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HORIZONTAL COLLABORATION IN LOGISTICS: THE CASE OF PROCTER & GAMBLE AND TUPPERWARE

- CASE STUDY -

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1. INTRODUCTION

The vast majority of commercial transport in Europe is carried out by road. Besides reducing the heavy dominance of road over the rest of transportation modes, among the main goals of European transport policy is to improve the efficiency of transportation system. In terms of vehicles efficiency, this challenge involves reducing empty running and low load vehicles as much as possible, since in both cases a large waste of resources exists. Empty running and low load vehicles undesirable effects on congestion, fuel consumption, CO2 emissions and costs are similar to those caused by vehicles fully loaded as these problems are positively related to the total kilometres travelled. Making better use of each vehicle's carrying capacity, the same goods can be carried with fewer vehicle movements reducing total kilometres travelled thus lowering negative externalities.

In recent years, levels of empty running have slightly decreased due to minor increases in efficiency in logistics operations. According to the latest statistics available at Eurostat, a 23.2% of all vehicle-km in 2012 involved an empty vehicle. In terms of weight, the average load factor in the remaining not empty vehicles is around 56%. The facts clearly indicate that there is room for improving road transport sector efficiency, thus making transportation system more sustainable in the long term.

Empty running is mainly caused by trade imbalances between locations and the lack of scale at carrier companies. In many cases, demand patterns make it very difficult to match opportunities to backload trucks after their primary delivery. A large share of carriers in Europe only operate five trucks or less forcing them to continuously reposition their vehicles to locations where they can continue serving their clients. This fragmentation of road transport industry also causes low co-modality usage, as bigger scale of operations is usually

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required for economically operating more environment friendly modes like railway or Short Sea Shipping. Another factor affecting low load are Just in Time production processes that are usually associated to high order fragmentation at shippers.

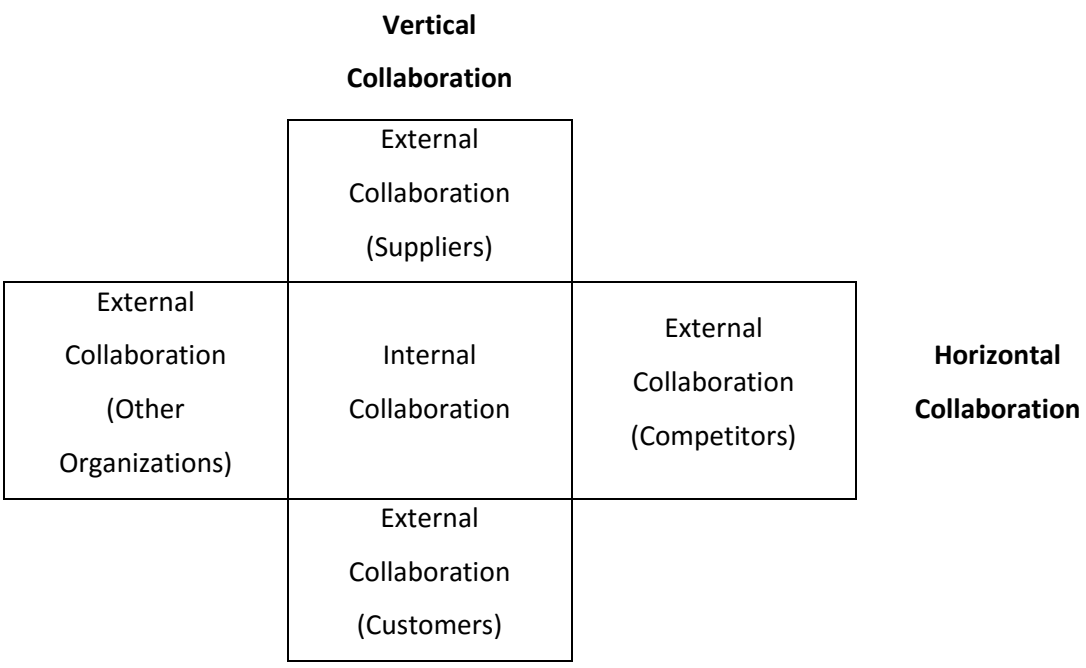
In the early 2010s, Procter & Gamble (P&G) identified a low load factor problem in its transport operations between its production facilities in Belgium and its warehouses in Greece. P&G shipments of detergents consisted in an intermodal solution of road and railway transport that was using a 95% of the maximum weight capacity of the vehicles but only 50% of the volume capacity. The company realized that increasing the use of the volume capacity of its vehicles was an opportunity to reduce logistics costs and increase the overall efficiency of its supply chain.

In P&G's research to find an innovative solution to low load factor problems the company considered load consolidation as a potential solution. Load consolidation is a traditional response to these challenges in which Logistics Service Providers (LSPs) aim to reduce empty back hauling and convert less-than-truckload (LTL) shipments to full-truckloads (FTL) by merging different shippers' freight volumes when there is some geographical and temporal overlapping in logistics operations. However, Logistics Service Providers (LSPs) are not able to take full advantage of all potential bundling synergies, as they are not allowed to modify their clients' transport orders and logistics volumes. Moreover, in this framework load consolidation is an internal optimization process that each LSP apply to cargo movements of shippers in its client's base. But freight flows potentially compatible for bundling are likely to pertain to different shippers, and given the high degree of fragmentation in logistics sector, it is unlikely that a single LSP operates those transport operations. P&G, through its project TINA, had already relied on load consolidation filling vehicles with its own light and heavy products, in order to reach an optimal cargo density. However, load consolidation did not seem to be an optimal approach to P&G concerns in this particular corridor but the idea of bundling cargo with other companies lead to consider collaborative solutions.

A more innovative answer designed to reduce capacity underutilization of the transport system is the integration of supply chains in supply networks. These supply networks would be the result of logistics collaboration among different companies that might involve jointly using transport capacities and warehouses or co-loading. Vertical collaboration is a partnership between companies and suppliers (Upstream) or companies and customers (Downstream). On the other hand, horizontal collaboration engages companies that might

be competitors operating in the same market or other organizations operating at the same level of the supply chain[1]. According to P&G view, horizontal collaboration seemed to be an interesting alternative able to increase the potential of load consolidation, by synchronizing transport orders from different shippers. In this sense, P&G understood the low load vehicles in the Belgium – Greece corridor as an opportunity to create a demonstration case of the high potential of horizontal collaboration. It is important to note that, despite the many likely benefits of horizontal collaboration, many companies and departments within these companies see horizontal collaboration as a very difficult to implement solution due to operational problems and mainly because of a lack of trust on other companies behaviour.

FIGURE 1. THE SCOPE OF COLLABORATION



Source: Barrat (2004)

In the time P&G was considering horizontal collaboration as a way to improve its supply chain efficiency, a project funded by the European Union and named Collaboration Concepts for Co-modality (CO3) was being carried out. CO3 was aimed to the development, professionalization and dissemination of information on the business strategy of horizontal logistics collaboration in order to make it a popular solution to freight transport inefficiency.

[1] An in-depth discussion of horizontal collaboration has been included in Appendix I.

Horizontal collaboration is a relatively new logistics practice and, according to the motivation of C03 project, probably its lack of application is due missing clear practical information and implementation guidelines. In this regard, C03 provided: a toolbox that includes a clear description of advantages and drawbacks of collaboration; a roadmap for its development that tries to minimize the impediments to be encountered; a legal framework; and the experience of conducting several pilot cases with actual companies to test the proposals made within the project[2]. Although P&G did not take part of the project as a pilot case, it took advantage of the knowledge about horizontal collaboration disseminated by CO3 and implemented its own horizontal collaboration project.

2. FINDING THE RIGHT PARTNER

The underutilization problem of transport capacities faced by P&G was happening in one of its multiple logistics corridors. The company was sending shipments of detergents between Mechelen (Belgium) and Athens (Greece). These products are quite heavy, which yielded that the 45 feet containers used for the transportation were full in weight but half empty in volume.

The company was using a multimodal transport solution in which the detergents produced in P&G distribution centres (DC) located in Belgium were palletized and shipped to Athens following the supply chain described in Figure 2. The loading operations of the palletized cargo in a single vehicle took an average of one man-hour. The frequency of the shipments was three times per week resulting in approximately 300 loads per year with transit times between 6 and 7 days.

According to CO3 proposal the first phase in setting up a horizontal collaboration project is finding the right partners (Identification phase) and this task is meant to be performed by a neutral third party (trustee). The trustee would be responsible of gathering the information from potential partners, avoiding them to directly share sensitive information, evaluating the best options and deciding which companies are more likely to compose a successful horizontal collaboration. The role of the trustee is to reduce uncertainty by increasing trust among companies.

[2] A summary of CO3 project is available in the document “CO3 project overview”

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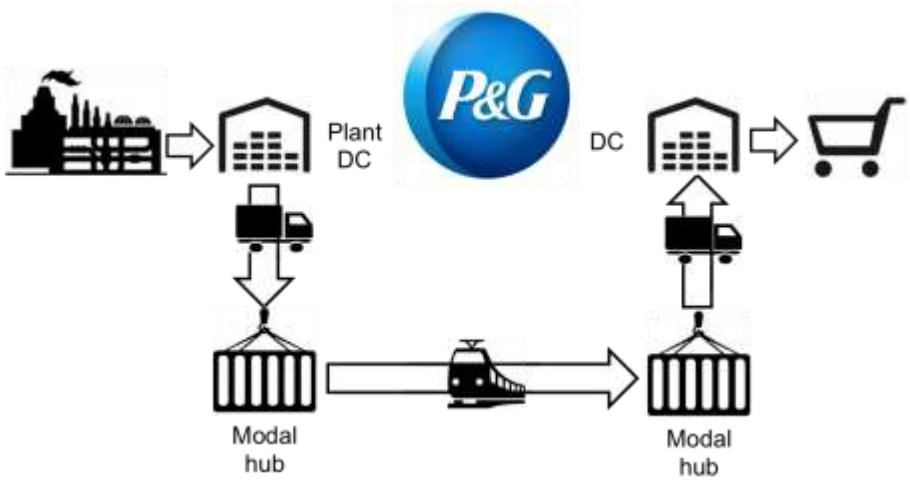
In this case P&G did not rely on a third party and acted itself as a trustee. P&G was seeking for a company sending light products in shipments between Belgium and Greece, with a similar supply chain design and using analogous routes that allowed them to use co-loading for their shipments. Moreover, the potential partner directives should be open-minded in terms of innovative solutions and willing to set up collaboration with an external company.

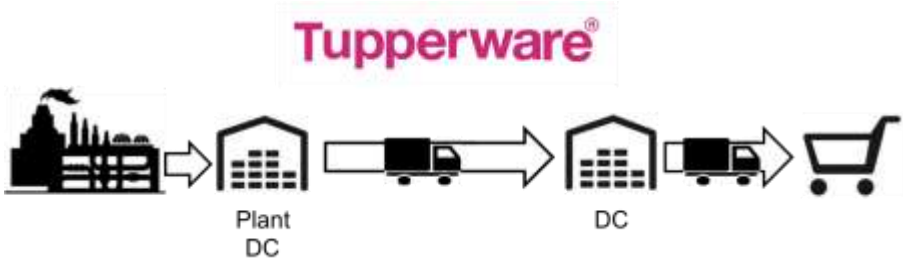
FIGURE 2. P&G SUPPLY CHAIN BETWEEN BELGIUM AND GREECE



Source: Muylaert and Stofferis (2014)

Finally, P&G selected Tupperware as its partner in the horizontal collaboration project. The reasons were that Tupperware also had manufacturing facilities and distribution centres in Belgium, more precisely in Aalst. Tupperware was sending plastics boxes to Thiva, 100 km. away from Athens, by road using 120 m^3 combi-trailers (Figure 3). The shipments had a frequency of one trip a week, with transit times between 3 and 5 days, which resulted in approximately 80 loads per year. The bulk cargo had a load preparation of 27 man-hours and filled around 80% of the maximum volume of the vehicles but only 30% of its weight capacity.

FIGURE 3. TUPPERWARE SUPPLY CHAIN BETWEEN BELGIUM AND GREECE



Source: Muylaert and Stofferis (2014)

Table 1 summarizes the main characteristics of the freight flows of P&G and Tupperware. The main opportunities are the alignment of the distances and routes covered by the products of both companies and also the compatibility of the cargo with heavy products sent by P&G and lightweight but voluminous products shipped by Tupperware. However, there were some important differences in terms of speed and frequency between both companies that had to be addressed.

TABLE 1. SUMMARY OF P&G AND TUPPERWARE SUPPLY CHAINS

	P&G	**Tupperware**
Sending location	Mechelen, Belgium	Aalst, Belgium
Receiving location	Athens, Greece	Thiva, Greece
Mode	Intermodal (Road + Train)	Road
Equipment	45 ft. containers	120 m^3 combi trailers
Loads per year	~300	~80
Transit time	6-7 days	3-5 days
Frequency	3 times a week	Once a week
Loading method	Palletized	Bulk
Load preparation	~1 man hour	~27 man hours
Volume utilization	~50%	~85%
Weight utilization	~95%	~30%

Source: Muylaert and Stofferis (2014)

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3. THE COMPANIES: PROCTER & GAMBLE AND TUPPERWARE

Procter & Gamble is an American multinational consumer goods company specialised in the following sectors: beauty care, baby, feminine and family care, fabric and home care and health and grooming. Some of the most recognizable consumer brands in these sectors are produced by P&G, making this company a world leader in consumer products. Since 2000, P&G sales have been declining due to intense competition which made the company aware of the need of changing supply chain strategies to create a competitive advantage.

In particular, P&G has been noticing how logistics was a far larger proportion of the product costs than ever. Managers usually see cutting logistics costs as an opportunity where there is plenty room to make business more profitable. P&G has been introducing innovations that make strong saving and efficiency progress like digitizing its Transportation Management systems. The “Control Tower”, as the company named it, provides real time information allowing managers to co-ordinate scheduling and vehicles movement reducing empty truck shipments.

Moreover, the company understands the potential of collaboration and sees the future of supply chains linked to the concept of Physical Internet. Physical Internet is a new paradigm in logistics that tries to replace current practices with the goal of enabling global sustainability of physical object mobility, storage, realization, supply and usage. Highly significant gains can be achieved in economic, environmental and social terms by introducing major changes in companies’ supply chains. The Physical Internet strategy aims to conduct changes in companies’ supply chains by creating an open global logistics system founded on physical, digital and operational interconnectivity through encapsulation, interfaces and protocols, that is, by applying the Internet building metaphor to the real world. In this regard, P&G aims to operate its supply chain in a collaborative environment in which all physical assets owned by different companies, including DCs and vehicles, are fully integrated in a logistics network.

The other company participating in the horizontal collaboration project is Tupperware, one of the world's leading manufacturers and sellers of plastic food serving, storage, and preparation products. Tupperware is widely recognized for designing top-quality, innovative products. The company, headquartered in Orlando (Florida), is widely recognised for

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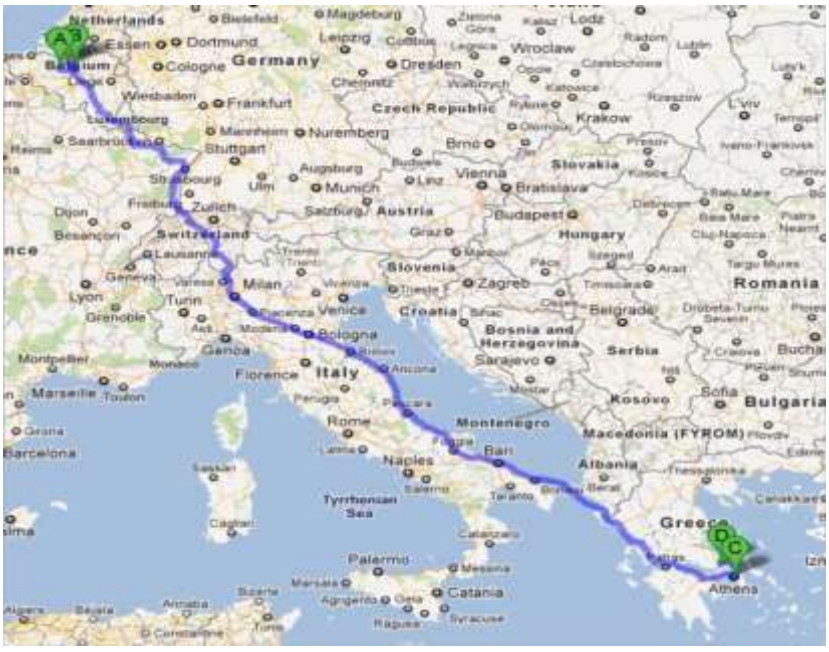
designing premium food storage, preparation and serving items to consumers in more than 100 countries.

In the past, Tupperware sustainability policies have been focused on lowering the use of input materials and energy in its manufacturing process in order to reduce the total carbon footprint. One way to moderate Greenhouse Gas Emissions is by recycling and conserving materials in its own facilities which reduces transportation of raw inputs. Tupperware's participation in this horizontal collaboration project might be understood as a new effort to improve the sustainability of its distribution processes.

4. SETTING UP THE HORIZONTAL COLLABORATION PROJECT

After evaluating the potential compatibility of both carriers, the next phase required to share further information between P&G and Tupperware. In this preparation phase in depth analysis of the flows indicated that there was a 98% overlap of lanes supplying the Greek market (Figure 4).

FIGURE 4. FREIGHT TRANSPORT FLOWS



Source: Muylaert and Stofferis (2014)

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This figure and the willingness to collaborate from both companies were seen as a promising starting point. In this second phase P&G built a profitable business case and quantified the potential benefits of collaboration. Benefits were measured in terms of efficiency gains and sustainability and service level improvements. One of the potential problems identified in this phase was that Tupperware was shipping all the cargo only using road transport, which was way faster than P&G intermodal transport line to Greece. In order to assess the true potential of the collaboration and reduce the uncertainty generated by these dissimilarities between both supply chains the companies decided to move ahead to the next phase: the operational implementation.

The horizontal collaboration was focused on incorporating the Tupperware flows in the P&G supply chain. The solution consisted in the elimination of all direct Tupperware truck shipments to Greece, which were being loaded as bulk in the vehicles (Figure 5 left). Instead, the Tupperware products were shipped to the P&G distribution centre in Mechelen. In this distribution centre, P&G detergents were being palletized (Figure 5 right) and loaded in containers. The horizontal collaboration required that the Tupperware plastic cases were top-loaded on the detergents pallets and transported to Greece using the 45 feet containers carried by road and railway. The resulting collaborative supply chain, in which freight flows from both manufacturers are bundled, is displayed in Figure 6.

FIGURE 5. FREIGHT LOADS

Source: Muylaert and Stofferis (2014)

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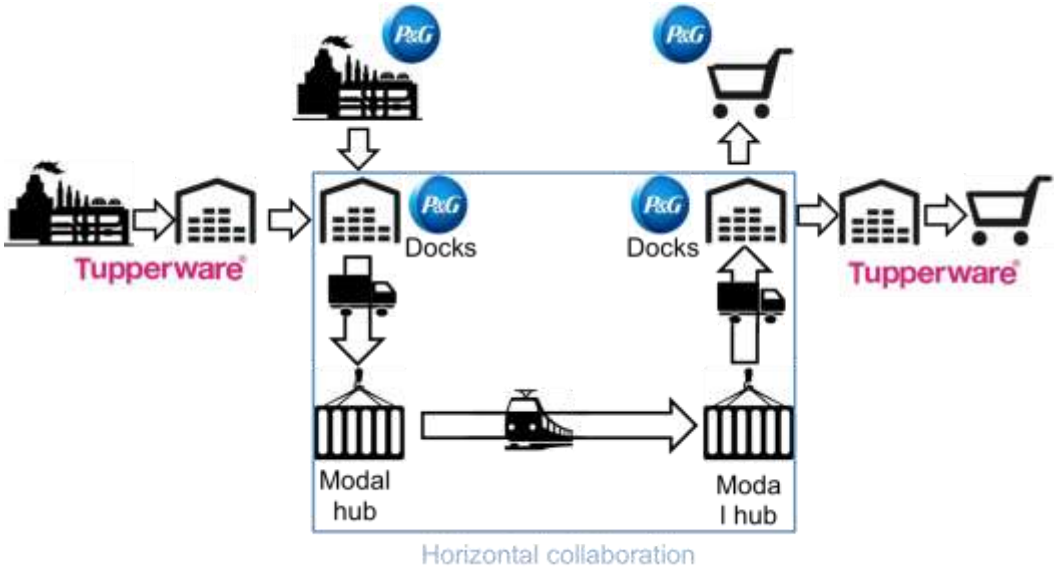
P&G set up some shipments trials following this setting in order to build trust between the two companies. Although this case looks simple, as it only seems to require integrating Tupperware and P&G flows in an already established supply chain, it really represents a sophisticated form of collaboration that posed big challenges to managers. It involved matching lanes, coordinating loads, a shift to an intermodal solution, optimizing container fill and thinking "outside the box" to get a creative solution: collaborative pallets. In addition, this sort of collaboration also demands coordination of information systems. The pilot shipments experience clearly indicated that information systems were not able to automatically handle the collaboration, which required manual overriding the systems. Although this was not the most efficient solution, it was practical and effective allowing operations managers in both companies to implement the project.

FIGURE 6. THE RESULTING COLLABORATIVE SUPPLY CHAIN



Source: Muylaert and Stofferis (2014)

After solving operational-related problems, Tupperware was also concerned about the impact that switching from fast truck services to the slower intermodal lane used by P&G would have on its customers. However, the speed reduction in the collaborative supply chain had no negative effects on Tupperware service levels. In fact, pilot shipments implementations show that the quality of Tupperware deliveries increased. This was the result of higher frequencies of P&G shipments to Greece, P&G was shipping detergents daily

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while Tupperware was sending the plastic cases only twice a week. Higher frequency shipments compensated the 2 days longer transit times. Since these pilot shipments were successful, those Tupperware departments that were more reluctant to establish the collaboration project were convinced of its feasibility.

Despite all the manipulation needed to accommodate the plastic boxes on top of the detergents (Figure 7), the collaboration resulted in double digit cost savings up to 17% on total lane costs. According to CO3 proposal, once the synergy is calculated in the business case, the next step in this phase places a relevant question about how to divide the cost savings. This point is crucial for avoiding mistrust and ensuring the success of the horizontal cooperation. It is highly recommendable to find a mechanism that makes all participants satisfied as they consider it an understandable, well-defined and fair formula. Many different mechanisms are discussed in C03 project, including proportional rules, Shapley value, nucleolus, Separable and Non Separable costs (SNS) and the Equal profit method.

FIGURE 7. FREIGHT LOADS BUNDLED

Source: Muylaert and Stofferis (2014)

Comparing formal properties of the formulas along with a subjective measure of the ease of implementation, CO3 indicate that the Shapley Value is the preferred method in smaller, coherent groups like in the case of P&G and Tupperware collaboration project. The Shapley value results from cooperative game theory and it is the result of revenues associated to

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each possible coalition to evaluate the impact of each shipper (marginal contribution) in the collaboratively avoided cost. The Shapley value fairly distributes costs and rewards to a number of collaborators that unequally contribute to a cooperative project. The savings distribution is based on the added value of each participant to the collaboration.

In this particular project, all the savings are for Tupperware as the dedicated truck shipments to Greece were eliminated and all the extra manipulation costs are faced by P&G in its distribution centres. Any simple rule of gain sharing mechanism, would have failed because this asymmetry in the logistics operations. In the case of collaboration between two partners, the Shapley value yields an equal distribution, which is a fifty-fifty division of the gains. The 17% cost savings were calculated as the total gains realized by the elimination of Tupperware shipments minus the extra manipulation costs incurred by P&G.

CO3 suggests establishing horizontal collaboration projects under a strict and detailed legal framework in order to reduce uncertainty and increase trust among partners. In addition, this legal framework is a necessary condition when collaboration is set between companies that are direct competitors so that the collaboration does not violate anti-trust laws. In this case, P&G and Tupperware are not competitors so this horizontal collaboration is not subject to competition laws. However, this business case requires that Tupperware compensate P&G for the manipulating costs and share the synergy gains so a real transfer of money from Tupperware to P&G is required. The companies had to find a legal formula that contains these money transfers but without P&G being regarded as a Transport Service Provider to Tupperware. The cooperative relation was finally instrumented as follows: P&G purchases the intermodal transport services on behalf of both companies and then passes on these costs to Tupperware as a “cost pass on invoice”. Both companies’ European headquarters are based in Switzerland and this legal formula is in accordance with the Swiss legal order.

Information sharing is usually a challenge in collaboration projects between companies. Besides being prosecuted by anti-trust laws in case of competitors participating in a collaborative project, companies are usually reluctant to share any kind of operational information. CO3 framework proposes that companies share only information with the trustee, which pools the information and does not disclose the exact figures of each company. In this case, P&G acts as a trustee, but the approach taken has the shape of an

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asymmetrical open book. While Tupperware reveals the transport costs avoided with the horizontal collaboration, P&G estimate and disclose the manipulation costs.

5. OUTCOME OF THE PROJECT AND FUTURE PLANS

Besides reducing transport costs in a 17%, the horizontal collaboration between P&G and Tupperware has additional impacts on efficiency and sustainability. The collaborative shipments of both companies have increased the overall efficiency of the shared supply chain by raising the load factor from around 50% to 85%. In addition, this project has allowed Tupperware to take advantage of a more sustainable transport mode, and by using railway means, a total 150,000 truck-km has been saved in the first year of the project application. This figure is related to a significant contribution of both companies reducing congestion in those saturated points in the corridor but also lowering climate change pollutants. According to P&G estimates, CO2 emissions have been reduced in more than 200 tons of CO2.

Another positive and relevant outcome of the collaboration between P&G and Tupperware is the impact it may have on the good image and reputation of horizontal collaboration as a potential solution to other companies. The high quality and innovative characteristic of the collaboration between P&G and Tupperware has been awarded with the “Prize of the audience” in the Supply Chain Award-Project of the Year 2013. The fact that two successful companies, which share the condition of leaders in their relevant sectors, have demonstrated that the potential benefits of horizontal collaboration can overcome the difficulties of its implementation might increase the future usage of this sort of collaborative transport solutions.

Besides this recognition from the industry, the success experienced in the development and implementation of this project have made P&G and Tupperware aware of the potential of horizontal collaboration. In fact, both companies are considering making the project larger by expanding collaboration between them and also by incorporating other companies to the coalition. P&G and Tupperware consider that both companies can take advantage of the know-how gained within this project by extending their collaboration to other lanes and corridors. The resulting larger volume available for co-loading is likely to increase the

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synergy gains by increasing the efficiency of not only two companies but of a larger group of shippers. In order to achieve the engagement of other companies, and also to make the collaboration durable, P&G and Tupperware recognize that there would be need to make use of the proposals by CO3 project framework. In particular, it seems that a case where more companies were involved would require an exhaustive legal framework to be developed and rely on a neutral third party, the trustee.

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APPENDIX I - HORIZONTAL COLLABORATION

Horizontal collaboration is usually understood as a coalition between two or more firms that operate in the same level of the supply chain, exchange or share resources (including information) and its main goal is to make business performance greater than would be achieved by the firms individually. This competitive advantage for participants is the result of a tailored relationship based on mutual trust, openness, shared risks and shared rewards (Lambert et al. 2004). The intensity and scope of this collaboration might range from limited degree coordination of activities between partners that last a short period to strategic alliances where operations are integrated and where each company regards the others as extensions of themselves.

These activities yield a new integrated supply chain model where different transport bundling strategies (Figure 1) are dedicated to reduce the final number of transport relations. First, a milk-run is set up as the combination of LTL flows in order to facilitate distribution and collection. Secondly, two routes travelling in opposite directions can be merged to reduce empty backload. Finally, shipments travelling in the same direction can be combined into a larger vehicle or even into an alternative mode such as rail, inland waterways or Short Sea Shipping.

The most frequent objective of horizontal collaboration is cost reduction, but this sort of partnership might also try to increase geographical coverage of partners services by combining their networks, make some innovations in the service provided, or reduce the social impact of the overall transportation system. Partners participating in horizontal collaboration can include shippers and carriers with different setups. The most studied configuration is the one where LSPs pool their capacities and make use of each other's network to increase load factors and reduce empty running. Another setup would be the collaboration between multiple shippers that might outsource their transport flows to a unique LSP. The collaboration between shippers and carriers has the largest potential to improve efficiency although it is more difficult to organize and maintain. It is worth noting that increasing the number of partners will enlarge potential synergy but the coordination costs will also be raised.

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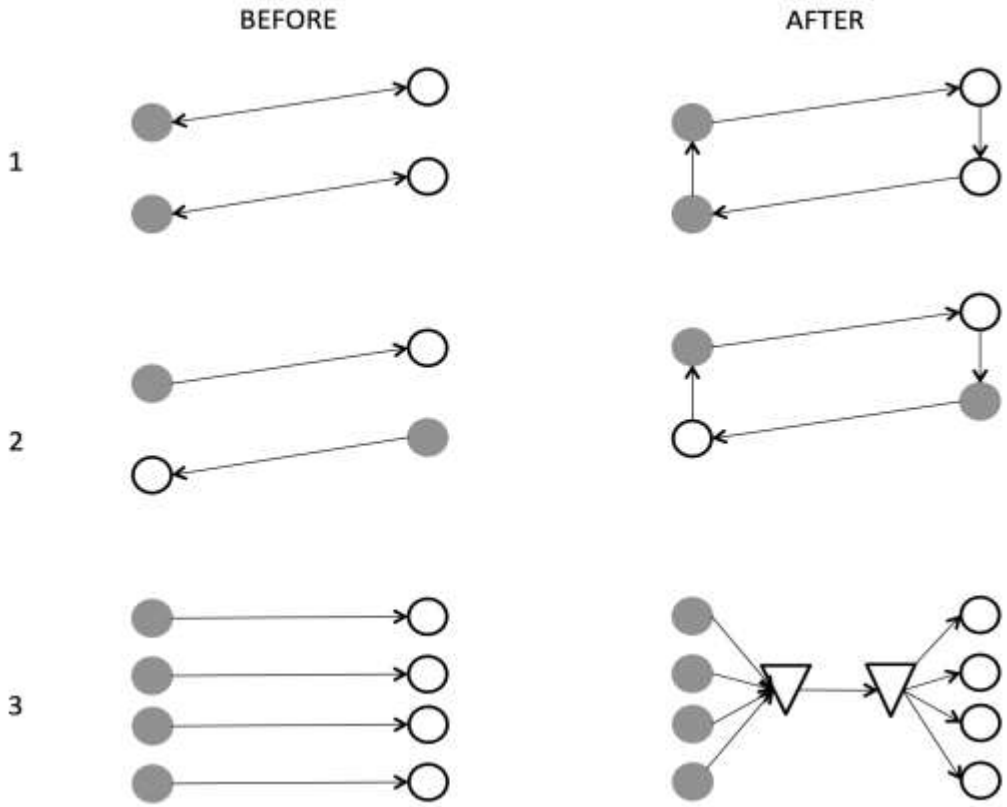
Figure 1. Before and after three transport bundling strategies.



Source: C03

Important aspects of horizontal collaboration include the assessment of potential benefits of cooperation and also considering the impediments that might reduce the likelihood of success (Table 1). The potential advantages of cooperation are related to the generation of relational rents, i.e. profits that cannot be generated by firms in isolation and that are the result of knowledge-sharing routines, complementary resource endowments and effective governance. In logistics, relational rents can be "hard" (e.g. economies of scale) and soft (e.g. learning and information sharing) and they can be identified for their impact on costs and productivity, service and market position.

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Table 1. Main advantages and impediments of horizontal collaboration

Advantages	Impediments
Cost savings and productivity gains	Partners selection
Service improvements	Gains sharing scheme
Market position enlargement	Partners unbalanced bargaining position
	Information and Communication Technology requirements

Knowledge and assets sharing provide an opportunity for organizational and know-how learning that can improve productivity of cooperative partners. Core activities that might reduce costs include decrease in empty hauling, better usage of storage facilities, and economies of scale or eliminate the high cost of duplication. Participants in horizontal collaboration can additionally reduce non-core costs by joint purchases (e.g. computers or vehicles), organizing common trainings or sharing facilities (e.g. fuel).

Synergy effects of cooperation also include the opportunity to improve service provided by collaborative firms. Interfirm specialization allows firms to focus in a set of activities or geographical markets generating greater customer value added at lower cost. In this fashion, companies can specialize while at the same time broaden their services and improve them in terms of speed, frequency, reliability and geographical coverage. Another way to enhance service quality is the result of knowledge sharing that might increase skills and capabilities of labour force.

Market position and bargaining power of horizontal collaborators can be enlarged as a result of alliances that expand the available fleet, service range and geographic coverage increasing customer reach. In some cases, horizontal collaboration might also act as a strategy that helps protecting market share.

Once the potential benefits of horizontal collaboration have been analysed it is also important to evaluate the obstacles that it poses. The most important impediment to the success of logistics collaboration is the risk of opportunistic behaviour. The large degree of asymmetry of information that characterizes horizontal collaboration requires building trustworthy relationships. Mutual trust is the result of overcoming impediments regarding

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partners' selection, determining and dividing gains, unequal negotiation positions of partners and Information and Communication Technology (ICT) requirements.

Finding potential partners is a complicated task that requires incurring in search costs to evaluate their organizational capabilities and compatibility. And even, in many cases companies are very reluctant to share data with other companies, especially if they operate in the same market. Another source of complexity in this sort collaboration comes from partner unreliability that is very difficult to evaluate.

Another of the obstacles usually found in the development of horizontal collaboration projects is associated with risks and gains sharing. Project partners do not easily anticipate the potential benefits and risks accompanying the introduction of cooperative solutions. A fair distribution of costs and rewards requires fully understanding the nature of the collaboration, with a clear definition of each partner roles and tasks and a correct measure to determine cost savings for each participant.

Unequal negotiation positions of partners may also play a significant role in the development of the collaboration. Relative bargaining power unbalances might lead to different conflicts. Previous experiences have identified situations where the smallest companies might lose clients or be expulsed of the market and also circumstances where larger players benefit most of cooperation when benefits are not shared in fair way.

The majority of companies operating in road transport sector are Small and Medium Enterprises (SMEs) that are usually characterized by late implementation of ICT. Horizontal collaboration might require up to date technologies for intensive data exchange, especially in medium size and intensity collaborations. Low size and intensity collaboration is unlikely to need special ICT capabilities while large collaboration projects are expected to yield enough revenues to justify ICT investments.