

# Trucksharing

*An Efficient Regional Logistics System  
Using a Co-Shipment Portal and ILP Optimized Purchasing*

## 1 Concept and Approach

We will achieve cost-efficient regional logistics through a solution that matches unused transport capacity to regional transports that are waiting to happen. Taking and executing a transport order will look like this:

1. **Order.** A user orders products online that are offered by a local store. This can work either in a shop operator's usual self-hosted webshop, with shipping integration plug-ins provided by us. Or, in the case of local food products, there is our existing marketplace platform [epelia.com](http://epelia.com).
2. **Shipping selection.** In the online shopping order, the buyer selects "same-day local delivery" as shipping option, offered at a shipping rate of about 1.5 - 5 EUR, depending on delivery distance and local price levels, but independent of weight.
3. **Mapping to delivery agent.** The shipping order is transferred to our regional logistics coordination server ("RELOCS"). The server keeps track of delivery agent locations via GPS status updates from apps on their mobile phones, and selects the agents with the most economical options to make the delivery, based on their current location, availability for transport jobs, source and destination locations of the delivery, future itinerary of the agent, experience and trust level of the agent (esp. for valuable goods), size and weight of the delivery, and capacity in the agent's means of load-carrying.
4. **Automatic negotiation with delivery agents.** Selected delivery agents receive automatic messages to their smartphone apps, offering them the transport job. The first to respond will get the job, and is informed of relevant times (picked purchase available at the shop, shop opening hours, customer availability, potentially express delivery deadline).
5. **Delivery execution.** The delivery agent picks up the pre-packaged purchase at the shop, transports it to the customer, and receives a confirmation of receipt on their smartphone app.
6. **Reviews.** The customer has the option to review the delivery agent, allowing better selection in future deliveries based on trust ratings.

A delivery agent can be anyone with an option to carry some load, as the load-carrying capacity can be specified to the system: a student with a bike, a full-time bike or cargo bike courier, a self-employed taxi driver looking to optimize vehicle utilization, or anyone doing their weekly groceries shopping or just visiting friends. This allows citizens to carry out delivery jobs for a side income while traveling their normal routes, and it also creates new employment options in the rare "low-skill" job category. To ensure professional conduct, they will however have to register a small business and get a freight insurance, for which we as the logistics platform can provide framework contracts.

The project proposal is in advanced conceptual state, being the end result of operating the food marketplace epelia.com since 2011. Epelia allows small farmers and food manufacturers to sell their products internationally via Internet.

One of our early insights was that it's not economically viable to let sellers rely on national parcel shipments for our marketplace. Only specialty food items can be economically transported this way as they have a high enough price / weight ratio, but not products for daily use.

To crack this problem, we first intended to team up with and support farmers markets, a traditional infrastructure of direct food sales from small farmers to customers, that would allow combined, cheaper parcel shipments from multiple shops to one customer. We explored this idea in a five-month trial in Matera, Southern Italy, together with the social innovation incubator "unMonastery". We also pursued several options for collaborations with farmers market associations in Germany, and regional government units that support them. However, in both cases we hit both cultural and organizational barriers: farmers markets are no viable distribution channel in Southern Italy for example, as they are less widespread and less coherent. While in Germany, they and their supporting organizations were just not ready to go beyond traditional on-site selling.

The natural consequence for us was developing the regional logistics system concept as a hub-less alternative to relying on farmers markets.

In addition to regional logistics being a concept, we also have an operational, custom-developed portal software available that we use for epelia.com and that would become the base software for the "virtual mall" of local shops that use our regional logistics system.

Our innovation relies on two key technologies: a web platform and smartphone app to aggregate transport offers and orders from diverse agents, and just-in-time optimization for economic purchases and delivery. The first is already operational in platforms such as postmates.com and tiramizoo.com, and is technologically "no big deal".

The second is not yet fully operational technology, since it relies on advanced usage of ILP (integer linear programming) techniques, namely in a time-critical live environment. This is not done usually, however, we have secured the help of another entrepreneuring team who has mastered just that in a relevant related context: the Makerfox / Economy App (makerfox.com) marketplace is optimizing a network of offers and orders for finding economic cycles, and its team has won the European Commission's Social Innovation Award 2013 ("Diogo Challenge") for this innovation.

Additionally, by being able to provide a custom webshop portal software as a basis, the development efforts for a logistics system and purchase optimizer integration is lowered by about half. In total, our innovation currently resides between TRL 5 and 6, but closer to TRL 6 ("technology demonstrated in relevant environment").

**Optimizing for low cost.** We intend to implement automatic ILP (integer linear programming) optimization of shopping lists across multiple shops, optimized towards lowest combined cost of products plus delivery. A first version of this will be part of this project's prototype deliverable and integrated with our epelia.com platform. Example: If a user puts five generic types of food items on their epelia.com shopping list, the algorithm would determine the different options of selecting matching products from local shops, calculate the total co-shipment costs at current spot prices, and propose the solutions with the lowest total cost for the user to choose from.

**Optimizing for small business support and other purposes.** The optimization target in ILP optimization does not have to be purely the lowest cost, though. It can also take into account goals like supporting local products, small local shops, healthy nutrition etc., while still offering buyers lower

prices than what their manually selected shopping baskets and transport options would amount to. This is the major way how our innovation can increase the turnover of local shops and revenues from local produce. We intend to deploy this feature on our own local food marketplace Epelia ([epelia.com](http://epelia.com)).

## 2 Impact

We identified several unmet key needs that will drive people to access our future low-cost regional delivery services:

- **Time efficient food shopping.** For stressed double-income couples, being able to order their food online and having it delivered to their door fresh and fast is an attractive alternative to spending scarce free-time on boring repetitious activities like food shopping. “Recurring order” options will also drive down the time to select the food online.
- **Food shopping for mobility constrained people.** Several groups of people are mobility constrained and would profit from having their regular purchases delivered for a comparable cost to the fuel needed for doing the pickup: seniors in rural areas, seniors in mountainous areas and historic downtowns, sub-urban people without access to cars etc..
- **Non-demanding employment.** Small-scale delivery logistics does not require a formal education or license in many European economies, and can be done in our portal without fixed working hours on availability basis. So it can provide new, non-demanding side income jobs to those who need them, including the unemployed, students and those caring for old people or for children.

In addition, we expect to find emerging new needs that are raised by new infrastructure services like cheap regional shipping. Some of the more predictable developments would be:

- **Regional toolsharing platforms.** Within the current collaborative consumption trend, there is a shift from ownership to access, which already gives rise to neighborhood object sharing platforms. Combined with a dependable and affordable regional logistics system, this could easily extend towards regional sharing platforms for more specialized tools and equipment, and to companies starting to access such services.
- **Offline-online integration.** A combined “virtual mall” webshop showing all offers of local shops is a strong means of getting customers back into the shops, which becomes relevant the more inner city purchases are replaced by online shopping.

**Regional shipment is a potential new, high-volume market. A set of conservative assumptions would be:**

- Regional shipment mostly be used for grocery shopping, with negligible other uses.
- 15% of Europe's nearly 214 million households [[source](#)] will take up online purchasing their food in the next 10 years.
- A household will receive 1.2 parcels on average per week via regional shipping.
- The average local food shipment would be about 4 EUR.

From these assumptions results a yearly market size of 8 billion EUR.

As every platform, a regional logistics platform needs an initial critical mass of both transportation agents and transport contracts to function, or It will fail to be attractive to both parties.

For regional food logistics, the most common user will be private individual from an urbanized region, suburban region, or peripheral region that can be connected to urban centers via regional logistics (ca. 35 km max. distance). Our concept relies on urban centers with at least ca. 30 000 inhabitants,

as the density is needed to provide the critical mass of transport agents and users in a region for the system to flourish.

Our strategy to establish the regional logistics system is to start in just one region and grow from that, along major traffic routes that connect major urban centers. We have to start small because of the "critical mass" problem explained above: we can achieve critical mass in one region right from the start, for example by collaborating with a minicar taxi company for the transport offers and a virtual mall with regional food shops for transport orders. But we cannot achieve critical mass nationally or EU wide at once. So growth will spread to neighboring regions one by one at first and will be slow, but that is fine because growth is naturally exponential.

Also we expect however that with more mature algorithms and spread across urban centers in Europe complete, the system will in later years not be limited by population density and will find new unintended uses throughout.