The PS1® system

(Telematic project for the optimization of the city logistics and the road transport of goods)

The General Mobility Plan

The need for mobility (which basically means the need to move people and goods for a variety of reasons) is the very bases on which the demand for safe and efficient transport services stems from. This demand is shared both by citizens and businesses. It is quite clear that a strategic plan (national/European) for the mobility encapsulates a wide range of interests and above all it is the primary concern of those who deal with transportation first hand.

Three main points of the general mobility plan

- **Prediction of mobility fluxes**

Planning of the transportation systems
Organization of the services infrastructure

Three different kinds of mobility

- **Short distance (urban and regional mobility, big cities and target areas included)**

Medium distance (interregional and national)
Long distance (local, Mediterranean, international, and intercontinental)

The general mobility plan will focus on three general objectives (efficiency, safety, sustainability) and will evaluate the situation accordingly.

As far as the safety is concerned the objective is to halve the number of casualties caused by road accidents by 2010 (In accordance with the UE decision)

Regarding the sustainability the objectives are two. The first one is to respect the Kyoto protocols and the second one to comply with the UE directives on the quality of the air. In so many words the idea is to reduce the carbon emission by 30 %.

With regard to the efficiency the idea is to implement a meticulous program that will regulate behavioral rules, connections and infrastructures through a better and more functional use of the Telematic platforms. This will bring about substantial improvements in the current situation which is a cause of distress for many.

Data

In Italy the road transport accounts for 80% of the total movement of goods. This is a very high percentage that puts the topic of auto transportation (and its badly needed improvement) right at the top of the agenda. In Italy the average distance covered for the transportation of goods is 50 km. It must be pointed out that we are talking about more than 50% of the total movements. These startling figures leave no room for misinterpretation and mercilessly underscore the entity of the problem. It is quite clear that the problem of traffic jammed cities and the congested state of their roads network is one of the priorities of the GMP (General Mobility Plan). The environmental impact is massive and the economic disadvantages (for those businesses that deliver goods to urban areas) noteworthy.

City Logistics

The urban traffic has to be de-congested. The main cause for congestion is the road transport that produces a great environmental impact. The logistics distribution of businesses that operate within urban areas has to be improved along with the safety of circulation. In order to achieve these goals it is necessary to sensibly reduce the number of vehicles and render their usage optimal. The final objective is to integrate the road transport with the other transport modes in order make the sustainability of cities and urban areas in general a concrete reality.

In this case scenario the relevance of the so-called reverse logistics (all operations related to the reuse of products and materials) for the optimization of transported volumes, is quite minimal. This is due to the fact that in Italy the transport is rarely done by third parties it is instead managed and carried out directly by the interested party.

This is why the main role played by the GMP is to efficiently organize the re-structuring of the transportation businesses in order to aggregate the offer, favor collaboration and implement the badly needed computerization of their systems. This will help improving the transportation services through the optimization of the loads, routes, driving hours done by drivers and periodic, thorough and quite strict overhaul of trucks.

Reverse logistics

From Wikipedia, the free encyclopedia

Reverse logistics stands for all operations related to the reuse of products and materials. It is "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics." The reverse logistics process includes the management and the sale of surplus as well as returned equipment and machines from the hardware leasing business. Normally, logistics deal with events that bring the product towards the customer. In the case of reverse, the resource goes at least one step back in the supply chain. For instance, goods move from the customer to the distributor or to the

manufacturer.

Business Implications

In today's marketplace, many retailers treat merchandise returns as individual, disjointed transactions. "The challenge for retailers and vendors is to process returns at a proficiency level that allows quick, efficient and cost-effective collection and return of merchandise. Customer requirements facilitate demand for a high standard of service that includes accuracy and timeliness. It's the logistic company's responsibility to shorten the link from return origination to the time of resell." By following returns management best practices, retailers can achieve a returns process that addresses both the operational and customer retention issues associated with merchandise returns. Reverse logistics is more than just returns management; it is all activities related to returns avoidance, gate keeping, disposal and all other after-market supply chain issues. Returns management – increasingly being recognized as affecting competitive positioning – provides an important link between marketing and logistics. The broad nature of its cross-functional impact suggests that firms would benefit by improving internal integration efforts. In particular, a firm's ability to react to and plan for the influence of external factors on the returns management process is improved by such internal integration. Third-party logistics providers see that up to 7% of an enterprise's gross sales are captured by return costs. Almost all reverse logistics contracts are customized to fit the size and type of company contracting. The 3PL's themselves realize 12% to 15% profits on this business.

Return of unsold goods

In certain industries, goods are distributed to downstream members in the supply chain with the understanding that the goods may be returned for credit if they are not sold. Newspapers and magazines serves as examples. This acts as an incentive for downstream members to carry more stock, because the risk of obsolescence is borne by the upstream supply chain members. However, there is also a distinct risk attached to this logistics concept. The downstream member in the supply chain might exploit the situation by ordering more stock than is required and returning large volumes. In this way, the downstream partner is able to offer high level of service without carrying the risks associated with large inventories. The supplier effectively finances the inventory for the downstream member. It is therefore important to analyze customers' account for hidden cost.

The vehicle routing problem (VRP)

From Wikipedia, the free encyclopedia

The **vehicle routing problem (VRP)** is a combinatorial optimization and nonlinear programming problem seeking to service a number of customers with a fleet of vehicles. Proposed by Dantzig and Ramser in 1959, VRP is an important problem in the fields of transportation, distribution and logistics. Often the context is that of delivering goods located at a central depot to customers who have placed orders for such goods. Implicit is the goal of minimizing the cost of distributing the goods.

Several variations and specializations of the vehicle routing problem exist (VRPPD, VRPTW, CVRPTW). Generally speaking though the system try to envisage the organization and

planning of the routes followed by the vehicles in the presence of:

- Multiple deliveries

More vehicles

Each vehicle:

- Can serve more clients

Has a limited capacity

Each client:

- Demands a certain product

Objective:

- To Minimize the cost associated with the vehicle's route (distance, time, etc)

These methods have to:

- Allot certain groups of clients to each vehicle

Elaborate and create a route for each vehicle

Many methods have been developed in order to find good solutions to the problem, but for all but the smallest problems, finding global minimum for the cost function is computationally complex.

PS1®: The Telematic solution

The creation of the PS1® has been possible thanks to the collaboration of an IT business that has patented in Italy two creative industrial products after 6 years of study on the road transport management in compliance with the law on the General Mobility Plan promoted by the minister of transports with regard to the predicting and management of transport flows. In addition to that there are two universities that have shown an active interest in the Archipelago SCEC Telematic platform. The department of information science of Milan and the department for the information technologies of Crema (CR) have given their support in the supervision and creation of specific algorithms that will be able to simulate and monitor the circulation and expansion of the local money SCEC (university of Milan). The university of Crema will give its support in the creation of specific algorithms (never implemented before) apt at improving the Telematic platform that focuses on the transportation of goods. It will be therefore possible to create a system by 2010 (Kyoto protocols) that will solve many problems related to the mobility of various strategic sectors of the economy.

Both staffs of the above mentioned universities are the regarded as the best experts in Italy in the WEB 2.0 and CVRP (Capacited Vehicle Routing Problem) fields. The Telematic platform of Archipelago will have an internal link that will allow every user to visually search a vehicle with characteristics that are well suited for the potential delivery. The system will show in real time the route (geo-localization) of one or more vehicles and their loading capacity (a feature

that has never been implemented before) and the user will be able to interact directly with the driver or with the manager of the business involved in the delivery.

Thanks to this system cost of transport in general will be more competitive with the added bonus that each vehicle will not cover its routes on an empty load. This will contribute substantially in helping the Italian government to comply with the parameters set by the Kyoto protocols on gas emissions. The system will also allow the drivers to interact trough the real time visualization of the respective positions. This can be done directly from the vehicle through the aid of an on-board display, a PDA or a smart phone.

The amalgamation of small businesses

The PS1® system can also serve a social and entrepreneurial function by facilitating the amalgamation process of the small and very small business that want to join forces and turn into bigger economic realities. By sharing the same kind of professional knowledge businesses can easily individuate and experiment possible and mutually beneficial collaborations which in turn, if successful, can give way to working synergies, alliances and even business mergers. These are just a few expedients that can be implemented in order to reduce operational costs. Another option would be to involve associations and consortiums in order to increase the contractual power of the small owners.

So far, in our personal experience, the system has already produced exciting results and contributed heavily in amalgamating three small fleets into a single, bigger one.

The Telematic tools that have been illustrated so far can be used and adapted for a variety of purposes:

1. Reverse logistic

Recovery of merchandise returns

2. Separate collection of rubbish (door to door)

Smart management of urban waste
Sustainable mobility (car-pooling, car sharing, taxis, transport of collective groups in urban areas)
Public transport in urban areas

3. Main modes of public transportation

Intermodal transport

4. Intermodal public transport (city logistics)

Health care

The VRP/ cVRP algorithms that will be developed for the PS1® could be also used respectively for the points 1,2,3,5,6,9,10 of the above mentioned list. The final objective is to find new algorithms that will optimize dynamically the new mobility flux. So far we rely on static models and this is their biggest limitation. With a single research in this field numerous problems can be solved with substantial savings for those who will take part in the financing of the project.

The EU has given clear guidelines regarding the mobility plans by setting up projects like

ELTIS. This project will gather data about the most noteworthy implementations of programs that deal with the transportation of people and goods within the European community. This reiterates once again the need for cooperation between existing realities in order to make the present ideas and applications better and more functional.

For example the GAUSS project, which envisages the implementation of the European satellite network GALILEO, finds its application in the PS1® system for the management of the drivers 'meeting points' and the transshipment of goods.

Part of the research of the University of Crema will focus on these topics and their results will be available by the year 2010 (same year of the Kyoto protocols). In closing we would like to spend a few words on the details related to the mobility applications that we have illustrated so far.

From point 1 to point 4: Transport, environment and waste

The PS1® system can be utilized for an efficient management of the reverse logistics, merchandise returns recovery, separate collection of rubbish and for a smart recovery plan for solid urban waste. The University of Crema could also study a way to warn an operative centre about the filling-up level of bins that present across a given territory. In this way it will be possible to organize the best possible itinerary and perhaps use even the private transportation vehicles that are well equipped to carry out this job.

Point 8: Intermodal transport

The PS1® system, thanks to its real- time communication system, lends itself to inter modality. This can be achieved thanks to the relative easiness of the system to find a vehicle that is suited for the delivery of the goods carried by a railway wagon or a ship. In this way it will be possible to abate waiting times and transport costs which are often due to the tome consuming transshipment of goods from trains to ships. The system would track down only the best suited vehicle both in terms of capacity and location.

Point 9: City logistics

The University of Crema has already elaborated interesting solutions to abate transport and logistic costs by drawing inspiration from other European realities. These different experiences can be combined in order to achieve even greater results. One example could be the Zurich cartogram along with other projects that are being developed by some transport businesses in various Italian cities.

Point 10: Health care

The University of Crema has developed a project in collaboration with the region of Lombardy that pertains to the health care field and focuses on the management optimization of the ambulances that deal with medical emergencies. This project can be implemented either on a national level or on a local level.