Analysis of the Impact of Packaging on Indirect Costs in the Retail Fresh Produce Supply Chain

BACKGROUND AND PURPOSE

As the use of reusable transport packaging in the North American fresh produce supply chain continues to increase, it's become apparent that traditional approaches to packaging cost evaluation are insufficient to properly account for true costs. Indirect costs are difficult to quantify and therefore not typically included. In particular, the cost benefit of standardization in packaging has been entirely omitted from retail cost analyses.

While packaging costs are not inconsequential, the logistics cost savings associated with supply chain packaging optimization are often far greater. IFCO recognized this need and commissioned Cal Poly to study the cost impacts of Reusable Plastic Containers (RPCs) v. corrugated fiberboard containers in the retail produce supply chain.

The study results were then used to develop a proprietary economic modeling tool, freshIMPACT™, with which retailers' supply chain cost impacts can be calculated at various degrees of standardization.

METHODOLOGY

The tool follows a Time-Driven Activity-Based Costing (TD-ABC) approach to evaluate activities impacted by packaging in grocery retailers' produce distribution centers, stores and asset recovery centers.

Packaging damage rates for uniform and mixed loads of packaging types were observed at distribution centers and retail stores. The percentage of RPCs present in a given mixed pallet was noted and later used to investigate the correlation between level of standardization of packaging and damage rate.

RESULTS SUMMARY

The study found that higher levels of RPC use in the DC resulted in faster performance of the observed activities (see Figure 1). In addition, it was concluded that RPCs likely reduce the need for specialized handling expertise due to their standardized footprint, interlocking design, and hand holds, which make highly variable processes consistent. Space utilization was also improved with RPCs, both packed with product and empty, yielding additional cost reduction. In addition, analysis of packaging damage (Figure 2) concluded that packaging-related damage is inversely related to the RPC usage rate with a high correlation.

Distribution Center Activities	RPC v. One-way	
Unloading of Truck (Unit Load)	0.00%	no statistical significance
Repacking (Unit Load)	32.05%	+ RPC faster
Taking into inventory (Unit Load)	226.67%	+ RPC faster
Stock Keeping (Unit Load)	8.96%	+ RPC faster
Order Picking & Palletizing (per container)	50.00%	+ RPC faster
Securing unit load (Unit Load)	38.46%	+ RPC faster
Loading Mixed Load Carriers (Unit Load)	18.92%	+ RPC faster
Retail Store Activities	**RPC v. One-way**	
Unloading of Truck (Unit Load)	0.00%	no statistical significance
Stocking/buffering Goods (Unit Load)	4.61%	+ RPC faster
Order Picking (per container)	53.85%	+ RPC faster
Transportation to Shelf (per cart)	6.25%	+ RPC faster
Providing goods (Hand Stocking per container)	-5.38%	- RPC slower

Figure 1

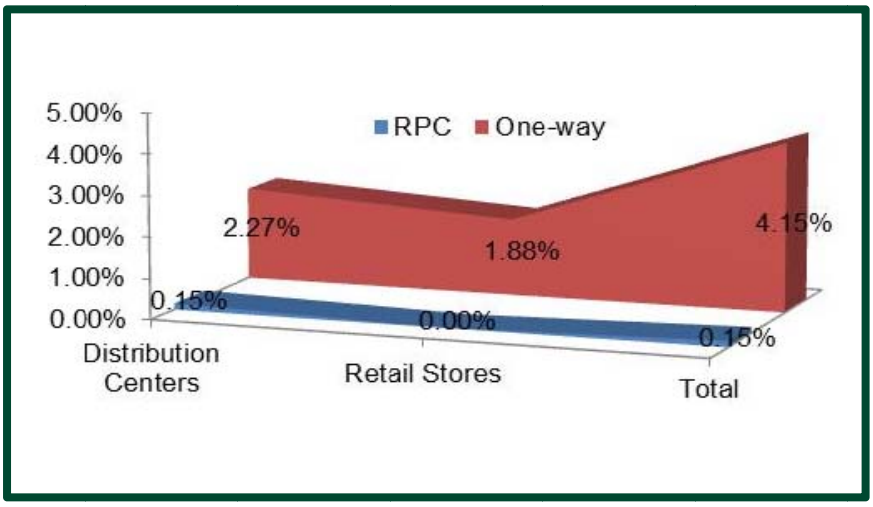

Figure 2

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ECONOMIC MODELING TOOL

To allow retailers to estimate packaging-related cost impacts in produce distribution, a tool was developed which summarizes the following indirect cost calculations (see Figure 3) for a specific retailer:

Cost	Calculation	Input
Product Damage	Formula derived from damage rate observations	Current rate of damage and RPC use rate
Labor/Handling	Costs per case handled derived from activity-based costing	Hourly labor rates at DC and store
Space Utilization	Costs per case stored at DC and store derived from container specifications	Costs per square foot of DC and retail space
Equipment	Costs per case handled with equipment derived from activity-based costing	Equipment costs
Transport	Cost per case delivered to store	Sourcing locations, volumes and costs per mile

Figure 3

To calculate retailer-specific costs, inputs are entered into the tool, including distribution center locations, product sourcing, personnel and warehouse space costs, loading specifications, and other details. In **Figure 4** are examples of various inputs.

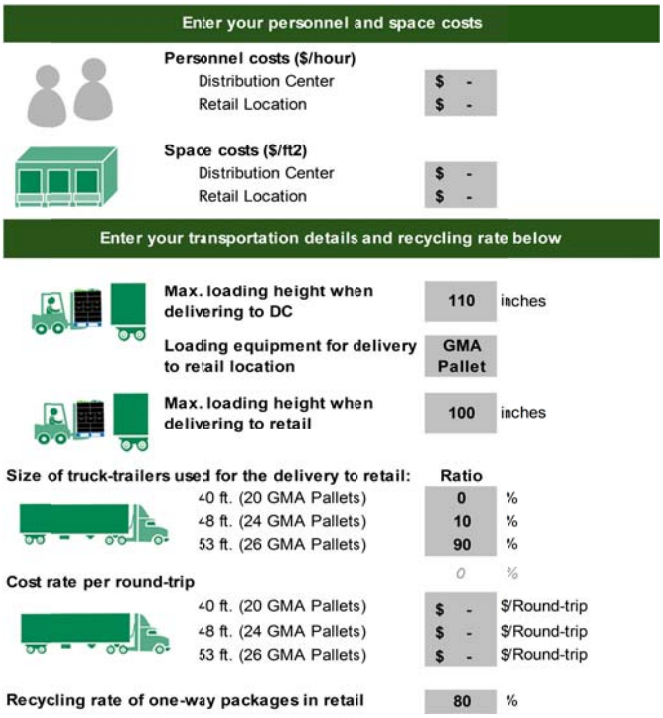

Figure 4

The output generated from customizable data inputs from the retailer show relevant costs for each link in the supply chain and a comparison of these costs based on the degree of current and potential RPC usage. Example outputs are reflected in **Figure 5** with a current scenario of 20% RPC usage and a future scenario at 80% RPC usage.

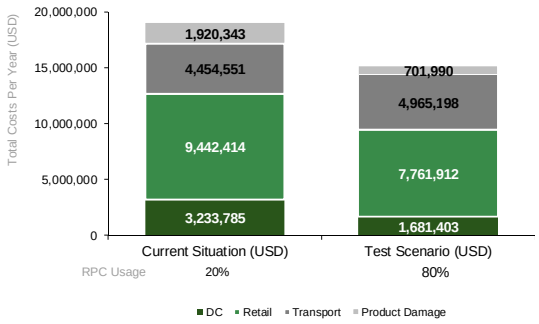

Figure 5

The tool also provides detailed product damage outputs based upon retailer specific data (see **Figure 6**). This tool allows the retailer to evaluate the impact packaging related choices (one-way and reusable packaging) have on the fresh produce supply chain. This should be critical in decision-making process when selecting the right packaging containers for your operations.

Enter the product damage estimates at Retail	
Current produce damage rate	**2.00%**
Action taken with damaged produce	**Damaged produce %**
Disposal	**33%**
Discount	**33%**
Transfer	**34%**
Total	**100%**
Percentage of product value lost	
Disposal	**100%**
Discount	**10%**
Transfer	**10%**

Figure 6

Key benefits of reusable containers include superior product protection, improved ventilation, reusability, recyclability, and one-touch (pack to display) capabilities.

The **freshIMPACT™ Economic Modeling Tool** provides retailers with a tool which is representative to the North American fresh supply chain, to evaluate the estimated cost savings of different packaging types in their specific operations and identify those savings at different levels of penetration based on customizable inputs.

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