Efficient Product Movement

Improving product transport and handling through the supply chain

AUSTRALASIA

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ECR Australasia – working together for total customer satisfaction

Efficient Consumer Response (ECR) is a business concept aimed at better satisfying consumer needs, through businesses and trading partners working together.

In doing so, ECR best practice will deliver superior business results by reducing costs at all stages throughout the supply chain, achieving efficiency and streamlined processes. ECR best practices can deliver improved range, consumer value, sales, service and convenience offerings. This in turn will lead to greater satisfaction of consumer needs.

ECR Australasia reflects a commitment to take costs out of the grocery supply chain and better satisfy consumer demands through the adoption of world's best practice. In an increasingly global food and grocery industry and a retail environment subject to rapid change, the future for Australian and New Zealand suppliers, retailers and wholesalers depends on increased efficiencies, reduced costs and added value for consumers. Influences such as global sourcing, new retail formats and channels, international retailers, competing products and services and technological innovation have all contributed to the pressure for change.

ECR Australasia is an initiative of manufacturers, retailers and wholesalers in the Australian and New Zealand food and grocery industry and is supported by the respective industry associations.

Launched in November 1999 and directed by a board of nine senior industry executives, ECR Australasia seeks to build on earlier collaborative work in the industry in Australia and New Zealand and to access the outcomes of global ECR related activities and the Global Commerce Initiative. Access to the outcomes of those international activities will enable ECR Australasia to take the best, adapt it to the Australasian scene and avoid the need to "reinvent the wheel".

In a supportive industry environment, ECR Australasia has an opportunity to identify and promote best practice at least resource cost.

The *"Efficient Product Movement"* guide addresses the opportunity for improvement in transport and distribution efficiency in Australia and New Zealand. With input from suppliers, retailers and wholesalers at the leading edge of process change in the movement of food and grocery products, the guide documents leading practice in Australasia and identifies the opportunities for further cost savings through innovation or standardisation in pallet and pack configuration, order multiples, technology, vehicles and storage facilities.

For more information about ECR Australasia, visit **www.ecraustralasia.org.au**

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Executive summary

This guide has been developed by a team of consumer packaged goods (CPG) manufacturers and grocery retailers and wholesalers brought together by Efficient Consumer Response Australasia (ECRA). The ECRA Board commissioned this guide in order to encourage improved efficiency in the handling and transport of product through the supply chain – ie efficient product movement.

Based on data provided by the working group, there is an opportunity to reduce product movement costs[1] by an estimated 4 to 12% for manufacturers and 15 to 18% for retailers, equating to A$560m - A$950m[2] for the Australasian grocery industry – a significant prize. This is achieved through supply chain efficiencies which are not only within an organisation, but also through collaboration between trading partners. Benefits are enabled by investments in infrastructure, automation and systems for planning and data management. External benefits require an understanding of product movement costs across the end-to-end supply chain. Understanding and insight is then shared between trading partners for mutual benefit. This process has already begun, as witnessed by the 12 case studies contained in this document.

There are five key recommendations.

- Understand the cost to serve and use supply chain trade terms to drive efficient product movement. The distinction between commercial and supply chain terms has been lost. Trading partners should separate supply chain terms from commercial terms, and remove obstacles to collaboration. This should enable both parties to identify and eliminate non-value adding activities.
- Collaborate to realise product movement opportunities and reduce total supply chain cost, enhance service and improve product presentation. Industry participants should select trading partners and share insights with them (such as demand and ordering patterns) to recognise and realise improvement opportunities, rapidly and pragmatically.
- Set product movement standards for the industry - based on clear and common understanding of cost impacts across the supply chain. These standards should cover pallet heights, store-ready unit load formats, vehicle specifications and DC operating environments.
- Use technology to coordinate product movement and increase the speed of stock transfer through the supply chain. Industry participants should consider transport planning systems, picking technology, SSCC labelling and ASNs, to reduce cost, time and errors.
- Recognise the increasing environmental and safety pressures on transport and packaging. Trading partners should innovate and collaborate proactively to address these issues.

1 Costs include packaging but exclude cost of product manufacture

2 The industry estimate assumes that some retail benefits will generate on-costs for manufacturers, averaging 23%

2 Introduction

The 2002 ECRA Tracking Study[3] showed that while progress has been made since 1999, when the second tracking study was completed, the level of maturity is below targets previously set by the industry. Experience suggests that up to 50% of the benefits of ECR are likely to be achieved from the last 25% of implementation. On this basis there is considerable benefit to be gained from further ECR implementation.

Why efficient product movement?

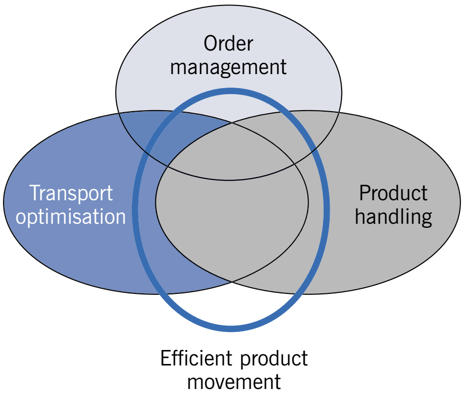


Figure 1: Efficient product movement

Efficient product movement (Figure 1) may be described as the combination of transport optimisation and efficient product handling (linked closely to the ECR concept of "efficient unit loads"). It is also linked to efficient replenishment ordering, as the order multiple will be a major determinant on the characteristics of product movement from the inventory holding location (the MDC or RDC) to the point of demand (the RDC or the store). In assessing the opportunities in these areas, it is useful to consider some of the outputs from the most recent industry tracking study.

Tracking study on transport optimisation

Only 21% of manufacturers and 33% of retailers were assessed to have moved beyond pilot testing in transport optimisation (Figure 2). This means that while opportunities are beginning to be recognised, the measures and methods to realise the benefits are not yet in place.

One leading practice identified in the study was the regular monitoring of transportation KPIs to measure vehicle fill, loaded kilometres and productive time. Another was the use of a total supply chain cost model for evaluating trade-offs between transportation and other supply chain costs and service levels. However, these practices were isolated.

Tracking study on efficient unit loads

In this area, only 18% of manufacturers have moved beyond pilot testing, but 51% of retailers indicated that they were moving towards rollout (Figure 3). The more advanced position of the retailers seems to indicate a growing recognition of the importance of efficient unit loads to retail supply chains. The gap between manufacturers and retailers is an opportunity for collaboration – while efficient unit loads may have a large impact on retail handling costs at both the DC and the store, it is the manufacturers that determine pack, case and pallet parameters.

Leading practices included standardised national packing and palletising configurations, display ready pallets and regular monitoring of vehicle utilisation. As with optimised transport, these instances were not widespread through the industry.

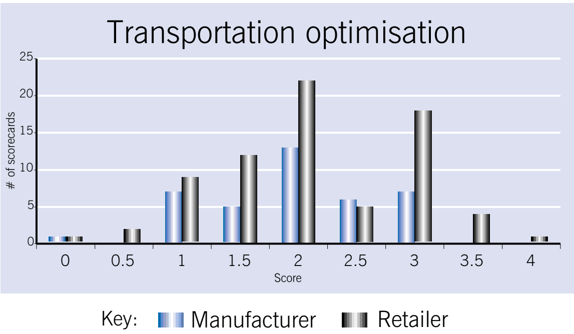


Figure 2: Transport optimisation maturity from the 2002 ECRA Tracking Study

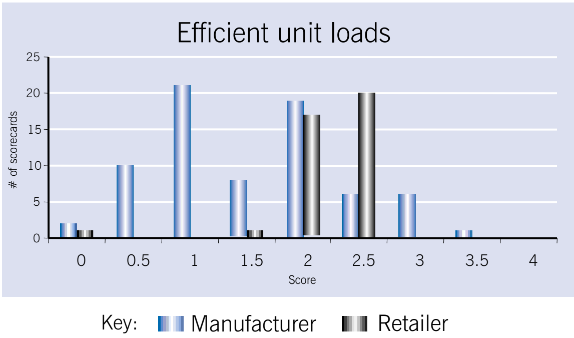


Figure 3: Efficient unit loads maturity from the 2002 ECRA Tracking Study

3 "Australasian Grocery Industry Tracking Study 2002", ECR Australasia, 2002

International comparisons

Looking internationally with the help of the global ECR scorecard[4], it appears that Australasia lags behind North America and Europe in maturity in both transport optimisation and efficient unit loads – indicating an opportunity to improve (Figure 4). Distribution costs as a percentage of sales are similar to those of North America, but behind those of Europe.

The guide to efficient product movement

The objective of this guide is to provide a useful reference point for all grocery companies, and the service providers that work with them, to improve the efficiency of product movement throughout the supply chain. Each industry participant will need to determine their own costs associated with product movement – using the principles of ABC (activity-based costing). On the basis of an understanding of costs, cost drivers and required service levels, trading partners can then work together to eliminate inefficiencies across the supply chain.

We believe the first step is to understand the issues (on both sides of the trading relationship) associated with product movement through grocery supply chain. This guide is intended to highlight the issues and emerging best practices and the to provide suggestions as how trading partners can work together to make product movement more efficient.

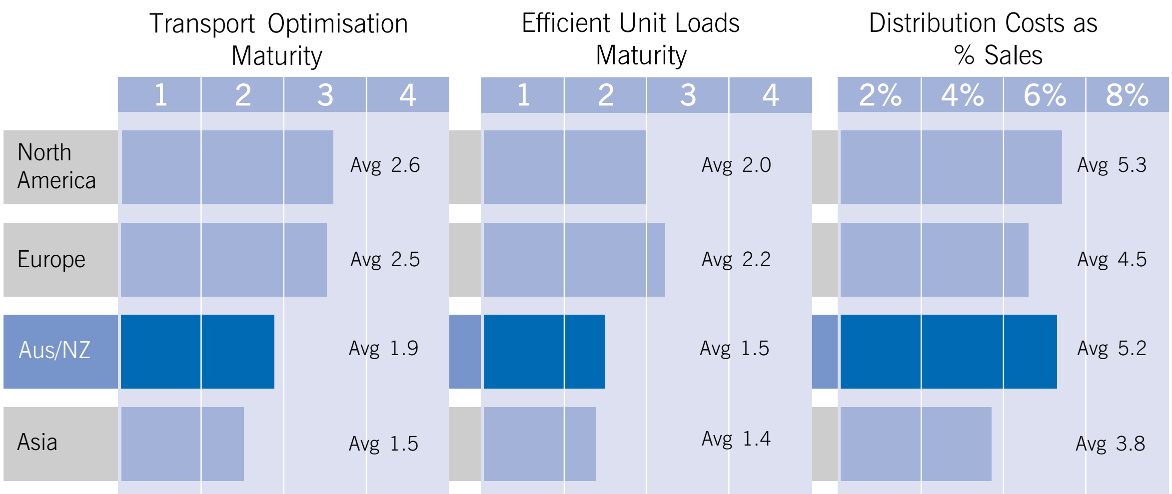


Figure 4: International product movement maturity levels and KPIs

4 See www.globalscorecard.net

Understanding the issues

Product movement issues span the supply chain. They cover physical parameters, such as case and pallet sizes and formats. Both core and supporting processes are involved, such as loading and unloading vehicles and replenishment ordering. Technology is important as an enabler, such as ordering systems, scanners and automated storage and retrieval systems. Finally infrastructure, such as DC network design, has a significant impact.

Mapping the causes of inefficient product movement

The Ishikawa (fishbone) diagram (Figure 5) illustrates some of this complexity. Causes of inefficient product movement have been grouped by the different physical areas where product is handled or transported. Causes related to support processes, principally replenishment ordering, have also been captured.

In addition to the complexity of the large number of different factors involved, there is also a web of inter-relationships between different factors. This complexity can easily become a barrier to efforts to understand and address product movement issues. It can lead to trading partners focusing on their own "back-yard" to the exclusion of wider supply chain perspectives.

There is, however, a high degree of consistency in the areas which both retailers and manufacturers see as priorities and as areas to work together. These are:

- Order multiples – including both RDC replenishment and store replenishment orders
- Receiving technology – including use of scanning and ASNs, and the possible future use of Auto-ID (RFID)
- Picking – including picking technology and the impact of case sizes and packaging formats
- Pallet configuration – including pallet height and possible store-ready formats.

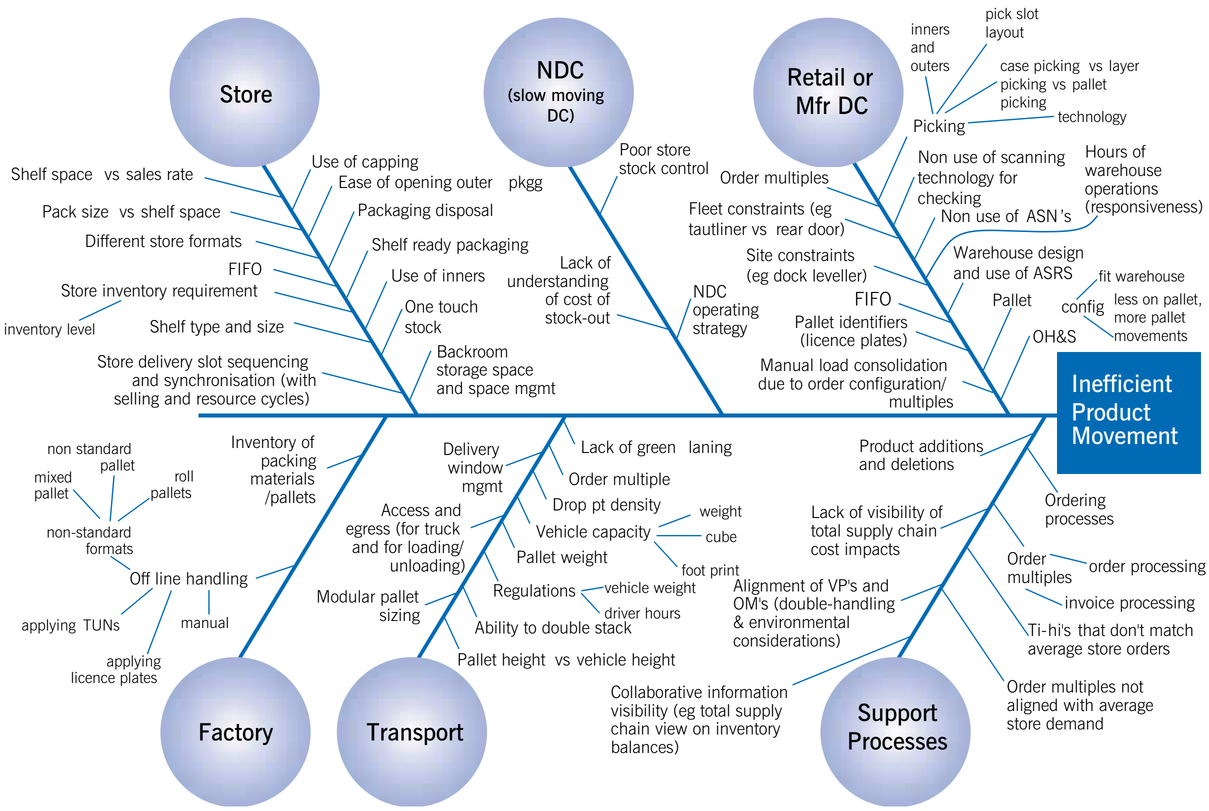


Figure 5: Ishikawa diagram for causes of inefficient product movement

However there are also some areas of particular interest to retailers:

- Occupational health and safety (OH&S) – a key issue (and opportunity[5]) as retail personnel physically handle every case at least once[6]
- Product movement within the retail store, including shelf-ready packaging, aligning pack size with shelf space and self space with sales rate.

And others that are mainly manufacturer concerns:

- Visibility of demand and inventory
- Delivery window management at the RDC[7].

A transport company perspective is shown in the inset article. Even though it may be helpful to consider the separate elements of efficient product movement, there is a significant degree of interdependency between different areas. Some industry solutions are "win-win" for both manufacturers and retailers. Others, such as store-ready unit loads, may reduce overall product movement costs but actually increase cost for one party, in this case the manufacturer. The issue is then how to recognise and share the benefits.

Inefficient product movement – a 3PL perspective

From the experience of Linfox, a major third party logistics service provider in Australia, there are a number of major factors which adversely affect utilisation of retail fleets under current operating conditions.

Delivery windows

Delivery windows to stores are often limited to certain hours of the day - high penalty rates for labour at stores preclude 24-hour deliveries in many areas. In addition, the operating hours for RDCs and MDCs do not match – the former are generally longer. Non-aligned delivery window timings can prevent back-loading of product to RDCs on store delivery vehicles.

Variation in delivery volumes

Seven day trading results in smaller average order quantities by stores, and combines with the variance in store order volumes on different days of the week, eg Tuesday low, Friday high. Direct store deliveries, which by-pass RDC's, result in smaller loads leaving RDCs and increased congestion at the store. Promotional activity results in irregular volume spikes throughout the inbound and outbound supply chain - these impacts are further compounded by lack of visibility of these activities for the service provider.

In addition to these operational delivery volume variations, there is a longer term trend towards smaller, more frequent orders, resulting in smaller, less efficient shipment sizes throughout the supply chain.

Physical infrastructure

Access problems at stores force the use of smaller vehicles to make deliveries. Most retailers require rigid sided vehicle pantechnicons for rear unloading at the store – whereas most manufacturers or primary producers use fork lift vehicles and side loading vehicles. This restricts back-loading of delivery vehicles to RDCs and MDCs.

Trade terms

Trade terms are usually FIS (manufacturer pays for transport to the RDC) – whereas FOB (retailer pays for transport) would facilitate back-loading of delivery vehicles to RDCs. Presently the "return empty" leg of any round trip is invisible to the transport customer.

Systems support

Sophisticated vehicle scheduling tools are expensive to purchase and to operate. However, they are essential for practical co-ordination of inbound and outbound freight to and from RDCs and MDCs.

5 A large Australian retailer identified OH&S as one of the top three areas for improvement and cost reduction

6 A possible exception may be fast-moving stock in a store-ready unit load

7 Demurrage can cost a manufacturer up to 9% of total supply chain costs

Understanding order management

Order multiples, the quantity of any single product ordered on a single order, are a key determinant of the configuration of product leaving the MDC or the RDC, and therefore a key driver of transport efficiency and product handling. Order multiples are created at the trading interface between manufacturers and retailers, and are thus subject to various influencing factors from different organisations. In turn, order multiples have multiple impacts on other parts of the extended supply chain. In order to understand these dynamics, the team created two influence diagrams, one for RDC replenishment orders and one for store replenishment orders.

The influence diagram for RDC order multiples (Figure 6) shows six factors impacting order multiples (as modelled by the combination of order frequency and order size). These are:

- RDC inventory gap vs target
- Cost of holding inventory
- Cost of order placement
- Trade terms
- Cases per pallet
- Product shelf life.

In an efficient ordering process, each of these factors should be taken into account in determining order multiples. Comparing this list with factors actually used by retailers and wholesalers reveals that trade terms and cases per pallet in particular are not always considered. It is also interesting to note that the cost of order placement is generally perceived to be negligible. Although the direct cost may be small, the on-costs[8] through the supply chain may be significant for all trading partners. RDC congestion and increased invoice processing and error management would be typical areas for added costs.

From the order multiple influence diagram analysis, trade terms stand out as a tool that may have been used in the past as a means of managing the movement of retailers to RDCs, but today appear to be seldom used. About a third of the largest manufacturers use trade terms or parcel buys to drive minimum order quantities – however very few of these have specified order multiples.

Looking at the influence diagram for store order multiples (Figure 7), the picture is similar to that for RDC order multiples. There are seven factors which should be taken included in the ordering process:

- Consumer sales rate (including daily and weekly cycles)
- Shelf capacity and minimum display quantities

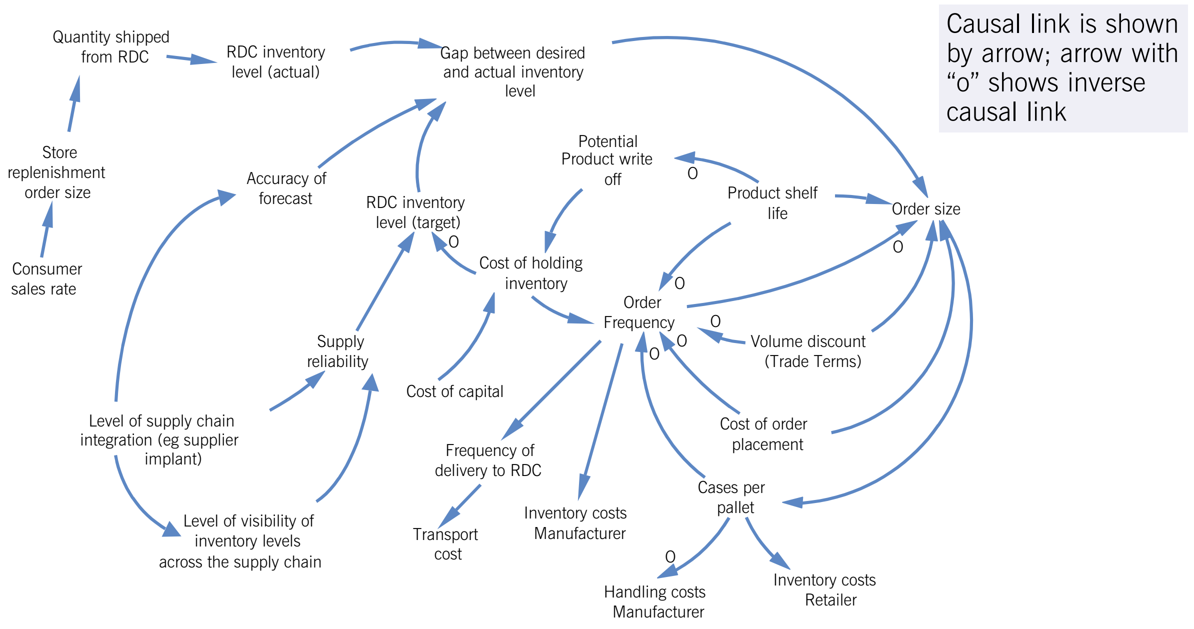


Figure 6: Influences on RDC order multiples

8 Outside the scope of this model

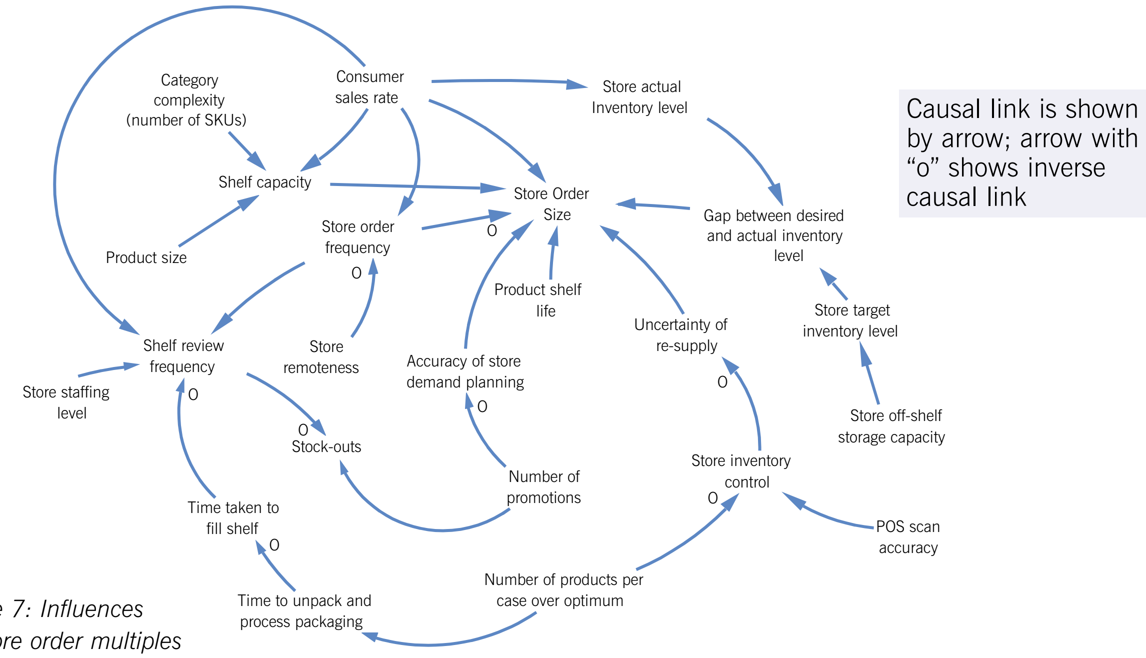


Figure 7: Influences on store order multiples

- Store order (and replenishment) frequency
- Accuracy of store demand planning
- Product shelf life
- Uncertainty of re-supply
- Gap between desired and actual inventory level.

If the store ordering process is based on a simple visual assessment of shelf stock, many of the above factors will be missed out. As a result, not only are stock-outs more probable, but replenishment order quantities are likely to be sub-optimal. Getting store order multiples right is a complex process that involves analysis of a number of interdependent parameters.

Appreciating regulatory issues

Environment and safety are becoming increasingly important factors for efficient product movement. In the environmental area, key considerations for the grocery industry include noise, air and water pollution, material re-use, recycling and waste disposal, handling of hazardous materials, resource utilisation and energy efficiency[9]. All of these are measured by eco-efficiency and sustainability metrics. In each of these areas there are potential benefits as well as costs. For example, improved transport utilisation will save money as well as reducing pollution and road congestion. Transport greenhouse gas emissions are almost 20% of Australia's national total and are projected to increase substantially[10]. This area has been targeted by government policy for abatement action. Such measures are projected to add 5-10% to commercial vehicle fuel costs.

The ECR Europe report on optimised transport[11] was clearly written in the context of possible environmental regulations and restrictions, as evidenced by the future vision "in which manufacturers and retailers collaborate with transport service providers to optimise the freight traffic arising from fast-moving consumer product distribution and to reduce the impact of their logistics operations on the environment".

Regarding safety, insurance premiums are rising significantly. Some leading companies are able to switch from government-administered workers compensation to self-insurance and achieve significant financial benefits. These companies are taking direct control of compliance, liability and provisions. Product movement involves a series of potentially hazardous operations which need to be managed proactively to minimise costs and risks. Companies need to have robust systems and educational programs to enable improved environmental and OH&S performance along the entire grocery supply chain.

A number of regulations and programs on food safety impact product movement in Australasia. Their aim is to facilitate the traceability of products along the food chain. Food safety along the supply chain is covered by Standard 3.2.1 – Food Safety Programs of the Food Standards Code of Australia and New Zealand. This requires all food businesses to implement food safety programs. In addition governments regulate use-by dates, lot identification, ingredient and allergy statements and residue limits. In case of last resort, the recall of unsafe food is co-ordinated by Food Standards Australia New Zealand.

9 "Environment Report 2001", Australian food and Grocery Council, 2001
10 BTRE (Australian Bureau of Transport and Regional Economics) Report 107, 2002
11 "The Transport Optimisation Report", ECR Europe, 2000

4 Emerging trends

In the product movement area, there are a number of trends which are addressing known issues and opportunities. These have been grouped into seven areas:

- Pallet configuration (including pallet height)
- Pack configuration (including RTIs/RPCs)
- Store-ready unit loads
- Scanning technologies
- Picking technologies
- Management of slow moving products
- Optimised transport.

Pallet configuration

The previous ECR Europe report on efficient unit loads[12] report stated that, "international standards are preferable to local standards". This is particularly important for continental Europe, with its high inter-country trading volumes. However, Australia has a well established national pallet standard, and this is likely to remain for the foreseeable future in the domestic market. As pallet usage worldwide moves towards the ISO standard[13] (1200 x 1000mm) there may be greater applicability for this standard in Australia. Currently, the Australian standard is the 1165mm square pallet, whereas the New Zealand standard is the ISO pallet.

The ECR Europe transport optimisation[14] report recommended a pallet height of 1.2m. This was based on a usable vehicle internal height of 2.7m, with a standard 1.2m height allowing double stacking to 2.4m. In Australia, the accepted maximum pallet height is 1.8m, though this may be reduced in the future to 1.6m, due to OH&S considerations. There is no industry "standard" pallet height, although there is recognition that standardisation of pallet heights would benefit transport planning by facilitating double stacking and eliminating "multiple standard height" pallets. The pressures facing the industry regarding pallet heights is summarised in Figure 8.

The European solution has been to accept lower pallet heights but to double stack pallets on vehicles (see Case Study A).

Pack configuration

Pack sizes for rigid rectangular cases have been defined in ISO standard 3394 (1984) and this standard is being gradually adopted worldwide. The standard ensures modularity based around a 600 x 400mm design which fits the ISO pallet and enables different packs from different manufacturers to be assembled together on a pallet – eg for transportation of product from the RDC to the retail store. There is currently no pack size standard in Australia.

In determining pack size, software is being used to find an optimal solution given a number of different parameters, such as product item dimensions, weight, volume, sales rate, and distribution distances.

There are a number of formats being developed which eliminate the carton altogether, and use inners in an alternative pallet configuration (Figure 9).
The issues being addressed include pallet stability and item labelling.

HIGHER PALLETS	LOWER PALLETS
• Better vehicle utilisation for single stacking (reduced booking slots needed at RDC) • Efficient product handling in MDC • Reduced handling of full pallet loads into RDC for given quantity of product • Reduced pallet movements in RDC to replenish picking slots • Reduced pallet hire, management and transport costs	• Possible to double or triple stack on vehicle – if modular height design • For medium moving products, more full pallet orders for MDC shipment • Lower average inventory holding in RDC (reduced risk of aged stock) • Easier to pick from top layer (OH&S) • For fast moving products, higher likelihood that full pallet can be delivered to store

Figure 8: The drivers of pallet height

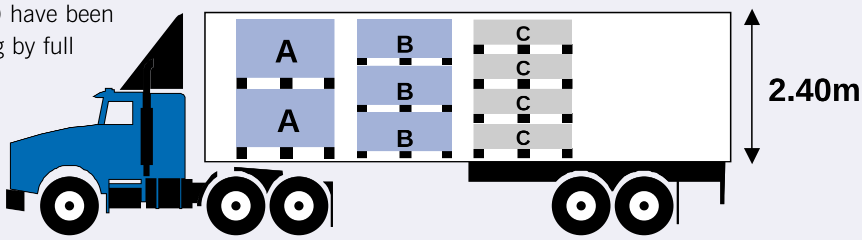
12 "The Efficient Unit Loads Report", ECR Europe, 1997
13 ISO standard 3676, 1983
14 "The Transport Optimisation Report", ECR Europe, 2000

Case Study A: Modular pallet heights

In France, a leading food manufacturer markets a variety of products with a total annual volume of 409,000 tons net weight.

Historically, each product category was ordered and delivered separately on pallets 1.70m high. Facilitated by a restructuring of the manufacturing and distribution network, customers are now given the opportunity of ordering across the whole range of products to take advantage of the transport savings to be obtained from making combined deliveries. Pallet heights have been determined as sub-modules of the 2.40 maximum useable internal vehicle height on the basis of customer target inventory levels and product sales rates. Pallet sizes for individual products have been defined so that they represent no more than 30 days of stock for a customer of average size and have been standardised on (A) 1.20m, (B) 0.80m and (C) 0.60m

Tariff incentives (trade terms) have been designed to promote ordering by full vehicle with homogeneous pallets. The different pallet height modules have even enabled small customers to place efficient orders at competitive prices. This new approach has enabled the achievement of a decrease in average delivery distance of 3.6% and an improvement in vehicle fill of between 35 and 41%.



(This case study first published in the ECR Europe “Transport Optimisation” report).

Figure 9: Alternative pallet configuration without cartons

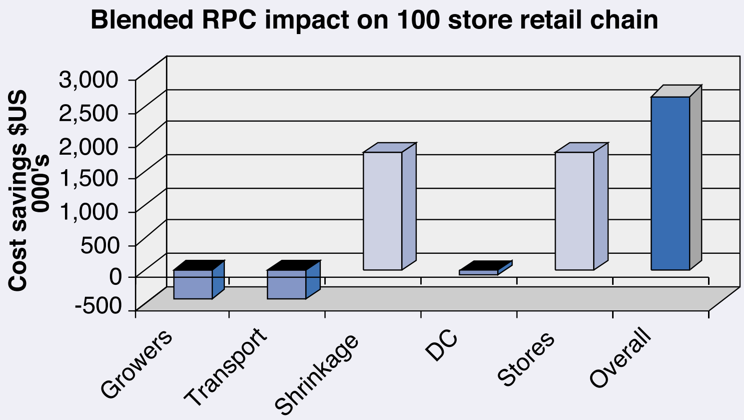
The use in the grocery supply chain of reusable modular secondary unit loads (known as reusable transport items or RTIs) is increasing, particularly for fresh produce. These are already in use in Australia with CHEP and a leading grocery retailer. The benefits of these RTIs can include reduced packaging cost and improved handling. In Europe and North America RTIs are regularly used directly on the store shelf, bringing significant productivity gains in shelf replenishment – (see figure 10 and Case Study B). Setting up the systems, processes, infrastructure and organisation for RTIs is a considerable investment, with implications for producers, retailers and RTI providers. Industry wide standards are leading practice, such as the TRANSBOX system developed by Finland’s largest retailer, Kesko.

Figure 10: Fruit and vegetable displays at major retailer, USA

Case Study B: Use of reusable containers

CHEP is an Australian based multinational company providing product movement hardware such as pallets and reusable plastic containers (RPCs). In the RPC area, CHEP runs a pool of containers to support the fruit and vegetable distribution operations of a leading Australian supermarket. Internationally, CHEP has RPC experience from both Europe and North America.

An audited RPC study in the USA looked at a sample of 14 growers supplying 3 RDCs (servicing 174 stores) with 13 stores (assorted formats), 25 commodities and 42 SKUs. The study found that use of RPCs added cost to some areas of product movement, although they reduced total supply chain costs and improved product quality.



A significant part of the overall value of RPCs was linked to their use in the store. If store based benefits are halved the total supply chain benefits are reduced by a third. Potential advantages for stores included:

- Quicker rotating and restocking of produce displays
- Quicker resetting of promotional displays
- Better on-floor sanitation (cleaning display racks)
- Reduced labour for reconditioning product - due to improved product quality and lower volumes of product on display
- Reduced packaging disposal and salvage handling – including disposal of waxed corrugate and other containers and bailing of non-waxed corrugate containers

In the study, the store needed to manage container returns to the RDC, and processed a greater number of units to meet an equivalent level of sales to cardboard cases due to reduced average item counts. Smaller display volumes increased the frequency of rotation and restocking activities, but this was more than off-set by the reduction in time required to complete these activities.

Store ready packaging, eg rip tab easy-opening cases, are being used intermittently in most European store formats – the case size is often not compatible with the shelf display format. Exceptions are where there a common industry product size, eg in wine and packet soups, and in discount retailers, such as Aldi, where shelf displays may be specifically built around case formats, in order to minimise shelf replenishment costs.

Store-ready unit loads

For fast moving products, generally soft drink, milk, cereals and special promotion items only, various forms of store-ready unit load have been developed (see Case Study C). While these formats have advantages in in-store handling, there may be significant costs involved in managing these items through the supply chain. In Europe, “less than full-size” pallets are estimated to grow to six percent of shipped product volume. These smaller pallets enable “mini-pallet” cross-docking which reduces the need for picking.

Case Study C: Unit loads for store display – options and impacts

Coca-Cola Amatil (Australia), a soft drink manufacturer, has experience of several types of store ready pallets, otherwise known as ULDs (unit load devices) or OTMs (one touch merchandise), through associations with Coca-Cola worldwide. ULDs are currently used in both Europe and USA, in a number of configurations. Footprints under consideration for the Australian market include:

a. 585mm x 775mm "mini pallet" with large trays

b. 585mm x 775mm "mini pallet" with small trays

c. 585mm x 380mm tray stacked on a dolly (a platform with wheels)

An optimal ULD configuration should align with the Australian standard 1165mm square pallet to maintain product movement efficiency. Six "mini pallets" take the same floor-space as two Australian pallets and this appears to be the most efficient format. If product is cross stacked on large trays, there is a further 25% increase in transport space utilisation with pallets stacked four trays high. "Mini pallets" should be configurable to address any stacking and racking constraints, so that they can be stored in Australian DCs. Manufacturing equipment to construct these "mini pallets" and forklift attachments to handle them already exist in the Australian market.

Dollies add to capital and maintenance costs, and need to be moved on "slave" base pallets at some stages of the supply chain. However they are more versatile and can be used with a greater range of SKUs, as they hold less than half the volume of a "mini pallet" with large trays.

Many of the challenges in implementing ULDs would be retail-focused – for example for "mini pallets" with large trays:

- What SKUs will warrant the shelf space to utilise these ULDs?
- How will stores separate pallets and trays and return them to designated DC's?
- Stores may need to order in quantities of 3 or 6 "mini pallets" to utilise vehicle space - this might be too many for smaller stores.

In any ULD implementation, there would be a large initial capital set-up cost. The chosen solution should therefore be applied industry-wide, with long-term commitment by both manufacturers and retailers.

Photographs courtesy of CHEP Australia

Scanning technologies

Advance shipping notices (ASNs) are designed to reduce the time and effort of checking by prior notification of replenishment deliveries. These are presently estimated to accompany less than half of all grocery loads in Australasia.

Bar-coding use of SSCC and GTIN codes (Figure 11) enables rapid identification of incoming pallets or cartons, and reduces effort required in checking and in ensuring that the right pallets are offloaded in multi-drop loads.

Auto-ID, or RFID, is an emerging technology that offers the potential to automate checking and product identification at every stage of the supply chain. Electronic tags at the case or item level would enable scanners to register the whole unit load for both despatches and receipts. Even for a multi-product picked pallet or a rainbow layer pallet, there would be no need for physical checking or handling of cases. This technology offers the potential to transform product movement processes, reducing costs, increasing product speed of flow and increasing the availability and reliability of inventory information[15].

[15] A more complete review of the impacts of Auto-ID on the wider supply chain is outside the scope of this project

Figure 11: Use of hand-held scanner to read GTIN code at Coles-Myer (K-Mart) DC

Picking technologies

Picking is an area of high cost, high complexity and also large opportunity for costly errors. However, a number of technologies are available that can both increase productivity and reduce error rates. The cost of these solutions may be both capital investment and some reduction in flexibility. The key technologies considered are compared in Figure 12.

There are also a number of technologies developed specifically for layer picking, including sophisticated attachments for fork-lift vehicles and applications with robots (stationary or on rails).

Picking technology	Attributes	Key success factors
Pick to pallet (minimal technology)	Flexible. Minimal capital investment.	Layout of picking slots and pick lists; clear case labelling; checking
Pick to belt (pickers pick onto moving belt)	Generally lower productivity than pick to light/voice. Has disadvantage that it can slow all pickers to the speed of the slowest. May need manual pallet building at end of belt.	Can be used to feed sortation
Pick to light (pickers directed from one pick slot to another by lights)	Comparatively high cost. May be appropriate for high product volume. Comparatively inflexible.	Determine how many of picking slots require this technology
Pick to voice (uses a headset with a voice recognition system)	Hands-free for picker. Suitable for medium to low product volumes. Productivity increase of 5-10% experienced. Highly flexible. Check digit at pick location helps to ensure accuracy of >99.9% and can avoid carton labelling costs.	Sufficient volume to justify investment of >A$100k (plus licence fees)
RF picking (pickers scan item and are directed by scanner display)	Suitable for random weight and flow-through processes. Can scan carton and direct to specific store pallet. Effectively manual sortation.	EAN compliant labelling. Scanning support from WMS. DC layout for flow-through
Case sortation (system of computer controlled conveyors and bar code scanners)	High capital and low labour cost. Implemented on varying scales at a number of sites in Australasia, with some success. Sortation enables case level cross-docking and flow-through.	EAN compliant labelling. Volume of at least 40,000 cartons per day. Increased benefits of reduced handling and reduced inventory if operated in flow-through format

Figure 12: Comparison of different picking technologies (Source: Frigmobile Pty Ltd)

Management of slow moving products

While 20% of an average retailer's SKUs account for 80% of the volume throughput, around 40% of SKUs have a sales rate of less than 4 items per store per week. Ensuring efficient product movement for these products may therefore require a different approach compared to fast- and medium-moving products. Many leading retailers (eg Albert Heijn in Holland) have moved to consolidate slow-moving products in a dedicated NDC (National Distribution Centre). This arrangement offers a number of potential advantages:

- Inventory reduction, through consolidation of RDC inventories
- Increased picking productivity through handling small orders in batches and using dedicated picking technology (also reducing errors)
- Reduced warehouse space required by designing NDC layout for slow-moving items
- Increased availability of slow-moving products in stores by increasing availability of product in the DC and providing more frequent deliveries of slow-moving products to the store (eg twice weekly).

Optimised transport

Optimised transport covers the improved usage of transport resources through initiatives such as reverse loading, advanced transport management systems (see Case Study K) and satellite tracking of vehicles to enable dynamic rescheduling. These initiatives offer the opportunity to reduce wasted transport capacity – the highest currently achieved vehicle utilisation rates are about 60%[16]. Dynamic vehicle scheduling systems could reduce transport costs by an estimated 14%[17].

There are also options which reconfigure the distribution network – for example Sainsbury's in the UK uses a network of primary consolidation centres (PCCs) to combine replenishments from local manufacturers, before they are delivered into the RDC. Manufacturers benefit through reduced transport distances, while the retailer benefits through lower RDC inventories and reduced RDC deliveries.

[16] Linfox estimate

[17] Linfox estimate

5 Achieving efficient product movement

The key to efficient product movement is generally a four step approach.

- Understand product movement costs and cost drivers
- Develop and share insights with selected trading partners
- Establish clear priorities and an action plan
- Implement the plan and measure the results

Note that these four steps assume a collaborative approach. For a purely internal project, the second step would be omitted. Cost reduction need not be the primary driver; service or quality could be the focus. However, even when cost is not the focus, cost impacts should be understood and managed.

Understand product movement costs and cost drivers

The first step in achieving efficient product movement is to understand the costs associated with product handling and product movement and the principal drivers of these costs. ABC (activity-based costing) is a necessary tool. This is true where costs are internally controlled and where costs are determined by the nature of the interface between trading partners. If structural changes in the supply chain are being considered, such as changes to the RDC network being served (see Case Study D) or initiatives such as factory-gate pricing, ABC becomes a business imperative. Unfortunately the application of ABC to understand fundamental activity costs is not yet universal in the industry.

The ECRA product movement model

The ECRA project team devised a qualitative product movement model, which is based on an ABC approach. The model does not quantify costs as these would be specific to a particular company.

The model (Figure 13) shows the different cost generating activities through the supply chain. At a high level, the high cost areas are transport, inventory holding, picking and in-store shelf replenishment. The single highest cost activity in the supply chain is generally the cost of transport from the MDC to the RDC. The model also included indicative cost drivers for different areas (see Appendix A).

Case Study D: Collaborating to reduce delivery points

Procter & Gamble (P&G) is a multinational manufacturer of household, healthcare and food products. P&G have collaborated with several major customers to reduce the number of delivery points for RDC replenishments. The objectives were to streamline the supply chain and remove costs in joint cost recovery projects.

In one project, a full review of ranging within various RDCs led both parties to logically determine the “ideal” RDC receiving points for replenishment deliveries. The number of ship-to points was reduced from about 100 to less than 30. For P&G, this led to an increase in vehicle utilisation of up to 50% and for the retailer, a reduction in RDC receipts enabling improved RDC productivity. Both parties benefited from a closer understanding of product movement through the supply chain and from the approach needed for a win-win collaboration process.

P&G used activity-based costing (ABC) to identify excess costs from existing product movement processes and shared potential savings data with customers. Both parties employed ABC principles within their individual cost recovery programs to manage and measure the benefits of smoother supply chain flow.

In addition to cost, the program also considered service. The impact of changes to product movement on the retail shelf was evaluated in order to minimise any possible impact on product availability in the retail store. After changes were made, inventory-on-hand, retail shelf availability and distribution performance were regularly reviewed to ensure continuity of supply chain performance.

TRADING PARTNER	LOCATION	ACTIVITY AREA	ACTIVITY		COST (L M H)
MANUFACTURER	FACTORY	PRODUCTION	MFP1	Produce product	H
			MFP2	Pack product (produce secondary unit load)	M
			MFP3	Palletise product (produce tertiary unit load)	M
			MFP4	Move pallet to storage area (non-direct ship only)	L
			MFP5	Move pallet to marshalling area	L
			MFP6	Despatch admin (check stock)	L
			MFP7	Load truck	M
			MFP8	Transport to MDC (in truck)	M
	MDC	DISTRIBUTION	MMD1	Queue to unload (in truck)	L
			MMD2	Unload truck	M
			MMD3	Receiving admin (check stock)	L
			MMD4	Put away in MDC (non-cross-dock only)	L
			MMD5	Storage in MDC (non-cross-dock only)	H
			MMD6	Let down pallet (non-cross-dock only)	L
			MMD7	Replenish MDC pick-face (picking only)	M
			MMD8	Assemble order (picking only)	M
			MMD9	Load conveyor (sortation only)	M
			MMD10	Sortation (sortation only)	M
			MMD11	Unload decline onto pallet (sortation only)	L
			MMD12	Marshal product/pallets (non-cross-dock only)	L
			MMD15	Despatch admin (check stock)	L
			MMD16	Load truck	M
			MMD17	Transport to RDC (in truck)	H
RETAILER	RDC	DISTRIBUTION	RRD1	Queue to unload (in truck)	L
			RRD2	Unload truck	L
			RRD3	Receiving admin (check stock)	L
			RRD4	Put away in RDC (non-cross-dock only)	L
			RRD5	Storage in RDC (non-cross-dock only)	H
			RRD6	Let down pallet (non-cross-dock only)	M
			RRD7	Replenish RDC pick-face (picking only)	M
			RRD8	Assemble order (picking only)	H
			RRD9	Load conveyor (sortation only)	L
			RRD10	Sortation (sortation only)	L
			RRD11	Unload decline onto pallet (sortation only)	M
			RRD12	Marshal products/pallets (non-cross-dock only)	M
			RRD13	Cross-docking (optional)	L
			RRD14	Load consolidation (optional)	H
			RRD15	Despatch admin (check stock)	L
			RRD16	Load truck	L
			RRD17	Transport to store (in truck)	H
	STORE	RETAILING	RSR1	Queue to unload (in truck)	H
			RSR2	Unload truck	L
			RSR3	Receiving admin (check stock)	L
			RSR4	Temporary storage (backroom) (optional)	M
			RSR5	Storage in store	M
			RSR6	Replenish shelves	H
			RSR7	Recycle/return packaging	M
			RSR8	Temporary storage (capping) (optional)	M

Figure 13: ECRA product movement model

Develop and share insights with selected trading partners

Developing insights will require analysis. Figure 14 (left) shows the results of an analysis looking at the degree to which vehicles are fully utilised on outbound deliveries to the RDC. The analysis considers both vehicle space utilisation, as measured by total order height, and vehicle weight utilisation, measured by total order weight. Note this analysis is for shipments in layers or full pallets.

Through such measures as consolidation of ship-to points and improved order multiples (see Case Study D again), utilisation may be increased as shown in Figure 14 (right). Analysis of RDC demand from stores can be used to guide the setting of optimal pallet heights, in conjunction with optimal RDC replenishment frequencies. Figure 15, using illustrative data based on weekly RDC replenishment, shows a clear optimal pallet height. Aligning pallet heights with demand is one objective; others may include handling cost and transport costs (vehicle utilisation). Studies have shown that the longer a unit load (eg pallet or case) is kept intact, the lower the handling costs[18].

Analysis of consumer units sold per store (Figure 16) may provide some direction on determining optimal case or inner sizing. Shelf space, store ordering and replenishment frequency and case weight restrictions should also be considered.

Developing and sharing opportunities to reduce total supply chain costs requires a collaborative effort between trading partners, based on a degree of trust together with sharing of appropriate information (see Case Studies E and F).

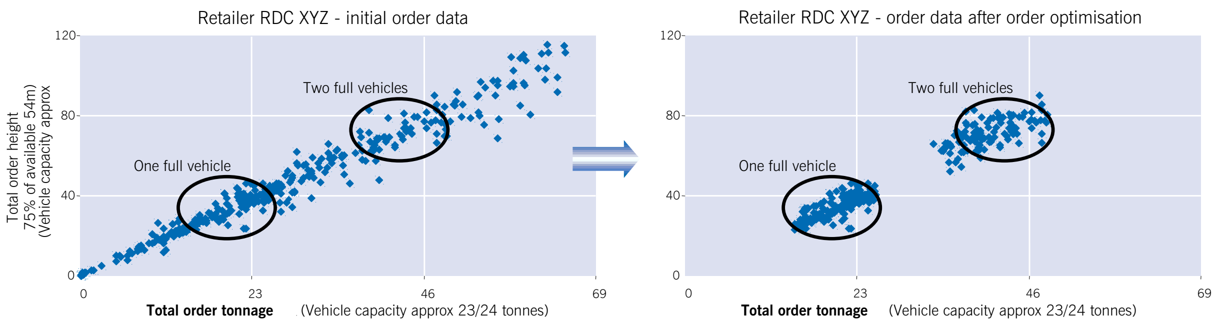


Figure 14: Analysis of order size impact on vehicle utilisation (illustrative)

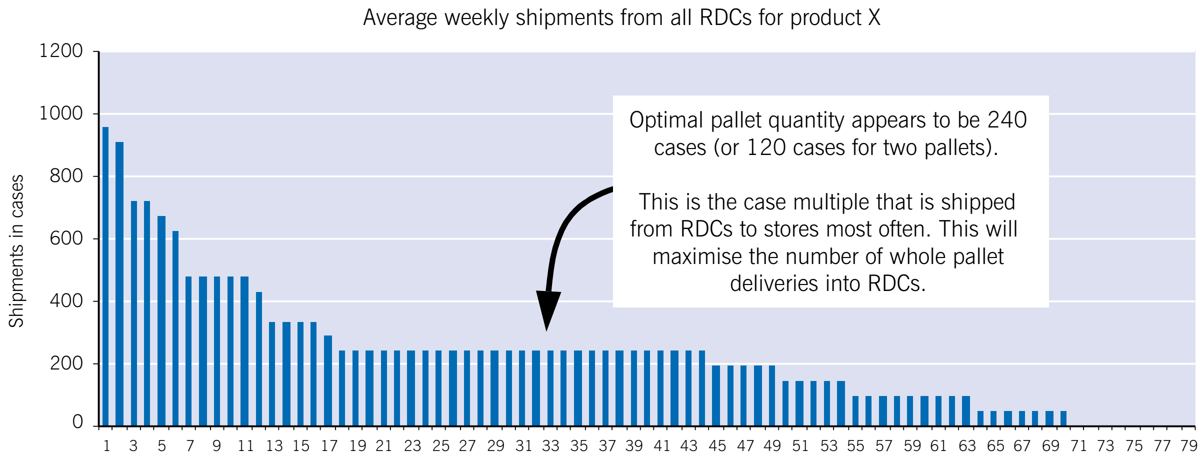


Figure 15: RDC shipment analysis (illustrative)

18 "The Efficient Unit Loads Report", ECR Europe, 1997; "Efficient Unit Load Study", Australasian GISCC, 2000

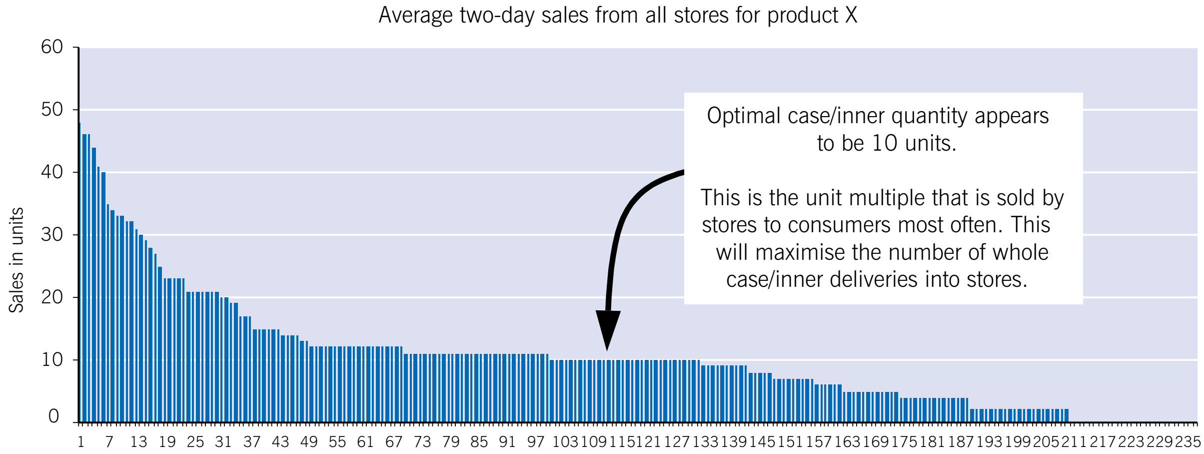


Figure 16: Store unit sales analysis (illustrative)

Case Study E: Collaborating to reduce product movement costs

Metcash, an Australian wholesaler supplying a number of Australian retail networks, and Colgate-Palmolive (Australia), a manufacturer of household and personal care products, have developed a joint Supply Chain Efficiency Program. The program, which has now been running for several months, targets product handling process improvements including vehicle utilisation, picking efficiency, ti-hi optimisation as well as more effective methods of product ordering and distribution.

Implementation of the program required changes to physical replenishment processes within both organisations. Importantly, the new concepts for product movement were developed collaboratively and execution planned through progressive levels of maturity. This meant that collaborative cost reductions were delivered from the first day of operation with the opportunity to develop further shared benefits.

Activity-based costing (ABC) has been a key driver for opportunity identification. The required data was simply not available within traditional accounting systems. Standard costing structures are generally not capable of providing the robustness of activity analysis required to define fact-based operational targets (other than aggregate financial measures of performance).

Progress with the program is reviewed by Metcash and Colgate-Palmolive jointly on a monthly basis using activity-based costing and balanced scorecards. The program is estimated to have reduced product movement costs significantly for the product categories involved.

When selecting partners for collaboration, the 4C's framework (Figure 17) provides a useful tool for checking collaboration requirements. The 4C's are the four principles of collaboration, which are:

- Objectives of both organisations are compatible
- Both organisations are committed at a senior level
- Organisations have the capability to collaborate, eg to generate, share and use specified data
- Both organisations are agreed on mechanisms to control the inputs to, and outputs from, collaboration.

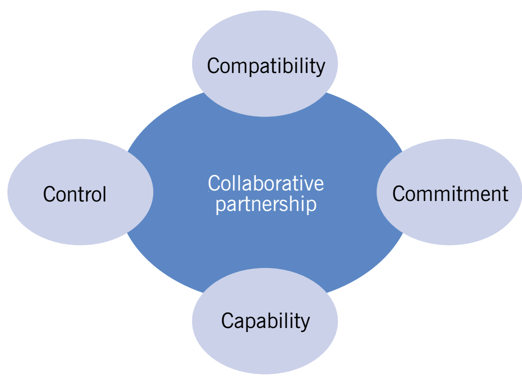


Figure 17: The 4C's of collaboration

Effectively used, CMI and VMI relationships can improve product movement efficiency by enabling the manufacturer to plan their own replenishments for optimum product movement cost, while keeping within the agreed RDC inventory levels. The manufacturer's initial focus may be solely on ensuring availability of product; further development of CMI or VMI operation should also consider product movement optimisation and influencing the size and timing of replenishment orders.

Establish clear priorities and action plan

Choosing a pilot project area for collaborative efficient product movement is a learning exercise. Learning about the extended supply chain and the impact changes may have on trading partner costs, as well as on service, quality and other factors, such as the OH&S or environmental impact. Learning too about the process of collaborative working – what information to share, and with whom and how to share it. For these reasons it is vital to agree priorities and a well-defined action plan, with specified resources, measures, objectives, scope and milestones.

Particular product movement operations, or specific transport routes, can generate disproportionately high costs. These routes may be a good place to start in a product movement cost reduction effort (see Case Study G).

Implement plan and measure results

Project management is a particular challenge when managing a team that may have members from more than one organisation. The governance of the project should be clear from the outset, with a defined process for identifying and resolving issues. Benefits from the project should be tracked and incorporated into supply chain trade terms once the pilot has established the feasibility of the new way of working. Development of such terms is the first of the recommendations in the next section.

Case Study F: Vehicle cube utilisation

Kellogg (Australia) Pty is a multinational FMCG company competing in the ready-to-eat cereal and snack food categories.

Kellogg acknowledges that the key to improved movement of product through it's supply chain is the strength of the collaborative relationship between manufacturer, third party logistics provider and retailer. Without an open and transparent supply chain relationship, it is clear that any potential benefits will be limited. Working together to achieve more efficient product movement throughout the total supply chain offers significant opportunities for improvement. It should not be an exercise that transfers costs from one point in the process to another.

For example, in a recent project looking at revising pallet heights it was demonstrated that although removing layers from the pallet height of specific SKUs would enable double stacking in the vehicle and therefore improved vehicle utilisation, the potential savings in freight were offset by a significant increase in handling costs incurred by both the manufacturer and the retailer.

In Kellogg's operating circumstances, where product volume, rather than weight, is the major influence, vehicle cube utilisation is paramount. The key to balancing cube utilisation and handling costs is to determine a modular pallet height and case configuration that takes into account:

- vehicle cube utilisation
- vehicle fleet constraints
- product handling costs
- pallet hire charges
- RDC order multiples
- store inventory holdings.

The ordering process was found to be highly significant. Order multiples should be calculated to ensure balanced stock coverage in the RDC while enabling efficient vehicle cube utilisation irrespective of the order mix. Improved vehicle utilisation also has the benefit for retailers of reducing the number of deliveries into RDCs, a significant cost and often a capacity constraint during peak promotional periods.

Case Study G: Low-hanging fruit - low volume, high cost lines

An examination of product movement costs by route can often show that a small number of routes are disproportionately expensive. Cadbury Schweppes has focused on shipments to Tasmania.

An analysis of costs and cost drivers was undertaken, from which it became clear that the key to cost reduction was to utilise the specialised equipment needed to traverse the Bass Strait (not compatible with most RDS's and MDC's) to the fullest and where possible to plan for complete round trips.

Cadbury Schweppes has been able to achieve significant cost reductions (up to 20%) by:

Cost breakdown	Cost drivers and constraints
MDC to wharf 25%	Cross docking to sea container Consolidation of LCL quantities Line haul from interstate MDC's Empty container pickup Vehicle running costs and labour costs Container utilisation driven by road weight and road height constraints
Sea freight 50%	Effective space utilisation on ship Lane utilisation ie 60% northbound vs 40% southbound Weight only constrained by lifting equipment capacities Specialised equipment required
Wharf to RDC 25%	Cross docking from sea container Deconsolidation of LCL orders RDC de-stuffing capabilities

- Planning round trips utilising the same equipment – Cadbury Schweppes manufacture in Tasmania
- Eliminating cross docking by utilising containers that can be both loaded and unloaded at the MDC and RDC
- Managing order sizes and SKU lot sizes by:
  - Working with customers to order in lot sizes that fit containerisation - difficult as traditionally Tasmanian volumes are small
  - Consolidating loads with trading partners – difficult due to the dynamic co-ordination required
  - Collaborating with a Tasmanian manufacturer to utilise empty return containers (this has been done)
  - Getting the customer to provide the consolidation activity – this model is currently being implemented with a leading retailer, which is providing the freight services.

6 Recommendations

Over the course of this project, industry representatives brought forward a number of viewpoints and successful approaches to make product movement more efficient. Underpinning them all are the five key areas to tackle:

- Understand the cost to serve and use trade terms to drive value-added activities
- Collaborate to identify and realise opportunities
- Set industry standards
- Use technology to coordinate product movement and increase stock velocity
- Be proactive on environment and safety.

Understand the cost to serve and use trade terms to drive value-added activities

Most existing trade terms are at best neutral to the development of supply chain opportunities. The focus is on dividing the cake, rather than making the cake bigger. As a result, significant opportunities are either ignored, or progressed too slowly. While prices and trade discounts will continue to be a commercially focused process of negotiation, terms for product supply should be agreed by the supply chain representatives of manufacturers and retailers. In this way, supply chain terms can incentivise beneficial collaboration and data based supply chain performance management (see Case Study H).

Understanding the cost-to-serve, using ABC techniques, means understanding the true underlying costs of trading in a particular way. This information can be used to identify and eliminate non-value adding activities. It can be used to identify areas that are wasting resources. It can direct energy and focus to where there are the largest prizes to be gained. It provides a sound basis for trading partners to work collaboratively to reduce costs, improve service and make product movement more efficient.

Collaborate to identify and realise opportunities

Trading partners should collaborate and start identifying opportunities for efficient product movement with an analysis of RDC orders, RDC demand and store demand. This provides a factual basis for discussions both within and outside the organisation on efficient product movement (see Case Study I). A further area to investigate for product movement opportunities is the weekly cycle of RDC orders and consumer demand. If these are synchronised, RDC inventories should be at a maximum just before peak consumer demand. The ultimate objective of all these analyses is to better understand how to align order sizes, pallet sizes and case sizes to consumer demand, while minimising total supply chain costs.

Case Study H: Managing product movement through supply chain terms

Procter & Gamble (P&G) is a multinational manufacturer of household, healthcare and food products. P&G have been able to incentivise efficient order multiples through a set of supply chain discounts and allowances which are separated from the main commercial trade terms.

Commercial trade terms, including promotional budgets, case deals, trade volume discounts and prompt payment discounts are negotiated together, usually every two years. This is a negotiation between P&G sales and finance, and the retail buyers.

Supply chain terms are agreed separately, generally on alternate years to commercial trade terms, and include a damaged good allowance and a supply chain efficiency discount. The latter discount is dependent on various ordering and replenishment criteria, such as:

- ordering method (eg electronic vs fax)
- quality of order information (“error-free”)
- case quantity per order (all SKUs)
- delivery method (eg taut-liners, back-loading)
- delivery points (consolidated into agreed RDCs)

Importantly, the supply chain efficiency discount is agreed following data sharing and discussions with retail supply chain management. Savings made through efficient product movement are acknowledged and improve the mutual commercial benefits of the trading relationship.

Set industry standards

In a number of areas the grocery industry needs to work together to determine industry–wide standards for product movement formats and practices. Where practicable, these should build on accepted international standards. Such areas include:

- Pallet heights
- Store – ready unit load formats
- Vehicle specifications (eg internal height and pallet access)
- Labelling formats such as EAN and GTIN
- DC operating environments (eg loading and unloading docks and operating times).

The project team debated pallet height standards and, although it was generally agreed that standards were needed, the team could not agree to the standard within the timeline of this project. Lack of standards leads inevitably to multiple standards, with associated costs (see Case Study J). Multiple standards may be a short-term win for particular industry players, but are unlikely to be of long-term benefit to the industry as a whole.

Use technology to coordinate product movement and increase stock velocity

A number of technologies have now been developed that can improve product movement, and other technologies, such as RFID (Auto-ID) are on the horizon. These technologies include planning systems (see Case Study K) that enable better co-ordination of supply chain elements both internally and externally; semi-automated product handling systems, such as layer picking or sortation technology; and data capture and communication systems, such as SSCC scanning and ASNs. Improved planning, for example, may enable more product to be shipped direct from the production line to the RDC, avoiding movement and storage in the MDC. Investments in technology should be based on a sound understanding of product movement costs and drivers, built into a robust business case. Technology should be combined with process and organisation changes to be really effective.

Case Study I: Collaborating to improve replenishment ordering

Goodman Fielder (GF) is Australasia's largest food manufacturer. Consumer Foods (GFCF) is the Australian retail branded division of GF supplying numerous well-known food brands from MDCs throughout Australia. Coles Supermarkets are a leading Australian retailer with a logistics operation known as GHPL.

A review of the GFCF's Queensland operations highlighted increasing order frequencies and a resulting decrease in average delivery quantities. A pilot program focusing on the supply of flour-based products was initiated. The study identified two GHPL RDCs (Gouldburn & Somersby) were each receiving multiple deliveries per week of smaller quantities equivalent to 200 deliveries from 400 orders.

Having identified a possible opportunity, the next step was to review this study with GHPL. The two trading partners considered:

- the ordering pattern
- stock-on-hand
- lead times
- the service level required
- vehicle utilisation
- full pallet percentage
- DC impact.

This review highlighted inefficiencies in the GFCF and GHPL product movement network and led to a collaborative pilot project. Over 8 weeks, the following outcome was achieved:

- Orders placed by GHPL reduced by about 300 per annum
- Inbound deliveries to RDC were reduced by 100 per annum
- Slow volume lines were consolidated into one RDC in Sydney
- RDC replenishment ordering frequency decreased by 50% while maintaining average inventory levels
- Full pallet purchases were increased from 15% to 90%
- Vehicle utilisation was improved through less "wood" being transported.

Following the success of the pilot project, the review is now being expanded to examine lead-times, ordering patterns and average RDC inventory levels through the whole GFCF distribution network. These outcomes, being reviewed in collaboration with GHPL, are highlighting further opportunities to streamline the supply chain.

Case Study J: The cost of multiple pallet height standards

A leading consumer goods manufacturer supplies product on a number of different "standard" pallet heights to meet the requirements of different customers in Australasia. The company has recently completed a project examining the costs and cost drivers for product deliveries from the MDC to a typical RDC, using activity-based costing principles.

The analysis focused on the additional costs to the MDC of varying pallet height standards, from the time of preparing the load through to picking, assembling and delivering product to an RDC in a non-automated environment. The analysis found that current delivery costs can be reduced by about 10% if RDCs order in standard pallet quantities (ie standard pallet heights).

Direct costs driven by multiple pallet heights included breaking down pallets to meet requested pallet configurations and under utilisation of vehicle space by not maximising the useable internal vehicle height. In addition, there were numerous additional indirect costs associated with administration (including claims for incorrect pallet quantities), system maintenance, consumables and extra pallets. There were also impacts on service, through increased picking errors (due to the inconsistent nature of the requested pallet heights) and increased RDC receiving complexity.

The manufacturer is currently working to implement standard height pallets to efficiently move product from manufacturer to distributor – and reduce costs to all parties.

Case Study K: A distribution management system

Linfox is a major third party logistics company, providing RDC to store distribution services for a major retailer's RDCs in NSW, Australia. In recent years, a number of factors have significantly increased the complexity of the distribution task. These are:

- Shorter delivery windows
- Higher levels of on-time delivery
- Increased numbers of deliveries
- Increased numbers of drops per load
- Vehicles of varying capacity, configuration and cost.

In response, Linfox has invested in a distribution management system which delivers an improved level of product movement efficiency despite the increased complexity. Key features of the Linfox system are:

- Networking of all RDCs to provide real-time information
- Consolidation of all NSW distribution requirements into a single fleet "demand stream"
- Dynamic allocation of tasks to vehicles, using sophisticated optimising algorithms
- Real-time field status through a fleet communications network
- Distribution visibility for RDCs, stores and management in real time.

The system is now in operation and delivering tangible benefits to the NSW fleet and their customers. The next step is to extend the application into MDCs to create a comprehensive "demand stream", and to develop 'what if' transport cost and capacity modelling to further enhance fleet responsiveness.

Case Study L: Collaborating on carton design

George Weston Foods Limited (GWF), a leading Australasian food manufacturer, has been a National Packaging Covenant (NPC) signatory since May 2001. "Speedibake" is the frozen par-baked product manufacturing division of GWF. Working with Amcor Fibre Packaging, Speedibake undertook a packaging review to improve carton utilisation, reduce SKUs and rationalise pallet configurations.

Redesigned shippers increased the amount of product per pallet and, together with rationalisation of pallet configuration, Speedibake reduced carton use by 20% and also eliminated 4,500 pallet movements and 100 vehicle deliveries per year. Further more. the benefits of reduced head space, carton redesign and improved pallet configuration have reduced freight into-store, decreased handling and storage, and reduced picking and breakdown costs for customers. These benefits have been achieved using higher recycled content boards but without an increase in board gauge or density or increase in transport packaging. Additionally, significant benefits have also been realised for the community in general, through reduced vehicle usage and resultant emissions and congestion.

Collaboration between NPC partners GWF and Amcor Fibre Packaging has resulted in more products being shipped on fewer pallets, with reduced storage and handling requirements for both the customer and the manufacturer.

(This case study first published on the NPC website, www.packcoun.com.au).

Be proactive on environment and safety

These are two areas that are growing in importance. A progressive approach can result in financial benefits as well as an enhanced business image.

In the environmental area, most leading grocery companies in Australia and NZ are signatories to the National Packaging Covenant, which provides a framework for managing the environmental impact of packaging through its life cycle, from design to disposal. It aims to provide more effective management of used packaging based on the principles of "shared responsibility" and "product stewardship" by embracing the practices of reduce, reuse and recycle. Signatories are required to draft action plans for packaging improvements, but there are no defined targets. There are numerous examples of practical and collaborative plans resulting in significant benefits in product movement (see Case Study L).

Safety, in the guise of OH&S and Workers Compensation payments, can be a high cost area. The industry average is 2.8% of payroll and this is rising. Some companies are paying more than double this amount. Discounts are being offered by insurers and regulatory authorities for proof of integrated OH&S systems with robust processes, as these help to mitigate against incidents and accidents.

The business environment is changing…

About two-thirds of the Australasian population live in the large cities, and therefore while the continent is large, the dispersion of demand is less so. Product movement efficiency in Australasia is already comparable to global averages[19]. Why then the focus on it at this time?

There are a number of areas where the grocery industry is changing that are likely to put a strategic focus on efficient product movement. These include:

- Pressure on inventory and product availability – in stores as well as in DCs – leading to smaller and more frequent deliveries
- Retail investment in supply chain development – driving initiatives such as EAN bar-coding and factory gate pricing
- New technologies such as RFID (Auto-ID) tagging
- Changes in store opening hours – the move to seven day, 24-hour trading
- New channels to market, such as service station forecourts and internet shopping
- Environment and safety pressures on transport and packaging
- Web-enabled technology that allows trading partners to more closely plan and co-ordinate their supply chain operations.

Left unmanaged, these factors have the potential to seriously disrupt the economics of product movement in Australasia. Businesses that recognise these changes and act now to prepare for them will be the winners in the industry.

[19] As indicated by benchmarks on distribution cost as a percentage of sales – as noted earlier

A Appendix A: Indicative cost drivers

ACTIVITY		TYPE	COST HML	COST DRIVERS	EXCEPTIONS
MFP1	Produce product	Auto	H	Raw materials cost Packaging cost Conversion cost Production cycle Demand volatility Forecast accuracy Foreign exchange	Unplanned changes in promotional calendars can cause significant added costs - overtime, non-optimal product movement, expedited materials, etc
MFP2	Pack product (produce secondary unit load)	Auto	M	Packaging cost Conversion cost Units/case	May involve significant re-packing cost for imported product
MFP3	Palletise product (produce tertiary unit load)	Auto	M	Case volume Maintenance cost Labour costs (where manual)	This is automated for 90% of products - less so for slow moving products
MFP4	Move pallet to storage area (non-direct ship only)	Manual	L	Pallet volume (smaller pallets cost more per case)	Cost H if demand peaks cause off-site storage and multiple handling
MFP5	Move pallet to marshalling area	Manual	L	Pallet volume (smaller pallets cost more per case)	Most product is shipped direct from production line to MDC.Automated conveyor systems used in 20% of large MDCs
MFP6	Despatch admin (check stock)	Manual	L	# of despatches Complexity of load (more complex for slow moving) Labour cost	Despatch admin costs generally higher for slow moving products. Scan to load - SSCC attached to pallet. Used as basis for ASN and electronic invoice
MFP7	Load truck	Manual	M	Cases/pallet Vehicle capacity (weight or volume) Handling costs (FLT) Labour cost Equipment cost	Automated chain conveyors used in 20% of large MDCs for truck loading for fast moving products
MFP8	Transport to MDC (in truck)	Manual	M	Distribution network design Vehicle capacity Vehicle utilisation Labour cost	Some product sent by seafreight or airfreight - particularly imports with long lead times
MMD1	Queue to unload (in truck)	None	L	MDC layout MDC labour practices Vehicle waiting time Labour cost	Problems occur in minority of MDCs due to combined loading/unloading docks. Despatches take precedence over receipts - particularly slow movers
MMD2	Unload truck	Manual	M	Pallets/vehicle Cases/pallet Double stacking capability Labour cost	Automated chain conveyors used in 20% of large MDCs for truck unloading for fast moving products
MMD3	Receiving admin (check stock)	Manual	L	Process capability	
MMD4	Put away in MDC (non-cross-dock only)	Manual	L	Labour cost Cases/pallet MDC configuration	
MMD5	Storage in MDC (non-cross-dock only)	None	H	Inventory holding costs MDC operating costs Racking type Forecast accuracy Manufacturing flexibility	For very bulky fast moving products, MDC is holding stock to make room in the RDC. Generally higher stock holding cover for slower moving products
MMD6	Let down pallet (non-cross-dock only)	Manual	L	Labour cost # of pallets Product racked vs bulk stacked	
MMD7	Replenish MDC pick-face (picking only)	Manual	M	Labour cost # of pallets Product racked vs bulk stacked	
MMD8	Assemble order (picking only)	Manual	M	Labour cost Cases picked Complexity (eg different pallet heights for different customers)	Significant variation in picked vs full pallet volumes. Slow moving products and smaller size products more often less than full pallets. Products generally handstacked for export. Cost can be H for slow moving, or L for fast moving
MMD9	Load conveyor (sortation only)	Manual	M	Labour cost	
MMD10	Sortation (sortation only)	Auto	M	Equipment maintenance cost	Sortation used where majority of products are sub pallet quantities, product are small and product value is high
MMD11	Unload decline onto pallet (sortation only)	Manual	L	Labour cost	
MMD12	Marshal product/pallets (non-cross-dock only)	Manual	L	Labour cost Load complexity	
MMD13	Cross-docking (optional)	Manual			NOT USED BY TEAM
MMD14	Load consolidation (optional)	Manual			NOT USED BY TEAM
MMD15	Despatch admin (check stock)	Manual	L	Despatch planning complexity - managing order complexity and optimising vehicle utilisation	Despatch admin costs generally higher for slow moving products. Costs can be H where there are multiple "standard" product configurations - checking complexity

ACTIVITY		TYPE	COST HML	COST DRIVERS	EXCEPTIONS
MMD16	Load truck	Manual	M	Cases/pallet Vehicle capacity (weight or volume) Vehicle configuration Handling costs (FLT) Labour cost Equipment cost	Vehicle configuration issues - eg B-double has 3m and 3.4m internal height along length of truck. Type of vehicle - drop deck, tautliner, B-double. Loading generally easier for smaller pallets
MMD17	Transport to RDC (in truck)	Manual	H	Order multiples Distribution network design RDC operating hours 24x7 operations Vehicle capacity Vehicle utilisation Labour cost	Pallet weight can be significant for slow moving or small sized products. Cost H for national of multi-state MDCs and for heavy or bulky product. Cost M-L for light/compact product.
RRD1	Queue to unload (in truck)	None	L	Labour cost Cost of subsequent delays Seasonal peaks	Some RDCs can have particularly lengthy unloading times due to RDC capacity management issues. Bulky or layer loads may be delayed more due to unloading difficulty. Cost may be increased if stock-out caused.
RRD2	Unload truck	Manual	L	# pallets Pallet height (Ti-Hi) RDC layout Availability of receiving lanes Seasonal peaks	Cost M dependent on layout of receiving area. At seasonal peaks, RDC congestion can increase cost
RRD3	Receiving admin (check stock)	Manual	L	Load complexity Receiving systems efficiency # invoices/load Load complexity Labelling Labour cost	Cost M for more complex loads (sub-pallet). Availability of receiving lanes may drive cost up due to load being placed in 2 separate checking locations
RRD4	Put away in RDC (non-cross-dock only)	Manual	L	# pallets Pallet height (Ti-Hi) RDC layout (distance from receiving lanes to reserve locations)	Cost M if RDC layout not optimal
RRD5	Storage in RDC (non-cross-dock only)	None	H	Inventory level	Appropriate cases/pallet different for network of larger stores vs network of smaller stores
RRD6	Let down pallet (non-cross-dock only)	Manual	M	RDC capacity (space) Pallet height (Ti-Hi) RDC layout (distance from reserve to pick face) Data integrity issues	Partial let-downs requiring putbacks further increase costs
RRD7	Replenish RDC pick-face (picking only)	Manual	M	RDC capacity (space) Pallet height (Ti-Hi) # of cases to remove from pickface Picking area complexity (eg # of 2nd level picking slots and carton live storage slots)	
RRD8	Assemble order (picking only)	Manual	H	Labour cost Layer vs case picking Degree of alignment between order and RDC layout - eg concentration of products from one area, eg carton live storage (gravity feed racking)	
RRD9	Load conveyor (sortation only)	Manual	L	RDC layout Process steps between receipt and sortation Labour cost	
RRD10	Sortation (sortation only)	Auto	L		
RRD11	Unload decline onto pallet (sortation only)	Manual	M		
RRD12	Marshal products/pallets (non-cross-dock only)	Manual	M	Size of load Despatch lane availability Utilisation of other RDC locations	
RRD13	Cross-docking (optional)	Manual	L	Labour cost RDC capacity (space) Lack of visibility of anticipated volumes ordered by stores	Cost is M if RDC capacity is not available
RRD14	Load consolidation (optional)	Manual	H	Labour cost # of pallets	Used for "distant" stores to achieve better cube utilisation. Requires planning to ensure suitable stock/load to consolidate
RRD15	Despatch admin (check stock)	Manual	L	# of pallets Load complexity Labour cost # of shorts (chasing)	Check ensures that all sections of load have been completed
RRD16	Load truck	Manual	L	# of pallets Labour cost # of despatch lanes required	
RRD17	Transport to store (in truck)	Manual	H	# of pallets # of vehicles # of drops Labour cost	Access restrictions

ACTIVITY		TYPE	COST HML	COST DRIVERS	EXCEPTIONS
RSR1	Queue to unload (in truck)	None	H		
RSR2	Unload truck	Manual	L	Order size # of vehicles Space to unload Double handling Labour cost	
RSR3	Receiving admin (check stock)	Manual	L	Receipts ex RDC DSD receipts Load complexity Labour cost	Most stock is ex RDC - little checking. All DSD checked, unpacked, matched against invoice(s), delivered to depts
RSR4	Temporary storage (backroom) (optional)	Manual	M	Space to store load Double handling (damage) Impacts on other areas and departments Delivery window verses store shelf replenishment times Interruption to grocery dept daily routines	
RSR5	Storage in store	None	M	Incorrect stock being ordered (both SKU and quantity) Double handling (damage) Re-processing	
RSR6	Replenish shelves	Manual	H	Staff availblity to process load Size of load Configuration of pallets (aisle ready)	May have one pallet per aisle for paper, petfood, soft drinks and cereals. Other depts up to 4 aisles per pallet
RSR7	Recycle/return packaging	Manual	M		Estimated at 3% of shelf replenishment cost
RSR8	Temporary storage (capping) (optional)	Manual	M	Incorrect stock being ordered (both SKU and quantity). Double handling (damage). Re-processing	Cost H if not managed to policy

Appendix B: Glossary

ASN	Advanced shipment notice – a list transmitted to a customer or consignor designating items shipped. May also include expected time of arrival
Auto-ID	Automatic identification – uses embedded chips to identify product codes using a remote scanning device
DC	Distribution centre (warehouse)
FIS	Free in store – customer takes title of stock once it has been unloaded at the customer's delivery point
FOB	Free on board – customer takes title of goods once they have been loaded onto the delivery vehicle
GMO	Genetically modified organism – eg herbicide resistant soya beans used as a food ingredient
GTIN	Global trade item number – a numbering standard for case and product barcodes
MDC	Manufacturer's distribution centre
NDC	National distribution centre – generally a DC used for nationally distributed slow-moving products
OH&S	Occupational health and safety
OTM	One touch merchandise – a product configuration that can remain intact between the end of the production line and the retail store, such as a product on a wheeled dolly
RDC	Retail distribution centre
RFID	Radio frequency identification – the technology used for Auto-ID
SKU	Stock keeping unit – a product at a stock holding location
SSCC	Serial shipping container code – a barcode data format used to identify unit loads at despatch and delivery
Ti-hi	Tier and height – generally pallet height
Trade terms	Contractual conditions for trade between trading partners, including discounts, incentives and allowances
ULD	Unit load device – a means of transporting unit loads, such as a pallet, "mini pallet" or wheeled dolly