BRANDED CONSUMER GOODS INDUSTRY | MODERN TRADE

BLUEBOOK

How to handle the road haulage crisis in the consumer products sector

ECR ITALY
EFFICIENT CONSUMER RESPONSE

CONTENTS

ECR ITALIA

MISSION

ECR Italia was established in 1993 with the mission to work alongside its customers and satisfy their wishes as best as possible, as fast as possible and at the lowest feasible cost, through a business process designed to share benefits throughout the value chain. The association's key points are to place the consumer at the centre of its operations and to create efficient and effective relationships between companies, based on a model of collaborative work and engagement.

OBJECTIVES

ECR's primary objective is to re-engineer processes in the distribution industry system in order to reduce costs, whilst encouraging collaboration between companies for the benefit of their consumers.
The association's current focus tendentially drives integration between supply chain players as a means to maximise the value of their joint operations, acting simultaneously on the demand side, on supply chain organisation and on other aspects that enter intercompany relationships.

STRATEGY

ECR Italia pursues its objective by coordinating the ongoing dialogue between industry and distribution, thereby creating the right conditions to build shared projects with well-defined objectives, with the help of companies and their managers, who take an active part in seeking common solutions.
ECR Italia therefore operates through a work method designed to deliver concrete results by stimulating an approach based on constructive debate between the parties.

ECR ITALIA MEMBER COMPANIES

DISTRIBUTION COMPANIES

Conad
Coop Italia
Crai
D.It - Distribuzione Italiana
Despar Italia
Esselunga
GS
Metro Italia
Selex Gruppo Commerciale
VéGé Retail

PRODUCTION COMPANIES

Barilla
Bauli
Beiersdorf
Bic Italia
Bolton Group
Cameo
Carapelli Firenze
Carlsberg Italia
Coca-Cola HBC Italia
Colgate Palmolive
Conserve Italia
Danone
Davide Campari-Milano
Elah Dufour
Eridania Italia
Fater
Ferrero
FHP di R. Freudenberg
GlaxoSmithKline Consumer Healthcare
Granarolo
Heineken Italia
Henkel Italia
Johnson & Johnson
Kellogg Italia
Kimberly-Clark
La Doria
L'Oréal Italia
Luigi Lavazza
Mondelez Italia
Montenegro
Nestlé Italiana
Parmalat
Perfetti Van Melle Italia
Procter & Gamble
Red Bull
S.C. Johnson Italy
Sperlari
Star Stabilimento Alimentare
Unilever Italia

WORK GROUP

PRODUCTION COMPANIES

Barilla
Bauli
Bolton
Cameo
Carapelli Firenze
Coca-Cola HBC Italia
Conserve Italia
Eridania
Fater
Ferrero
FHP di R. Freudenberg
Heineken
Kellogg
Lavazza
L'Oréal
Mondelez
Nestlé Italiana
Nestlé Waters
Parmalat
Procter & Gamble
Red Bull
Unilever

DISTRIBUTION COMPANIES

Conad
Conad Nord-Ovest
Coop
Coop Nord-Ovest
Crai
Esselunga
Metro
Selex

LOGISTICS OPERATORS

Bisinella
Brivio & Viganò
Cab Log
Fas
Geodis
Italtrans
Logistica Uno
M.A. Grendi
Maganetti Spedizioni
Number1
Stef
Transmec To Be

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Foreword

Consumer goods companies today are up against a critical problem in the logistics world, with the pressing need to reorganise an increasingly prized resource, transport.

This daunting challenge, caused by a shortage of lorry drivers and soaring fuel prices, entails reviewing processes, trying out innovative solutions and setting in motion synergies that can optimise the supply chain in its entirety, whilst looking beyond the perimeter of each single company to produce a new and better kind of efficiency.

Against this backdrop, establishing a dialogue with other companies in the sector and sharing successful experiences (incidentally always ECR's way of working) are an invaluable way to learn about and build on virtuous initiatives, pooling them to create a knowledge base open to all.

ECR companies are behind countless initiatives to get the most out of transport.

They are working on extending the unloading time window at large-scale distribution centres, to improve on-time delivery, reduce unloading waiting times and maximise the lorry drivers' driving hours. They are also exploring how to digitalise the order-to-delivery process, so as to increase supply chain visibility and speed up the process itself, and are pushing ahead to improve the managing of vehicles arriving to unload.

This list only gives a taste of the lines of intervention, as the range of **possible solutions to smooth the organisation of transport and lighten the current pressure on this sector** extends much further.

The purpose of this bluebook is to arrange these solutions in a logical manner and set out what needs to be done to implement them, while giving readers the facts about their impact on the supply chain.

These **17 solutions**, which merge into six lines of intervention, are designed **to achieve two macro targets: optimise journeys and optimise lorry driver capacity**. The bluebook also contains a list of key words that help to explain the linkages between the solutions.

This clear exposition was developed through a scientific approach, as in previous occasions, with input from companies and the backing of a joint research team from Politecnico di Milano and LIUC Università Cattaneo. Its purpose is to drive progress across the entire consumer goods system.

The idea behind this bluebook is to give companies practical support, so we can work together to seize new opportunities for growth.

Introduction

According to a 2022 survey by **Transport Intelligence**, picked up by **IRU** (International Road Transport Union), the Italian haulage market is short of 15,000 drivers at least.

Hard work, low pay, little free time and being away from home are the main reasons why people give up this job, especially those driving the long distance routes through Italy and across Europe. This exodus is matched by an ageing lorry driver population, adding to the misgivings for the years ahead. The average age of Italian lorry drivers is 55, and fewer than 1% are under 25.

Even companies operating in the consumer goods supply chain (suppliers and large-scale distribution businesses) have trouble finding drivers for their fleets or to transport goods, a situation that has been troubling road haulage for several years.

As reported in the most recent survey carried out by the **"Gino Marchet" Contract Logistics** Observatory at Politecnico di Milano, 49% of companies had trouble finding transport services in the past two years (mostly at peak times), while 63% of commercial carriers have struggled to find drivers. The Italian Transport Ministry ran an analysis on professional driving licence holders and found that over 36% of Italian lorry drivers are inside the last ten years of their careers, and only 1.9% are in the first ten. Therefore, all other conditions being equal, road haulage will lose even more drivers than it attracts in the foreseeable future, worsening an already critical situation.

The main cause of this crisis is a lack of trained lorry drivers, compounded by sub-optimal working conditions (the heavy shifts, the prospect of not getting home at night and being away from one's loved ones, and so forth), the failure to appeal to younger generations and the high cost of getting a professional driving licence and appropriate certificate (in Italy, drivers must hold a Certificato Qualifica Conducente Merci (CQCM) to engage in the carriage of goods on behalf of third parties).

If we want to minimise the negative impacts of the haulage sector crisis, or the fallout from extraordinary events such as the Covid-19 pandemic, we must identify solutions that can plug the gaps in the system:

1. **Optimise road travel**, by reducing the number of outward and return journeys and empty runs, increasing vehicle capacity utilisation (even when it could mean longer lead times) and, when possible, shifting to intermodal transport (road-rail and road-sea). The objective is to cut over-reliance on "all-road" transport for long-range deliveries by turning to rail and the "motorways of the sea".

   Another plus point of these solutions is that transporters can strengthen their commitment on the environmental front. Apart from the fuel consumed in road transport, the number one enemy of green logistics is the air "breathed" by goods packaged in inefficient unit loads (a unit load is defined as one or more packages secured to a pallet so that the entire unit can be handled by mechanical equipment) and transported on vehicles at under payload capacity.

2. **Optimise lorry driver capacity**, by reducing loading and unloading wait times at the suppliers' warehouses and large-scale distribution centres, and evening out demand, including through greater order visibility and increased collaboration along the supply chain.

   Importantly, to achieve this second macro objective, all phases in the order-to-delivery process must be fully synchronised, from dropping off orders at the warehouse to delivering goods to the customer.

The 17 solutions listed in this report were assembled during numerous research projects that engaged companies in the consumer goods supply chain and were backed by the joint team from LUIC Università Cattaneo and Politecnico di Milano. These system solutions are not necessarily purpose-built to address the ongoing crisis, but can be the outcome of more general projects to improve supply chain efficiency.

The solutions are presented in a clear logical diagram and initially grouped into two macro objectives (optimise journeys and optimise lorry driver capacity), each of which contains six lines of intervention. Every line of intervention (e.g. increase number of intermodal journeys) is associated to a hashtag (e.g. **#modal_switch**) to make it easier for readers to browse through the various solutions, all of which are correlated.

For example, if the time window to unload goods is extended into the afternoon, it is easier to introduce intermodal services (**#modal_switch**), and these, in turn, can be made more efficient by using time slot booking systems (**#slot_booking**).

1. OPTIMISE JOURNEYS BY ACTING ON TRANSPORT DEMAND AND SUPPLY	
1.1 Reduce number of journeys	
1.1.1 Increase order size	#order_size
1.1.2 Use large-sized vehicles	#vehicle_size
1.2 Increase the utilisation level of vehicle capacity	
1.2.1 Merge orders	#merge_orders
1.2.2 Standardise unit load height	#standardise_unit_load_height
1.3 Reduce empty runs	
1.3.1 Offset outward and return journeys	#offset_outward_&_return_journeys
1.3.2 Introduce backhauling and/or round trips	#backhauling
1.3.3 Redesign the distribution network	#network_redesign
1.4. Increase intermodal journeys	
1.4.1 Use intermodal rail services	#modal_switch
1.4.2 Use intermodal sea services	#modal_switch

2. OPTIMISE LORRY DRIVER CAPACITY BY ACTING ON THE DEMAND TIMELINE	
2.1 Reduce unloading waiting times	
2.1.1 Extend the unloading time window at distribution centres	#extend_goods_receiving_window
2.1.2 Use time slot booking systems more largely	#slot_booking
2.1.3 Reduce acceptance and control times for incoming goods	#digitalisation
2.1.4 Introduce stand-by semi-trailers	#stand-by_trailer
2.1.5 Improve pallet exchange handling	#pallet_exchange
2.2 Even out weekly/monthly logistic flows	
2.2.1 Reduce peak day deliveries	#even_out_demand
2.2.2 Prepare for seasonal peaks by stockpiling tactically	#advance_stock
2.2.3 Introduce collaborative planning models and VMI (vendor managed inventory)	#collaborative_planning

We have drawn up a datasheet for each solution, containing:

1. Its description (what it is and why it is being proposed).
2. What to do to implement it (explaining the steps with examples, and listing the players involved).
3. The impact areas (listing the benefits for the supply chain, plus the constraints and obstacles).

Furthermore, each datasheet explains who develops the solution, namely whether it is the transport demand-side (large-scale distribution producers and companies that buy or benefit from the transport services) or the transport offer-side (3PL and road haulage companies). The datasheet also indicates whether the solution has to be implemented by just the company in question or by more parties along the supply chain. Lastly, the datasheet shows whether investments are needed for technical aspects and assets, or for aspects linked to processes and organisation.

We have included anonymous statements from various supply chain actors, to frame each solution within a context and outline the perspective of producers/suppliers (PRODs), large-scale distribution companies (LSDs) and logistics operators (3PLs). Lastly, we have inserted references to previous studies by ECR Italia and to GS1 Italy's own solutions, so that readers can learn more about a specific topic being covered by the various work groups.

To conclude, this document is an overview of the subject, designed to help companies tackle and find long-term answers to the current crisis in the haulage sector and its impact on work continuity within the consumer goods supply chain.

1 OPTIMISE JOURNEYS BY ACTING ON TRANSPORT DEMAND AND SUPPLY

1.1 REDUCE NUMBER OF JOURNEYS

1.1.1 Increase order size

DESCRIPTION

Large-scale distribution companies increase the average size of the orders placed with their suppliers – after reviewing their goods re-ordering policies – which translates into receiving fewer deliveries for the same annual quantity of each item. The modus operandi of this solution is to round up quantities of a single item to a full unit load for orders of low-selling products, to increase the number of full unit loads for high-selling products, and generate full-truck loads for very high selling products or during promotions.
These two factors can reduce order fragmentation, producing considerable cost benefits. This is important because extremely fragmented orders can cost three to four times more than re-ordering items in full unit loads. As of today, full unit loads make up three quarters of the annual volumes for consumer goods [Dieci anni di logistica nel largo consumo – Mappatura dei flussi logistici (Ten years of consumer goods logistics – Logistics flow map)].

WHAT TO DO

When implementing this solution, the first thing is to determine the right quantity to re-order for each article, i.e. the quantity that will minimise the sum of the supply chain costs connected to the order-to-delivery process.

This value can be obtained by simulating how cost items vary when changing the number of product packs per order line. The list of these cost items includes the re-ordering costs incurred by the distribution centre, the costs incurred by the supplier delivering the goods, and the cost of receiving and maintaining stock at the distribution centre [Il processo di riordino ottimo per la filiera del largo consumo (The ideal re-ordering process in a consumer goods supply chain)].

[SI.RI.O. (Simulatore Riordino Ottimo di filiera)], for example, is an excellent simulation tool designed to identify the ideal number of product packs to re-order on average based on the type of pallet used per unit load, the estimated monthly demand and the standard costs for a given pairing (producer - large-scale distribution). SI.RI.O does not replace the re-ordering systems in large-scale distribution companies, but it does let operators see how different re-ordering choices impact on the supply chain, especially for middle-low selling articles, which are often re-ordered in partial unit loads.

When companies seek to make **supply chain savings**, they should mainly concentrate on articles where each re-ordered batch is equivalent to less than 0.5 months' coverage on average and where re-orders never make up full unit loads of a single item.

Therefore, when reviewing the articles to order in full unit loads, we can work on several levers:

- Round up the quantities to a full pallet load when the re-ordering system proposes a quantity that is at least 40 to 50% of a full pallet.
- Review the parameters used in the re-ordering system on a regular basis, checking the quantities re-ordered against the quantities used in the month (½ month < average coverage per batch < 2 months).

As shown in many business cases, for this solution to work, both sides in the supply chain (producers and large-scale distribution) must work together, and they must agree about how they split both costs and benefits. When SI.RI.O. suggests that an article should be re-ordered in full pallets, the manufacturer's benefit is proportionally more than the merely fewer order lines, as order picking costs are cut and the percentage of transport capacity utilised is higher, noting that transport accounts for about 50% of order-to-delivery costs. Another way to increase order size is through agreements whereby producers manage their stock held on site at the distribution centre (**#collaborative_planning**).

When implementing this solution, a particularly critical point is to keep the logistics data files aligned, so that the quantities ordered for a single article can be correctly rounded up to a full unit load. We must also be mindful of shelf-life, as an increase in order size means more days' coverage. Therefore, this solution can only be applied to articles where there are no particular perishability issues.

In some cases, there are logistics discounts, which are fixed by the producers and based on the business given to their logistics operators and, when given weight thresholds are exceeded, the transport tariffs are reduced. This arrangement can also be used as an incentive to round up quantities to full-pallet or full-truck loads.

IMPACT AREAS

An increase in the quantities normally re-ordered for a certain article means that large-scale distribution companies must shoulder the increased financial and warehousing costs linked to holding consumer goods stock. These greater costs are, in reality, mostly offset by the fewer operations needed to manage the lower number of orders and, in turn, the lower number of deliveries and acceptance operations per article at the large-scale distribution company. Added to this are, naturally, the benefits for producers arising from a reduction in transport costs, owing to the greater number of full-load journeys plus the increase in goods shipped directly to the distribution centre (avoiding the time and cost of visiting intermediate transit points along the transporters' distribution network).

Furthermore, managing largely full unit loads can reduce administration time and costs for incoming unit loads at the distribution centre, as well as those relating to the producers' order picking process, which, in turn, translates into fewer problems and delays in departure. In nearly all the business cases analysed, it emerged that, for large-scale distribution, the increase in financial costs caused by the greater order size is more than offset by the decrease in cost items associated to the physical and administrative operations in the order-to-delivery process [Un vademecum per il next normal – Lesson learned post Covid-19 nella filiera del largo consumo (Vademecum for the next normal – Lessons learnt post Covid-19 in the consumer goods supply chain)]. If we add this benefit to the discounts for **full pallets** offered by some manufacturers, the savings for large-scale distribution go up even further.

When a logistics operator operates a multi-producer logistics platform to fulfil all the orders from the same distribution centre, the increased order size would translate into an increase in the average drop size per delivery (**#merge_orders**) and an increase in the average vehicle capacity/payload utilisation per journey. Furthermore, when single-item full unit loads are packed to a standard height such that they can be stacked one on top of another in the lorries (**#standardise_unit_load_height**), the resulting increase in average drop size per delivery also leads to a substantial rise in payload volume utilisation in the transport vehicles.

«Every order has an admin cost. We give our customers incentives to reduce the number of orders they place per year». **PROD**

«Certain conditions must be met for us to apply a logistics discount. There must be a minimum order size (pallet layer or full pallet), orders must be sent through EDI (electronic data interchange) and we want a fast track for unloading (if they don't have a platform where we can book an unloading slot)». **PROD**

«We calculate our current discount for full loads as the difference between a direct full-load delivery and a delivery where we have to go through a transit point». **PROD**

«We only use a small percentage of layered unit loads. This is because we round up orders that make up 20% or more of a full unit load to the next full pallet (1.2 →2 pallets)». **LSD**

«It's much less trouble to receive five lorry loads of mineral water at the distribution centre than one load of cosmetics». **LSD**

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

1.1.2 Use large-sized vehicles

DESCRIPTION

Companies using large-sized vehicles/heavy goods vehicles (HGVs) in combination with an organisational model whereby orders for the same recipient are merged or, alternatively, delivered via multi-drop runs, can reduce the number of journeys needed to cover the same annual demand.

In the consumer goods sector – for sundries and dry goods – about three quarters of the vehicles that make deliveries to distribution centres are 16.5m **articulated lorries/ semi-trailers** with a capacity of 33 unit loads; the next most common vehicles are **rigid lorries** with a capacity of up to 18 unit loads arranged on a single loading layout. In particular cases (say for tissue), companies will use 18.75m **articulated HGVs with trailer** ("large volume" lorries), which can carry up to 38 unit loads. The unit loads can generally be stacked on two levels, as the lorry's cargo compartment is nearly 3m high. Their load capacity is over 110m^3, against about 80m^3 for an articulated lorry/ semi-trailer. If a bridging platform is placed over the gap between articulated HGV and (open-ended) trailer, fork-lift trucks loading/unloading goods can travel along the entire length of both vehicles without the need for further manoeuvring.

This solution also includes a project entitled **Progetto 18** promoted by the Italian Automotive Industry Association (ANFIA) to improve efficiency in road haulage through the introduction of an optimised 18m tractor unit-semi trailer combination. Lorries using this system can stow a further 10m^3 on their loading bed, equivalent to 37 unit loads. HGVs up to 18m were given the go-ahead to circulate in 2021, after a 12-year test period during which time they were checked for manoeuvrability, stability and safety.

WHAT TO DO

The producer – through its 3PL or directly with its commercial carriers – can use an HGV as long as there are no obstacles to access either at is own manufacturing site/ warehouse or those of the recipient. As the customer will not necessarily order enough goods to make up a full HGV truckload, this solution can be implemented efficiently by merging together several orders for the same recipient (**#merge_orders**), or, alternatively, set up multi-drops by interspacing loading and unloading points along the route (**#offset_outward_&_return_journeys**). From the transport flow map for 2019, we can see that an articulated lorry makes 1.9 deliveries of sundry goods each journey [Dieci anni di logistica nel largo consumo – Mappatura dei flussi logistici (Ten years of consumer goods logistics – Logistics flow map)]. Achieving this 1.9 is actually quite hard and entails finding a pool of neighbouring recipients that place orders for the same delivery date and respect their prebooked slots (**#slot_booking**). In order to optimise multi-drop journeys, the supplier would need an office with a control tower to handle the vehicle routing directly, or else pass on its distribution to a logistics operator that can assemble the deliveries from several senders to one or more recipients (transport groupage or co-loading services).

Offering logistics discounts for full-truck loads can be an incentive to use HGVs. When considering these full-truck load discounts, also take note of the vehicles' maximum payload weight and maximum capacity (it would be absurd to think of transporting particularly solid goods in articulated lorries, as the HGV would be well under its load capacity measured in pallets on a single loading plan. Furthermore, it is a good idea to tie in with customers about the exact number of unit loads that gives the load discount (for example, 33 unit loads instead of at least 30).

Large-scale distribution companies can also implement this solution when delivering to their sales points, with the obvious exception of those in city centres where there are heavy traffic restrictions (for example, vehicles or vehicle combinations over 7.5m are banned from Zone C in Milan).

IMPACT AREAS

Haulage is more efficient when using an articulated HGV or another large-sized lorry, as there are fewer journeys for the same annual demand. However, size is not the only factor that comes into play to optimise transport, as size must be used in combination with deliveries organised to maximise the payload of departing vehicles.

For producers, this solution reduces the unit transport cost, which, as we know, accounts for about 50% of the order-to-delivery process. There are also benefits for large-scale distribution companies when fewer vehicles arrive at their distribution centres, as the receiving operations will be more efficient. In addition, lorries with trailers could be used to offer unattended **#stand-by_trailer** or "semi-trailer" services. Using larger vehicles to feed distribution centres has an impact on the re-ordering policies in large-scale distribution and thus on stock at the destination points.

«We changed how we pallet our products five years ago, but we still get full-truck orders for 32 pallets instead of 33». **PROD**

«Last year, we bought 20 semi-trailers through Progetto 18 and that took about 4,000 journeys off the road.». **3PL**

«When we do more multi-drop deliveries, our payload utilisation and vehicle performance also go up». **3PL**

«The limited traffic zones are forcing us to make city deliveries in smaller and smaller vehicles with a low environmental impact». **LSD**

Transport demand / supply	**DEMAND**	**SUPPLY** ✔
Supply chain / Single company solution	**SUPPLY CHAIN**	**SINGLE COMPANY** ✔
Required investment	**TECHNOLOGY & ASSETS** ✔	**PROCESSES & ORGANISATION**

1.2 INCREASE THE UTILISATION LEVEL OF VEHICLE CAPACITY

1.2.1 Merge orders

DESCRIPTION

Orders placed by customers in the same destination zone are accumulated and loaded onto the same vehicle to maximise payload utilisation and optimise the use of lorry drivers, today a resource in short supply.

Orders can be merged through these two methods:

- Multi-drop deliveries.
- Multi-pick deliveries.

In multi-drop deliveries, a supplier accumulates orders from several customers, typically large-scale distribution centres. This method therefore involves a single origin point and several destination points.

In multi-pick deliveries, goods are loaded from various supplier warehouses and shipped to one delivery point (a distribution centre or hypermarket). In this case, there is a single destination point and several origin points. The vehicle makes a series of stops to collect goods that will be transported to the same destination point.

WHAT TO DO

Orders can be merged when they have the same delivery date or delivery interval, and when the collection or delivery points are in the same geographical area. It is easier to merge orders for deliveries within a fixed interval of time, because of the greater freedom to choose which orders to merge.

In terms of implementation, one obstacle working against this solution – and which applies to both multi-drop and multi-pick deliveries – is when drivers have to wait excessively long to load or unload on site at the supplier or customer, independently of the quantity of goods to collect or deliver. A delay at any of the points causes delays for all subsequent collections/deliveries, making this transport plan unworkable.

For the solution to work, there must be solutions in place to cut the drivers' waiting times at the suppliers' facilities or at large-scale distribution centres. Some such solutions are:

- Extend the unloading time window at distribution centres (**#extend_goods_receiving_window**).
- Use time slot booking systems properly (**#slot_booking**).
- Reduce acceptance and control times for incoming goods (**#digitalisation**).
- Use stand-by trailers (**#stand-by_trailer**).

When delivery dates or time slots prevent orders from being merged, suppliers and delivery point buyers can agree to match their delivery periods, in view of merging orders.

Alternatively, logistic operators can agree with the manufacturers on fixed delivery days for neighbouring distribution centres, making it easier to merge orders as well as to introduce multi-drop or multi-pick deliveries.

In some cases, it is easier to merge orders by creating multi-manufacturer warehouses. These warehouses belong to the logistics operators, which manage goods on behalf of their suppliers. In these cases, while goods belonging to different suppliers are handled in separate areas within the same building, the logistics operator plans transport with visibility on the entire pool of orders for that warehouse. Therefore, multi-producer warehouses are a way to increase the probability of concentrating all the orders from several customers in a single origin point, and thence of utilising transport vehicles to their full capacity.

IMPACT AREAS

Merging orders increases the payload utilisation level on lorries, which, in turn, reduces the number of vehicles circulating overall and so lessens their environmental impact. Also, because fewer lorries turn up to deliver goods, there is less crowding at warehouses. This solution does not require much in terms of investment, but it does need closer coordination between the various supply chain players.

PROD *«We analysed how often we deliver to our customers and the batch sizes. Then, in agreement with our 3PL, we floated the idea to change our delivery days, as it would help us merge orders whenever we couldn't load the lorry to its full capacity».*

PROD *«When planning routes, we work with two delivery drops at most. Waiting times at the distribution centre make it impractical to do more».*

LSD *«The producers asked if we could change our delivery dates, saying they would share some of the benefits of using lorries and payloads better».*

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

1.2.2 Standardise unit load height

DESCRIPTION

This means identifying a standard unit load height for single-item full pallets (traditionally 120cm, including the pallet), such that the unit loads can be stacked in pairs on the lorry and fill the cargo compartment. When doubled stacked, the two unit loads must be lower than the vehicle's maximum loading height, net of the empty space needed to move the unit loads easily when loading and unloading (traditionally 240cm, including the pallet).

This kind of standardisation only applies to a share of consumer goods, those where the unit load plus pallet is as near as possible to the ideal height of 120cm (a Europe-wide reference number).

When planning a pair of stackable unit loads, we must also consider the unit packs' resistance to crushing (assuming that they will not be strengthened or modified), as well as the weight limits of both pallet and lorry. If we assume that the loading capacity of an articulated lorry (the most commonly used vehicle in the consumer goods sector) is 33 unit loads on a single loading layout and its payload is 28,000kg, the ideal weight of two full unit loads stacked one on top of the other is 800kg.

WHAT TO DO

If we decide to standardise the height of a unit load, we must first analyse the weight and volume of each product pack, and check its resistance to crushing. Information on stacking restrictions must also be included in the logistics data file.

Today, many products (for example, the individually wrapped sweet snacks for children) are packaged with stacking in mind, during storing, internal handling and transport. However, standard unit load height also comes into play when the two stacked unit loads are higher than 240cm (for example, toilet paper, where the unit load is 130cm high). These unit loads can be transported on "large volume" HGVs.

The first group of products to review are those whose current unit load height is over 120cm (including the pallet) and whose simulated weight (i.e. adjusted to a theoretical height of 120cm) is less than 400kg (including the pallet).

Unit load heights can be standardised in the following cases:

- Products where the unit loads are heavy (for example, beer or tins of tuna), which can be stacked under lighter unit loads. The overall weight of the stack must be less than 800kg and the height of the stack must be less than the cargo compartment (240cm).
- Products where the unit loads are light and high, which cannot be stacked because the product packs can be easily crushed (for example, potato crisps). The unit load could be modified by making the primary or secondary packaging more crush-resistant so that the load units can be stacked in pairs (the primary packaging is in contact with the product, the secondary packaging secures the various product packs). There may be a trade-off between the greater packaging cost and the benefit of maximising the volume capacity of the vehicle.

- Products where the unit loads are light and low, which cannot be stacked because the packs of items can be easily crushed (for example, spices). These unit loads can already be stacked today if they are placed on top of low and resistant unit loads. In this case, it is a good idea to evaluate the benefit of increasing the primary and/or secondary packaging's resistance to crushing to make the unit loads fit for stacking one on top of each other.

Some suppliers are also considering whether the secondary packaging can be modified by changing the number, arrangement and composition of the primary packages to improve their resistance to crushing. In other cases, the secondary packaging can be modified by simply altering the height of the primary packages and not their arrangement, so that the unit load height becomes as near to 120cm as possible.

IMPACT AREAS

By standardising the height of single-item unit loads, the volumetric capacity of the vehicles used by the producers or their 3PLs can be utilised more effectively. However, having freed-up space by making better use of the lorry's volumetric capacity for one order, that space must be utilised for a second order (**#merge_orders**), in order to reduce the number of journeys; alternatively, the recipient could increase the order size (**#order_size**).

The impact of standardising unit load heights varies depending on the product rotation:

- For high-selling products (typically ordered in full unit loads or multiples thereof), reconfiguring unit load heights will translate into an increase in the utilisation of the volumetric payload, without particular consequences for the order size (number of packs ordered).
- For medium-low selling products (generally layer orders or in non-full unit loads), reducing the number of packs in a full unit load – by reconfiguring the unit load to a standard height that is lower than the original – could generate a greater number of orders rounded up to full unit loads, shifting from unit load layers [Il processo di riordino ottimo per la filiera del largo consumo (Optimal re-ordering in the consumer goods supply chain)].

With regard to high-selling products, large-scale distribution companies may feel several negative effects:

- Increase in number of journeys to replenish picking stations from warehouse stock. In the hypothesis of holding stock in lower single unit loads (rather than being double stacked), the picking stations would need replenishing more frequently (because every truck cycle would handle fewer packs than before).
- Increase in the number of pallets in exchange and relative handling costs (**#pallet_exchange**) [La gestione dei pallet nella filiera del largo consumo (Managing pallets in the consumer goods supply chain)].
- Reduction in warehouse utilisation volume-wise, because, although the pallet racking is in use, it would not be to its full height.
- Increase in receiving costs and times at the distribution centre, as more unit loads need to be checked (as do their relative SSCC (Serial Shipping Container Code) labels).

By contrast, standardising unit load heights also brings benefits to large-scale distribution:

- Less time (and cost) to unload the vehicles, because more product packs are handled when unit loads are double stacked (in the hypothesis of unloading two stacked unit loads from the vehicle in one forklift go).
- Less space taken up on the receiving decks, because stacking standard height unit loads make better use of space.
- Less time (and cost) to transfer the unit loads from the goods receiving area to the storage aisles (in the hypothesis that two full unit loads stacked one above the other can be handled in total safety, reducing the number of truck cycles for an equal flow of packages in arrival).
- Possible increase in orders placed at the sales points for single-item full unit loads of high-selling products or in promotion.

Concerning medium-low selling products, because large-scale distribution companies can round up some orders to the full pallet load, there could be benefits linked to:

- Lower complexity and costs in goods receiving (in the hypothesis of handling two unit loads stacked one on top of the other).
- Logistics discounts applied when ordering full unit loads from a supplier.
- Fewer handling operations to transfer the unit loads from the receiving area to the storage aisles, and when replenishing the picking stations (because there are more product packs per unit load).
- Lower risk of breakage, typical when re-ordering in unit load layers.

Conversely, the main negative impact is potentially the greater financial burden of tied-up capital, owing to buying more quantities of goods than suggested by the re-ordering systems (**#order_size**).

Some suppliers have recently standardised the height of their unit loads for some products. They confirm that there are many benefits in utilising vehicles to their full volumetric capacity, as this increase in payload utilisation translates into significant cost savings (transport costs make up about 50% of the order-to-delivery costs), on top of there being fewer lorries in circulation [La logistica per la creazione di valore nella filiera del largo consumo (Logistics to create value in the consumer goods supply chain)]. Furthermore, in the hypothesis of double stacked unit loads, the cost of moving unit loads from the end of the production to the storage area would drop, as would the vehicle loading costs.

Concerning low-selling products, which potentially could be ordered by large-scale distribution companies in full unit loads, increasing the probability of receiving orders in full unit loads would give these benefits:

- Reduction in the time and costs for order picking, as there are fewer single order picking operations proportionally than full-pallet picking (or unit-load picking) operations.
- Reduction in order fulfilment times, leading to an improvement in the level of service offered to large-scale distribution (greater punctuality and more flexibility).
- Reduction in the cost of reworking unit loads (such as lowering pallets or re-palletising goods) on the distribution centre decks.

However, even consumer goods suppliers can feel some negative effects, as they have to:

- Reconfigure a good part of their pallet storage places in their warehouses, with a one-off cost to alter the racking heights, or reconsider the cost of space if they use a warehouse managed by a 3PL.
- Handle more pallets for equal flows of packages.
- Work on the palletisation at the product line end to ensure the maximum throughput per hour.
- Invest in crush resistant packaging if this is a necessary part of reconfiguring their unit loads.

PROD *«Here, we work with tissue products and they occupy a lot of space, so we commonly use "great volume" articulated HGVs with a usable height of 280cm, and they can carry 76 stacked pallets, each 130cm high».*

PROD *«The liquid detergent boxes are tall and impractical. Unfortunately our logistics can't get itself heard by R&D».*

LSD *«Our distribution centre is crammed full, so we are forced to lower pallets on arrival to stow them on the racks, especially when they send us full-height unit loads so as to maximise their transpor».*

LSD *«For some products, safety issues are a factor when we want to move double stacked unit loads (we are not worried about crushing, its their stability when we move them)».*

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

1.3 REDUCE EMPTY RUNS

1.3.1 Offset outward and return journeys

DESCRIPTION

By "offsetting outward and return journeys", we mean arranging points for loading/unloading along the same route travelled in the outward leg.

Usually carriers are tasked (and paid) to travel from an origin point to a destination point and, once they make the delivery, they are historically responsible for finding loads near the previous journey's destination point. The greater is the carrier's capacity to find shipments for the return leg, the more efficient will its transport be, especially if the lorry can return to the general area it departed from on its previous journey.

The objective of counterbalancing outward and return journeys is to optimise the vehicle's payload, reducing the risk of empty (no cargo) runs.

There are two possible ways to improve this balancing exercise, and both solutions focus on matching demand and supply.

- Collaboration between both sides (buyers and logistics operators).
- Visibility on vehicles seeking shipments and loads seeking transport means.

WHAT TO DO

Haulage companies can include the aspect of balancing outward and return journeys in their logistic system design or implement it during transport planning.

Balancing journeys implies strategically analysing the quantity of goods transported per section of route and identify the sections where the same vehicle can be used on both outward and return legs. The freight company's analysis is based on the entity of the travel flows it handles, and it can analyse the various transport nodes linked to a single company or those of all the companies in the same industry (horizontal collaboration). Therefore, this process can bring into play different product categories (for example, tinned foods originating in North Italy and dispatched to South Italy, in combination with fruit and vegetables from South Italy dispatched to North Italy) or different industries (for example white goods and furnishing).

Horizontal collaborations (i.e. between buyer companies and between logistic operators) can be a way to match transport demand and supply; alternatively, companies can go through online marketplace platforms. When planning transport operations, carriers (or logistics operators) can place their transport offer on these platforms and customers/logistics operators can offer their loads. Depending on the tool used, demand and supply are matched through an automatic or a manual procedure.

The advances in logistics 4.0 solutions mean that these marketplaces are becoming more and more efficient, including in terms of the traceability of goods and real-time visibility on the exact location of transport vehicles.

Historically, only logistics operators and haulage companies have used these marketplaces. More recently, the platforms have also opened their doors to the purchasers of transport services.

For these solutions to be effective, as previously stated, all supply chain actors must work collaboratively, and keep each other fully up to date about their transport assets and loads.

#backhauling (which refers to the return journey) can also be included in solutions to help to balance outward and return journeys.

IMPACT AREAS

Offsetting outward and return journeys also reduces empty runs, and this, in turn, will reduce transport fees for buyers, on the one hand, and cut the number of transport vehicles used (and so needed) in the supply chain, on the other.

If we assume that 50% of journeys today are empty runs, avoiding these empty runs would solve the current shortage of lorry drivers in the market.

The necessary investment to implement these solutions are spread among the interested parties, and users usually pay an annul subscription to use marketplace platforms.

PROD *«We have a plant in North Italy and another in South Italy, and we use the same logistics operator for both. We have estimated the inter-company flows between the two plants to optimise round trips».*

PROD *«Our 3PLs use more than one marketplace to find loads and reduce the percentage of empty runs».*

LSD *«Historically, marketplaces were cumbersome to navigate and find matches. The recent versions are much more user-friendly, and more geared to our needs».*

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

1.3.2 Activating backhauling and/or round trip logics

DESCRIPTION

Backhauling is a collaborative practice where the buyer organises and optimises transport operations, with products sold ex works. Large-scale distribution companies planning their delivery runs will make a pickup at the supplier's plant or central warehouse, and the supplier, in turn, makes sure that the goods are ready to be collected at the agreed time and place.

This arrangement is often called a round trip, as the points of origin and destination are often one and the same. Transport is generally organised so as to connect all three players in the consumer goods supply chain (the producer's/3PL's warehouse, the distribution centre and the sales point network), together with their relative loading and unloading points.

WHAT TO DO

The backhauling model can bring into play remote producer warehouses (near peripheral sales points) and/or those close to distribution centres, thereby exploiting the return journeys of vehicles delivering to the sales points.

Planning the pick-ups and deliveries is often passed on to a logistics operator, which, as it manages the distribution centre on behalf of the large-scale distribution company and has other customers, can set in place synergies to reduce empty runs as far as possible (**#offset_outward_&_return_journeys**) and thus optimise its transport.

Implementation is helped by having visibility on the origin and destination points in the supply chain [Atlante ECR (ECR Atlas)].

IMPACT AREAS

Backhauling can be particularly advantageous in large-scale distribution, reducing the percentage of empty runs (especially from distant destinations), in that, by working collaboratively, the vehicles used to replenish sales points are used to collect goods from the suppliers. This solution helps to cut the mileage travelled by empty lorries, as well as to reduce the number of vehicles in circulation and increase the quota of paid-for transport kilometres.

As part of its research, ECR interviewed several large-scale distribution companies, finding that backhauling is not currently commonplace (used by only 5%), owing to producers seeing this solution as counterproductive to their warehouse operations and their logistics operator's planning. Bearing in mind that producers would inevitably scale down the volume of business given to their logistics operator, there could be possible negative repercussions on the organisation of delivery rounds.

At the same time, large-scale distribution companies that do manage to introduce backhauling complain that it is difficult to build delivery rounds given the high waiting times when collecting from suppliers.

Therefore, for this solution to gain ground, the waiting times for loading and unloading must go down, while the impact on the travel flows handled by producers and large-scale distribution should be carefully analysed.

- On the producer side, they must not only compare the current efficiency level with the sales price delta linked to selling ex works, but also with the gain in efficiency as the result of handling fewer travel flows directly.
- On the large-scale distribution side, as well as evaluating how backhauling effects the percentage of empty returns, they must also verify the vehicles' overall usage times and the resultant impact on the level of service provided to sales points.

PROD

«We compared our distribution costs to the costs that some of our large-scale distribution customers managed to get when they combined normal deliveries to their sales points with trips to collect, and ship on, goods from their suppliers. In some cases, it made financial sense to turn over transport to the recipient».

LSD

«Together with our 3PLs, we analysed the return trips from delivering to sales points where we knew there was a high percentage of empty runs, and we found a group of producers to whom we could propose backhauling».

LSD

«We have a network of shops all quite close to the distribution centre, so we can make several delivery rounds a day on the same vehicle. This means we could also go to our suppliers and do a few ex works pickups».

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

1.3.3 Redesign the distribution network

DESCRIPTION

This procedure involves introducing a distribution model where the logistics points are arranged in hierarchic order (factory warehouses, central warehouses, peripheral warehouses, buffer warehouses and transit points), and goods are then dispatched from these logistics points to distribution centres or sales points. In particular, when working with more distribution network levels, it is possible to decouple the transport flows leaving the production plants from deliveries to customers. As a result, companies can plan full-load replenishments from primary to secondary points (for example, from the factory warehouse to a regional warehouse), thus maximising the journeys. Additionally, as stock is held at several points along the distribution network, the new arrangement is expected to cut the weighted average distance between the location holding stock and the delivery points, whilst also minimising the percentage of empty runs.

WHAT TO DO

One course of action is for producers to get hold of a series of peripheral warehouses – including through out-sourcing agreements with their 3PLS – and take the precautionary measure to transfer the goods meant for a precise geographic area or market sector. Goods can be dispatched to customers from the peripheral warehouses in full-truck loads or via multi-drop deliveries. In both cases, the shorter distance on average results in a lower percentage of empty mileage.

For example, a company with a plant and factory warehouse in North-East Italy may decide to split its stock of finished products among several peripheral depots, one being its factory warehouse, which will service North Italy. The company will also have a second warehouse in Central Italy and a third in Sicily, to serve their respective areas.

As another example, think of a company with several factories across Italy, each manufacturing a specific product line. The company can arrange for products to be moved between the various plants in a two-way process, thereby creating a distribution network based on factory warehouses that stock a full product mix to serve their customers in each area.

Furthermore, stock can be transferred between the distribution network points via intermodal transport – rail or sea – (**#modal_switch**), in that:

- It is possible to optimise the quantities to be transferred, as long as they are in full-loads (one, two or more swap bodies).
- There are no mandatory delivery restrictions as such (a potential late delivery is not in itself a disservice).
- Goods do not necessarily have to be delivered in the morning, the recipient needs only to be informed about the expected time of arrival, in function of the transit time and whether there is room on the railway for the goods over the course of the day (**#extend_goods_receiving_window**).

IMPACT AREAS

If supply chain costs are split between warehouses, stock and transport, it may be decidedly more cost effective to duplicate stock points. Despite the extra costs linked to stockpiling goods, valued at the square root of the number of warehouses ("square root of n rule"), the reduced transport costs for warehouse-to-warehouse full-truck transfers works out to be more beneficial. So, on the one hand, a lesser number of larger warehouses produces economies of scale. On the other hand, a distribution model based on a network of central and peripheral warehouses means that transport can be maximised in the primary routes between warehouses with fully loaded articulated lorries (**#vehicle_size**) that can carry 66 120cm high unit loads (**#standardise_unit_load_height**). This method cuts shuttle costs over long distances, as well as the weighted average distance for deliveries from peripheral warehouses to customers in the pertinent geographic area, meaning that more deliveries can be made per journey (**#merge_orders**), and the number of empty runs also goes down.

In the case of a company with a single plant based in northern Italy, the decision to open a second stock point to service customers in central-southern Italy requires, on the one hand, careful planning around the sales to customers served by this new peripheral warehouse. On the other hand, it means deciding which orders should be served directly from the northern Italy plant and which from the new warehouse. Nevertheless, in most cases, this solution is more cost-effective in terms of total distribution costs and more resilient in terms of business continuity than using a single warehouse [Un vademecum per il next normal – Lesson learned post Covid-19 nella filiera del largo consumo (Vademecum for the next normal – Lessons learnt post Covid-19 in the consumer goods supply chain)].

If internal transfers can be made using intermodal rail services, there will be further cost benefits compared to making the journey by road alone (**#modal_switch**).

PROD *«I often came up against this maxim: we must concentrate all our stock in a small number of warehouses and utilise them as best we can. This may be true for warehouse costs, but if we add the transport costs, concentrating stock in a single point may have the opposite effect».*

PROD *«Transport costs have recently shot up, much more that warehouse costs. We want to be more efficient so we are updating our distribution network and getting more warehouses».*

PROD *«We have connected our Nogara and Marcianise plants via a return intermodal service. This translates into 800 fewer journeys a year».*

«We have reviewed how we allocate production among our various plants, and have brought down the number of internal transfers substantially. We now try to fill vehicles up to at least 95% payload, for a return journey».

PROD

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN**	**SINGLE COMPANY** ✔
Required investment	**TECHNOLOGY & ASSETS** ✔	**PROCESSES & ORGANISATION**

1.4 INCREASE INTERMODAL JOURNEYS

1.4.1 Use intermodal rail services

DESCRIPTION

Road-rail combined transport using Intermodal Transport Units (ITUs), in the form of swap bodies or semi-trailers, which can be transferred easily from a lorry to a train.

In intermodal rail transport, goods are typically loaded on a lorry at the origin point and transported by road to a rail terminal. At the intermodal terminal, ITUs are moved vertically onto a goods train and taken to a destination terminal, where they will be moved vertically again, and loaded onto a second lorry, which will carry the goods on the final section of road.

WHAT TO DO

Users must jump through several hoops to gain the maximum benefit from intermodal rail transport.

In first place, while rail is cheaper than road, road-rail transport has two additional stages, those when goods are moved. These two additional operations add costs to the process and, for this reason, it should not be considered unless there is a minimum distance between the origin and destination points, determined on the basis of several factors. These include how transport costs are structured, the lorry driver cost and, more broadly, the amount of traffic on the roads (the higher road transport costs are as a percentage of total costs and the more traffic congestion there is, the greater is the incentive to use road-rail combined transport).

In general, for road-rail combined transport to be cost-effective, the distance between origin point and departure terminal added to the distance between arrival terminal and destination must be equal or less than 20 to 25% of the distance to be travelled by rail.

In second place, companies implementing this solution must decide whether their transport and destination catchment areas allow them to make these journeys on a regular basis. In other words, whether the train can be fully loaded on both outward and return journeys. The rule of evening up the outward and return journeys also applies to intermodal rail-road transport (**#offset_outward_&_return_journeys**).

Intermodal transport works when we want to transport large volumes over medium-long distances and there are intermodal terminals in the vicinity of the origin and destination points.

Extending this solution to companies needing to transport medium-low volumes, and so cannot, by themselves, put together a fully loaded train introduces a further layer of supply chain collaboration and the merging of orders for each destination point (**#merge_orders**).

Given that railway lines are crowded in the daytime with goods trains running alongside passenger trains, the railway leg normally takes place at night-time, and goods are picked up from the origin terminals in the afternoon or evening.

This arrangement has a strong bearing on the delivery lead time from the customer's perspective. If we suppose that goods are loaded in the afternoon of day A, they would then be transported by rail over night. Considering the technical times to unload the ITUs and planning the final road leg, goods could only be delivered in late afternoon on day B or even on day C. If we want to retain similar lead times to the current ones, this solution would only be workable if the distribution centre accepts arrivals in the afternoon or evening (**#extend_goods_receiving_window**).

In intermodal transport, it is hard to cover potential peak periods, in that transport capacity is typically less flexible than for road transport. Buyers wanting their transport operations to be totally flexible will tend to use road transport alone, as it meets their needs more closely, or they will use intermodal transport for only part of their volumes.

Intermodal transport is facilitated when logistic centres are located within freight terminals. In this case, it is both easier and faster to manage travel flows, given their proximity to intermodal terminals, which are themselves situated within freight terminals.

Today, supply chain users have yet to embrace intermodal transport, although there is clearly great potential for development [Progetto intermodability (Intermodability project)].

Both the demand and the supply sides must take a number of actions to overcome the current situation (for example, increase the frequency of connections and flexibility in planning).

Concentrating on demand, the current incompatibility between railway transit times (and their variability) and acceptance times at distribution centres is often a barrier to this solution. Therefore, the development and spreading of intermodal transport is strictly connected to the supply chain companies being ready to review their distribution processes and the logics underlying their delivery planning, especially at the acceptance stage.

IMPACT AREAS

Rail-road intermodal transport has a considerable economic and environmental impact.

Economically, for the long tracts, rail-road intermodal transport is potentially cheaper than road transport because of its economies of scale (**#merge_orders**).

Environmentally, an initial benefit is less traffic on the roads and this, in turn, implies greater road safety, with fewer accidents as a result of fewer vehicles in circulation. Furthermore, it means fewer CO_2 emissions. According to the ECR Intermobility study, transferring the 450,000 heavy vehicles in circulation across Italy to intermodal rail-road freight transport would result in 70,000 tonnes less CO_2 emissions per year [Progetto intermodability (Intermodability project)].

Intermodal transport means that unit loads are unlikely to be broken up as they are carried in secure containers, reducing the risk of damaging the products. In second place, using intermodal rail from North to South Italy (and vice versa) could solve the issue of lorry drivers being unwilling to take on long distances, the need to find drivers ready to spend one or more nights away from home and the shortage and conditions of reserved parking areas for lorries.

PROD *«We have used intermodal transport in the past (swap bodies on goods train + lorry), but we had to stop because we couldn't find a return goods flow that would make it worthwhile».*

PROD *«We are trying out intermodal transport from central to northern Italy. So we have asked the distribution centres if we can deliver goods in the afternoon».*

PROD *«We have two large plants in Italy, each with its distribution warehouse. Because of their strategic location, we can even out our North-South and South-North travel flows, and reap the benefits of intermodal transport by reserving whole trains to carry our goods».*

PROD *«Intermodal transport doesn't meet the timings demanded by large-scale distribution, although we could implement it as of now».*

LSD *«We've organised intermodal transport for branded products from North to South Italy, and we act as aggregators to get a fully loaded train».*

Transport demand / supply	**DEMAND**	**SUPPLY** ✔
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS** ✔	**PROCESSES & ORGANISATION**

1.4.2 Use intermodal sea services

DESCRIPTION

Sea-road combined transport using scheduled sea freight services to transport vehicles or unit loads (e.g. trailers, semi-trailers and containers) that provide frequent, rapid and cost-effective transport of goods from their point of origin to their destination at conditions that match road transport services.

Currently, Italy has a wide offering of short-range maritime cabotage with the islands and other Mediterranean countries, along routes known as the "motorways of the sea". These services use Ro-Ro (roll-on, roll-off) ferries, and connect ports along the Tyrrhenian Sea and the Adriatic Sea. The main services on the Tyrrhenian side link the northern cities of Genoa, Leghorn and Savona with ports on the lower Tyrrhenian sea (Naples and Salerno) and in Sicily, while the services operating on the Adriatic coast link up Venice, Trieste, Ravenna and Bari. As of today, there are over 120 services travelling along the motorways of the sea which originate and/or terminate in 25 Italian ports, with 500 departures a week offered by 20 companies.

WHAT TO DO

To use intermodal maritime services, the first thing to do is flag up the long routes travelled with fully-loaded lorries towards destinations near disembarking ports where there are already Ro-Ro ferry connections.

Similarly to intermodal rail, the first thing is to analyse the travel flows and distances from the ports of embarkation and disembarkation, in order to compute the effective savings in terms of shorter distances travelled by road. As the study showed [Progetto intermodability (Intermodability project)], there is a economic viability threshold linked to the ratio between the mileage travelled by road to and from the embarkation/disembarkation ports and the sea leg. Lastly the decision to use Ro-Ro ferries as an alternative to road transport is one that suppliers must take through their logistics operators, after checking the times, costs and potential critical areas in the service. In particular, carriers must agree longer delivery lead times with their customers, of at least one, two or three days more than in all-road transport. They must also keep fully on top of which sea connection lines receive ministry incentives.

It is unnecessary for anything other than the transport unit (e.g. trailer or semi-trailer) to travel on the sea leg, meaning that drivers do not have to make these long trips, which, apart from anything else, keep them away from home for several nights a week.

From the interviews held during [Dieci anni di logistica nel largo consumo – Mappatura dei flussi logistici (Ten years of logistics in consumer goods logistics – Logistics flow map)], it emerged that a particularly common option is to embark a vehicle going to the Sicilian market from North Italy at one of the ports in the mid or lower Tyrrhenian sea, such as Civitavecchia and Salerno.

To optimise intermodal maritime and compensate for the shortage of lorry drivers, even

in this case, it would be a good idea to push the use of "stand-by-trailers", which are trailers decoupled from the tractor unit (**#stand-by_trailer**). On reaching the embarkation port, the carrier detaches the semi-trailer to be loaded on the ferry and collects the disembarked semi-trailer waiting in a nearby parking lot. The first semi-trailer will then be collected by a tractor and loaded onto the ferry. On reaching the destination port, the semi-trailer will be picked up by a second carrier appointed to continue the journey to the destination point.

IMPACT AREAS

A non-accompanied journey minimises the lorry driver's non-valued-added time. By not travelling with the tractor, the driver can, instead, use the remaining working hours to make another trip starting from or near the port. Furthermore, current ministry incentives can lead to considerable savings on the combined transport service, making it cheaper than all-road transport. However, intermodal transport cost-effectiveness is known to be limited by several factors, including long minimum distances and the need to offset the outward and return journeys (**#offset_outward_&_return_journeys**), dubious frequency and reliability of maritime services (especially in the summer) and restricted access to Ro-Ro ferry quays in port, not to speak of the need for close coordination among the various parties involved in the door-to-door service chain.

The benefits of short-range maritime transport on ferries are also linked to reduced environmental pollution and fewer road accidents, so more safety at less cost, given the ministry incentives.

The Italian Ministry for Infrastructure and Transport encourages the shift of freight transport to the motorways of the sea through "Marebonus", a scheme financed by RAM (the network of Mediterranean motorways). The beneficiaries are ship owners and shipping companies who put forward a three-year project to introduce services using Ro-Ro ferries registered in any EU country. The incentive is calculated on the basis of transport units for the kilometres that will not travel on the Italian road network, and part of the sum is passed on to the carriers that use these services.

However, a few unresolved issues are still holding back the expansion of this alternative to road transport, for consumer goods in particular, linked to inflexible and irregular services, the duration of the journey, delays and cost.

Weather conditions, plus potential problems during embarkation and disembarkation, can cause delays that thwart the high level of punctuality demanded by large-scale distribution centres.

Similarly to intermodal rail, there could be reserved slots, including in the afternoon and evening (**#extend_goods_receiving_window**) for suppliers that use transport methods other than by road, to encourage them to make the – also green – choice to switch to intermodal transport.

«For the past couple of years, with the new Ravenna - Brindisi - Catania line and two departures a week, we have been diverting more than 50% of our southern Italy traffic from road to the sea». **PROD**

«Because of continuous disruption on the Salerno - Reggio Calabria line, we regularly use the Ro-Ro ferry services between Naples and Catania». **3PL**

«The new Genoa - Taranto line means we can make one third fewer long distance journeys, which used to tie up our lorries for 3 to 4 days a week». **3PL**

Transport demand / supply	**DEMAND**	**SUPPLY** ✔
Supply chain / Single company solution	**SUPPLY CHAIN**	**SINGLE COMPANY** ✔
Required investment	**TECHNOLOGY & ASSETS** ✔	**PROCESSES & ORGANISATION**

OPTIMISE LORRY DRIVER CAPACITY BY ACTING ON THE DEMAND TIMELINE 2

2.1 REDUCE UNLOADING WAITING TIMES

2.1.1 Extend the delivery window at distribution centre

DESCRIPTION

Extension of the acceptance time window into the afternoon or evening at large-scale distribution centres, in combination with variations to the arrival time for suppliers and their couriers making a delivery. The purpose is to reduce waiting times for unloading couriers and dilute the flow of vehicles entering distribution centres over several hours in the day. By "delivery window", we mean the period of time when the distribution centre will accept goods and which couriers must respect when they arrive to unload.

The acceptance time window can be extended vertically or horizontally. In the former case, distribution centres must increase the number of hours a day they accept goods in arrival. Currently, goods are commonly received in the morning, but the window could be extended into the afternoon and, in some cases, to the evening. Horizontal extension instead means receiving deliveries more days in the week. Goods today are typically accepted Monday to Friday, but the days could be extended to Saturday or, in special cases, even to Sunday.

A recent survey found that only 21% of distribution centres in Italy are ready to accept goods in the afternoon, and fewer than 10% accept goods on Saturday. Furthermore, in two thirds of distribution centres, this window is less than six hours long, and they generally operate with a single shift from 7:00 to 13:00 ["Migliorare l'efficienza logistica" ("How to improve logistics efficiency")].

WHAT TO DO

If the intention is to extend the acceptance time windows into the afternoon or evening, distribution centres must re-organise their warehouse staff and slot in a new shift (either back-to-back, or slightly overlapping the morning shift, based on the distribution curve of lorry arrivals).

This change must also be evaluated in light of the physical arrangements at the distribution centre, especially the layout of the loading and unloading docks and the density of bays per square metre. Some distribution centres have only a few docks per square metre arranged in a row and not much reception space (ground-level bays), and suppliers arriving will cross over with lorries departing to the sales points, creating excessive internal traffic of people and vehicles and reducing productivity and safety. Other distribution centres have a double frontage of loading and unloading docks and an appropriately sized ground reception bay, and they could extend their acceptance times into the afternoon or evening without hindering the work to prepare goods in exit, which could run in parallel.

If a distribution centre has the right structure and organisation to accept goods even in the afternoon, suppliers and their carriers could rethink, at least in part, their journey "bi-orhythms", and plan to make at least some afternoon deliveries. Looking at driver hours and the working time directive (nine hours a day plus loading, unloading and waiting time, up to a maximum of 13 hours a day, which can go up to 15 hours twice a week) and supposing that drivers start work early in the morning (say at 6:00), they could make their last delivery by mid-afternoon (15:30) and be back at their company by 19:00. When haulage companies deliver goods in the evening (say 17:30), they must re-jig their journeys so that lorry drivers do not start work before 9:00 (and return at 22:00).

Paradoxically, there can be cases where, even when drivers do not reach their maximum driving hours, they must be rested anyhow because of the time spend waiting to load and unload. Loading and unloading waiting time is still considered working time and is added to the drivers' uptime.

Large-scale distribution companies will find it useful to agree the best expected arrival time beforehand with their suppliers (e.g. morning or afternoon). This arrangement makes it easier for the distribution centre to manage its internal operations and so increase the level of service it provides.

This solution is easier to implement if large-scale distribution companies can book their unloading times on a time slot booking system (**#slot_booking**). The flow of traffic in arrival can thus be spread out, as can the operations linked to receiving, controlling and putting the stock away. However, a recent study has shown that, although time slot booking systems have been around for over ten years and have more than proven their usefulness in planning reception operations and so reducing waiting times, they are employed by fewer than half the distribution centres. Time slot booking systems can bring down waiting times to one hour on average, against two and a half hours when bookings are not managed or not made ["Migliorare l'efficienza logistica" ("How to improve logistics efficiency")].

Alternatively, distribution centres can draw up bi-lateral agreements with certain suppliers and/or logistics operators, arranging to unload in the afternoon, evening or even at night and fixing the day of the week, the time slot and the maximum leeway beforehand. Individual agreements can also be set up for intermodal delivery (**#modal_switch**), where the railway part is typically at night, with arrival at the rail freight terminal in the morning and then onwards by road, expecting to reach the destination after 13:00, depending on the distance from terminal to distribution centre. In some cases, the parties can make arrangements for supervised but unmanned night deliveries, with a remote operator sending the driver to a reserved lane and bay set apart from the rest of the warehouse.

In both cases, this procedure works for suppliers where:

- Transport flows are significant.
- Orders are generally full-truck loads (**#order_size**).
- Delivery is via articulated lorries (**#vehicle_size**).
- Transfers are ex plant or ex warehouse, with no intermediate transit points.
- Products are uncomplicated to handle at reception (e.g. few products and all in

single-product full unit loads).
- They score highly for their delivery reliability, as a missed afternoon delivery would generate a cost for personnel waiting pointlessly at arrivals.

All these features match up perfectly with collaborative logistics models (**#collaborative_planning**).

The option of making afternoon deliveries should not be seen as advantageous for large-volume suppliers alone, as logistics operators can also benefit. If their starting point is a multi-producer warehouse (**#merge_orders**), they can organise multi-drop shipments to two or more relatively close distribution centres on pre-agreed days and times, making sure they synchronise the various deliveries and that drivers finish within their allowed driving hours.

When extending delivery days horizontally, this solution is doubtlessly harder to implement because of the severe limitations set out in the EU driving directive (among which a ban on weekend driving, especially in the summer) as well as to give drivers the proper rest time (at least 45 consecutive hours if the lorry driver is at home, or 24 hours otherwise).

IMPACT AREAS

Extending the goods reception time at large-scale distribution centres is feasible even without the backing of excessive funds, and is decidedly beneficial for all supply chain actors. These longer unloading windows can bring tangible advantages, for both the large-scale distribution centres and the suppliers (producers and/or their 3PLs).

On the large-scale distribution side, this arrangement could:
- Reduce traffic in the distribution centre aisles, because fewer fork-lift truck operators and order-picking personnel would be scurrying around. As these two groups work alongside each other in the stock area (inbound flows) and in goods collection (outbound flows), their hourly productivity would go up.
- Spread the flow of inbound goods uniformly, minimising the probability of stocking goods in the wrong area, which can happen if outbound and inbound goods are not synchronised. Storing goods in places other than the right location can have negative consequences, including the likelihood that fork-lift operators will have further to go when they stock or replenish picking stations.
- Reduce the risk of not receiving goods (when, for example, a lorry is in a queue to unload and the goods miss their ongoing shipment) or to have to reject late deliveries.

On the flip side, extending the time window for receiving goods at distribution centres could have negative fallouts if the afternoon shift staff is underused or deliveries arrive late, taking the shift into overtime. Therefore, to avoid falling afoul of even one of these two downsides, before extending the reception time window at a distribution centre, all aspects must be checked out carefully, including verifying that the required conditions are in place.

For producers and their 3PLs, the longer these delivery windows are, the more freedom they have to optimise their vehicle fleet, meaning they can organise multi-drop deliveries on fully loaded lorries and maximise their drivers' driving hours. However, the intended optimisation falls through whenever reception is overly busy and the planned waiting time is longer than expected.

Extending the acceptance time window also makes it possible:

- For operators to prepare orders in the warehouse without rushing, as work is spread out over the day.
- For drivers/carriers to respect the agreed delivery times, as factors out of their control that could potentially lengthen the delivery time will have less impact.
- For carriers to increase the number of intermodal transport deliveries, because railway transit times and acceptance at distribution centres match up more closely, providing a positive impact on both costs and the environment.

In conclusion, if the arriving vehicles are balanced out better over time, the distribution centre can improve the way it organises its receiving operations, and reduce, as far as possible, the waiting times for lorries to unload, especially for short local delivery runs, which become feasible in the new distribution network framework (**#network_redesign**).

«In intermodal transport, the lorries' arrival times don't' always match the unloading slots. Extending goods acceptance to the afternoon would let us use intermodal transport more, with all its economic and environmental benefits». **PROD**

«Some distribution centres let us in at the agreed time slot, and then make us wait for hours on the loading dock». **3PL**

«If I could only receive goods in the morning I'd freak out, given how much inbound stuff arrives». **LSD**

«We've tried to get our suppliers to deliver on Saturdays, but they claim their carriers won't, not even at peak times». **LSD**

«By running goods acceptance into the afternoon, we spread out the inbound flow and reduced overlaps in operators, improving productivity no end». **LSD**

«We got ourselves ready to accept goods in the afternoon, but then nobody turns up and we struggle to make arrangements with our suppliers – or their carriers – who have everything set up for morning deliveries». **LSD**

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

2.1.2 Use time slot booking systems more largely

DESCRIPTION

Carriers/logistics operators and supply chain actors, in general, can use booking systems to reserve their loading and/or unloading time slots at a given logistics point (e.g. a supplier's plant or warehouse, or a large-scale distribution centre). For example, the producer, or its 3PL, delivering to a large-scale distribution centre can book a slot on the required delivery day for each order. In some cases, the 3PLs combine orders due to be delivered in the same time slot (**#merge_orders**). This solution helps companies plan their transport and warehouse logistics better.

WHAT TO DO

This solution is based on a cloud-based platform that can be accessed by all three supply chain actors, i.e. producers, large-scale distribution and 3PLs. If not developed in-house, it is usually a Software-as-a-Service (SaaS) platform, purchased on a pay-as-you-go basis.

Alongside their technological development, the supply chain players should also update their reception and/or shipment processes. Companies must indicate the interval of time in the day when they manage their reception/shipment operations. They must then split this interval into slots, stating the number of vehicles that can be used in each slot. This is an estimate, and is based on several factors, including type of order (simple, with single-product full unit loads, or complex, with multi-product unit loads bound by quality controls, use-by dates and weight checks), number of allocated operators, any synchronised put-away operations and warehouse capacity utilisation. The outcome of this exercise is to come up with dynamic time slots, so, instead of being forced into slots with a fixed predefined capacity, companies can define longer or shorter time slots that match the requirements of each order.

As in all planning systems, efficiency depends on the actors' capacity to stick to what has been agreed (carriers must arrive on time, warehouses must process goods within the agreed time). Compared to planning in a closed setting, as in production, transport planning is more likely to be affected by external events, such as traffic busyness. Therefore, a new idea in the supply chain pipeline is dynamic time slot booking, where scheduling the loading and unloading varies in function of the transport vehicles being behind or ahead of themselves. This solution is often combined with transport visibility systems that use geo-referencing functions (to indicate when an approaching vehicle is at a given distance from a logistics point).

In some cases, especially with a short order-delivery lead time, the 3PLs may be unable to find the best slot to optimise their logistics flow (think of intermodal transport where lorries can often only deliver in the afternoon). It is possible to get round this problem by reserving slots for groups of producers or 3PLs, especially when they make many deliveries in the day. When slots are reserved to encourage intermodal transport, they are known as "green slots".

In some cases, large-scale distribution players use time slot booking systems after overhauling their warehouse logistics. In others, they first introduce a booking system, and then start on continuously improving their processes, especially how they estimate their dispatching/receiving capacity and what this capacity actually is. Lastly, since this approach is totally new for the supply chain, the players need additional guidance and encouragement to re-think the entire organisation of their logistics process.

IMPACT AREAS

Improvements in the planning of transport and warehouse logistics have a bearing on transport and warehouse operations. For example, booking a slot to unload products means cutting down the unloading vehicles' waiting times. This shorter waiting time, in turn, translates, on the one hand, into additional driving hours to play with and, on the other, the option to combine the delivery with other work (for example, another delivery as part of a multi-drop service, or picking up goods for the return journey (**#offset_outward_&_return_journeys**). Cutting the waiting times has a direct impact on waiting time costs, which are applied when lorries wait over two hours. For warehouse operations, spreading lorry arrivals over several hours means that resources can be used better, while the loading and unloading can be evened out. Potentially, it could be possible to synchronise loading and unloading operations over the day, producing tighter logistics flows (just-in-time flows).

PROD *«It's a problem of organisation, if we solve it, we all benefit».*

3PL *«When volumes start to go up, there never seem to be slots when you want them».*

LSD *«In 2020, after we'd re-organised the warehouse, we too put in a time slot booking system».*

LSD *«We introduced a booking system and checked the waiting times. This gave us the numbers to tweak our receiving capacity, so we split orders into five classes based on the time lorries spend at the unloading dock».*

LSD *«We don't feel the need for a booking system, as we can receive goods beyond the normal timetable».*

LSD *«Several 3PLs deliver various orders a day, some book slots, others don't and it leads to confusion».*

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN**	**SINGLE COMPANY** ✔
Required investment	**TECHNOLOGY & ASSETS** ✔	**PROCESSES & ORGANISATION**

2.1.3 Reduce acceptance and control times for incoming goods

DESCRIPTION

Goods receiving at large-scale distribution centres is one step in the order-to-delivery process, and involves unloading the lorries, inspecting the quality, condition and quantity of incoming goods (and repairing/refurbishing the unit loads if needed) and then transferring the unit loads from the unloading decks to their allocated storage space in the warehouse.

The time not strictly spent on moving goods at large-scale distribution centres can be reduced by using technology to minimise the (total or partial) acceptance and control time for incoming products. Goods receiving takes in operations other than actually moving goods, and technology is used to read bar codes on the unit loads as they arrive, or, in some cases, on each pack in the unit load.

As well as verifying the secondary and tertiary packaging on incoming goods, sell-by dates are checked for the single products. All the information collected during the acceptance and control phase must be gathered up into a software management solution, typically a warehouse management system (WMG), to build up a cache of information on the products handled.

WHAT TO DO

The time spent on accepting and controlling goods at large-scale distribution centres can be reduced by introducing RFID (radio-frequency identification) or DESADV (despatch advice) technology, used in combination with SSCCs (serial shipping container codes).

RFID is used to identify and/or memorise information contained in electronic labels known as RFID tags, which can be tracked at a distance by fixed or portable devices known as RFID readers.

The distribution centre will receive pallets with RFID tags, which provide – in a fully automatic way – information about the quantities and products received that can be checked against the order. Labels must be applied to goods at the departure points and, when the goods reach their destination point, the unit load is sent through an RFID gateway or the label is read by an RFID gun.

A DESADV is, instead, a message with all the shipping information, and that about the products in the shipment. The producer or logistics operator sends this information ahead digitally via electronic data exchange (EDI) to the recipient. If an SSCC label is placed on each unit load to be shipped and the information included in the DESADV, when operators at the distribution centre receive the goods, they can scan the SSCC label and rapidly and automatically extrapolate all the required data and information about the shipment.

SSCCs are identification keys used to identify the logistics unit, helping to make the goods receiving process faster, as information can be cross-checked with the DESADV, defined as “a message specifying details for goods despatched or ready for despatch under agreed conditions”. Once read, all the information contained in the bar code on

the unit load is linked up and can be accessed across the system [Ottimizza il processo di consegna con il DESADV [(Optimise delivery with DESADVs)] [Etichetta logistics GS1-128 (GS1-128 logistics label)].

These solutions are generally implemented in pairs (one seller and one buyer). Because of the kind of technology applied, the interested parties must work in close collaboration to transfer goods (PRODs/3PLs and LSDs) and the information must standardised.

Therefore, for these tools to be effective (reducing the time spent on controlling unit loads and goods on arrival), most of the supply chain players should draw up agreements that not only cover their technological arrangements but also each single process.

In parallel with the introduction of these technologies, there can be other forms of collaboration between producers and large-scale distribution designed to reduce the burden of checking the quality of each single product and the number of packs per unit load. If producers commit to dispatching high-quality products (via certified deliveries that translate into a sort of free pass), goods receiving operators need to check the quality and composition of the unit load only every so often. If they come across discrepancies in the expected quality and/or quantity, they will activate appropriate procedures to deal with the irregularities.

IMPACT AREAS

Introducing the solutions described has a considerable impact on the productivity of operators at goods receiving, as well as on reducing waiting times to unload the lorries. Firstly, as the receiving goods procedures are less complicated, operators can process more incoming vehicles in the same period of time; secondly, there are cost savings linked to the fewer typically administrative operations.

However, anyone considering whether to adopt these solutions must assess the investment needed to implement and introduce them more widely among the interested parties in the supply chain.

«Our 3PL has a system to certify orders, so we can send the certified shipments to our distribution centres, and this cuts the unloading time». **PROD**

«We have set up an RFID system to read SSCC codes on the pallets. We started with one RFID gateway to read them automatically. Now all the bays have a gateway». **LSD**

«We are working with numerous producers to reach the point where we use DESADV in more than 50% of our deliveries». **LSD**

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS** ✔	**PROCESSES & ORGANISATION**

2.1.4 Introduce stand-by trailers for incoming goods

DESCRIPTION

This system involves stand-by trailers, which are trailers decoupled from the tractor. When the carrier is delivering goods, the driver leaves the loaded semi-trailer in a secure parking lot near the customer's warehouse and collects an empty trailer. The loaded semi-trailer will then be collected with another tractor unit and taken to an unloading bay. The same procedure works when loading goods, as the carrier can leave an empty trailer in a secure parking area near the supplier's warehouse and collect a previously loaded semi-trailer.

With this system, drivers do not have to hang around waiting for goods to be loaded or unloaded, and with no waiting time (time with zero added-value), their driving time is used more efficiently.

WHAT TO DO

To implement this system, the logistics operator must have more semi-trailers than the HGVs it regularly uses, and it must have enough room at or near its warehouse to make the semi-trailer switch. Another option is to use swap bodies. In both cases, the logistics operator needs a tractor unit on or near the secure parking, plus a system that can trace the contents of each semi-trailer and where it is parked (mirroring how the system used to trace pallets in the warehouse). This solution therefore requires a greater investment in logistic assets.

Stand-by trailers are a way to optimise loading and unloading operations, and works particularly well with regular connections and in peak periods.

For example, this use of semi-trailers is particularly helpful in the consumer goods supply chain when the distribution centres find themselves handling high volumes of goods per year and/or when they are at or near full capacity. Another advantage of this solution is that semi-trailers can also act as temporary external warehouses, despite the additional work involved.

Fine-tuning this system requires good collaboration between all supply chain players. Large-scale distribution companies must be ready to provide the external parking area and the necessary technology. The 3PLs must be ready to buy more semi-trailers, and know how to plan the journeys so that they utilise the time available in the most effective way. Lastly, the producers must give their backing to the logistics operators, both for the initial investment and in terms of keeping up a dialogue with the delivery points.

Using semi-trailers as external warehouses could potentially also improve efficiency.

IMPACT AREAS

Decoupling lorry drivers from loading and unloading operations can potentially eliminate loading and unloading waiting times, which are currently overly lengthy (according to ECR research entitled ["Migliorare l'efficienza logistica ("How to improve logistics efficiency")], the drivers' average waiting time is between 45 and 300 minutes). After going through goods acceptance, HGVs leave

their full semi-trailer and pick up an empty one, cutting waiting time to the bare minimum, thereby also optimising driver time, a decisive point with today's shortage of lorry drivers.

This solution is also cost-effective for the warehouse, especially during shipping. Companies can spread the warehouse operators' work evenly across the day, independently of when lorries arrive, and work can be organised without having to factor in potential delays in arrivals.

PROD *«We analysed our delivery points, and found those where stand-by trailers would work best. We are now developing this system with our 3PL».*

LSD *«One of the 3PLs used by our producers has rented an area near our distribution centre to use for stand-by trailers».*

LSD *«We have arrangements in place with several 3PLs used by our producers, so as to optimise semi-trailer rotation in the parking area».*

Transport demand / supply	**DEMAND**	**SUPPLY** ✔
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS** ✔	**PROCESSES & ORGANISATION**

2.1.5 Improve pallet exchange handling

DESCRIPTION

This is the procedure to organise pallet exchange, while reducing the further time spent by lorry drivers waiting to collect the pallets, which can be at the same time as they make the delivery or subsequently, also in the light of recent legislation. Italian Law no. 51 of 2022 regulates the procedure to return equipment used during transport and mandates its return. Under this legislation, recipients must either hand back the equipment or issue a voucher for the debt, which must be paid after six months.

Apart from the waiting times for unloading, lorry drivers lose time between entering and leaving a distribution centre because of disagreements over the quality of pallets rejected on delivery (6% of the incoming flow on average), and further time is lost while they wait to load the same number of pallets in replacement.

WHAT TO DO

Firstly, pallets have to be organised by type, separating EPAL (European Pallet Associated) pallets in a suitable state to be exchanged (70% of all pallets arriving at a distribution centre) [Dieci anni di logistica nel largo consumo – Mappatura dei flussi logistici (Ten years of consumer goods logistics – Logistics flow map)] from EPAL pallets that are damaged or not good enough to be exchanged. Furthermore, it makes sense to keep pallets from other pooling systems in different piles, for example CHEP (Commonwealth Handling Equipment Pool), LPR (Logistic Packaging Return) and the Italian CRP pallets.

Large-scale distribution companies proposing to return EPAL pallets immediately to delivering lorries must build up a buffer of pallets of the same quality as those received, so as to reduce the drivers' overall time spent in the distribution centre. This pallet buffer can be stored near the loading bays at the distribution centre, or elsewhere on site, preferably under cover to protect the pallets from the weather.

The restitution process must be as efficient as possible, to stop drivers from wasting time. The operators organising transport must clearly know beforehand whether the pallets will be exchanged there and then, or whether the distribution centre will issue vouchers, as this helps carriers to optimise the delivery run when drivers are making multi-drop deliveries (**#digitalisation**).

While the best option for EPAL pallets is to replace the pallets immediately, to cut waiting times, for other pallet pooling systems, the most common solution is to load as many pallets as will fit on an articulated lorry (for example, 528 pallets = 33 piles of 16 pallets each) or on an articulated lorry plus trailer (**#vehicle_size**). Alternatively, carriers can balance a return journey to collect the pallets with an outward journey to deliver goods (**#offset_outward_&_return_journeys**). Lastly, a semi-trailer loaded with pallets can be parked at a distribution centre dock (**#stand-by_trailer**), and it will be picked up by the same driver that makes the delivery.

If pallets are returned later, it can be useful to book a loading slot (**#slot_booking**) for drivers who only need to collect return pallets.

IMPACT AREAS

Distribution centres handling millions of packs on many different types of wooden pallets are impacted the most, in that recipients must return the pallets in one of several ways:

- Exchange the same number and quality of pallets as those received immediately.
- Exchange the pallets later, based on the number of pallets indicated in the voucher issued; it may make sense to load the lorry up completely for its return journey.

In both cases, large-scale distribution companies, which handle different piles of pallets to return to its suppliers, must bear the cost of physically storing the pallets (preferably kept under cover for protection), as well as the costs to repair pallets damaged while on site, to make sure that only sound pallets are sent back to suppliers. Similarly, the supplier must build up a stash of pallets that can be exchanged [La gestione dei pallet nella filiera del largo consumo (Pallet management in the consumer goods supply chain)].

Italian Law no. 51/2022 converting the "Ukraine Decree", especially Art. 17ter, states that "Parties that receive pallets on any basis, except the buying and selling thereof ... are obliged to return to the owner or buyer the same number of pallets of the same type and of equal or similar technical features and quality as the pallets received". Large-scale distribution companies must necessarily update their procedures to return pallets in order to repay their debt to suppliers, either by creating a buffer of pallets suitable to be exchanged when receiving goods, or by buying new, used or repaired EPAL pallets on the market. Law no. 51/2022 also states that, if pallets are not returned immediately, the recipient must issue a digital or paper voucher, in other words, an "irregular" transferrable bill of exchange, the value of which will be established by an observatory set up by the Italian Ministry for Economic Development. Should the recipient fail to return one or more pallets within six months of the date on the voucher, the recipient mandated to return the pallets must pay the market price for one pallet multiplied by the number of unreturned pallets.

PROD *«Sometimes, our agreements with haulage companies include a % increase on the outward journey to allow for pallet returns (for example, 6% = 1 return every 15 outward journeys».*

PROD *«We ask our 3PLs to register vouchers within ten days from making a delivery, as we settle the balance with our customers every month and we check the situation of pallets and vouchers at the 3PLs' every 15 days.».*

LSD *«Based on the sender, we already know what state the pallets will be in when we unload them, and how many we'll have to discard».*

Transport demand / supply	**DEMAND**	**SUPPLY** ✔
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

2.2 EVEN OUT WEEKLY/MONTHLY LOGISTIC FLOWS

2.2.1 Reduce peak day deliveries

DESCRIPTION

This process involves moving the times when suppliers deliver to distribution centres, in order to even out the peaks in incoming goods over the week, and also those at the end of the month. Distribution centres can make periodical adjustments, over a week or month, to cope with work peaks in transport or, more in general, to the order-to-delivery process, reducing pressure on the lorry driver shortage and on restrictions to driving hours.

A recent survey [Dieci anni di logistica nel largo consumo – Mappatura dei flussi logistici (Ten years of consumer goods logistics – Logistics flow map)] shows that deliveries at the start of the month are not in balance with those at the end, and the fourth week accounts for 35% of all monthly transport flows, against a hypothetical average of 25%.

The case in point applies particularly to dry and sundry products, and depends, to a large extent, on the suppliers' trading pattern, and drives their logistics flows onto the last week of the month (although they sometimes also jump up at the end of a quarter). Such imbalances are even felt during the week, as the workload is higher on Mondays and on Thursdays into Fridays.

The monthly and weekly transport flows for fresh produce are, instead, more regular, as in most cases they involve just-in-time transport flows centred on the need for ventilated transport and the shorter shelf-life, which plays havoc with seasonal stocking policies. The proportion of Saturday morning deliveries of fresh foods is significantly higher than those for dry goods and sundries, primary because local prefectures regularly issue permits to transport perishable goods (ATP - Accord Transport Perissable).

WHAT TO DO

Change the pattern, the "biorhythm", of how distribution centres place their orders (in other words, the periodicity of incoming transport flows across the week to satisfy the outgoing sales point demand), requires end-to-end effort and serious commitment on the part of sellers and buyers.

On their side, large-scale distribution should place orders with deliveries spread out from Monday to Friday, keeping an eye on the quantities in arrival in, for example, number of packs, number of pallets or square metres). On their side, the suppliers, working through their logistics operators, should respect delivery dates and agree a weekly timetable with large-scale distribution such as to spread the transport flows out more evenly, especially when the 3PL works with a multi-producer warehouse in a **#merge_orders** logic.

In some cases, when the distribution centre receives promotional goods on fixed days of the week, this creates potential imbalance in the volumes entering its premises.

Nevertheless, with regards to dry goods and sundries, when the distribution centre holds cyclical and safety stocks, incoming and outgoing transport flows are temporarily decoupled, and this prevents the periodicity in consumption at the sales points over the week from impacting on the suppliers' periodical delivery pattern.

Time slot booking systems (**#slot_booking**) can help to even out incoming transport flows at the distribution centre, not only day-by-day (**#extend_good_receiving_window**), but also over a week or a month. These systems must obviously be integrated with the distribution centre's automatic re-ordering systems and warehouse management systems (WMS).

VMI (vendor managed inventory) is another solution to help even out the timing of transport flows (**#collaborative_planning**).

Furthermore, distribution centres can also use commercial tools to even out transport flows over the month. One such tool is the **everyday low price (EDLP)** pricing strategy, which reduces the **bullwhip effect** caused by from variations in demand from downstream sales points.

However, the sales side must forego their deeply-entrenched habit of pushing orders to the month end or quarter end to reach their sales targets. This reasoning is often marked out as the main culprit of creating imbalance in transport flows over the month.

IMPACT AREAS

Vehicles operate at different levels of intensity over the week, with the risk of not being able to move goods on some days, when no transport is available. Clearly this creates a high degree of inefficiency for the transport system, especially in the current period where there is such significant driver shortage. In the same way, it is not very efficient to work with delivery rhythms that lean towards one day of the week or to the end of the month. In particular, moving transport flows onto the month end hits the 3PLs particularly hard, as they must handle work peaks concentrated at the end of the month and are unable to optimise either their warehouse or their transport resources.

High variability in incoming transport flows at distribution centres over the week, peaking on Thursday and Friday and at the month end, translates, on the one hand, into heavy costs for the providers of transport services, which, in turn, will pass them on to their customers. On the other hand, there is the risk of missing agreed delivery times, with impacts on the service offered (punctuality and keeping to the agreed delivery date), generating a negative fallout on the organisation of receiving goods processes.

«We have a 30% peak in transport flows every last week of the month, which has a drastic effect on our warehouse and also for our carriers, as they have to guess what transport we will book for the month end».

PROD

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

2.2.2 Prepare for seasonal peaks by stockpiling tactically

DESCRIPTION

This concept involves moving goods early to warehouses situated near customers, effectively shuttling between the local warehouse and the distribution centre in peak demand periods. These peaks can be determined by seasonal products, such as Christmas and Easter treats, or be linked to promotional periods, all carefully planned well ahead.

Depending on how far in advance goods are moved to local warehouses, the outcome is to create either tactical or strategical stock. We talk about tactical stock when stock is sent in advance to the local warehouse a few days to a few weeks ahead, while strategic stock is when goods are sent in advance much earlier.

Creating strategic stock also compensates for lack of space in the original warehouse.

WHAT TO DO

Creating tactical or strategic stock at a peripheral warehouse means first identifying when (periods in the year) and where (origin-destination routes) access to the right level of transport service is significantly more critical and costly, as well as determining the delivery points where order variability is typically high. For these destination points, it is important to increase visibility on the sales orders or sales forecasts, to know when to move products from the manufacturer's plant/central warehouse to the peripheral warehouse.

Clearly, the capacity of these second layer warehouses must be checked, because of the substantial reorganisation and rationalisation that has taken place in recent years.

IMPACT AREAS

This solution is particularly pertinent wherever there is limited transport capacity. When producers face limited capacity in peak periods, they are forced to turn to the spot market to buy additional capacity to match their increase in demand. Buying on the spot market, however, comes at an additional cost.

This solution means that the company can exploit lower transport fees and carry goods outside peak periods, where the constraint of lower transport capacity is less important. In this way, the intention is to optimise transport costs from the producer's warehouse to that of the customer.

Using shuttle transport minimises the number of vehicles used and enables companies to respect their customers' delivery dates, reduce stock-out costs and the costs linked to procurement risk. Most of the costs linked to stocking goods in local warehouses and for the additional handling are, in any case, compensated by the lesser use of transport services bought on the spot market under conditions of limited transport capacity.

When using third-party warehouses, distribution centres can request additional temporary stocking capacity, which will be activated as and when needed. To be implemented, this solution requires coordination between the producer/large-scale distri-

bution and its logistics supplier.

In other cases, new locations must be set up beforehand, to be activated if and when needed. In both cases, activating additional warehouses gives some breathing space and helps the logistics flow to be as flexible as possible.

PROD *«We receive some very large orders during promotions, many semi-articulated HGVs-worth per customer order, and it's hard to find the lorries».*

PROD *«We are working with our 3PL to try out tactical stocks, when we know about a promotion well in advance».*

PROD *«For deliveries via transit points, we round up the quantities up to fill the vehicles, creating small stocks at the transit points, especially for high-selling articles».*

LSD *«We are bringing in the producers' logistics, to get them to increase their visibility on peak logistics flows linked to promotions».*

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN**	**SINGLE COMPANY** ✔
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

2.2.3 Introduce collaborative planning models and VMI (vendor managed inventory)

DESCRIPTION

There are several collaborative planning models. One is VMI (vendor managed inventory), a customer-supplier collaborative planning technique where the customer gives the supplier data about warehouse stock and flow data (at least for the warehouse outgoing flows), while the supplier takes over the handling of the customer's stock, thus optimising logistics flows. If the two parties work together, they both are ensured visibility on the supply chain, and the product is more likely to be available at the delivery point. Another solution is to use information sharing models, with the parties agreeing to share information (for example, on sales levels per geographic area, product replacement plans) without altering the re-ordering process.

WHAT TO DO

VMI requires some initial investment to develop automatic information sharing applications and to set up the planning process. In particular, VMI implies defining the rules of collaboration (service level, minimum and maximum stock coverage, etc.) and sharing the agreed information in a timely manner.

VMI requires evaluating the size and distance of the distribution centres to be served, as well as defining a minimum critical mass, in order to seize all the potential benefits of this method. This technique is often associated with an increase in delivery frequency, in a perspective of continuous replenishment. VMI can also instigate multi-drop deliveries (**#merge_orders**). Producers and 3PLs can organise themselves to combine their deliveries and maximise the full use of transport vehicles. In an emergency, like in the first waves of Covid-19, VMI was perceived as a strong tool to increase visibility over the supply chain and improve its response capacity.

If information sharing is the chosen solution, the investment is at a lower level. The parties must agree about the information they will share and how often they will update these data. Infrequent updating means data can be shared through traditional and non-invasive methods.

IMPACT AREAS

VMI enables producers to improve their visibility on the effective consumption of products and synchronise relative demand and production. Such an improvement allows suppliers to improve their delivery distribution week by week in the month (**#even_out_demand**), reducing peaks of activity and bringing benefits to the transport and order picking side.

For delivery points in large-scale distribution, this solution has several benefits, including greater efficiency in managing stocks and a reduction in stock-out costs.

From the perspective of the planning process, there is certainly more intense activity for the producer, hence higher costs, which are offset by the benefits mentioned above.

Information sharing helps all parties in their decision-making process, and gives them a better insight into supply chain dynamics.

PROD *«VMI gave me visibility on my orders, removing distortions in demand linked to the distribution centres' re-ordering policies».*

PROD *«We use VMI for some of our important customers, and it helped us to be very reactive at the start of the pandemic».*

PROD *«We have set up VMI with several distribution centres. We found that flow synchronisation has improved, and we can fill our lorries more and have increased the percentage of our multi-drops».*

PROD *«Leaving orders in the customers' hand means transport doesn't get optimised».*

PROD *«We have agreements with some large-scale distribution operations to share our sell-out data. These data help us see the true progress of demand and the stock levels in the supply chain».*

LSD *«We use VMI with 20 suppliers. The supplier's focus on its products and its visibility on the entire market makes it easier for distribution centres to improve the level of service they provide to sales points».*

Transport demand / supply	**DEMAND** ✔	**SUPPLY**
Supply chain / Single company solution	**SUPPLY CHAIN** ✔	**SINGLE COMPANY**
Required investment	**TECHNOLOGY & ASSETS**	**PROCESSES & ORGANISATION** ✔

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