

Optimising vehicle utilisation scenario

Routes to a greener future
Towards more sustainable freight transport



Main menu

The freight industry in the 21st century - Impacts and Risks

10 mins

Responses

10 mins per case

Conclusion

5 mins

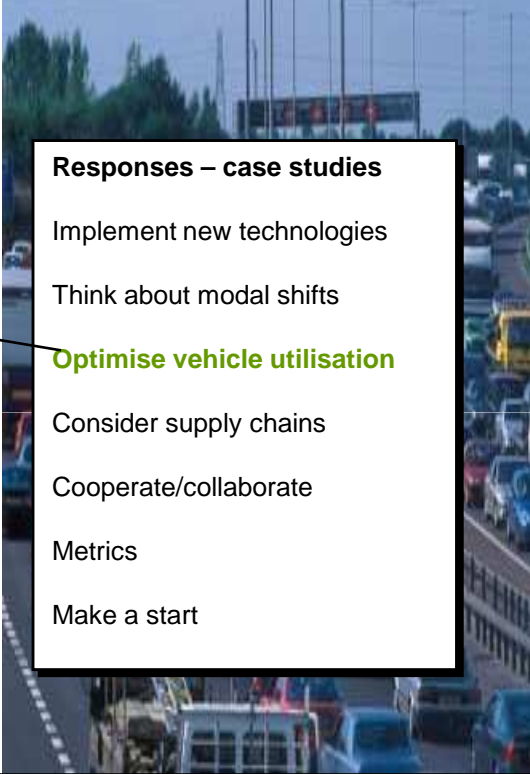

Links

Relevant legislation
Sources of loans and grants
Accreditation bodies
Other useful links
Glossary`



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Responses – case studies

- Implement new technologies
- Think about modal shifts
- Optimise vehicle utilisation**
- Consider supply chains
- Cooperate/collaborate
- Metrics
- Make a start

◀ ▶

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Optimising vehicle utilisation

The way that vehicle capacity is used can have a strong positive or negative effect on the environmental impact of transporting goods. Considering load levels, packaging design, the use of suitable vehicles and effective demand management can all contribute to reducing the impact of freight transport.

This case study looks at these, and other issues.

[Click here to start.](#)



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Optimising vehicle utilisation

Annagrette Schmidt is the managing director of Medi GmbH, a large manufacturer of medical instruments located in southern Germany. She employs 1500 people.



As well as the German factory, she has a factory in Shannon, Ireland, operating to the requirements of the US Food and Drug Administration in order that it can serve the North American market. She has recently opened a third factory near Warsaw, Poland.


Before continuing, click the map icon to find out more about each of Medi GmbH's factories. You will be able to access this map at various points in the case.




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This popup map acts as a resource for the learner at key points in the scenario.

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Click on each location to see more about each of Medi GmbH's factories, and the products that are manufactured there.



The factory in **Germany** (located next to the European Distribution Point (EDP) for all Medi products) manufactures large free standing products (worth about €100K) and delivers them to their point of use where they are installed using crews that travel in the dedicated vehicle that transports them. The packaging for these products needs to be effective but 'look' etc. is not important, the customers are large laboratories in hospitals and medical research centres.

Other popups shown on the map:

Ireland
The factory in **Ireland** produces small hand held devices (worth €50) for sale on the shelf, with nice packaging and detailed usage information in the appropriate language. These are sold in pharmacies via regional distribution centres (including pharmacy wholesalers) to the general public

Poland
The factory in **Poland** is new and produces smaller desktop instruments (worth between €1,000 and €1,500) that were previously made in Germany and mainly sends them via the European Distribution Point (EDP) in Germany to markets across Europe. This factory is very modern with an automated material handling system. The customers are hospitals who will use several of these in many parts of the hospital.

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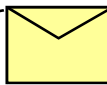
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Pressures

Annagrette arrives into work one morning and has four emails waiting:

Click each mail...



From Finance Director: Hello Annagrette. Can we have a meeting about the latest logistics cost statement? They have put up general costs by 5% and we need to get a handle on this.

Also, I'm getting a lot of pressure from our marketing people about competitor costs. Apparently, Global Instruments are shipping instruments from China at a much lower cost than we are...

From Frank, Supply Chain Manager: Look – I'm getting a lot of criticism about transporting so much air. It's not our fault: the block pallets are used so that the products can be easily loaded and unloaded by forklifts which means that with the product in the middle of the pallet, the maximum packing is to 1.5m high but the truck is 2.4m high. The problem lies with the size of the product and the packaging design.




From Sales Manager: Dear Mrs. Schmidt. Some of our major customers have signed up to EMAS and they intend to review our environmental performance, including transport. Can we talk about this?

From her daughter Gudrun (an environmentalist, working in the factory for the summer doing a study on carbon footprinting): Hi Mother. I can't believe the amount of useless packaging I'm seeing in the packing area. This all has to be manufactured, bought, stored, assembled and transported. Looks like the transport area will have a big impact on that carbon footprint.

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A wide range of possible options

Annagrette asks Frank – Supply Chain Manager – to come up with a list of possible methods of increasing vehicle usage. He provides the following.

Select what you think are viable suggestions

- Orienting the product so that it sits better on the pallet
- Higher density foam around the product to reduce box size
- Change from pallet to slip sheet
- Use smaller trucks
- Mix the items on the truck to fill more space
- Change to Euro pallets
- Reduce the packaging size so that the products can be stacked higher
- Use collapsible crates instead of outer corrugate packaging
- Use a long trailer

OK

◀ ▶

Yes this will prevent spillages, breakages and waste

Yes, this will reduce special requirements while still protecting the product

Slip sheets are useful in some circumstances but this should be studied. Specialised push pull attachments are needed for forklifts for example. But slip sheets are smaller and more compact. Less space is required for storage and they are easier to transport back.

Maybe not. As long as the pallet fits the truck well, it doesn't matter. Remember the Polish plant requires Euro pallets, so there is currently a manual handling ("handball") step.


No, this is permitted in Sweden but not other countries.

Note that some of these may be incorrect options, some may be suitable in certain circumstances, while others will be good options in almost all situations.

Having made their selections, the user sees specific feedback as they roll their mouse over each option. For the sake of clarity, this wireframe shows only a selection of popups.

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Palette options – some questions 1

Annagrette realises that pallets are an important factor in how products are loaded and she asks Frank a couple of questions.

Select what you think is the most likely answer.




Between:

- 1 and 30
- 31 and 100
- 101 and 300
- More than 300

OK

US companies currently use over **400** different pallet sizes.

(Source: "How Do Differing Standards Increase Trade Costs? The Case of Pallets, The World Economy, Vol 30, Issue 4.")



Firstly, I've heard there are a lot of pallet sizes in the US. How many are used there?

Having clicked OK, the user receives this feedback.

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Palette options – some questions 2

Annagrette realises that pallets are an important factor in how products are loaded and she asks Frank a couple of questions.

Select what you think Frank's answer will be.

But Frank – that's astonishing!! What about standardisation? How many of these pallet sizes have been adopted as standard by the International Organisation for Standardisation?



- 2
- 3
- 6
- 9

OK

Having clicked OK, the user receives this feedback.


There are 6 different pallet sizes in ISO standard 6780:2003

<u>mm</u>	<u>Inches</u>	<u>Region</u>
1200 x 1000	47.24 x 39.37	Europe , Asia
1200 x 800	47.24 x 31.50	Europe
1219 x 1016	48.00 x 40.00	North America
1140 x 1140	44.88 x 44.88	Australia
1100 x 1100	43.30 x 43.30	Asia
1067 x 1067	42.00 x 42.00	North America, Europe , Asia



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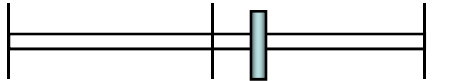
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Re-designing the package


Annagrette instructs the design team to improve the box shape of the desktop device to increase vehicle usage. But they resist, explaining that the boxes were designed that way because the customer said it was important to protect the product – which is why there was so much packaging. Annagrette insists, and instructs the design team to contact customers to check their views.

What do you think the customers' response will be?

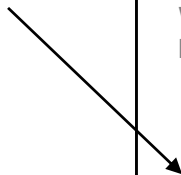


Want more packaging No change Want less packaging

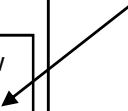
OK



The users places the slider to indicate how they think the customer might respond.



Of course, we don't really know how customers will respond. But in general they are pleased to be asked. In this case, they may well prefer less packaging, as this must be disposed of after use. Also, removing items from complex packaging can delay the staff in the hospitals, where time is critical.



Having clicked OK, the user receives this feedback.

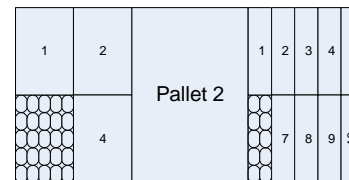
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Changing the layout in the trucks

Annagrette asks Frank to have a look at changing the layout of the desktop instruments in the transport trucks. He looks at a few options, and comes up with a novel solution.

For a full presentation of Frank's solution, click on the palette on the right. To move on, click Next.




Clicking on the palette opens a new window in which the user can view a presentation showing the solution. It has been removed from the main flow of the scenario as not all users will want to work through the detail. (In these wireframes, it is shown at the end (slides 19-24).



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Another problem...

Some time later, a new hospital opens which prompts Medi GmbH to consider their delivery options. Previously, the large free standing products, which are made in Germany, were delivered individually direct to the hospital in a large rigid truck (which needed a forklift to unload), accompanied by the crew to set them up.

But Frank suggests delivering 2-3 products at a time to local service centres, then using a smaller vehicle to deliver to the hospital, with the installation crew travelling separately.

Is Frank's suggestion a good one?
Consider why it might be...

Yes – it will reduce cost and emissions

No – it will have no effect

OK

Delivering several instruments to local hubs, with smaller vehicles used for the last part of the journey, is likely to reduce transport costs. This is probably therefore a good suggestion, although there will be trade-offs between transport costs and the value of the inventory held and every case should be judged on its merits.

Navigation arrows: left and right

Having clicked OK, the user receives this feedback.

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Ecological footprint

Annagrette's daughter, Gudrun embarrasses her mother by arguing publicly with the Finance Director about the relationship between reducing costs and reducing ecological footprint. To settle the situation, Annagrette asks them to compare a number of different ways of delivering 4 pallets to a specific customer. She gives them five routes and asks them to calculate the cost and the footprint of each.

Rank the 5 options in order of cost and footprint (1 means most expensive in cost rank, worst footprint in eco rank, 5 means cheapest, best footprint)


	Transit Time	Cost rank	Eco rank
Dedicated air courier	17 Hours	<input type="text" value="1"/>	<input type="text" value="1"/>
Commercial air cargo	23 hours	<input type="text" value="2"/>	<input type="text" value="2"/>
Dedicated truck transport	40 hours	<input type="text" value="3"/>	<input type="text" value="4"/>
Consolidated road freight	64 hours	<input type="text" value="5"/>	<input type="text" value="3"/>
Sea freight	96 hours	<input type="text" value="4"/>	<input type="text" value="5"/>

Using dropdown menus, the users are asked to rank each option by what they think would be their relative cost and ecological footprint



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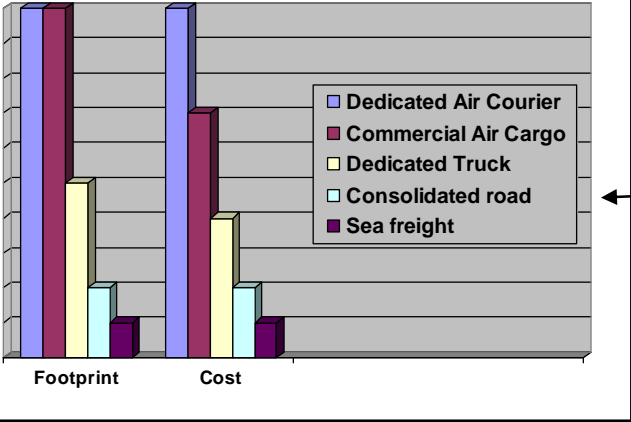
Ecological footprint

Annagrette's daughter, Gudrun embarrasses her mother by arguing publicly with the Finance Director about the relationship of ecological footprint and cost. To settle the situation, Annagrette asks both of them to select the cost and footprint of a delivery route.

She gives them a list of options and asks them to rank them from 1 (best) to 5 (worst).

Rank the options from 1 (best) to 5 (worst) based on the cost and footprint of the delivery route.

Dedicated Air Courier
Commercial Air Cargo
Dedicated Truck
Consolidated road
Sea freight



Mode	Footprint	Cost
Dedicated Air Courier	High	High
Commercial Air Cargo	Medium-High	Medium-High
Dedicated Truck	Medium	Medium
Consolidated road	Low-Medium	Low-Medium
Sea freight	Low	Low

96 hours

Eco rank

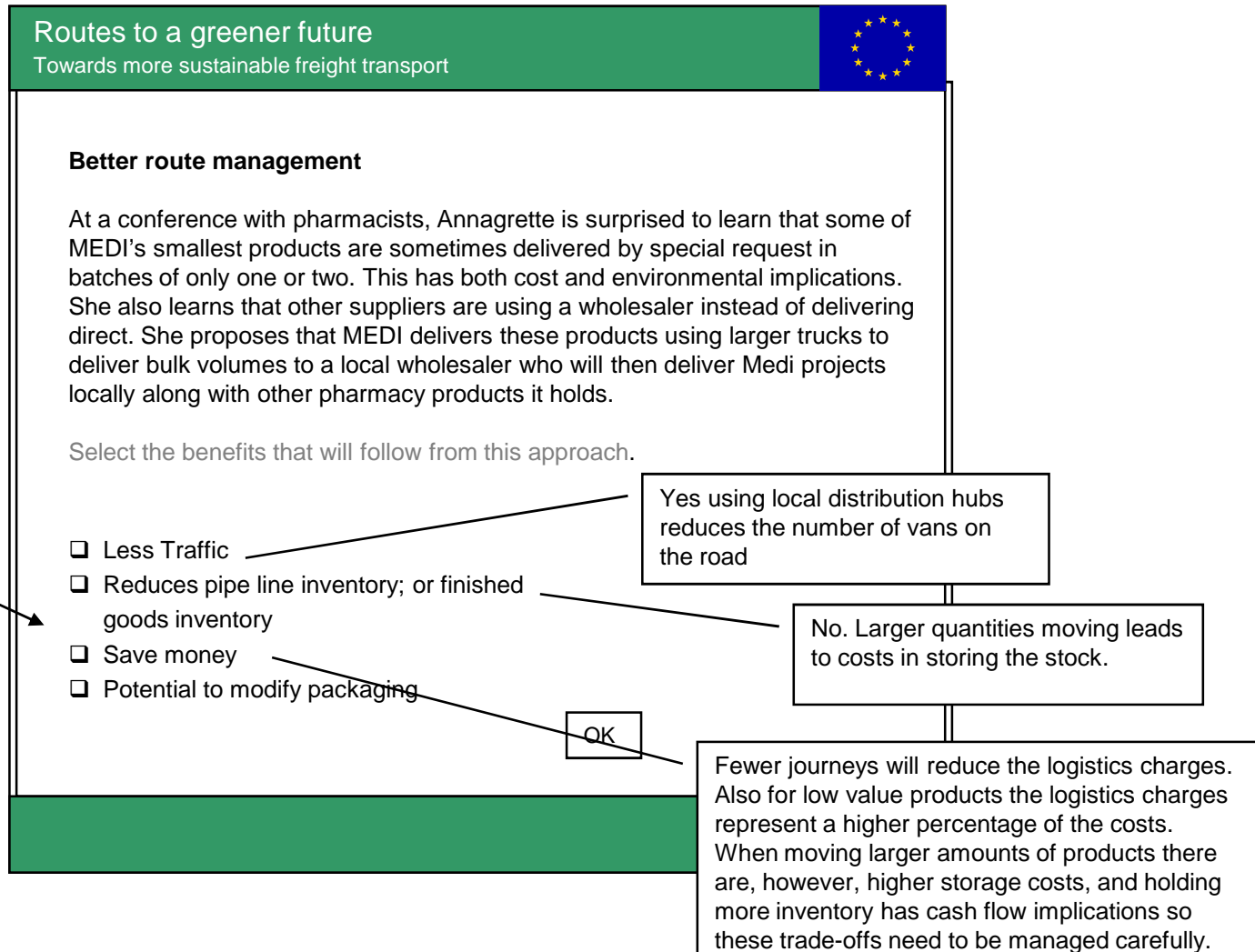
3
2
1
4
5

1

1

Having made their guess, the user sees a graphical representation of cost and ecological footprint. The figures given would be indicative (not exact) but would give a good indication of relative performance.


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Having made their selections, the user sees specific feedback as they roll their mouse over each option. For the sake of clarity, this wireframe shows only a selection of popups.


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Improved Demand Management

Annagrette learns that the European Distribution Centre has been demanding stock from Ireland and Poland very often, even on a daily basis. Sometimes, quite small quantities of material are being delivered – some by air – at high cost and with environmental implications. Currently the Irish plant is delivering to the EDC 3 days per week with different order quantities. Annagrette asks for suggestions for rectifying this situation.



Which of these suggestions might help?

- Increase delivery numbers
- Link minimum order company to full carton/pallets
- Link minimum order quantities to full truck load (FTL)
- Improve information sharing with customers.

Navigation: ◀ ▶

The user can click on this map icon for a reminder of the map from earlier in the scenario.

Having made their selections, the user sees specific feedback as they roll their mouse over each option.

No, this would make matters worse

This would improve the situation since only full pallets would be loaded on each truck and transport of air (empty space) would be eliminated.

This trade off between storing and ordering could be investigated.

[This could reduce the 'bull whip effect' i.e. the phenomenon whereby small changes lead to major swings in over- and under-stocking.

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Training and awareness raising

It's one year later and Annagrette is pleased to learn that her logistics bill has been reduced by 14% with no loss of production or delivery levels. Customer satisfaction levels are also up, for all three product ranges.



At a top level meeting she discusses this with colleagues and they realise that almost all the improvements have been made due to internal investigations and suggestions.

They agree that other improvements could be possible if they further stimulate thinking and suggestions among their own staff and they agree to fund a company-wide training and awareness programme regarding environmental issues, with specific reference to transport.



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Conclusion and further information

That's the end of this scenario. It looked at a range of issues in the area of optimising vehicle utilisation

. The main areas covered were:

- Investigating options
- Redesigning packaging
- Use of appropriate vehicles
- Better route management
- Improved demand management

You can access various resources from the main menu or from here:

A [pdf summary](#) of this case study

A [powerpoint presentation](#) of the main points made in this case study

A set of [weblinks](#)

www.freightbestpractice.org.uk

www.greenlogistics.org

<http://topsend.com/products.html>

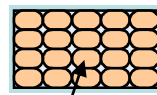
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If the user selects to see this self-running presentation in slide 11, a separate large popup window appears above the main scenario, which they navigate via the markers at the bottom of the screen.

Changing the layout in the Trucks – Part 1: placing the items into cartons and the cartons onto pallets

The initial packaging design for the desktop instrument had been designed to be used with 1200 x 1000mm pallets. Detailed effort went into the design of the logistical elements of this product.

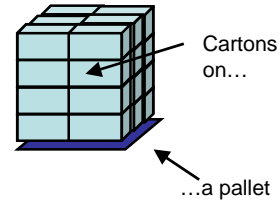
20 items (each 300 mm high x 120 mm x 80 mm) are packed as a single layer into a carton (300 mm high x 600 mm x 320 mm)...



Items in a carton



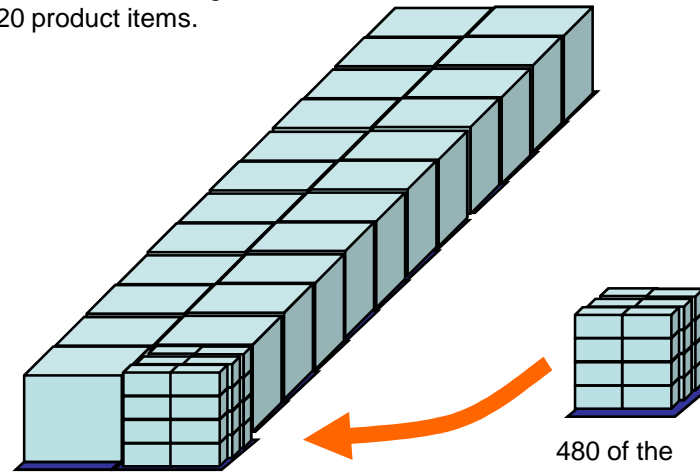
24 cartons are loaded onto each pallet, as 4 layers of 6 cartons, therefore each pallet carries 480 of the individual items...



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Changing the layout in the Trucks – Part 2: placing the pallets into the truck container

...and there are 24 pallets
(2 wide x 12 long) in a
truck container, totalling
11,520 product items.



480 of the
individual items;
24 cartons.

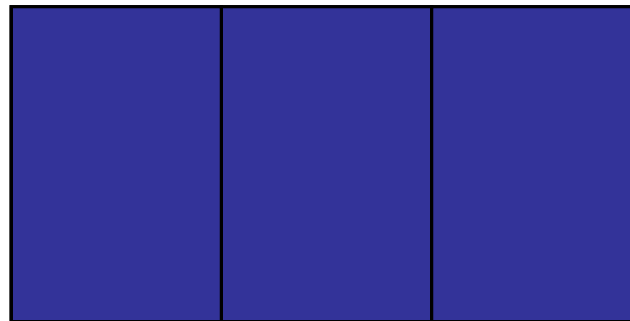


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Changing the layout in the Trucks – Part 3

However, there is an automated material handling system in the European Distribution Centre. This system only operates with standard euro pallets, so this requires a logistical change. The euro pallets are 1200 x 800mm.

Three euro pallets span the container as shown below. There will now be a total of 30 pallets per container as pallets are not stacked.



Pallet 1

Pallet 2

Pallet 3

Pallet Sizes:

- 1200 x 1000 mm (Current Pallet)
- 1200 x 800 mm (Euro Pallet)

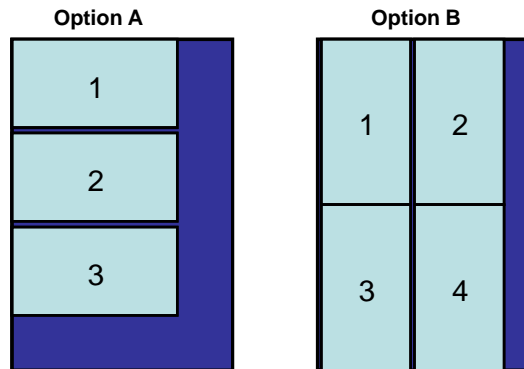


Optimising vehicle utilisation scenario

Changing the layout in the Trucks – Part 4: how will the existing cartons fit on the new pallets?

So if the same packing is used, will it be possible to utilise pallet space as efficiently as with the current pallet?

No! A maximum of only 4 cartons per pallet is possible (Option B below). This equates to 9,600 items per container (30 pallets x 16 cartons x 20 items). A container can now only transport 83.3% of the previous full load when compared with the original situation.



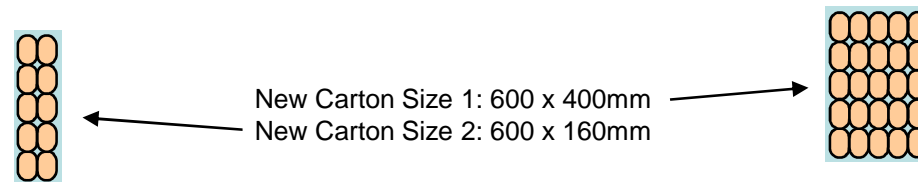
Optimising vehicle utilisation scenario

Changing the layout in the Trucks – Part 5

Frank is not happy with this result. He wants to know if this can be improved. There appear to be two potential solutions involving a redesign of the carton – as shown in the next slide.

This involves changing the carton size to include a 5th row of items (25 items in carton), or separating the contents of the initial carton into two separate cartons (10 items in carton). In both cases this equates to 400 items per pallet, with 12,000 items on a container (30 pallets x 400 items). In these cases the quantity of items on the container has improved over both the previous and original scenario.

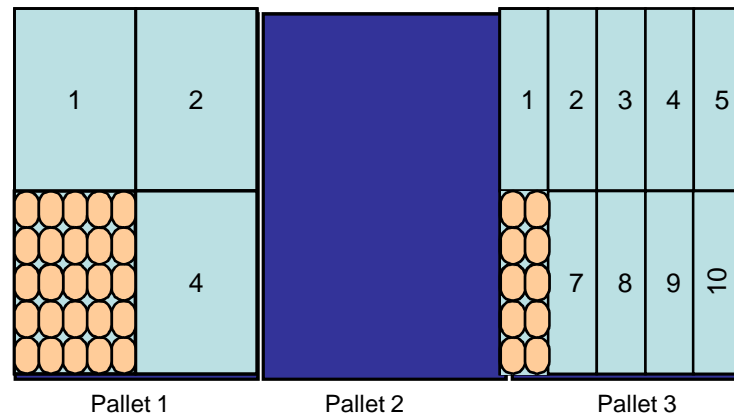
The container can now carry 12,000 items versus the previous load of 9,600 and the original load of 11,520 items. This is due to better pallet space utilisation.



Optimising vehicle utilisation scenario

Changing the layout in the Trucks – Part 6

Here is what the end solution looks like:



Frank is pleased. This is a potentially very useful solution to the problem of 'transporting air' and will have significant economic and environmental benefits for Medi.

