally, need to customize for the market requirements [Bezat 2008].

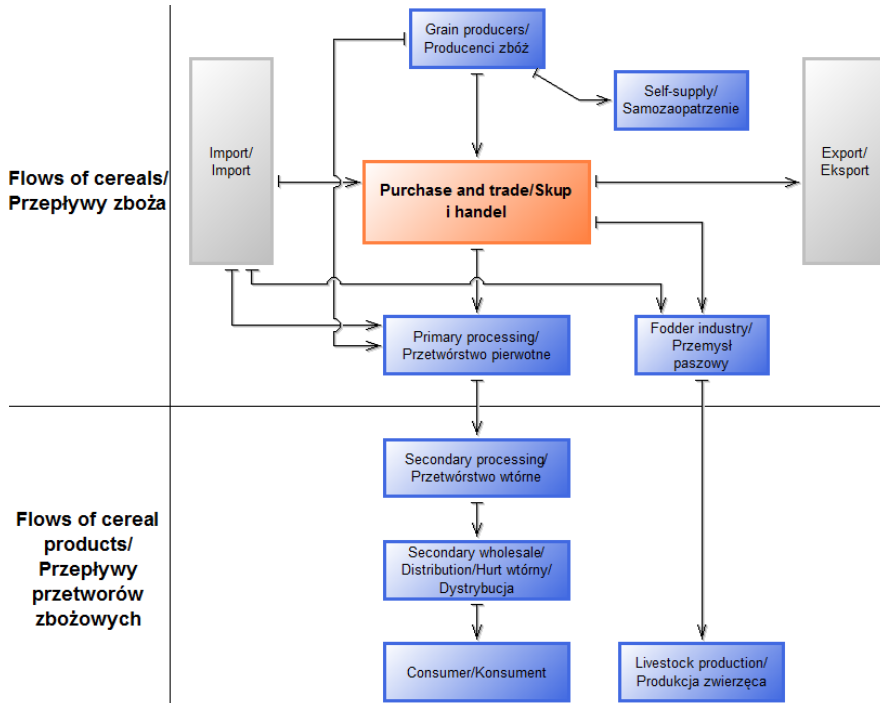


Figure 1. The structure of the grain supply chain in Poland

Rysunek 1. Struktura łańcucha dostaw zbóż w Polsce

Source: own study based on Stańko, Bojańczyk 2000

Źródło: opracowanie własne na podstawie Stańko, Bojanczyk 2000

in grain production amounted to 70% in 2007 (1,68 million farms)³ [The cereal... 2011]. In Poland, farms with an area up to 20 ha are the largest percentage (90%) in the structure of farms producing cereals [The cereal... 2011]. Hence, it can be stated that Polish agriculture, compared to German or French agriculture, is characterized by a very high fragmentation of grain production. In Poland, the constant grain production is lead by 500 thous. farms. Annually, they provide the market with 8-8,5 million tones of cereals⁴ [ARR 2008]. A primary role in the trade market is played by a small group of farms (estimated at around 50 thous.) with an area over 50 ha and large farms with an area of 2-3 thous. ha (this group gives to the market over 50% of cereals) [Gołębiewski, Klepacki 2007].

According to IAFE (Institute of Agricultural and Food Economics), there were approximately 850 units involved in grain and feed trade in 2005 in Poland [Judziński et al. 2006]. The largest of these are: Elewarr (20 elevators and warehouses with a total storage capacity of 650 thous. tones), Polish Mills (Polskie Młyny) (32 storage facilities with a total capacity of 600 thous. tones) and Rolimpex (25 storage facilities and elevators with a total capacity of 460 thous. tones). In 2005, the distribution system consisted of tens of thousands of key farms producing grain for sales and about 430 trade companies making supplies from secondary market and import [Raport o przemyśle... 2006]. Through this channel 5 to 7 million tones of cereals flowed every year. As a result of the concentration of intermediaries' activities in the grain trade, approximately 40 companies had 70% of market share [Seremak-Bulge, Jerzak 2006]. According to CSO's (Central Statistical Office) data, there were 136 grain trade companies in 2009 and the number increased by 30% since 2004 [Niepublikowane dane... 2011].

³ Within the last 20 years in Poland, one has seen concentration processes of grain production (decrease in the number of farms producing cereals from 2,7 million in 1990 [Judziński et al. 2006] to 1,6 million in 2007 [The cereal... 2011]) which took place thanks to development of the system of leases and transformations occurring in former PGRs (State Agricultural Farms).

⁴ It is estimated that production volume and marketability will increase as a result of specialization of production [ARR 2008]. The share of commodity farms increases with increase of an average area [Judziński et al. 2006]. In large companies, a high level of technology reduces random factors, and grain production within the group is characterized by lower volatility [Judziński et al. 2006].

Fragmentation of the production structure, that influences directly lot sizes and possibility of supply of the chain's stages, is another aspect characterizing the grain supply chain. A buyer, however, requires from his suppliers large, uniform in terms of quality and batches delivered on time. Due to the specific structure of Polish agriculture, it is obvious that only part of grain producers is able to meet these requirements. In this context, both increasing market strength of producers by joining cooperatives or creating producer groups and reinforce the meaning of buying and trade stages play an important role in grain distribution process.

At the stage of processing in the Polish grain supply chain, a strong concentration processes can be noticed. These processes take often place thanks to foreign capital.

In the milling part (processing of grain into flour, groats and cornflakes), there were about 750 companies with a registered business, including about 300 companies with a significant market share in 2005. It is estimated that 680 entities in the grain industry are engaged in milling for consumption purposes [ARR 2008]. 170 enterprises had to report mandatory, 39 of which were medium and large companies employing over 50 people (70% of the total milling industry). The largest mills are as follows: VK Mühlen Polska, Polskie Młyny (Polish Mills), Gdańskie Młyny and Dolnośląskie Młyny.

The structure of the Polish milling industry is constantly changing – the largest declines in the number of operating companies were recorded in the group of small⁵ (decrease of 90% since 1990) and medium⁶ companies (decrease of 70 since 1990). The number of large mills⁷ remains constant, slightly more than 200 [GAM... 2006].

In 2005, the structure of the fodder industry was created by 350 private companies involved in production of industrial feed, including 185 enterprises employing at least 9 people on a permanent basis (35 of which employed 50 and more people). The sector is characterized by the fact that only a few companies, as Provimi (former Central-Soya), Cargill, Koudijs, LBN, Dosche, SANO, demonstrate more than 50% of market share in the feed production [Judziński et al. 2006].

SWOT analysis

While assessing the grain supply chain, the modified SWOT analysis was carried out. The Polish grain supply chain was assumed to be an object in the analysis. The analysis was conducted for three stages of the supply chain, namely: the production, purchase and trade as well as processing. Within the critical assessment of the integration in the chain the modified SWOT analysis was made, within the weaknesses and threats of Polish grain supply chain were identified. The weaknesses and threats of Polish grain supply chain were presented in table 1.

Most weaknesses of the Polish grain supply chain are visible on the side of raw materials' supply. Firstly, there are fluctuations of quality and quantity of consumption grain – mainly due to weather conditions, low use of biological progress and a low adjustment of crops to soil conditions – which may cause periodic shortages of raw materials for production.

Secondly, fragmentation of the grain production in Poland is much stronger than in other European countries like e.g. Germany and France. The fragmented structure of agriculture areas causes difficulties due to the necessity of cooperation with numerous small entities. In this context, a reluctant to establish producers' groups and cooperative structures combining batches of raw materials from different producers is a weak aspect of the chain. On the supply side, there is only a few percentages of specialized farms of over 50 ha. However, the share of small producers, that show low motivation for the use of certified seed material and use outdated production technologies and produced grain for their own purposes (mostly as feeds in livestock production), is significant.

Thirdly, a low level of integration and weak formal relationships with buyers of raw materials (a low level of contracting) are weaknesses in terms of the Polish supply chain. Due to the relatively small number of the major grain trade companies (although in recent years, changes have been observed at this stage of the chain), a producer-processor relation is the popular channel of grain flow.

Reducing of demand for grain products may be a threat for channels of grain flow, however, these processes can be mitigated by an increased demand for feeds from livestock production and their high absorption of grain. Another danger affecting the volume of supply is an increase in prices of production inputs (fertilizers), while the volume of domestic demand for raw materials may be limited by an increase of competition from Ukraine and Russia.

SWOT analysis conducted for the grain industry in Poland in 2000 deserves the attention. The analysis includes the following stages of the supply chain: production, primary wholesale, processing, secondary wholesale, retail and import/export [Stańko, Bojańczyk 2000]. Many issues raised by the authors remain still valid.

⁵ Companies with processing capacity < 30 t/day (< 10000 t/year)

⁶ Companies with processing capacity 30 – 100 t/day (10000-36000 t/year)

⁷ Companies with processing capacity > 100 t/day (> 36000 t/year)

Table 1. The modified SWOT analysis of the grain supply chain in Poland**Tabela 1. Zmodyfikowana analiza SWOT polskiego łańcucha dostaw zbóż**

Weaknesses/Słabe strony
– fluctuations of grain quantity and quality/ <i>duże wahania w ilości i jakości zbóż konsumpcyjnych</i>
– low motivation to use certified seed/ <i>niska motywacja do wykorzystywania kwalifikowanego materiału siewnego</i>
– low level of marketability (significant use of grain on farms)/ <i>niski poziom towarowości (znaczne wykorzystanie zbóż w gospodarstwie)</i>
– fragmented grain production (a small share of farms with an area over 50 ha)/ <i>zbyt rozdrobniona produkcja zbóż (mały udział gospodarstw o powierzchni pow. 50 ha)</i>
– spatial mismatch between supply and demand/ <i>dysproporcja przestrzenna podaży i popytu</i>
– low level of farm specialization – fragmented structure of grain species/ <i>mały stopień gospodarstw wyspecjalizowanych – rozdrobniona struktura gatunkowa zbóż</i>
– low level of the supply chain's integration/ <i>niski poziom integracji ogniw łańcucha dostaw</i>
– weak relationships with buyers of raw materials/ <i>słabe powiązania formalne z odbiorcami surowców</i>
– reluctance to form producer groups and cooperative structures/ <i>niechęć do tworzenia grup producenckich oraz struktur spółdzielczych</i>
Threats/Zagrożenia
– increase of production input prices (fertilizers, plant protection)/ <i>wzrost cen środków produkcji (nawozy, środki ochronne)</i>
– reducing the grain supply for consumption due to alternative grain use (biofuels)/ <i>ograniczenie podaży zbóż na cele konsumpcyjne poprzez pojawienie się alternatywnych kierunków zastosowania ziarna (biopaliwa)</i>
– decrease in consumer demand for processed grain products/ <i>spadek popytu konsumpcyjnego na produkty przetwórstwa zbóż</i>
– increase in competition from Ukraine and Russia/ <i>wzrost konkurencji ze strony Ukrainy i Rosji</i>

Source: own study

Źródło: opracowanie własne

Undoubtedly, the structures of the individual stages have changed both proprietary and quantitative structures (market sharing). It seems that the issue of privatization at all stages of the supply chain is no longer a problem. Also, the concentration process of storage, processing and trade is far more moved. The market situation seems to be stable and market shares of the largest players are changing only slightly. Modernization of the sector (infrastructure) is far more advanced than in 2000 due to access to EU funds or intensive investments of foreign companies at all stages of the sector.

Problems referring to the fragmentation of the Polish agriculture (grain production) as well as still low marketability and a low share of high quality seed material remain valid. The aspect, pointed out by the authors, concerning the whole supply chain, e.g. a low level of cooperation between the stages – weak organization of the chain (a low level of contracting) is gaining on importance.

Additionally, the grain market is characterized by significant seasonality of production and food supply. These fluctuations can be limited by the food industry, since the processing technology allows the production of goods with high durability. Moreover, technical and technological progress in production, storage and food processing (e.g. cereals) significantly contribute to mitigating the economic and social impact of the seasonality of food supply [Kowalski 2007].

Conclusions

In the framework of the paper the critical analysis of Polish grain supply chain was conducted. The modified SWOT analysis was used in this context. Based on the results of the analysis the following conclusions regarding Polish grain supply chain were made:

1. The main weakness of the grain supply chain in Poland is a low level of integration and weak, formal relationships with recipients of raw materials. It can be stated that the use of contracting decreases with the downward shift along the chain – in the processing companies about 30% of purchases, and in the trade companies about 15% is contracted.
2. Another weak aspect of the first stage of the chain is strongly fragmented production of cereals. The fragmented structure of farming causes difficulties due to the necessity of cooperation with different entities and is the main reason for a low marketability of grain production.
3. Reducing of demand for grain products may be a threat for channels of grain flow. Another danger affecting the volume of supply is an increase in prices of production inputs (fertilizers), while the volume of domestic demand for raw materials may be limited by an increase of competition from Ukraine and Russia.
4. In relation to the SWOT analysis of the grain supply chain conducted by Stańko and Bojańczyk in 2000 [Stańko, Bojańczyk 2000], it was stated that a lot of the issues raised by the authors are still valid (fragmentation of the Polish agriculture, low marketability, low share of certified seeds, low level of

cooperation between stages of the channel). Undoubtedly, structures of individual stages have changed both the ownership (privatization) and quantitative structures (fragmentation of the market). Also, modernization of the industry (infrastructure) is far more advanced than in 2000 thanks to access to EU funds or intensive investments of foreign companies in all stages of the chain.

The founded weaknesses and threats in Polish grain supply chain indicate among others the weak integration. One can observe poor cooperation between stages of supply chain. The large number of producers and seasonality of production difficult creating of long-term relation. The weak integration in Polish grain supply chain results from the low share of contracting. The poor cooperation with different entities within the grain supply chain is the main reason for a low marketability of grain production, which opens the market for foreign competitors.

Bibliography

- ARiMR – Agencja Restrukturyzacji i Modernizacji Rolnictwa. 2008: [www.arimr.gov.pl/index.php?id=38&id1=0&id2=1, date of reading], accessed January 2011.
- ARR – Agencja Rynku Rolnego 2008: Rynek zbóż w Polsce. [www.bip.minrol.gov.pl/DesktopModules/Announcement/ViewAnnouncement.aspx?ModuleID=1564&TabOrgID=1683&LangID=0&AnnouncementId=10153&ModulePositionId=2199, date of reading], accessed January 2011.
- Bezat A.** 2008: Polish farms in the light of quality requirements. Scientific Journal Warsaw University of Life Sciences - SGGW. *Problems of World Agriculture*, vol. 3(18), 7-13.
- Cooper M.C., Ellram I.M.** 1993: Characteristics of supply chain management and the implications for purchasing and logistics strategy. *The International Journal of Logistics Management*, 4(2), 13-24.
- Davis T.** 1993: Effective supply chain management. *Sloan Management Review*, Summer, 35-46.
- GAM – Groupement des Associations Meunières de l'UE, The European Flour Milling Association. 2006: Manual on the European flour milling industry, 125-129.
- Golebiewski J., Klepacki B.** 2007: Poziom produkcji i zużycia zbóż w Polsce w latach 2000-2007. [W:] Czy grozi Polsce kryzys zbożowy (w świetle pozarolniczego wykorzystania ziarna) (ed. B. Klepacki). *Więś Jutra*, Warszawa, 16-23.
- Judziński B., Seremak-Bulge J., Lopaciuk W.** 2006: Zmiany podmiotowej struktury produkcji zbóż. [In:] Ewolucja rynku zbożowego i jej wpływ na procesy transmisji cen. *Program Wieloletni, Report*, no. 38, IERiGŻ-PIB, Warszawa.
- Kowalski A.** 2007: Istota funkcjonowania rynku żywnościowego i rolnego. [W:] Rynek rolny w ujęciu funkcjonalnym (red. W. Rębisz, M. Idzik). Wyższa Szkoła Finansów i Zarządzania w Warszawie, IERiGŻ-PIB, Warszawa.
- Lee Y.** 2000: Study of Relationships between Apparel Manufacturers' Supply Chain Management, Company Characteristics, and Inventory Performance. Dissertation submitted to the Faculty of the Virginia Polytechnic Institute and State University, Virginia.
- Niepublikowane dane naliczane na podstawie kwartalnego sprawozdania statystycznego F-01/I-01, sporządzonego przez podmioty gospodarcze prowadzące księgi rachunkowe, w których liczba pracujących wynosi 10 i więcej. 2011: CSO. Przedsiębiorstwa z grupy PKD 14.27, Warszawa.
- Raport o przemyśle zbożowo-młynarskim w Polsce. 2006: Izba Zbożowo-Paszowa, Warszawa.
- Seremak-Bulge J., Jerzak M.** 2006: Rozwój systemu rynkowego. [W:] Ewolucja rynku zbożowego i jej wpływ na proces transmisji cen (red. J. Seremak-Bulge). *Program Wieloletni, Report*, no. 38, Wyd. IERiGŻ-PIB, Warszawa.
- Stańko S.** 2007: Tendencje na rynku zbóż. [W:] Czy grozi Polsce kryzys zbożowy (w świetle pozarolniczego wykorzystania ziarna) (red. B. Klepacki). Wyd. Więś Jutra, Warszawa, 30-39.
- Stańko S., Bojańczyk E.** 2000: Rynek zbożowy. [W:] Strategiczne opcje dla polskiego sektora agrobiznesu w świetle analiz ekonomicznych (red. E. Majewski, G. Dalton). SGGW Centrum Naukowo-Wdrożeniowe, Warszawa.
- The cereal supply balance sheet of the Statistic Office (EUROSTAT) of the European Union. 2011: [www.ama.at/Portal.Node/public?genetics.rm=PCP&genetics.pm=gti_full&p.contentid=10008.71230&supply-balance-sheet.pdf, date of reading], accessed February 2011.

Streszczenie

Celem naukowym podjętym w artykule było przedstawienie struktury i organizacji wybranych ogniw polskiego łańcucha dostaw zbóż. Analiza została przeprowadzona dla trzech ogniw łańcucha dostaw, a mianowicie: produkcji, skupu i handlu oraz przetwórstwa. W ramach krytycznej oceny integracji w łańcuchu dostaw przeprowadzono zmodyfikowaną analizę SWOT, w ramach której zidentyfikowano słabe strony i zagrożenia dla polskiego łańcucha dostaw zbóż.

Główną słabością analizowanego łańcucha jest niski poziom integracji i słabe formalne powiązania z odbiorcami surowców. Kolejny słaby aspekt to silnie rozdrobniona produkcja zbóż. Zagrożeniem dla kanałów przepływu ziarna może być zmniejszenie popytu na produkty zbożowe. Innym zagrożeniem wpływającym na wielkość podaży jest wzrost cen środków produkcji (nawozów), natomiast popyt na surowce może być ograniczony przez wzrost konkurencji ze strony Ukrainy i Rosji.

Correspondence address:

dr eng. Agnieszka Bezat
Warsaw University of Life Sciences – SGGW
Nowoursynowska Str.166, 02-787 Warsaw, Poland
phone: +48 22 593 41 09
e-mail: agnieszka_bezat@sggw.pl