URBAN AND RURAL AGRO-FOOD SYSTEMS AS A FACTOR OF LOCAL SUSTAINABLE DEVELOPMENT
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# IDENTIFICATION OF FACTORS INFLUENCING THE SUPPLY CHAIN OF CEREALS FROM FARMER TO FINAL PROCESSING

## 1. Introduction

The production of cereals is an important element of agricultural production in Poland. A large area of arable land is occupied by cereal production, while Poland produces a significant part of total European production.

The agricultural market is a peculiar market from the point of view of logistics management, as it faces supply shocks, mainly due to weather conditions, while technological change not only increases supply in the longer-term, but also influences quality. Table 1 presents the production of different types of cereal in Poland in 2003. Although wheat accounts for one third of total production, the production structure is quite differentiated. When analysing the share of output according to province (Table 2), it turns out that Dolnośląskie (Lower Silesia) is the largest wheat producer with more than 13% of total production. Almost all of the wheat (97%) is produced by the private sector [www.stat.gov.pl, 2005]. Within the private sector, 80% is produced by private farms while 20% is produced by agricultural companies [www.gov.stat.pl, 2005]. This implies that a large number of producers operate on the agricultural market, which negatively influences the flow of agricultural products in the supply chain and significantly increases transaction costs. In this paper, first the basic characteristics of the cereal market in Poland are de-

**Table 1.** Cereal production in Poland in 2003

| Types of Cereal | Thou. tonnes | Share in production |
|---|---|---|
| Wheat | 7858 | 33.66% |
| Rye | 3172 | 13.59% |
| Barley | 2832 | 12.13% |
| Oats | 1182 | 5.06% |
| Corn mixture | 3608 | 15.45% |
| Triticale | 2812 | 12.04% |
| Maize | 1884 | 8.07% |
| Total | 23348 | 100.00% |

Source: MRiRW, 2004.

**Table 2.** Share in production of wheat according to province

| Province | Share in production |
|---|---|
| Dolnosląskie | 13.17% |
| Kujawsko-pomorskie | 9.14% |
| Lubelskie | 10.83% |
| Lubuskie | 1.36% |
| Łódzkie | 3.12% |
| Małopolskie | 4.01% |
| Mazowieckie | 5.45% |
| Opolskie | 7.94% |
| Podkarpackie | 4.24% |
| Podlaskie | 1.82% |
| Pomorskie | 7.56% |
| Śląskie | 2.74% |
| Świętokrzyskie | 2.99% |
| Warmiński-mazurskie | 8.89% |
| Wielkopolskie | 9.05% |
| Zachodniopomorskie | 7.69% |

Source: www.stat.gov.pl, 2004.

scribed. Then a simple model of the production chain is presented. Finally, different aspects of intervention purchasing (government procurement) are discussed.

## 2. Basic characteristics of the cereal market

The cereal market in Poland possesses the following basic characteristics:

– a large number of rather small producers, which negatively influences costs and efficiency of the flow of seeds;

– dependency on legal regulations of the European Union and the Polish government, aimed at stabilisation of the market and equalising demand and supply by *e.g.* intervention purchasing;

– market instability resulting from natural variability in the supply of cereals and a lack of equilibrium between supply and demand;

– uncertainty about the harvest due to nature, *e.g.* weather conditions, condition of soil;

– the need for investment in modern fertilisers, harvesting technology and equipment, in order to minimise the loss in harvesting (total crop – harvested crop);

– limited or even lack of access to information on the harvest in the region;

– a lack of organisations co-ordinating the flow of cereals. This implies a high level of discretion in production (sowing) decisions and decisions regarding what amount is placed on the market and in what way this is done;

– high costs and capital requirements of guaranteeing quality in the production process and high transaction costs of selling cereals;

– short period of harvesting (season-dependent) and necessity of storage due to demand throughout the whole year;

– high quality cereals are required for further processing;

– strong competition from firms from other EU countries.

## 3. Participants in the supply chain

The first participant in the wheat production chain to be discussed is the agricultural producer. This could be a public sector producer, who is subject to uniform principles set by the responsible government agencies. Most of these producers have the possibility of storing agricultural produce. The main characteristics of private agricultural companies are: large cultivated area, investment in quality by way of appropriate fertilisation, use of modern equipment and storage facilities. The largest group of agricultural producers are individual farmers, often cultivating a small area, having limited access to state-of-the-art methods of plant protection and fertilisation, while very often lacking storage facilities. As a result, marketing of their produce is more difficult.

**Distributive trade** or an intermediary is the next link in the logistic chain. Their task mainly consists of purchasing, storage and selling. They set market prices based on costs. These costs are determined by *e.g.* access to agricultural produce and the level of use of storage space. They sign contracts with producers, but also buy on the "free market".

The existence of **Intervention Purchasing** (government procurement) and the resulting creation of buffer stocks (Public Intervention Stock) is based on uniform EU regulation. In the logistic chain this storage creates a safeguard against the appearance of a surplus or shortage of agricultural produce on the market.

**Food processing** is based on two types of purchase: contractual deliveries and market purchases. Firms in this part of the logistic chain possess two types of warehouses: central warehouses and warehouses where inputs are stored. They are interested in reducing the level of storage of non-processed agricultural products, as they also need to store partly-processed or final food products.

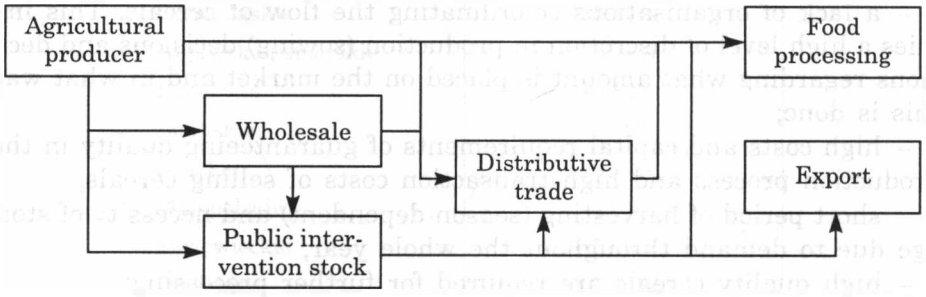


**Fig. 1.** Identification of the logistic production chain for cereals in Poland
Source: author's own elaboration.

## 4. Intervention Purchasing

State intervention has an enormous influence on the functioning of the cereal market. The mechanism for intervention purchasing [ARR, 2004a] satisfies European Union law, which also applies to Poland since it joined the EU on 1 May 2004. The mechanism is aimed at stabilising the agricultural market by buying when there is a surplus on the market and selling when there is a shortage. Intervention purchasing is often treated by producers and intermediaries, who are not able to receive a market price that exceeds the intervention price, as an "emergency system".

Intervention purchase is possible by delivery to a warehouse or at the place of storage. The size of purchase depends on the following factors.

– In the case of intervention purchase by delivery to a warehouse within the Public Warehouse System, the minimum amount of one type of cereal purchased is 80 tonnes;

– In the case of intervention purchase at the place of storage, the minimum amount of one type of cereal purchased is 1000 tonnes.

The institution that supervises intervention purchases in Poland is the *Agricultural Market Agency* (Agencja Rynku Rolnego). Intervention purchases take place between 1 November and 1 March. During this period, the *Agricultural Market Agency* is obliged to purchase cereal at intervention prices, under the condition that minimum quality and quantity requirements are fulfilled. The cereal purchased may be sold in the internal EU market or may be exported. However, the decision to sell cereal from the Public Intervention Stock is taken by the European Commission on request of the interested EU member country.

The regional dimension of intervention purchases is represented by *intervention centres*. Intervention centres are responsible for specified geographical areas in accordance with Commission Regulation (EEC) No 2273/93 of 28 July 1993. Such a geographical area (region) has to fulfil the following conditions:

**Table 3.** Monthly increase in the intervention price of cereals

| Month | Increase in intervention price (euro per tonne) |
|---|---|
| July | — |
| August | — |
| September | — |
| October | — |
| November | 0.46 |
| December | 0.92 |
| January | 1.38 |
| February | 1.84 |
| March | 2.30 |
| April | 2.76 |
| May | 3.22 |
| June | 3.22 |

Source: Council Regulation (EC) No 1784/2003 of 29 September 2003

**Fig. 2.** The Dolnośląskie province, divided into Powiats (different colours)

1. the production of cereals should temporarily or permanently exceed local market demand;

2. the region should be of special importantance as a cereal market (for the EU market, as well as the export market);

3. the region should possess significant storage capacity.

23 intervention centres exist in the Dolnośląskie province (Lower Silesia) for wheat purchase. Each covers a *Powiat* (a Polish administrative district). For other types of cereal the numbers are: 12 intervention centres for barley and 7 intervention centres for maize [ARR, 2004]. There are no intervention centres in the following *powiats*: powiat Kamienna Góra, powiat Lubań, powiat Wałbrzych.

The intervention prices are equal for all types of cereal in the intervention mechanism – 101.31 euro per tonne. This price is increased in

particular months according to the rates presented in Table 3. The reason for this price increase is the storage time of the cereal by the farmer. The longer the storage time, the higher the price, while as a result the costs of storage in the Public Warehouse System are lower. This system gives farmers an incentive to store themselves, while in the case of a lack of storage capacity, they can receive an attractive price for their produce.

Intervention storehouses are located in intervention centres. The Agricultural Market Agency chooses these among firms offering storage services and contracts such a storage capacity that satisfies demand. A significant contractual condition is that the Agricultural Market Agency only pays for factually used storage space and not for the availability of storage capacity. The following criteria are taken into consideration when contracting storage capacity: price, location, storage capacity of the warehouse, demand for storage by the Agricultural Market Agency.

## 5. Concluding remarks

Access to reliable and complete information is crucial for optimising the flow of cereals in the production chain. In particular, information on local markets and the creation of instruments for the collection and processing of information is important.

From the point of view of logistics management, analysis of basic indicators of efficiency, effectiveness and costs with the aim of introducing methods for increasing the effectiveness of local co-operation between subjects operating in the cereal production chain is required. This may lead to increased efficiency and achieving economies of scale for all participants in the cereal production chain.

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