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ORIGINAL PAPER

USE OF (SELECTED) E-BUSINESS MODELS IN THE AGRIBUSINESS SECTOR TO SHORTEN THE FOOD SUPPLY CHAINS

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JEL Classification: Q13, Q 14, Q18.

K e y w o r d s: e-business models, short food supply chains.

A b s t r a c t

The aim of this paper was to identify and evaluate the potential of using e-business models to shorten short supply chains in food trade made by farmers. The research was based on a diagnostic survey. The interviews were conducted with a previously elaborated questionnaire. 104 food producers from the Province of Warmia and Mazury (województwo warmińsko-mazurskie) took part in the study. E-business models make it possible to shorten food supply chains. Farmers who sell their produce through e-commerce can eliminate intermediaries from the supply chain or at least limit their number, using such e-commerce platforms as polskiebazarek.pl, olx.pl, allegro.pl. The research results indicate that the most popular e-business model among food producers was the market creator model.

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WYKORZYSTANIE (WYBRANYCH) MODELI E-BIZNESU W SEKTORZE AGROBIZNESU W CELU SKRACANIA ŁAŃCUCHÓW DOSTAW ŻYWNOŚCI

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S ł o w a k l u c z o w e: modele e-biznesu, krótkie łańcuchy dostaw żywności.

A b s t r a k t

Głównym celem artykułu była identyfikacja i ocena możliwości wykorzystania modeli e-biznesu do skracania krótkich łańcuchów dostaw żywności stosowanych wśród rolników. W badaniach zastosowano metodę sondażu diagnostycznego, a techniką badawczą był wywiad przeprowadzony z wykorzystaniem wcześniej opracowanego kwestionariusza ankiety. W badaniach wzięło udział 104 producentów rolnych z województwa warmińsko-mazurskiego. Modele e-biznesu zwiększają możliwości skracania łańcuchów żywności. Rolnicy, sprzedając swoje produkty za pośrednictwem e-sklepów, mogą wyeliminować pośredników z łańcucha żywnościowego lub przynajmniej ograniczyć ich liczbę, wykorzystując takie platformy sprzedażowe, jak: polskiebazarek.pl, olx.pl, allegro.pl. Wyniki badań własnych pokazują, że spośród opisywanych modeli e-biznesu najbardziej popularny wśród producentów żywności jest model *market creator*.

Introduction

Short food supply chains are alternative systems of selling agricultural and food produce in comparison to the dominant, traditional forms of sales, based on long distribution channels of many intermediaries (food processors, wholesalers, retailers). Large retail chains usually enjoy a dominant competitive position, thanks to high concentration. The forms of distribution used in short food supply channels are characterized by few or no intermediaries between food producers and final consumers, or short geographic distances between the first and last link in the distribution chain (Parker, 2005, p. 2, 3; Deverre & Lamine, 2010, p. 57-73; Szymańska & Lukoszová, 2019, p. 92). The definition by the Agricultural European Innovation Partnership (EIP-AGRI) says that "a short food supply chain is such an organization of production, distribution and transactions between the food producer and the customer that limits the number of intermediaries engaged in the process to the necessary minimum" (EIP-AGRI, 2021).

A direct contact between the producers and consumer, as an effect of the shortening of the supply chain, has many benefits. It contributes to the consumer's understanding and recognition of the history and tradition of a given product and strengthens their loyalty and trust towards the producers and the products they offer. A direct sale is also accompanied by financial advantages gained by both sides of the transaction. Food producers obtain higher prices for their produce compared to what they would be paid by a processing plant or a wholesaler. On the other hand, the customer pays less because the margin imposed by the middlemen is eliminated. The shortening of the geographic distance between the food producer and the end customer brings down the cost of transport and may also have a positive effect on the environment through the reduction in the emission of greenhouse gases (Raszeja-Ossowska, 2017, p. 1; Szymańska & Lukoszová, 2019, p. 92).

Methodology

The main objective of this paper was to identify and evaluate the potential of using e-business models to shorten short supply chains in food trade performer by farmers. The study relied on the diagnostic survey method, and the research technique was an interview based on the previously elaborated questionnaire. 104 food producers from the Province of Warmia and Mazury (województwo warmińsko-mazurskie) took part in the study, which was conducted in June 2021.

E-business models in theory

A direct sale of agricultural products can be achieved in various ways. The most common forms of distribution used by farmers include: a direct sale on the farm, sale on a food market, or through the Internet (Chwast, 2021; Szymańska & Lukoszová, 2019, p. 94), with the use of various business models. There are many definitions of this concept in the literature (Tab. 1).

Every company operating in the e-commerce industry uses some business model. It provides solutions to, among others, the manner of generating operational income, and the ways to acquire and retain clients. A lack of a precise business model is one of the main barriers in the development of enterprises operating in the e-commerce sector (Nojszewski, 2006).

The shortening of the supply chains can be done through the engagement of producers and the implementation of information and communication technology – the Internet, and the sale of agricultural products through this channel. This is made possible by the implementation of the simplest existing e-business models, like direct sale instruments, mainly e-stores, and non-direct ones, most

Table 1

Definitions of business model

Author	Definition
M. Wierzbiński	„a manner (template?) of managing an economic enterprise for profit, or in broader understanding, along with the concept of managing through value (Value Based Management), to generate a satisfactory rate of return for the owners"
P. Timmers	„architecture of product, service and information flow taking into account the characteristics of various economic operators and their role"
P. Weill and M.R. Vitale	„a description of the role and relations between consumer, clients, business partners, suppliers, which determine the flow of goods, information and financial funds, as well as main benefits to the stakeholders"
J. Magretta	„a story which explains how the enterprises operates. In particular, the following questions should be asked to implore the business model: What clients are serviced by the enterprises? How is the value made for the client? How does the enterprise generate profit? How does the enterprise deliver value to the clients at justified cost?"
A. Afuah and Ch.L. Tucci	„a method of using and maximizing resources adopted by the enterprise to offer products and services to clients, whose value exceeds that offered by competitors, and which provides profit to the enterprise"

Source*:* the authors, based on: Tutaj (2019); Sitko-Lutek & Skurzyńska-Sikora (2016); Wierzbiński (2015); Ryszko (2014); Leszczewska (2013); Timmers (1998); Weill & Vitale (2001); Magretta (2002); Afuah (2004); Afuah & Tucci (2003).

commonly transaction platforms or models offered by organizers or creators of the market – OLX, Allegro, industry specific platforms.

The era of online stores (e-tailer) dates back to the launch of Amazon.com internet store. The main advantage of online shops is that they are available 24 hours a day, and business can be made without leaving home. Initially, e-tailers operated only online, with no physical representation. Along with the technological progress, the owners of retail stores began to build their own Internet websites, as they noticed the competitive edge of the new market participants, and new ways of acquiring and maintaining clients (Szulc & Kobylański, 2014, p. 65).

The e-tailer sector has low entry barriers and is highly competitive, with a potentially large size of the market. Every Internet user can be classified as a potential client. However, it should be said that sustainable presence on the market can only be possible upon the implementation of a suitable pricing strategy or focusing on building the marketing and applying loyalty programs. The products on offer are practically unlimited in terms of geographical availability and variety.

Market Creators are defined as entities which organize the market environment for both buyers and sellers. The original example of an e-business model is considered to be eBay.com platform, founded in 1995. It proposed an important change in the market contact, which enabled the introduction of the client-client relation in the e-commerce environment. The e-business model offered by market creators moved the traditionally organized physical venue of business

in the geographical sense to the online environment. This shift allowed one to eliminate both physical and geographical constraints. The main service offered in this model is the organization of a virtual space, or guaranteeing the suitable technological infrastructure, allowing the buyers and sellers to meet, negotiate the price and make safe transactions. Sometimes the Market Creator e-business model is adopted to complement the model used by E-Tailers. Amazon is an example of an e-commerce company which is managed in this manner. Besides the main operation of an online store, the company is also an intermediary in the exchange of goods, providing a market environment for buyers and sellers (Szulc & Kobylański, 2014, p. 69).

In agriculture, the most popular companies operating in the Market Creator model are: allegro.pl, olx.pl, or polskiebazarek.pl, which was set up in 2020. On the olx.pl website, there are two categories where farmers can place offers of their products: "agricultural products" and "little market." On 23 January 2022, they had 25,716 and 19,294 active offers, respectively (OLX, 2022). The newest of the platforms mentioned above, polskiebazarek.pl, was created in liaison with the Ministry of Agriculture and Rural Development (MRiRW) and the regional branches of Agriculture Advisory Centres (ODR) as an instrument of direct sale from the farmer to the consumer (Ministerstwo Rolnictwa i Rozwoju Wsi, 2020).

The availability of the technological infrastructure has been increasing, so entities in the e-agrobusiness sector begin to take advantage of its popularity and the effectiveness of operation it offers. The awareness of this technology is rising among individual food producers, who are particularly sensitive to lengths of the supply chain. They are negatively affected by the phenomenon of price spreads, which occurs when the institutional market infrastructure is poorly developed, leading to the growing asymmetry of the effectiveness of production and trade operations. The rise in the popularity of food purchases through the online channel, reinforced by the Covid pandemic, is a factor contributing to the development of this channel. This is why an interest in the shortening of supply chains as a result of the spread of the Internet and e-business models seems a logical result of the analysis of the business environment.

„Cooperation-Short Supply Chains" Measure as an example of the EU financing of an Internet store

Short supply chains and local sales have always existed, playing a vital role in the lives of urban and rural residents. However, it has been noticed that the European Union did not use to be as much interested in this type of sales as expressed now, in the present rural development policy (Kapała, 2015, p. 151).

Recent years have witnessed a significant impact of the European Union on the development of direct sales of agricultural produce. The growing demand

among consumers for the local products of familiar origin encourages farmers to expand their offer array and produce ready-made food of better quality. To seek new markets for their products, beside the farms themselves, farmers began to create local food networks and the so-called short supply chains, i.e. doorstep sale, creating purchase baskets or organized street market sale.

The „Cooperation-Short Supply Chains" Measure was implemented to satisfy these needs, and proposed to complement the existing solutions with Internet stores and online sale.

The main objective of the "Cooperation" measure is to create short supply chains and local markets. This aims at reducing the number of intermediaries to no more than one, which will generate more economic, good value for money, fresh final product (Agencja Restrukturyzacji i Modernizacji Rolnictwa, 2021). First and foremost, the Rural Development Programme in Poland (RDP) assumes that short supply chains should support the horizontal integration of farmers. In turn, this integration should contribute to achieve the benefit of scale following from the shared production, sale, or ordering of means of production. Secondly, the short food supply chains are expected to support the vertical integration, motivating farmers to take consecutive steps connected with other phases of the food chain, like small scale food processing, so that food producers can save on the food processing and retail margins (RDP 2014-2020, 2014, p. 48).

Assistance is given to a group of at least five farmers who meet the basic requirements concerning sales; they should have registered one of the forms of sale, i.e. direct sale, agricultural retail trade (RDH), marginal operation, local and limited operation (MOL), direct deliveries, or economic activity in at least one of the types of activities enumerated in Chapter 10 and 11 of the Polish Business Activity Classification.

The first recruitment for the „Cooperation-Short Supply Chains" Measure was carried out between 29 March 2021 and 12 May 2021. The grants were allocated in two amounts, depending on the manner of implementing an investment. The higher grant of PLN 325,000 was given to operational groups aiming to purchase a means of transport as part of the investment; the lower grant of PLN 280,000 was given to other groups (Rozporządzenie Ministra… 2016).

The basic criterion for being qualified to either group was to pass the score threshold. An applicant group had to score at least 13 points. Points were assigned for such characteristics as: more than five participants in a group, diversified offer of products for sale, participation of at least one farmer who takes part in a quality system or organic farming system, launching of an internet store or a mobile application to sell agricultural products online, etc. (Rozporządzenie Ministra… 2016). These days, especially in the context of the Covid pandemic, this form of sale plays a key role in purchasing goods by customers.

The underlying assumption is that an online store should to become a new direction of distribution of agricultural products. Owing to such stores, products

coming from farms can find their market more quickly, which will mean they will be sold fresher and for lower prices (Agencja Restrukturyzacji i Modernizacji Rolnictwa, 2021).

During the recruitment to the spring 2021 "Cooperation" measure, which was carried out between 29 March 2021 and 12 May 2021, 200 applications were submitted in Poland; 97 applications were accepted (SIR, 2021).

Research results

According to the Public Opinion Research Center (CBOS), the smallest professional group using the Internet were unskilled workers, closely followed by farmers (Komunikat z badań, 2019, p. 3).

104 food producers from the Province of Warmia and Mazury participated in the statistical research. Nearly 81% were farmers residing in the country, 19% were farmers living in cities. The largest groups were farmers aged 40-49 (34.62%) and 30-39 (30,77%); the respondents aged 50-59 (19.23%) and 20-29 (15.38%) represented the remaining sample. There were no respondents aged below 20 or over 59. Most of the participants had higher (53.85%) or secondary education (30.77%); 15.38% had vocational education. None of the respondents had only primary or lower secondary education.

The farmers who participated in the study did not own Internet stores, nor did they use this form of sale. However, nearly 35% of the respondents, even though they did not own an online store, sold their products online through auction websites like olx.pl, allegro.pl. More than 61% of the respondents declared that they do not usually sell products online (Fig. 1).

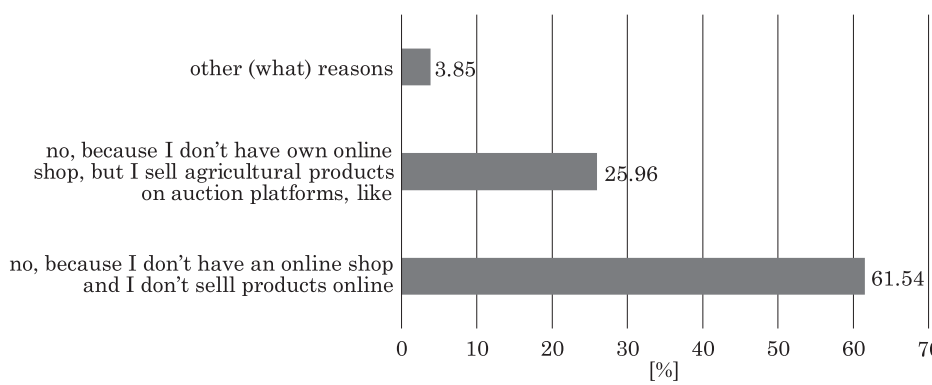

Fig. 1. Online sale of agricultural produce declared by farmers
Source: the authors, based on own research.

A large majority of food producers declared the purchases of means of production, spare parts for machines, machines, instruments, etc. in online stores (88.46%). They believe that online shopping saves money and time (51.92%), and that it is a very comfortable solution (36.54%). Close to 12% of the respondents do not buy online, as they prefer traditional shops (5.77%), and want to see the product before the purchase (5.77%) (Fig. 2).

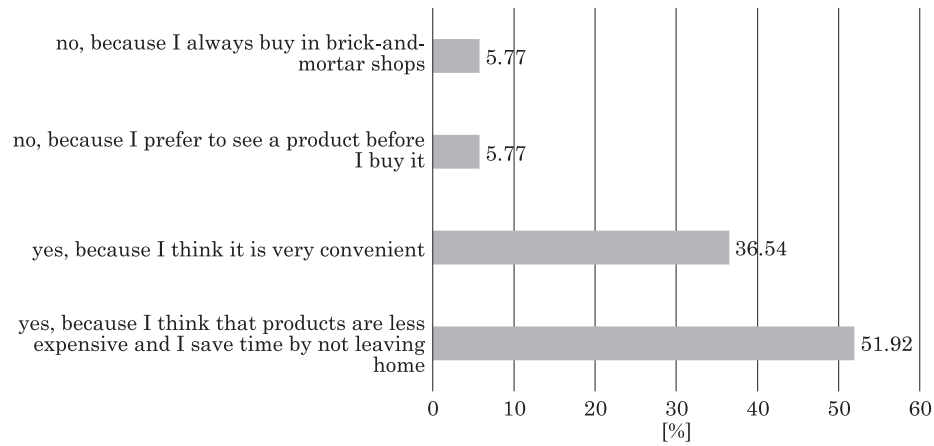

Fig. 2. Declarations of food producers on purchases of means of production, spare parts for machines, machines, instruments, etc. in online stores

Source: the authors, based on own research.

Food producers declare purchases through auction platforms; however, the largest group were the farmers who shop online less than once a month (60.87%); 21.74% buy online once per week, 17.39% once per month (Fig. 3).

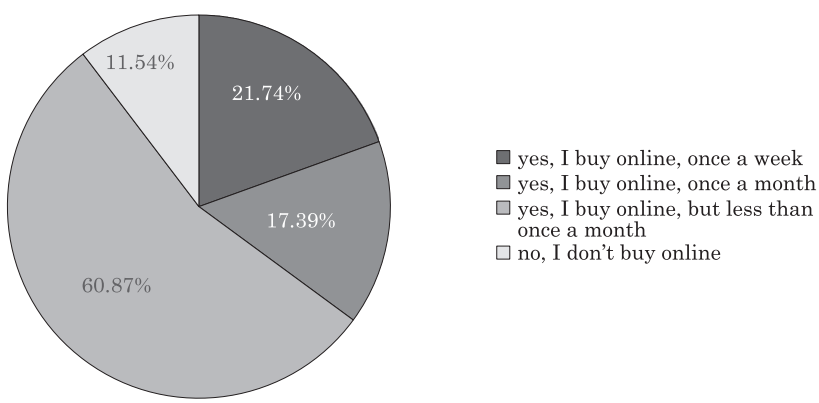

Fig. 3. Declarations of food producers on the frequency of purchases of means of production, animals, machines, machines, instruments, etc. through action platforms like olx.pl, allegro.pl, or sprzedajemy.pl

Source: the authors, based on own research.

Food producers sell means of production, animals, machines, machines, instruments, etc. through action platforms like olx.pl, allegro.pl, or sprzedajemy.pl, but the largest group were those who did so sporadically. 69.23% declared to make such sales less than once per month, 11.54% of the food producers sold this way once per month, 11.54% once per week (Fig. 4).

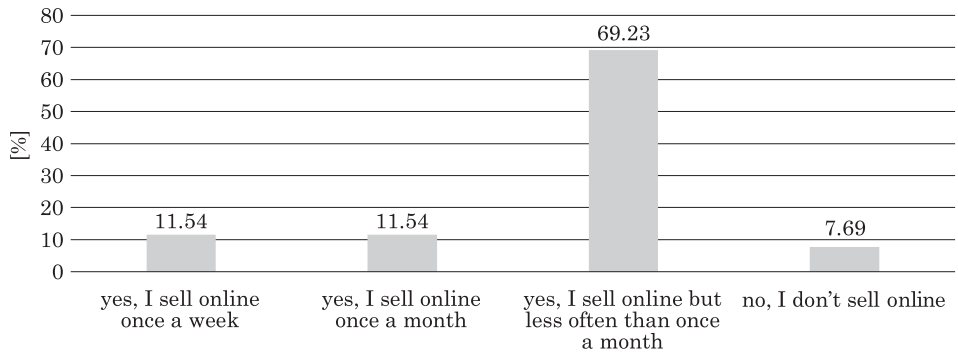

Fig. 4. Declarations of food producers on the sale of means of production, animals, machines, machines, instruments, etc. through action platforms like olx.pl, allegro.pl, or sprzedajemy.pl
Source: the authors, based on own research.

Most of the respondents have farms with an area no more than 25 ha (65.38%), followed by those whose farms are up to 5 ha of arable land (26.92%), farmers whose farms are between 6 ha and 15 ha (19.23%) and between 16 ha and 25 ha (19.23%) (Fig. 5).

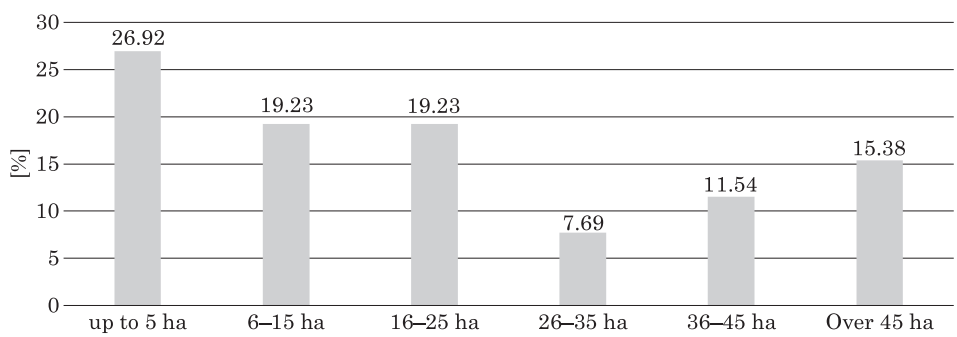

Fig. 5. Farm area declared by the respondents
Source: the authors, based on own research.

The research objective was to investigate a possible link between the farm area managed by the respondents and the sale of products through the Internet they engaged in. Unfortunately, none of the studied farmers owned an internet store. However, 90% of the respondents sold their products through auction

platforms and advertisement portals. A chi-square test of independence was used to carry out this analysis. First, we combined the answers given by the respondents on the sale of products through auction and advertisement portals, and the area of their farms (Tab. 2).

Table 2

Declared sale of products on auction and advertisement portals by respondents and the area of their farms

Observed values							
Farm area	up to 5 ha	6-15 ha	16-25 ha	26-35 ha	36-45 ha	over 45 ha	total
Yes, I sell online once a week	4	0	0	0	4	4	12
Yes, I sell online once a month	4	4	4	0	0	0	12
Yes, I sell online, less often than once a month	12	16	16	8	8	12	72
I don't sell online	8	0	0	0	0	0	8
Total	28	20	20	8	12	16	104
Expected values							
Yes, I sell online once a week	3,23	2,31	2,31	0,92	1,38	1,85	12
Yes, I sell online once a month	3,23	2,31	2,31	0,92	1,38	1,85	12
Yes, I sell online, less often than once a month	19,38	13,85	13,85	5,54	8,31	11,08	72
I don't sell online	2,15	1,54	1,54	0,62	0,92	1,23	8
Total	28	20	20	8	12	16	104

Source: the authors, based on own research.

There are noticeable differences between the observed values (property of the person, entity or phenomenon, measured or observed) and the expected values (determining the expected results of a random experience). The analysis shows that the chi-square coefficient for the statistical significance $\alpha = 0.05$ and df = 15 is 46.37, while the critical value is 24.9958. The value of the chi-square test is higher than the critical value, which means that there is a correlation between the size of the farm managed by the respondents and their sales of products through the internet.

To analyze the strength of this correlation, we used the V-Cramer coefficient and the C-Pearson coefficient. The V-Cramer coefficient was 0.3855. It falls in the 0.3-0.5 band, which means that the strength of the correlation between the size of the farm and their sale of products on the Internet is moderate. The value of the adjusted C-Pearson coefficient was 0.6243, which means that

the strength of the correlation between the size of the farm and their sale of products on the Internet is significant. The analysis of the collected data indicates that the farmers, depending on the size of their farms, engage in the online distribution of their sales in varying degrees

Conclusions

E-business models make it possible to shorten food supply chains. Farmers who sell their products through e-commerce can eliminate intermediaries from the chain or at least limit their number, using sale platforms like polskiebazarek.pl, olx.pl, allegro.pl, etc. Research suggests that the market creator model is more popular among food producers. This could be related to the convenience of using particular models. The sale of products through polskiebazarek.pl or olx.pl does not require the farmer to set up and administer own internet store, which would be much more complicated, time consuming, and costly.

E-business models have advantages and disadvantages, and therefore every farmer who decides which model to apply should consider a few issues. As shown above in this paper, best prices for agricultural products can be obtained in online shops. However, this is connected with additional obligations on the part of farmers. The economic size of a farm should also be taken into account. It would be hard to sell products only through an online store by large farms that produce, for example several thousand liters of milk per day or grow vegetables on hundreds of hectares. This is why the e-tailer model could be easier for farms with smaller agricultural production. Another issue is the direction of production on a farm. The research data show that some agricultural products are seldom or never sold through e-commerce, like grain which, without processing, has low or no value to the consumer. As mentioned before, processing of food means significant investment to equip the farm with suitable infrastructure, machines, devices, etc. This is why for some farmers, like those who mainly grow crops, the choice of the market creator model is a better solution, which may not completely eliminate brokers, but can constrain their number.

It is also possible to use a mixed model, for the sale of products with either the e-tailer and market creator models, and for selling products via the Internet or traditionally, in street markets or to purchasing centers. This solution allows a farmer to sell larger quantities of products more easily; it can also serve as a gateway to the sale exclusively through the Internet.

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