

## An Analysis of the Local Food Market: Sociological and Logistics Aspects

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**Abstract** Transport is a key link between supply chain entities, while it has negative impacts on the environment. Shortening the supply chains in logistics is important, especially due to customer demands, cost and emissions reduction. The shortening of supply chains represents a complex problem, existing also in the field of a local food production. This paper addresses a supply chain problem of Spanish tomatoes, which are compared with locally “produced” and supplied tomatoes from Maribor. A comprehensive analysis of local food market in Maribor was performed from both logistical and sociological aspects. The supply chains were compared regarding the complexity, environmental impact and the quality of tomatoes. A comparison of the cost perspective of supply chains was also made. The large gap arises with the interests of supermarkets, as the Spanish supply chain can provide tomatoes throughout the year, while locally grown tomatoes are seasonal. Sociological aspect addressed information about shopping habits of inhabitants and their knowledge of domestic and locally produced foods.

**Keywords:** • Supply chain • shopping habits • Life-cycle assessment  
• local • domestic •

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## 1 Introduction

The promotion of locally produced food has a number of positive effects. These are the protection of the environment and the reduction of particular environmental impacts (e.g. CO<sub>2</sub> emissions), the shrinking of supply chains and shortening of logistical routes, the promotion of new jobs in rural areas and the improvement of the health of the population as a result of enjoying better quality food (Mundler *et al.*, 2016; Rothwell *et al.*, 2016). However, it can be perceived that locally produced food is devalued due to cheap imported food. Food multinationals also have large advertising budgets and very well succeed in hiding the huge gap that exists in the quality of their food and unprocessed or less processed local food. Due to the lack of information about the mode of food production and origin, consumers often have misconceptions about the value of the food they eat, although they are becoming more and more aware about the sustainability issues (Wognum *et al.*, 2010).

Logistic and sociological challenges of local food production should be also addressed, since freight transport has a strong impact both on environment, considering air, soil and water as well as living organisms (Canfora, 2015). The consequences of air pollution caused by freight transports are an increase in CO<sub>2</sub> emissions that generate a greenhouse effect, which results in atmospheric deposition, coastal areas and the extinction of animal species. Also, SO<sub>2</sub> emissions in transport affect acidity, therefore frequent occurrence of acid rain, which destroys nature and agricultural products. Emissions also affect soil (erosion, acidification) and water (acidification) (Novak, 2010).

Local food production and consumption is a challenge for sociological perspective as well. The purchase of local food stimulates local economy and local farmers. Consequently, money remains in the local community. Buying local food strengthens the links between the producers and consumers in the local community. This is reflected in three aspects; connecting people, promoting collective well-being and helping local farmers (Derkatch & Spoel, 2015). Food quality must also be considered in the sociological aspect. Foods of local origin have a higher nutritional value than imported food, which contains more chemicals. Chemicals are used for fruit and vegetables and those keep vegetables "fresh" for a longer period of time. Locally produced fruit and vegetables mostly

contain fewer additives than imported vegetables (Nacionalni inštitut za javno zdravje, 2016).

Due to the fact that consumer consciousness in the area of sustainable food supply is growing (Validi *et al.*, 2014) supply chain shortening is more than necessary.

## 2 Methods

The paper focuses on the logistic and environmental effects of a sustainable local food production, where 1 locally produced product (tomato) was evaluated from the supply chain point of view. Spanish and Slovenian tomato's supply chains were compared. Based on the obtained data from company Betafruit (German company that distributes fruit and vegetables through Europe), two simplified supply chain models were designed and a comparison of complexity, logistics routes and environmental impacts was performed. Mentioned supply chains can be seen in Figures 1 and 2, which are further discussed under the section 3.

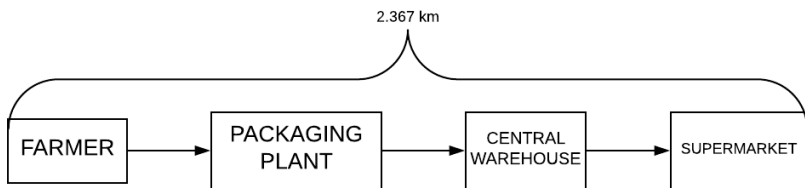


Figure 1: Spanish supply chain.

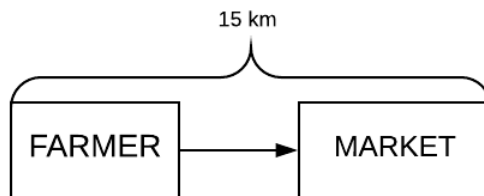


Figure 2: Slovenian supply chain.

Milà i Canals *et al.* (2008) are comparing the environmental impacts of domestic and imported vegetables (pulses, lettuce and broccoli) presented and important starting point. The survey showed differences of imported (vegetables from Uganda, Spain and Kenya) and home-grown vegetables (from the United Kingdom) in economic, environmental and sociological aspects. The research was carried out using the LCA (Life-cycle assessment), focusing on the study of the environmental impact of the product (in our case, vegetables) throughout the life cycle of the product. Therefore, all the effects on the environment of vegetables, such as energy consumption, pesticides, production and transport of oil, which are transporting vegetable transport vehicles, were taken into account in the analysis. The results were used as important findings of this research for our comparison of supply chains. The distance between the city of Maribor and the Spanish town of Almeria (famous for the production of tomatoes) and between Starše and Maribor was compared.

The second part of the research focused on the sociological aspect of local food market. Random participants were included in an online questionnaire. Questionnaire was solved by four age groups from 30 to 60 years. Respondents also had to define their place of residence and current employment status. The size of the sample is therefore 101 respondents, while the more precise structure of the sample according to the given criteria is shown below in Tables 1,2 and 3.

**Table 1: Age groups of respondents**

<b>Age (years)</b>	<b>f</b>	<b>f%</b>
<b>30 – 39</b>	16	16
<b>40 – 49</b>	35	35
<b>50 – 59</b>	33	33
<b>60 or more</b>	17	17
<b>All respondents</b>	101	100

The biggest age groups were people aged 40-49 and 50-59 years. Younger people were deliberately not included in the survey, as they usually eat food bought by their parents. Students also have subsidised food and do not buy the same amount of food as independent households.

**Table 2: Employment status of respondents**

<b>Employment status</b>	<b>f</b>	<b>f%</b>
<b>Employed</b>	70	69
<b>Self-employed</b>	8	8
<b>Retired</b>	19	19
<b>Unemployed</b>	4	4
<b>Sum</b>	101	100

**Table 3: Place of residence of respondents**

<b>Place of residence</b>	<b>f</b>	<b>f%</b>
<b>Large city</b> (more than 100.000 residents)	5	5
<b>Small city</b> (from 10.000 to 100.000 residents)	38	38
<b>Village</b> (to 10.000 residents)	58	57
<b>Sum</b>	101	100

### **3 Results**

Results are divided in two parts - logistical aspect considering comparison of two supply chains and sociological aspect where the survey about buying local food was carried out.

#### **3.1 Logistical aspect**

The purchase of locally produced foods would be better, because it would consequently result in lower global warming potential due to lower CO<sub>2</sub> emissions, less acidification, less water consumption, lower human toxicity potential, lower ozone layer depletion potential etc. The implementation of locally grown food and delivery of it to the local food market in Maribor would consequently mean food with less pesticides, which is more nutritious and would mean less pollution. The problem is only a price, because the local agriculture would not be able to follow the requirements of customers, which in turn implies a higher price and a scarcity problem. Here, the benefits of vegetables from Spain appear, but Spanish vegetables are usually grown for mass consumption and are

full of special fertilizers. It must be mentioned that mass production also consumes huge amounts of drinking water. Also, transport from Spain represents a huge negative impact on the environment, and at the same time a longer supply chain. This can be solved by the implementation of the supply of locally grown Slovenian food, and consequently, the impact on the environment would be reduced; the biggest impact on this would be a shorter logistics path.

It was found that the route between Almeria and Maribor is 2.337 km long and the route between Starše (we used it as an average of the distance farmers who would sell tomatoes from the city of Maribor) and Maribor is about 15 km long. If the length of these routes is compared, a difference of over 2.000 km in the distance exists. This also implies, in terms of supply chains, the overcoming of a larger distance and greater pollution of the environment. Also, due to the distance, there is a need for several intermediate supply chain links. The model of the Spanish supply chain (Almeria – Maribor) is presented in Figure 1, which was designed on the basis of a conversation with the leading staff of the German company Betafruit, which deals with the distribution of fruits and vegetables from Spain across Europe.

The model of the system above applies to the proximity of the supply chain and is not divided into the supply chain microelements. This model can be compared with a simplified Slovenian supply chain, where the transport distance is only 15 km, Figure.

When comparing the presented supply chains, there is more than an obvious difference in the distance that the company or farmer has to make so that the tomato can be provided to consumers. However, tomatoes that come from Slovenia are more nutritious and fresh, since the supply chain is much shorter. Tomatoes from Spain must travel a huge distance, which also means a longer period of time and the inability to provide crop quickly. The great advantage of the Spanish supply chain is that it can provide tomatoes throughout the year.

### **3.2 Sociological aspect – analysis of the survey**

Analysis of this part is divided into smaller analyses of responses to questions asked in questionnaire.

#### *Question 1: Are you buying locally produced food?*

Depending on age, the highest fraction of those, who answered yes, were aged 50-59 years (38%). Depending on employment, the majority of those buying local food is employed (69%), followed by retired people (18%). It is also interesting, that out of 4 unemployed people, 3 are buying local food, which is usually more expensive. Survey showed that people, who live on the village, are buying less local food, than those living in the city.

#### *Question 2: Why do you decide not to buy local produced food?*

The results showed that respondents doubt about food selling as locally is really locally produced. Unemployed also mentioned higher prices. There were also a lot of answers where people said that they grow their own food and that is the reason, that they do not buy it.

#### *Question 3: Why is it important to you to buy local produced food?*

The majority responded to the higher quality of food, following by support of local producers, other said there is less chemicals used while growing food and it is always fresh. For the age group 50 – 59 years health is the bigger benefit of eating local produced food.

#### *Question 4: Which locally produced foods are most commonly purchased?*

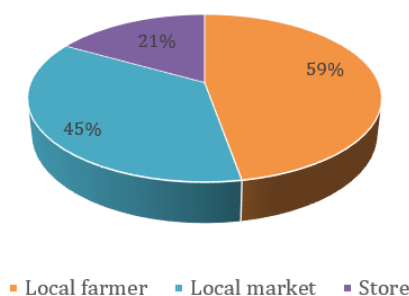
81% of people buys locally produced eggs. 65% are buying meat and vegetables. There were also answers to buy as much local food, as possible, including honey, flour and cereals.

*Question 5: Are you willing to pay higher price for locally produced food?*

84% are willing to pay more. Interestingly, those who answered, that do not buy local food often, were willing to pay higher price for local food, while those, who already buy local food, still want lower and competitive prices.

*Question 6: Where do you most often buy locally produced food?*

Where do you most often buy locally produced food?



**Figure 3: Where do people most often buy locally produced food?**

59% of those, who buy locally produced food buy, it from a local producer alone, 45% in the local market and 21% buy it in the store.

*Question 7: Respondents had to indicate, how often they buy local foods*

42% are buying local food several times a week. Some people who answered, that they do not buy locally produced food often answered, that they buy it once a month or at least once a year.

*Question 8: Are you aware of the negative impact on the environment caused by food imports?*

93% of people are aware of mentioned problem. Interestingly, 25% of those, who do not buy locally produced food are also aware of negative impact, meanwhile 5% of those who buy local food, do not care about this. As we have shown before, the main reason for buying local food is quality of food.



## 4 Discussion

### 4.1 Logistic aspect

Considering results of logistic part, it can be perceived that local produced food has greater benefits for environment. Transport cause less environmental damage, food has higher quality, supply chain is more transparent and the paths are obviously much shorter. The main problem is price. Also considering the survey, prices of imported food are usually much lower and that way more consumers are able to afford it. Due to results of comparison incentives for the farmers could bring an added value, so they will be competitive on the food market.

It is also necessary to discuss about massive production of local food. When buying and selling smaller amounts, the supply chain can truly be simplified in just two steps - farmer and consumer. However, if larger amounts of locally produced vegetables, fruit and other goods would be sold, some sort of logistics centre should be established. Better organisation, higher traceability and short supply chains can be provided. Considering establishing logistics centre for local food in Slovenia the following services must be included:

- collection of fruits and vegetables and other food (by farms)
- storage of food
- processing of food (such as cooking, freezing)
- labelling, packaging
- consolidation
- food safety and standards activities (HACCP)
- administration, information technology

It is also important to locate logistic centre properly and logistically most efficient. Different parameters influent decision about location such as accessibility (motorway and rail accessibility, road network, restrictions for trucks), characteristics of location (possibility of expansion, social environment, construction restrictions, price, water supply, sewage, electricity) and economic environment (surrounding companies, competition, financial stimulations).

It also can be perceived that unfortunately self-sufficiency with local food in Slovenia is not possible due to capacities, and the weather conditions, which are not suitable for growing fruits and vegetables during the whole year. Considering the research, the main realistic goal is to educate consumers about buying local food and to increase awareness about positive effects of changing people habits in buying food. It is also reasonable to expect, that Slovenia will encourage local produced food more with financial and organisational support such as establishing logistics centre.

#### **4.2 Sociological aspect**

Due to sociological part and survey which was carried out, it can be perceived that mostly older generations are buying local. This may be the consequence of different lifestyles, if we consider younger survey participants. Their life pace is faster, and they may not have time to visit local markets, which are also usually open only in the morning. It is logical, that people living in the village are buying less local food, because they grow it themselves.

There is also some doubt about locally produced food really being local, which is the consequence of latest findings that some local food sellers were buying imported food and were selling it as home grown. Most consumers, that buy local, are aware of quality of local food and that is the main reason they buy it. It is interesting that most consumers buy local eggs and most are willing to pay more for local food.

The important result was regarding the place of buying local food. Most are buying it directly from the farmer, and can be argued that consumers do not trust local markets. Due to results, higher traceability and transparency of farmers when selling on local market can be suggested, but it is almost impossible to know, if fruits and vegetables are really home grown.

Most consumers are aware of environmental contribution when buying local food, but still a lot of young-age groups are not buying it. Considering this, it is important to raise awareness about all positive effects of buying locally produced food.

This can be made with organising events on local markets, marketing of locally produced food, giving information about environmental impacts and interesting positive facts, when buying local food, educating about quality and nutritional value of local food and also organising local food markets in the afternoon hours.

## 5 Conclusion and further research

Our research was divided in two parts - logistic and sociological. A comparison of Spanish supply chain and local supply chain was carried out and survey about buying local food was made.

To summarise all the results, Slovenia has a great potential to be more self-sufficient in producing and buying locally produced food, however, some obstacles emerge but can be overcome via awareness raising and regulations.

Thus most important step is so educate consumers, so the market would grow faster and a system for local food market would be established. Considering the market growth, logistical centre for local food would have to be established and for the optimal location of this centre, decision making programs (Dexi) could be used. Buying local food could improve the environmental pressures as well as health of consumers.

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