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Urban food planning and transport sustainability: A case study in Parma, Italy

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Abstract

Nowadays local authorities try to solve problems related to the environmental sustainability of the cities through various urban logistics measures, which directly and indirectly affect the urban food supply system. This paper presents an ongoing research on the urban food transport system and its impact on the city environmental sustainability. The research analyses the city logistics project for food transport implemented in Parma, Italy, in order to identify external costs indicators that help policymakers in evaluating the environmental sustainability of different logistics measures. According to this state of the research, the paper aims at suggesting a methodological framework to estimate the urban food demand, the urban food supply and the urban food transport. These sub-system provide the baseline scenario to evaluate the external costs reduction obtained by the Parma's project.

Keywords: Urban food system, Urban sustainability, City logistics, Parma - Italy.

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1. Introduction

At global level, the population is increasingly concentrating in the cities. In Europe, around 75% of the population lives in urban areas and it is foreseen to increase up to 80 % by 2020 (EEA, 2010). At the same time, the quality of life in the cities is declining and urban pollution keeps increasing in terms of carbon dioxide (CO₂) emissions, waste, noise, and lack of greenery (Alexandre, 1996; EEA, 2010).

Many of European cities struggle to cope with social, economic and environmental problems resulting from pressures such as overcrowding or decline, social inequity, health problems related to pollution and traffic. Looking through the urban environmental sustainability assessment carried out by cities and local authorities, the major impacts are generated by food and transport¹, as confirmed by various “food miles” studies (Pirog et al. 2001; Pirog et al. 2005; Coley et al., 2007).

Considering the whole food system, Tukker (2006) identifies food as one of the top three contributors to the environmental impact in society, and food transportation as a major part of that impact.

In terms of transport externalities, total road transport is responsible for 70% of CO₂ emissions, and more precisely urban traffic accounts for 40% of these emissions. The urban freight traffic performance (ton/km) weights for 30% of the total freight traffic and the equivalent-vehicles used for freight urban distribution accounts for 20% of the total urban road congestion (ECMT, 1997).

Few analyses focused on determining and evaluating the urban food transportation impact (DEFRA, 2007; Tukker, 2006), however this issue is object of a growing attention, as crucial component in the urban food system and urban mobility. Indeed, despite increasing interest in urban sustainability and food carbon footprint, little is known about the multilevel interrelationships in urban food systems related to food transport, logistics, distribution, waste and access to water (Sonnino, 2009).

The methodological framework proposed in this paper applies to the “urban food metabolism” (Bohle, 1993), to describe the key elements and the functioning of the food supply system in urban environment, with special attention to the transport and logistics sub-systems. The proposed scenario outlines the complex interrelationships amongst the various actors, as city users and inhabitants, urban food suppliers, logistics providers and carriers, in order to evaluate the process of food distribution within the city and its contribution to the urban ecological sustainability.

The urban food metabolism tool is finalized to assess the impact of emerging city logistics solutions for food on a basis a of environmental sustainability indicators, thus we analyze the case study of Parma, a relevant city logistics project in the North of Italy.

The paper aims at providing tools for a critical discussion of the methodology adopted within the ongoing investigation. The expected results of the study are to provide an analysis detecting the main features of the urban food demand and supply with qualitative and quantitative description, and an evaluation of the urban food transport at the distribution stage, including corporate retail, independent channels, hotels, restaurants and cafés and institutional food services within the city limits. Furthermore it is foreseen to evaluate the environmental impacts generated by the “last food mile” in terms of CO₂ emissions, congestion, and social costs. The evaluation compares the scenario *before* and *after* the urban freight distribution optimization implemented by the Municipality and the Wholesale Produce Market.

¹ A growing number of cities is drafting various types of environmental impact assessments, i.e. London (*City Limits*, 2002), Toronto (*The Toronto Ecological Footprint*, 2002).

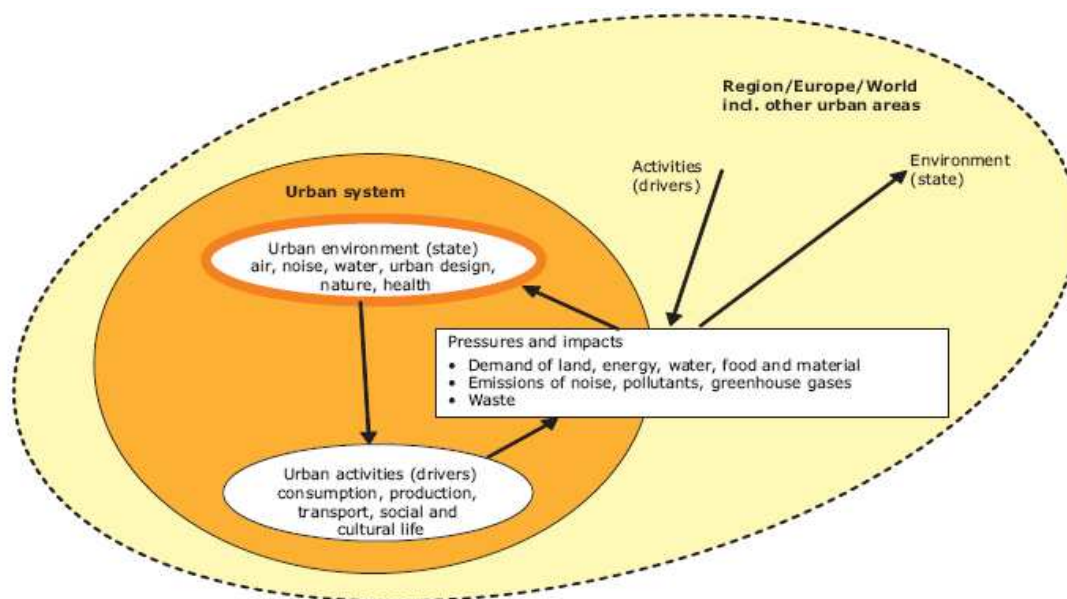
2. Urban sustainability integrated approach

Urban environmental quality is the result of drivers in many areas at different scales and policy levels. Policy response on urban matters from all governmental levels - besides the local level also the regional, national and European level - is necessary. The complexity of urban systems (see Figure 1) requires integrated and balanced solutions rather than isolated measures.

“Improving the quality of the urban environment, making cities more attractive and healthier places to live, work and invest in, and reduce the adverse environmental impact of cities on the wider environment’ is consequently the target of the Thematic Strategy on the Urban Environment” (EC, 2006).

Local authorities are looking for new policies in order to improve the environmental impact of urban food economy, especially in terms of energy use, transport and waste. The emerging need is to improve supply chain efficiency to reduce problems and costs caused by food distribution, which contributes to climate change.

Figure 1. The urban environment in relation to areas and activities beyond cities and towns



Source: EEA, 2010

Nonetheless the urban delivery of food is only part of the whole urban food supply chain, therefore it should be considered from a broader perspective. In recent years more articulated strategies addressing the food supply sustainability have been identified by European, national, regional and local policymakers and other actors along the food supply chain. Many cities are implementing agro-food governance policies and started re-designing urban food, by provisioning through single initiatives or coordinated strategies. The contemporary urban food planning is more than just reduce food insecurity and implement “feed the city” policies: it deals with creating new economic opportunities for small farmers and retailers, fostering individual and communal health, enhancing environmental friendly programs at urban and peri-urban level (Marsden, 2006). These initiatives focus on an ecological approach and set objectives based on the triple-bottom-line: environmental, economic, and social sustainable development.

Concerning the food transport policies, Maunsell (2007) proposes to focus on the following areas of intervention:

- The potential impact of consistent implementation of existing best practice on food transport logistics efficiency;
- Opportunities for reducing the external impacts of food transportation by improving local supply and distribution networks;
- Opportunities for improving transport efficiency through step changes in transport methods or infrastructure; and
- The potential impacts of changing regulations on logistics.

Related to the food transport and logistics issues, a growing concern for the environmental and social effects generated by the urban haulage of goods has led local and national authorities as well as companies and transport operators to promote actions for an improvement of the associate logistics. Studies, research activities and pilot projects have followed in order to try and minimize the negative impact of urban haulage of goods and its externalities on the standard of living (Da Rios et al., 2003).

The challenge is to provide efficient distribution of food to urban small retailers and consumers, reducing the associated environmental and social impacts (in terms of carbon emissions, congestion, mobility) generated by the urban food deliveries. Indeed, the small scale distribution of goods in urban environment, defined as “last mile” logistics, is one of the most problematic parts of the supply chain, due to the high atomization of recipients and to their increasing requirements (Lenz, 2004). This is highly relevant in the case of inner city food transport, intended as last part of “food miles”. Therefore the crucial issue, analyzed by this paper, focuses on the “last food mile”².

On a literature review, only few European city logistics projects identified specific measures optimizing the perishable goods transport at urban level, i.e. London LowHub service, delivering fruit and vegetables from the New Covent Garden Market to city center businesses. Other examples on optimizing urban food logistics are represented by the model of “alternative food hub” (Morley, 2009).

In Italy, one of the most relevant case is presented by the city of Parma, where the urban goods haulage has been redesigned through renewed logistics services provided by the F&V wholesale market, Centro Agro Alimentare e Logistica (CAAL). The project has implemented an urban distribution center with delivery services of selected food products categories, using environmental friendly vehicles, and optimizing load factors and routes thanks to the ICT tools.

3. Methodology

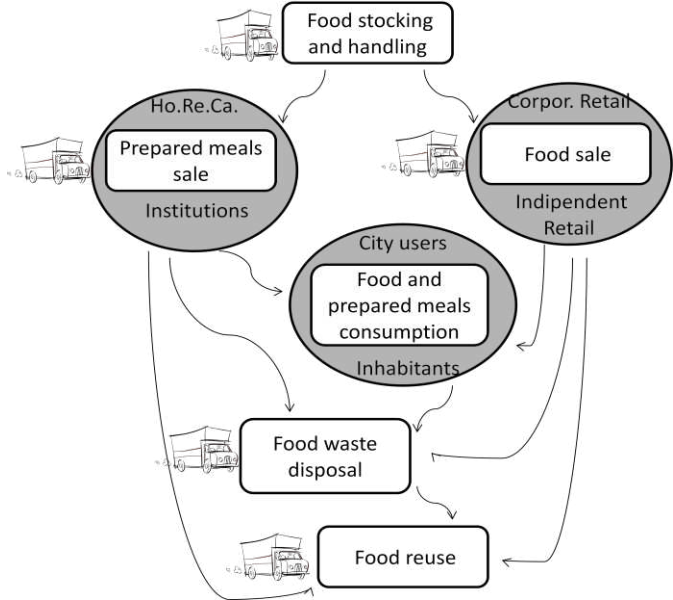
To understand the urban food distribution system, we base on the concept of “urban metabolism”, hereafter UM, (Wolman, 1965), which sets the analogy with the metabolic processes of organisms, and asserting that “Cities transform raw materials, fuel, and water into the built environment, human biomass and waste” (Decker et al. 2000). Bohle adapted the UM model to the urban food system and identified the “urban food metabolism” (1993), thus we apply the model to selected processes of urban food provisioning, transport and consumption.

In this study, the examined sub-systems are the urban food demand, the urban food supply, the food transport and the environmental impacts of food transport. The crucial factors constituting the model are density, morphology, transportation technology (Kennedy, 2007),

² Here we define the concept of “last food mile” and we use it in the study to facilitate the comprehension of our research.

city users flows, urban consumer habits, food suppliers managing mechanisms, food products flows. Figure 2 presents the urban food flows on the basis of the main functions representing the urban food system.

Figure 2. The urban food flow – Focus on distribution



Source: own elaboration

3.1 The urban food system

Cities are social and economic centers of communities and generate a complex interrelation of functional, environmental and social aspects. Daily, people coming from the peri-urban and regional areas travel to the city for a variety of reasons, including work, study, shopping, business and socializing. These transitory flows are defined as city users (Martinotti, 1993) and, together with permanent and temporary inhabitants and tourists; they provide a complete picture of people creating the city life, by utilizing goods and services, and participating to the socio- economic city networks.

The issues of feeding inhabitants and city users, while guaranteeing the food access to different groups of citizens, are highly depending on a mix of urban policies and local interactions, such as, commercial opportunities, regulatory conditions, and transport services and infrastructures. These elements contribute to shape the urban food system and the set the frame in which food supply chain actors operate.

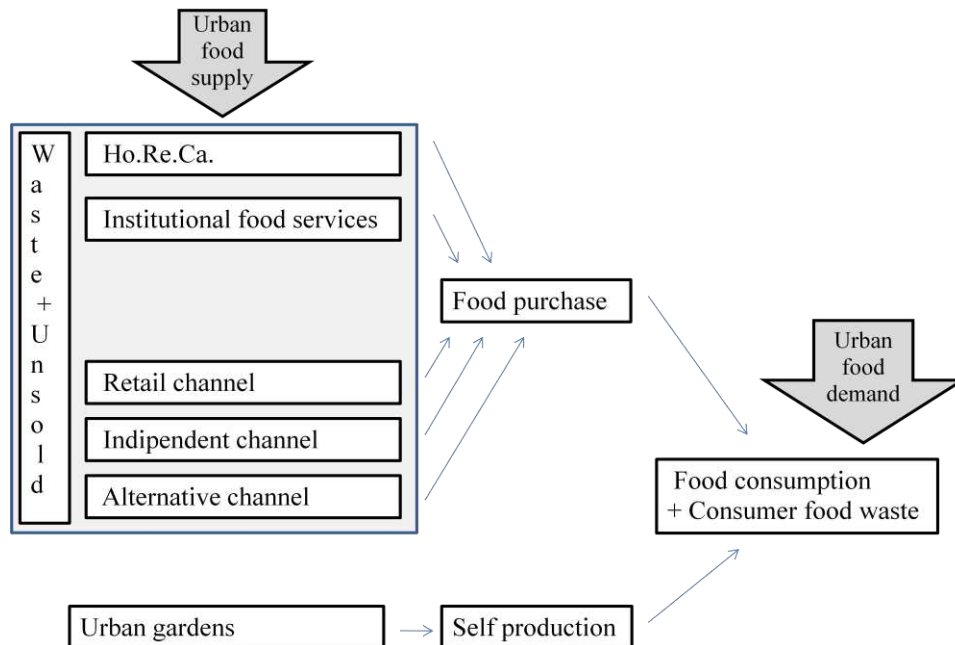
The urban food system is investigated from the demand/supply perspective, as showed in Figure 3. The demand of food considered in the study is the daily average amount of food consumed by the inhabitants and city users, and the amount of food waste generated by them³. In the Italian urban areas, except for a very small amount of food grown with own urban vegetable gardens⁴, most of the food is purchased, through a variety of commercial channels, depending on the at home (supermarkets and groceries) or out of home (Ho.Re.Ca. and institutional food services) consumption.

³ In many countries studies have estimated the quantity of food wasted by households; it results be a consistent portion of the total purchased food, between 20% and 30%, that go to the disposal sites. The first report, *The food we waste*, has been drafted by WRAP in 2008.

⁴ In Italy, urban agriculture has recently gained new attention, but its role in the urban food provisioning is minimum, due to the limited green spaces available within the historical city centers (Galli et al., 2010).

The full urban food supply includes the amount of products *sold* by the food suppliers, and the amount of *unsold* or *wasted* food (Segrè et al. 2011). The volume of food products managed by the urban food suppliers at the distribution stage provides the total amount of food which daily reaches and circulates in the city.

Figure 3. Urban food system



Source: own elaboration

Therefore the analysis needs to include four different steps:

- Estimating the daily food demand by the city population and people temporary fluxes;
- Estimating the daily food supply by the food businesses and food services;
- Evaluating the urban food transport performance;
- Evaluating the environmental impact of the urban food transport, related to the different logistics measures.

The urban food demand is the basis to estimate the urban food supply (adjusted with unsold and wasted food). The urban food supply represents the total amount of food circulating in the urban area, and it is the basis to evaluate the food transport performance. These three subsystems depict the baseline scenario of the urban food transport system, then the environmental impact of urban food transport is evaluated through external costs indicators.

3.2 The urban food demand

In this and in the following paragraph, we estimate the total amount of food requested by and available to the population, drafting a sort of *Annona* for the city of Parma. In ancient Rome, the *Annona* was the plan of all means of subsistence, especially grain stored in the public granaries, for provisioning the city (Chisholm, 1911). The former scope of the *Annona* was to guarantee the supply and the distribution of corn requested by the urban population, as a planning and managing tool. In this analysis, we choose to draw a descriptive scenario, estimating demand and supply of food in the whole city.

The food demand is calculated on the *per capita* food by the total flows of people which daily live the city and use goods and services. The people flows are: permanent and temporary residents, city users (employees, business-persons, one day tourists etc.), nights sleeping tourists.

According to the Italian food purchase figures⁵ (ISMEA, 2007), the daily purchase of food⁶ is 1.137gr., including the eventual food waste generated at the consumption stage. The consumer patterns are different among the whole urban population, thus the main trends are investigated, distinguishing on population groups and consumption habits.

The purchase of food is finalized to at home and out of home consumption. In the first case, the consumer buys food in the chain retail, or in independent retail or in alternative channels, in the second case the suppliers are hotels, restaurants, and cafés, institutional food services and corporate cafeterias.

3.3 The urban food supply

To identify the existing urban food supply and describe the main market features, a general analysis of the urban commercial channels is drafted. Taking into account the highly complex and fragmented supply chain in the European urban environment, the resulting description provides a representation of the atomized and non homogeneous scenario.

The full food supply is provided by the distribution system, which can be grouped in three market models (see Table 3). The available data on the Italian food market share show the dominant position of the chain retailers at the distribution stage. Consumers prefer the mainstream channels, with high competition among hypermarkets, supermarkets and discounts, reaching the 70% of the market turnover. The independent retail system, as corner shops and grocery stores, has a secondary relevance, covering some niche (RER, 2008).

In the descriptive scenario, we choose to include self-production by home gardens and public gardens within the city limits. While detailed data are scarce on urban horticulture in developed and developing countries, FAO observes a growing quantity of fruit and vegetables production in the urban and peri-urban areas (2010).

Table 1. Urban Food Supply

| Residents and city users food sourcing | |
|---|---|
| Corporate retail | <ul style="list-style-type: none"> ◦ Hypermarkets ◦ Supermarkets ◦ Superettes ◦ Discounts |
| Independent retail | <ul style="list-style-type: none"> ◦ Grocery stores ◦ Health and Specialty stores ◦ Corner shops ◦ Food Co-ops |
| Alternative channels | <ul style="list-style-type: none"> ◦ Flea market ◦ On farm retail ◦ farmers markets ◦ PYO –Pick Your Own ◦ CSA-Community Supported Agriculture |
| Self production | <ul style="list-style-type: none"> ◦ Home gardens ◦ Public vegetable gardens |

⁵ Cfr. Institute of services for the agricultural and food market, ISMEA Domestic purchase: trends for food products 2007. The data is calculated on the basis of the Italian population (age > 3 years) in 2007.

⁶ This data is confirmed by the data resulting by the amount of consumed food (INRAN, 2008) and the amount of wasted food by the Italian households (ADOC, 2010).

In our study, the urban food supply is described through the corporate retail, independent retail, Ho.Re.Ca., and Institutional food services. The amount of food managed by these suppliers is estimated considering the sold food and the unsold food (wasted and/or redistributed products)⁷.

The first step of the study is to obtain an urban food supply estimation, that we assume is the amount of food transported by commercial vehicles (light and heavy vehicles) circulating in the city area. The next step is to identify the performance and the main features of the urban food transport, providing the necessary data to assess the environmental impact of urban food transport, on the basis of the identified indicators.

3.4 The urban food transport system

To describe the urban food transport⁸, we focus on selected components by characterizing city logistics and perishable goods logistics processes, on the basis of the technical guidelines issued the Regione Emilia Romagna, Mobility and Transport Department (Rosini et al. 2005). The resulting logistic variables' framework provides the basis to describe the "last food mile". According to the City Ports report (2005), the variables characterizing the performance of city logistics processes are:

- Logistics variables, that characterize the transport service related to the process, in particular:
 - frequency: delivery frequency;
 - load unit: shape in which the goods are usually grouped and loaded on vehicles (pallet, roll, box, etc.);
- Technological and organizational variables, that characterize the technical organization of the transport, particularly:
 - typology of vehicles: dimensions and technical features (for example refrigeration) of the vehicles;
 - delivery period: period of the day in which the delivery of the goods is usually carried out;
 - other: other transport features, for example necessity to respect hygienic rules (HACCP), necessity of staff training, etc;
- Level of logistics optimization, the optimization of the process is here understood as capacity utilization of the vehicle (in weight and/or volume);
- Logistics management, which is the formal procedure of goods delivery,
- Carriers typology, which are the type of carriers used for the transport (couriers, special transport, etc.); under this heading the possibility of work on own account is also indicated;
- Nodes of the supply chain, are the departure points (producers, suppliers, warehouses of wholesalers, etc.) and arrival (retail shops, final consumers, etc.) of the goods.

Perishable goods logistics focuses on "fresh food products" (meat, dairy products and sausages, etc.) The supply chain can be grouped such as:

- The fresh retail supply chain, intended for large food distribution areas (either hypermarkets or supermarkets) or to smaller areas associated to a large distributive

⁷ The estimation bases on the Last Minute Market dataset, University of Bologna.

⁸ More in general, the OECD definition of urban goods transport (2003) is: "*The delivery of consumer goods (not only by retail, but also by other sectors such as manufacturing) in city and suburban areas, including the reverse flow of used goods in terms of clean waste*".

chain; it is characterized by an upstream optimization of the deliveries and by greater constraints in terms of service (time schedule and number of deliveries) for the recipient of the goods;

- The traditional fresh supply chain, intended for sale areas of food products generally of small dimensions (the so called neighborhood commerce), that is characterized by a greater incidence of deliveries from wholesalers or of self provision.
- Dry retail, for foodstuffs at middle or long expiry dates, not bound to specific preservation conditions (paste, oil, canned food, etc.), and household products (detergents and soaps for the personal hygiene, for woven, for dishes, etc.);
- Fresh retails, for fresh foodstuffs with close expiry date and bound by special preservation conditions;
- Frozen retails, for frozen foodstuffs.

The food delivery phenomenon in urban environment is described by a qualitative point of view and, where possible⁹, quantitative, identifying more specific features of the goods movements. The actors interviewed are representative of haulage industry, business, local authorities and community/ environmental groups.

3.4 The environmental impact of urban food transport

Few countries have analytical tools and data for evaluating the effectiveness of their policy measures concerning urban goods transport, resulting in their measures as a cause of unexpected side effects (OECD, 2003).

In the literature various typologies of costs are distinguished, but there are not unified definitions among the different authors. Following the solution proposed by "Amici della Terra" Italian national report (Friends of the Earth, 2005) and Regione Emilia Romagna, Mobility and Transport Department data (Rosini et al. 2005), the quantification of the total external costs of transport in urban environment will be calculated using the set of indicators shown in Table 2.

Despite the influence of many variables, as provided in paragraph 3.3, on the total impact assessment, the available coefficient on the external costs impact of urban food transport is calculated on the basis of the impact of one main technological variable that is the typology of vehicles (light and heavy ones circulating in the urban area).

Table 2. External costs assessment

| External costs indicators | | |
|---|----------------|----------------|
| Greenhouse gas - CO ₂ , CH ₄ , N ₂ O | Light vehicles | Heavy vehicles |
| Atmospheric pollution (CO, COVNM, SO ₂ , NOX, PM ₁₀) | | |
| Noise | | |
| Accidents (Number of Accidents, killed and injured) | | |
| Congestion (Total time lost) | | |

Source: Friends of the Hearth, 2005

3.5 Data collection

The research seeks to gather data for each of sub-system and to identify critical gaps in data availability. Primary and secondary sources are used to collect data for this study: interviews

⁹ Feasibility studies and urban freight transport data are available for the city of Parma and Region Emilia Romagna. We select data describing the main relevant features in order to evaluate the urban food transport performance.

with supply chain participants; news articles; websites; direct observation of urban distribution center, wholesale market, stores and business premises and the collection of secondary economic and demographic data. Relationships with food suppliers, wholesalers, carriers, managers, shop owners, public representatives, and other stakeholders are investigated.

4. Parma case study

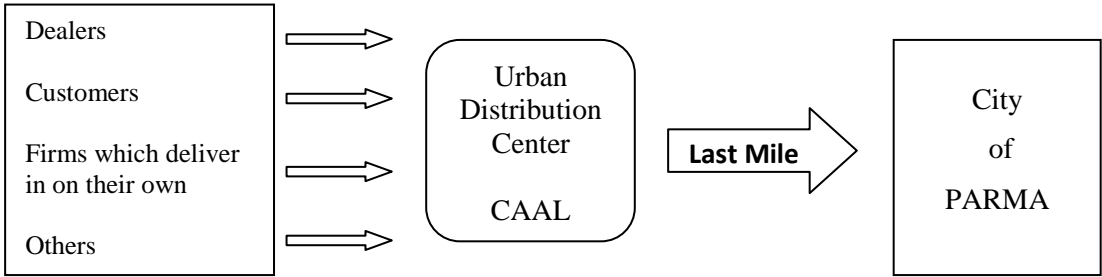
The analysis focuses on an Italian case study, the Parma city logistics project, which developed an innovative urban food delivery system, Ecocity, since 2008. Parma is a city of 180.000 inhabitants, located in Emilia Romagna region, well-known for its traditional, high quality food products. The attention to the food supply system sustainability boosted policymakers to redesign the urban distribution of goods, with the support of CAAL, the wholesale produce market. CAAL is located in a strategic area and is experienced in perishable goods logistics.

Ecocity includes a renewed logistics platform dedicated to food products implemented at CAAL, and a fleet of twelve natural gas powered vehicles. As well at institutional level, the local authority promoted a new act to regulate freight transport in the limited traffic area. Moreover, the freight mobility plan adopts an ICT platform for the optimization of routes, which provides dynamic routing and scheduling to reduce distances travelled. The figure 4 shows the functioning of the city logistic project.

The main objective of the project is to rationalize and optimize the deliveries through an eco-friendly service. The specific objectives are:

- Raise vehicles filling rate
- Reduce environmental impact
- Reduce the number of commercial vehicles in the city centre
- Increase the effectiveness of the whole delivery of goods

Figure 4. Ecocity logistic project



Source: CAAL, 2009

Starting from Ecocity project, we will provide a case study to assess an effective evaluation of according to the last food mile approach¹⁰.

The available project data have been integrated with the last food mile approach in order to gather the missing data to describe each of sub-system (food demand, food supply, food transport system) and to provide an effective and reliable analysis of the external costs impact.

4.1 Materials

¹⁰ Previous feasibility and monitoring studies mainly focus on urban freight transport and logistics, without benchmarking the urban food system.

Primary and secondary sources have been used to collect data for this study: interviews with supply chain participants; news articles; websites; direct observation of urban distribution center, wholesale market, stores and business premises and the collection of secondary economic and demographic data. Relationships with food suppliers, wholesalers, carriers, managers, shop owners, public representatives, and other stakeholders have been investigated.

5. Results

At this stage of the investigation, partial results are available up to the first stage of the investigation, that is the assessment of the freight transport weight according to the food demand, food supply estimation and the characteristics of the food transport system that have been outlined in the methodological framework.

5.1 Parma's food demand

To estimate the demand of food expressed by the city in a working day, the number of consumers is calculated through the official population figures issued by the Municipality register. Moreover the estimation of the number of city users (employees, business-persons, students, tourists, etc.) is obtained with the support of the Municipality officers¹¹. In the city of Parma, the total estimated number of inhabitants and users of the Parma's city area is about 240.000 people (see Table 1), eating in the city at least one meal.

Table 3. Parma's residents and city users

| Population group | People in a working day | Percentage |
|---------------------|-------------------------|------------|
| Residents | 184.460 | 76,9 |
| Temporary residents | 21.000 | 8,8 |
| Commuters* | 33.000 | 13,8 |
| Tourists | 1.200 | 0,5 |
| Total | 239.660 | 100 |

* Net of commuters, living off residents commuting to the peri-urban area.

Source: our elaboration on Municipality of Parma data, official statistics and secondary sources, 2009

On the basis of the Municipality's available data, the Parma self production is highly limited and, thus negligible in this estimation. To represent the complex urban complex demand of food, we assume commuters purchase in the city only the half of the total amount of daily purchase of food (most likely they will consume lunch and, eventually, breakfast in the city, and dinner at home)¹². Permanent and temporary residents and tourists purchase and consume the entire amount of food within the city.

Table 4. Parma's daily food demand

| | Estimated daily purchase per capita (kg) | Aggregate daily purchase (kg) |
|------------------------|--|-------------------------------|
| Residents and tourists | 1,137 | 547.347 |
| Commuters | 0,568 | 4.515 |
| Total | | 551.862 |

Source: our estimation

¹¹ There are no available official data about city users in the most of Italian cities. Some research has been conducted for big cities as Milan and Turin. The last population census, dated 2001, does not provide relevant aggregated data on city users.

¹² Due to limited available data about average meal weight, we assume at home and out of home meals have the same weight.

Based on the Confesercenti ER's study¹³, in Emilia Romagna region people (age > 3 years) eating one meal out of home are 33% , thus around 78.100 people daily consume food out of home. Therefore 8,3% (45.935 kg) of the total food demand is consumed out of home.

5.2 Parma's food supply

The food commercial services and shops in Parma in the city center and in the whole urban area are different for management structure, size, and food products selection. On a preliminary analysis of the District's Chamber of Commerce database, we observed the high share of registered food commercial activities on the city full number of shops and stores. Additional information are gathered by the RER studies on the food distribution system (Table 5). Although more detailed info are necessary to complete the study of the corporate and independent channels, and, particularly, of the Ho.Re.Ca. sector.

Table 5. Retail surfaces share within Parma city limits

| Sale store | % |
|----------------------|------|
| Hypermarket | 20% |
| Hyper < 6.001 m | 20% |
| Hyper > 6.000 m | 0% |
| Supermarket | 49% |
| Super <800 m | 12% |
| Super 800 - 1.299 m | 11% |
| Super 1300 - 2.499 m | 12% |
| Super > 2.499 m | 14% |
| Discount | 12% |
| Superette | 14% |
| Specialized | 6% |
| Total | 100% |

Source: Regione Emilia Romagna, 2008

5.3 Parma's food transport

According to the Region Emilia-Romagna (RER) estimations, in urban areas 70% of trucks bring 30% of the volumes and it calculated a huge potential for consolidation near city centre. Parma Municipality and RER examined the urban traffic system in 2001, 2004, 2006 with various data collection methods. Specific analysis have been conducted in order to describe the freight transport volumes in two different zones: inner city and city limits areas.

Available data deal with the following supply chains: fresh food, dry food, Ho.Re.Ca., and fruit and vegetables from wholesale market. The elaboration of the collected data is undergoing.

5.4 Parma's food transport impact

At present, only general data have been collected to evaluate the environmental impact of the food haulage. The available information estimates that 55% of air pollution is generated by urban freight transportation in the inner city (CAAL estimations, 2010). The evaluation of the food transport environmental impact at urban level results from the complete gathering of previous sections, our expectation is to evaluate the Ecocity environmental impact on the current freight transport scenario.

¹³ CAT Confesercenti, 2009, *Emilia Romagna Food Consumer Pattern*.

6. Final remarks

The analysis on the urban food system is still incomplete; however some cues can be suggested as preliminary considerations:

- including in the urban food demand estimation the city users flow and the household waste phenomenon provides a more realistic picture of the daily amount of food requested by the cities;
- identifying the urban food supply through the full representation of food commercial activities, as corporate retail, independent retail, Ho.Re.Ca. and institutional food services describes the existing high atomization of the distribution system in our cities;
- the available data on the urban food transport in the last mile service depicts a scenario characterized by strong logistic inefficiencies and high potential of city logistics optimization.

Due to the ongoing elaboration of the data, at this stage of investigation the paper could not facilitate a full comprehension of the expected benefits of the methodology adopted.

As well the risk related to lack and disaggregation of data needs to be carefully considered along the next research steps.

Urban areas now constitute the living environment of the vast majority of the population, and it is common interest raising the quality of life in these areas with integrated policies. Special attention is on food supply system and the food transport, that directly impact on the city sustainability. Although urban food freight system is very complex and heterogeneous, indeed the delivery and collection of goods in urban and metropolitan areas, especially in the core areas of cities with old and established centres, have a major impact on the local community as concerns its economic strength, quality of life, and the accessibility and attractiveness of the city.

At present, balancing the need to access for goods and services with local environmental and social concerns is a crucial point. Rethinking urban mobility, as requested by the European Commission, involves managing the transport demand, optimizing the use of all the various modes of transport, providing innovative services and coordinated logistics actions, particularly needed for the perishable goods transport. Moreover the last food mile logistics can represent a starting point to redesign the urban mobility system and to renew the “urban culture” of people living and using the city (Bologna, 2010).

Urban food planners and policy makers are looking for the most effective logistics strategies to booster the economic prosperity, quality of life and environmental protection, and for tools helping in evaluating these strategies in terms of environmental impacts. Our approach focuses on setting a tool that helps planners and policy-makers to understand the urban food system from a logistic point of view, and we expect to identify sustainability indicators for city logistics solutions related to the food supply.

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