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Packaging Design's Impact on Sales and Supply Chain in the Consumer Goods Industry

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Packaging Design's Impact on Sales and Supply Chain in the Consumer Goods Industry

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Summary:

This thesis created a new framework for addressing the impact of product packaging and product formula design on truckload efficiency and the entire supply chain within the consumer goods industry. This project also developed a tool for estimating changes to consumer demand and gross profits, due to packaging and formula modifications. This thesis was nominated for the ZLOG Best Thesis Award for 2011.



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KEY INSIGHTS

1. Looking at the trade-off between logistics and packaging material costs and revenues is necessary for making balanced decisions.
2. Not all package size changes have an equal effect on sales and truckload efficiency.
3. Package changes can lead to shelf visibility increases while also decreasing costs.

Introduction

Today the concept of truckload efficiency is important to both companies transporting goods and society as a whole. Companies try to manage costs by increasing truckload efficiency, and society feels the effects of overcrowded roadways and pollution from transportation. Within Europe there is substantial area for improvement, since transportation vehicles have an overall load efficiency of only 43%.

There are many ways to address the problem of truckload efficiency, including analyzing factors like routing of vehicles, vehicle types, co-shipment opportunities, cube-fill utilization, product packaging design, or formula composition. The last two options for analysis represent a new way of looking at truckloads. Instead of analyzing the vehicles or how they deliver the products, the focus is on what is inside of the shipments on these trucks.

This thesis analyzes the impact that changes to product packaging and product formula can have on truckload efficiency and on the entire supply chain within the fast moving consumer goods industry (FMCG).

The FMCG industry is highly competitive industry, where marketing and brand image play a crucial role. Therefore, the marketing departments have an active responsibility in product packaging design. Their decisions are based on ensuring that products will sell and revenues will not suffer due to "bad" packaging. In contrast, logistics departments, concerned with the actual transportation of these goods and how they can be loaded into trucks for

transport, value creating packages that will lead to high truckload efficiency.

Thus, in order to facilitate changes to packaging, logistics departments must be able to demonstrate that product demand and profits will not suffer, in spite of the changes. This creates a roadblock and the need for a new manner of expressing the effects of changes.

Approach

The approach to the research began by better understanding the work that had already been completed to measure and increase truckload efficiency. It quickly became apparent that much research had already been completed on this topic, and in hopes of providing insights, we focused on understanding how product packaging changes could improvement truckload efficiency. To explain our new approach, we developed a theoretical framework and an Excel based tool and calculator.

Framework

Considering all that was learned regarding truckload efficiency and the need to create a new framework for addressing ways to improve truckload efficiency, we created a model that looks at packaging in terms of the entire supply chain. The model illustrates how changes in package size indirectly affect sales, by directly affecting logistics costs, price margins, service levels, and the product’s carbon footprint. The framework is shown in Figure 1.

To understand the framework, it is important to explain the different relationships that are included in the three branches.

1. The first branch of the framework proposes that as product package size decreases, truck volume fill will increase, as products are smaller and more can be transported in the same space. Therefore, logistics costs will decrease, as fewer trucks are needed in transportation. Now that manufacturers have achieved savings in their logistics costs, they will share some of these savings with their retailers. Through a reduction in price to the retailers, without an increase in the price to consumers, the manufacturer allows retailers to have a higher gross margin on this product. The increase in gross margin for the retailer will then impact the product placement decisions. Retailers will be encouraged to place the product in a location that will be more visible and allow them to sell this new, more profitable product. As visibility increases, sales should also increase.

2. The second branch explains how the changes in product package size will affect the retailer’s inventory stocking decisions. The lower price to retailers will allow them to purchase larger quantities of the product, which will lead to a higher availability of the product within the store. Consequently, the increased margin of the product will also encourage the retailer to improve their service level for the product so that they can avoid stock-outs of the now more profitable product.

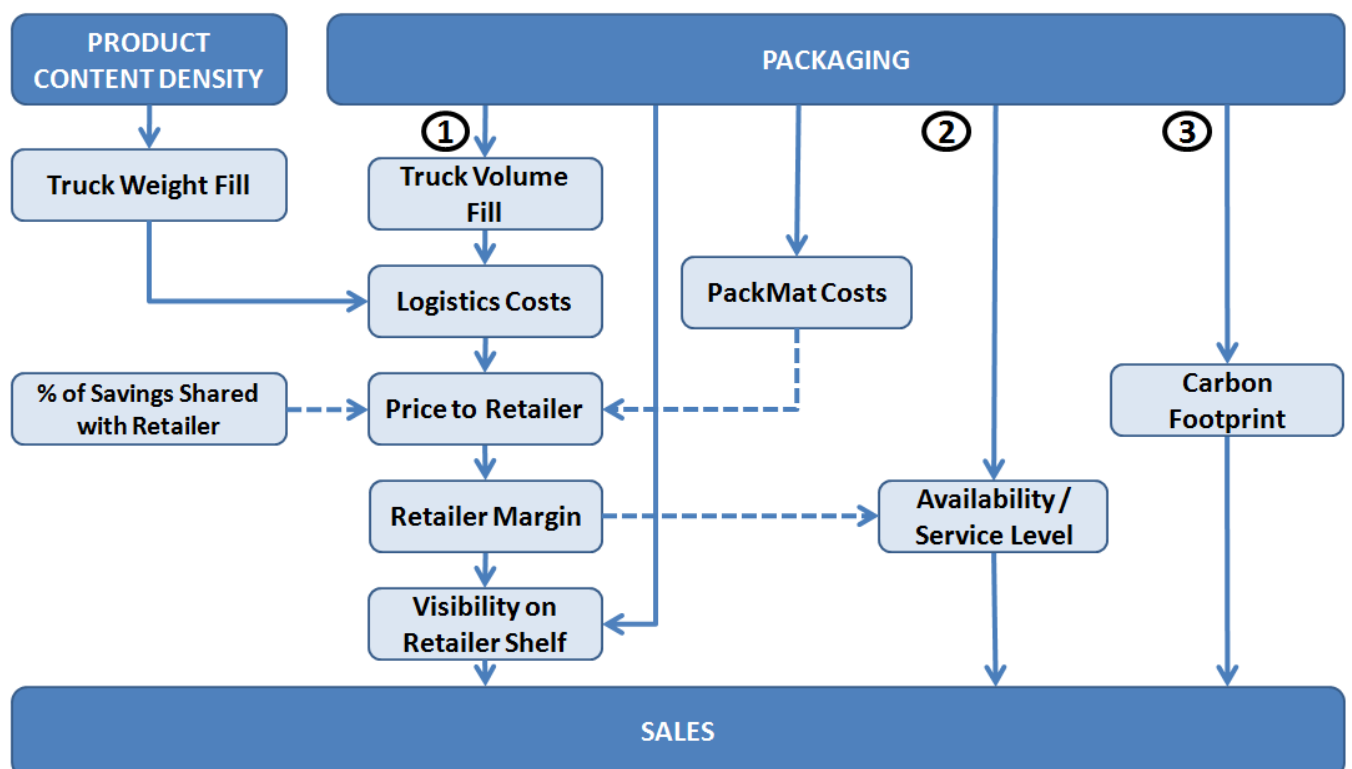


Figure 1 - Proposed framework

3. The last branch of the model relates to the environmental impacts of packaging reductions. Through the reduced size of the package, fewer trucks will be needed to ship the same amount of products. This reduction in trucks will lead to a reduced amount of emissions from trucks used in transportation. The package itself will also need fewer raw materials, due to the smaller size. The positive effects that the manufacturer is having on society will be illustrated to consumers to show that the company is environmentally conscious. For the number of consumers whose purchasing decisions are influenced by environmental factors, this change should be positive and encourage them to purchase this smaller more environmentally-friendly package.

Excel Tool & Calculator

Building on our framework regarding the product packaging's relationship to the entire product supply chain, we developed an Excel-based tool. The tool allows a manufacturer to estimate the impact of changes in packaging and/or formula design.

The four outputs of the tool show changes in consumer demand, gross profits (revenues minus transportation and packaging material costs) for the manufacturer, truckload efficiency for transporting the product, and retailer shelf visibility for the product.

The changes in consumer demand are calculated from the hypotheses that larger package size leads to better consumer perception and that more sustainable packaging make products more attractive to environmentally conscious consumers.

Gross profits are determined by the estimated revenue for the product, minus the transportation and packaging material costs. The changes in gross profits are then calculated by the differences for the current and proposed products.

In order to illustrate the changes in truckload efficiency, the tool measures the difference in what percentage of the transport unit (truck) is product, packing material, and air, between the current and proposed product.

Lastly, the product's retailer shelf visibility is calculated by the change in how many products can be placed on the retailer's shelf and how much of the shelf space is used by the product.

Application and Analysis

After completing our Excel tool, we tested various scenarios, where we made changes to product packages, for two types of products, a liquid fabric softener in a plastic bottle and a powder laundry detergent in a cardboard box. The different scenarios included changes to the package dimensions and product formula, in order to see the effects that these changes would have on demand and gross profits for the manufacturer.

In order to explain our key insights, we will explain one of the scenarios we studied, which analyzed the impact on logistics and packaging costs, demand, and profits, of changing the dimensions of the liquid fabric softener bottle. In the scenario, the product's formula was modified so that non-value adding water was removed and the bottle's height was increased and depth was reduced. These two changes would allow for the product to having a smaller size which would increase truckload efficiency for transporting the product and increase the shelf visibility of the product.

The impact of these changes shows that both logistics and packaging costs would decrease, in addition to an increase in profits, and the product would be more visible on the retailer's shelf. The complete results from this scenario are shown in Figures 2 and 3.

Logistics and packaging costs would decrease due to the increased truckload efficiency, the need for fewer trucks to transport the same amount of products, and the package requiring fewer raw materials for production, respectively. Profits would increase due to the lower costs and the increased demand from consumers who value environmentally-friendly products and would then purchase this product.

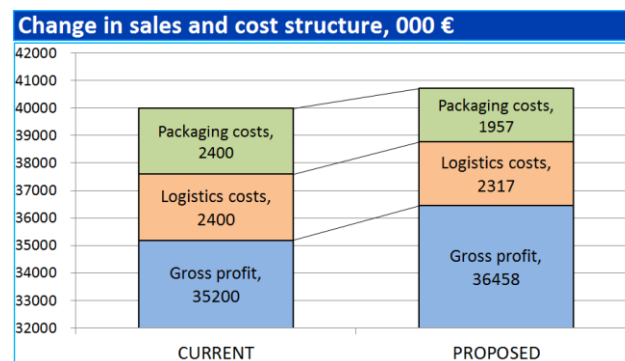


Figure 2 - Change in sales and cost structure

On the retailer's shelf, the product would then be more visible as the height of the product has increased to fully utilize all of the shelf space. Additionally, now that the product has a smaller depth, more products will be able fit in the same space on the shelf. This increase in products on the shelf will lead to a greater number of products on the retailer's shelf, instead of in storage in a stockroom. The increase in availability on the shelf should reduce the amount of stock-outs and lead to higher sales.

Changes in shelf visibility		
After proposed product changes:		
How much more (or less) of the shelf face is used?	+	3%
How many more (or fewer) products can fit on the retailer's shelf?	+	38
How many more (or fewer) products can fit in one row?	+	1
How many more (or fewer) rows can be stocked in one shelf?	+	6
How much more (or less) of the shelf height is used?	+	6%

Figure 3 - Changes in shelf visibility

Conclusion

The initial scope of our research involved analyzing methods for improving truckload efficiency. As we began our research of the topic, it became apparent that extensive research had been completed by companies within the FMCG industry in order to improve truckload efficiency, through studying methods of loading trucks, various truck types, and routing of vehicles. This created the opportunity for us to look at this topic from a new vantage point that could change how the topic had been addressed in the past. Thus, our research analyzes how changes to product packaging affect not only truckload efficiency, but the entire supply chain within the FMCG industry.

Through our work we intended to show the impact that changes to product packaging could have on logistics costs, retailer inventory decisions, and consumer demand. In order to demonstrate these relationships, we created a theoretical framework and an Excel tool and calculator. The framework illustrates the variables in the supply chain that are affected by the product changes, and the Excel calculator can be used as a decision-making tool when considering packaging or product design changes. The purpose of this tool is not to reach 100% accuracy but to facilitate a balanced decision

by providing a look at different trade-offs and to estimate potential benefits before going into further details.

In a large company, managers are required to make decisions before they have complete information or access to all relevant data. Different departments and functions often have competing goals and incentives, biasing their decisions. We envision our work as assisting companies within the FMCG industry to look at packaging design problems so that no key driver is forgotten and no factor is given excess attention. We expect that various aspects of the model may face some criticism, but nevertheless, see it as a benefit for stimulating discussion.