Value Analysis and Optimization of Reusable Containers at Canada Post

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We analyzed the use and sharing of a logistics package, a returnable container, often out of stock, between Canada Post and its large mailing customers. Standardizing and sharing logistical packaging should bring members of a supply chain tangible benefits from productivity and efficiency gains. We determined that inventory imbalance between supply locations and demand locations caused the problem. We found that different accounting methods gave very different results in calculating the benefits. We concluded that there is always a benefit for the mailer. For Canada Post to benefit, however, the container must be returned quickly. We used a minimum-cost-flow model to confirm that the company has enough containers to satisfy demand. With better planning and control of the inventory, Canada Post can prevent disequilibrium between supply and demand.

Canada Post manages the largest physical distribution network in the country, collecting, sorting and delivering 40 million pieces of mail a day to over 12 million addresses. It has a highly structured work environment and a highly paid unionized work force, compared to others in the distribution business. The postal network covers all delivery points in Canada every business day, so most of the costs of operating the network are high and fixed.

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The company collects mail from street letterboxes, post offices, and large customers' premises. Seventy-four hundred local post offices each ship collection mail to one of 22 mechanized mail sortation plants or one of 74 distribution centers. After the mail is collected, it is sorted by shape first and then by destination. Mail is either for local or regional delivery (local mail) or for delivery beyond a geographic area of a predetermined radius (forward mail). The distribution centers sort mail for their geographic region based on the Canadian alphanumeric postal code. The mechanized plants sort and exchange all the forward mail between the major nodes in the network—the distribution centers and other plants.

Canada Post's objective is to provide quality service; keeping operating costs low and mail volumes high. Commercial customers give Canada Post 80 percent of the mail it delivers. Large business customers in central Canada, located along the Quebec-Windsor corridor, produce most of the mail for delivery further east and west. This distribution profile arises from the country's demographics.

Mail is inherently fragile—the packaging is paper—and the more times it is handled, the higher the cost and the greater the risk of damage. Canada Post and its large volume customers have long shared a common value chain. Most commercial customers presort their mail to benefit from Canada Post's incentive discounts, sorting it by type and delivery destination. Canada Post can transfer this presorted mail at the origin dock for transport downstream for final sortation, saving intermediate handling steps and cost.

Modular Material Handling

Like many North American companies, Canada Post mechanized its sorting and material-handling processes in the early 1970s. In 1976, at the same time that engineering teams were overhauling the sortation plants, Canada Post introduced a family of hard-sided, stackable containers, or tubs, that worked in concert with the conveyor systems and other material-handling equipment being introduced. Before this, the company had used only canvas and polyethylene mailbags, which it provided to any customer on demand.

The tubs come in two sizes and have snap-on lids. The tubs can be nested or stacked in large open metal wire cages called monotainers. The monotainers have steel pallet bases and four fold-down hinged walls. Mailbags and loose parcels also fit into the monotainers, either combined with the tubs or not. The tubs and monotainers are costly, with the latter costing $325 (Canadian) each.

The system for sharing monotainers was off balance.

Because full monotainers can be safely double-stacked, a 48-foot truck holds double the traditional 24 pallet positions for transport. In addition, the base of a monotainer can hold 1.5 times the weight that a wooden pallet can hold. Because Canada Post has at least doubled the material-handling and transportation capacity of a unit load, it has halved the cost.

The new containers are very popular with employees and customers. Using the containers reduces the amount of brute force needed for mail handling and keeps the sorted mail in unit loads. The containers are cleaner and easier to handle than mailbags. Containers have a standard size and maximum capacity, so their weight never goes beyond a standard tolerance, unlike bags of mail.

Success Brings Problems

Customers quickly adapted their mail-preparation processes to accommodate the modular containers. They soon started requesting empty monotainers from Canada Post, which provided them freely. The flow of monotainers to and from large customers is still largely unstructured. Canada Post uses the monotainers within their facilities to consolidate mail and to transport mail between postal facilities. Large mailing customers use various methods in presorting their mail. Some use bundles shrink-wrapped on pallets, which the sorting plants must unwrap and re-containerize in monotainers. Some use loose mailbags or tubs, which the plant then sorts by destination into monotainers.

Canada Post has no ready alternative to monotainers. Its mechanized plants cannot accept or use most wooden pallets because they are not standardized and the plants' material-handling equipment and facility layouts are configured for monotainers. A monotainer shortage is a major production headache for a mechanized plant.

Ten years after introducing them, Canada Post faced chronic irregular monotainer shortages. The shortages did not appear to be based on predictable customer demand. In 1986, faced with cash and equipment shortages and increasing customer complaints, Canada Post set up periodic physical inventory counts in its own facilities and on customers' premises. Since 1986, it has performed three such counts, each one more costly and unproductive than the last.

Team Effort

In 1997, the executive committee refused a request to purchase monotainers until the operations group had better control of the existing inventory. From year to year, mail volumes had been stable or declining, and the numbers of monotainers used to exchange mail between Canada Post's own mechanized plants had been stable. In spite of this, plants in central Canada reported monotainer shortages as early as May, and every year, over the three-month, high-volume period preceding Christmas, a dedicated team of specialists controlled the flow to insure an adequate supply to all the plants. As soon as the plants reported a shortage, Canada Post routinely refused customer requests; the company frequently reduced the inventory and allocation of monotainers to customers. The company's largest customers expected predictable supplies of monotainers for their operating requirements, and they could not rely on Canada Post to provide them.

In 1997, Canada Post asked us to work on the monotainer shortage problem. The company asked us to find a solution at the least cost to the company that would satisfy its customer-service objectives. With its cooperation and support, we spent the summer reviewing the events since 1976.

We found two main obstacles to identifying the root cause of the problem. The first was the wealth of anecdote, fact, folklore, and data that had built up over 20 years. We had to screen, verify, and validate this information for relevancy. Over time, many employees and departments had managed pieces of the problem. All the individuals we interviewed had strong opinions and different solutions; we knew we had to achieve consensus. Customers and some suppliers were also interested in the work we were doing.

Checking Assumptions

We started with the facts that the plants suffered periodic shortages and that customers were dissatisfied with the supply of monotainers. The postal network is very complex, so we spent a long time defining the problem and its causes. We feared we could overengineer the solution if we couldn't represent the problem succinctly. We recognized that the problem could have many root causes, but we wanted to find one main cause. We realized we would need empirical proof for any proposal because of the diversity of opinion within Canada Post.

Empty monotainers were not in the right place at the right time.

We formed a team made up of Canada Post operations and sales specialists, several large customers and outside suppliers for input, advice, and support. After seven months, we presented this team's interim findings to Canada Post's senior executive committee. During the next few months, we validated our definition of the problem, quantified the results, and developed a planning model to predict and meet demand.

We used an engineering problem-solving methodology—value analysis—to define the problem from Canada Post's customer's viewpoint and to build consensus. This gave us a frame of reference that we kept throughout subsequent problem-solving steps.

We then ascertained that the monotainer added a quantifiable value to the customer as well as to Canada Post. First, we enumerated the major material-handling and transport activities for the supply chain, starting with customers, and running all the way through to Canada Post's dispatch from its plant docks. We analyzed two types of customer presorted mail: mail for forward delivery, which is transferred straight onto trucks at the origin Canada Post dock; and mail for local and regional delivery, which is worked at the origin plant before dispatch. We listed and compared the activities for both transfer and work mail prepared in monotainers and prepared on common wood pallets.

We were looking for confirmation and quantification of a shared benefit from using the monotainer. Therefore, we next multiplied the known engineered time standards for the major activities by the labor rate to determine that using monotainers reduces the aggregate value of the activities, although it may not necessarily reduce the number of activities. We calculated the net present value (NPV) of the use of monotainers, varying the number of trips per year. We compared these results to two alternatives—using \$5 wooden pallets and using \$150 cardboard monotainers. The NPV calculations confirmed the sensitivity of the benefits to a key variable.

After quantifying the shared benefit of the monotainer in the supply chain and verifying that it was the right container under appropriate conditions, we used operations research techniques to develop a model to confirm both that Canada Post had sufficient quantity in inventory to meet demand, and the optimal distribution of empties in the network.

Value Analysis

We needed to separate fact from fiction, and we wanted to define the problem quickly and precisely. We therefore started the study with value analysis [Hayes 1992; Mudge 1971], an analytical methodology used by multidisciplinary teams to identify a problem and find opportunities to correct it while meeting customer expectations. Value analysis is based on two tenets—that the team uses the unique method of function analysis and that it uses a sequential, organized job plan. The job plan follows seven phases: (1) information gathering, (2) function analysis, (3) speculation, (4) evaluation, (5) proposal development, (6) report, and (7) implementation and audit. We used only the first four because we wanted to develop a robust definition of the problem and some preliminary ideas for its solution. By following the steps in sequence, we ensured that we reached our conclusion only after performing a full analysis.

In gathering and reviewing the information in the first phase, we came to a basic understanding of the problem. In function analysis, the next phase, we pinpointed primary functions succinctly with two words—an active verb and a measurable noun—by asking why and how questions. We developed a list of the functions of a monotainer. We agreed that the monotainer's main function in the postal distribution network is logistics packaging, with subfunctions of protection, utility, and communication [Twede 1988]. We evaluated the relationships of these functions and developed alternatives.

During this part of the study, we limited our scope to the sequence of major activities for mail in monotainers from a customer's site through to dispatch from a Canada Post plant's dock (Figure 1). Customers' presorted mail to be transferred (flow A, Figure 1) and presorted mail to be worked on in the origin Canada Post plant (flow B, Figure 1) are integrated into the company's network (flow C, Figure 1) at different points. Customers preparing their mail reduce the number of activities the company has to do, a saving to Canada Post.

Typically, teams identify three or four functions as requiring improvement when they seek a root cause for a problem. We found one problem function: the system for sharing monotainers was off balance. The company needed to ensure equilibrium between demand quantity and available quantity.

In the next phase of the job plan, speculation, each problem function identified previously is the subject of a creative session in which the team members use brainstorming techniques. These ideas are then evaluated in an evaluation phase, the last one we used. We held brainstorming sessions to find ways to improve the operations and customer satisfaction for the system for sharing monotainers. We subsequently presented recommendations to the management executive committee, under three main thrusts.

(1) The Toronto region will have full responsibility and authority for empty

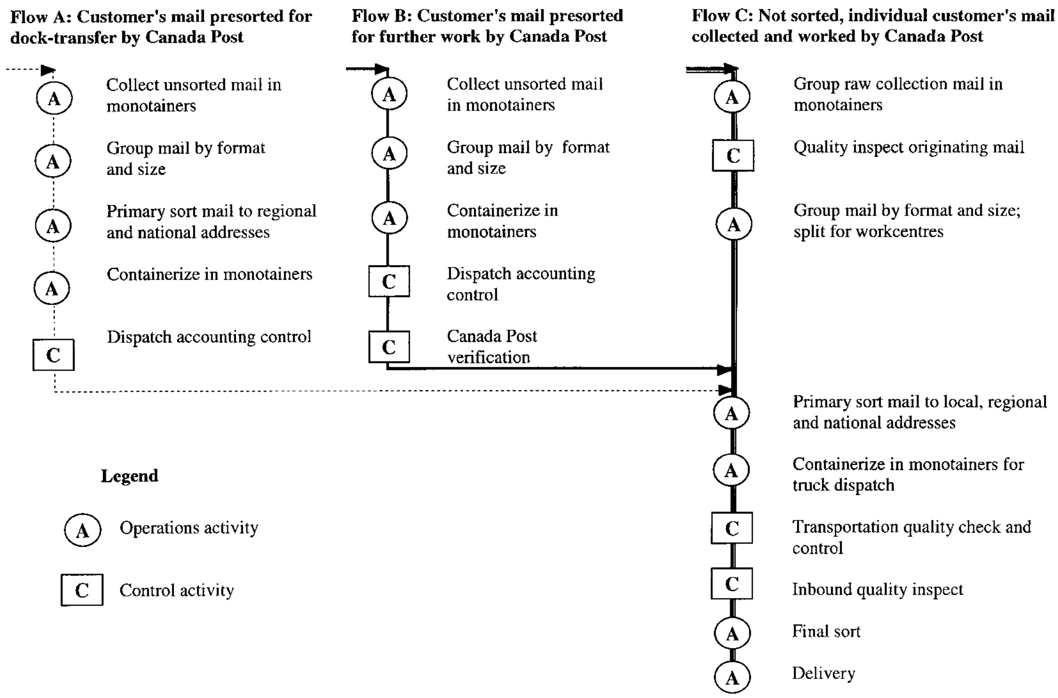

Figure 1: Our study concerned the major activities in forward-mail sortation when monotainers are used. Customers sort mail to be dock-transferred (flow A) or to be worked at the origin plant (flow B). Both flows integrate into Canada Post's own originating mail (flow C). Customers presorting mail to be transferred (flow A) on a Canada Post dock saves Canada Post four operations activities compared to collection mail; customers presorting mail that has to be worked (flow B) in a plant saves Canada Post only two operations activities.

monotainers;

(2) Toronto will negotiate with the other regions to establish reasonable levels of empty monotainer inventory to meet their requirements and Toronto will control all monotainer movements between regions; and

(3) The other regions will have a deadline to return monotainers they receive back to Toronto, and this return cycle time will be enforced.

Defining the Problem

The value analysis with the team enabled us to reach consensus on the problem definition. Plants in the Quebec-Windsor corridor, specifically metropolitan Toronto, shipped out many more monotainers with mail than they received back from the other regions. Given the abundant supply of monotainers going from Toronto to plants in the eastern and western regions, these plants and their customers rarely lacked monotainers. Therefore, the monotainer shortage was specific to plants and customers in Toronto. Shipments out and receipts in were not in balance. Monotainers were not where they were needed (Toronto) when they were needed. This was a classic logistics problem.

We believed that the problem was exacerbated by the time lag between customers receiving empty monotainers and returning full ones. Canada Post cycles monotainers within its own network within two or three weeks. A customer's cycle time between receiving empty monotainers and returning full ones is between four weeks and three months. This delay keeps many monotainers out of circulation for a long time. We explored this premise further in the operations research part of our study.

The Value of Sharing Monotainers

We found general consensus within Canada Post that using monotainers adds considerable value by reducing its material handling. Interestingly, there was no agreement that sharing monotainers with large customers resulted in any value for Canada Post. The customer's benefit is obvious: the customer has unrestricted use of free monotainers instead of buying pallets and saves money in material-handling costs. Our challenge was to isolate the benefits attributable to sharing monotainers, not to sharing work in itself.

To isolate the quantifiable benefit of using monotainers, we listed the major handling and transport activities Canada Post performed for mail received this way as opposed to on pallets. As a material-handling activity costs money, we expected fewer activities to result in supply-chain benefits.

We compared the number of activities the customer performed and Canada Post performed for mail shipped in monotainers and mail shipped on pallets. We did this analysis for mail to be worked at the plant of origin and for mail to be transferred on Canada Post's docks. The results (Figure 2) show that the supply chain must perform six more activities if mail to be worked comes to Canada Post in monotainers: 40 versus 34 activities. Canada Post performs five of these six additional activities; the customer performs one additional activity.

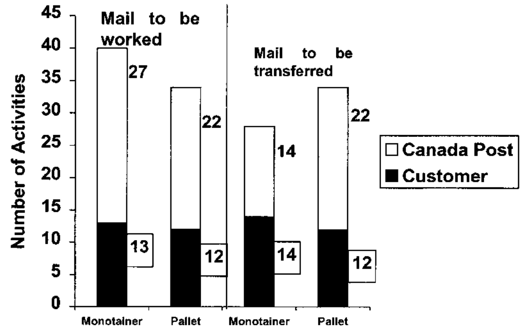

Figure 2: When we compared the total number of activities in the supply chain for mail to be worked in monotainers and on pallets, we found the supply chain less efficient if the mail is in monotainers (40 activities versus 34). Canada Post has five more activities if worked mail is in monotainers (27 versus 22); the customer is penalized slightly with one more activity (13 versus 12). When we compared the total number of activities in the supply chain for dock-transfer mail in monotainers and on pallets, we found the supply chain more efficient if the mail is in monotainers (28 activities versus 34). Canada Post has eight less activities if transfer mail is in monotainers (14 versus 22); the customer is penalized slightly with two more activities (14 versus 12).

Under the second scenario, the results (Figure 2) show that if mail to be transferred on the shipping dock comes in monotainers, the supply chain performs six fewer activities: 28 versus 34 activities. Although Canada Post performs eight fewer activities, the customer performs two more activities to send mail in a monotainer. So, Canada Post benefits from receiving mail for dock transfer in monotainers as it saves eight activities.

Based on this evaluation of the number of activities, we concluded that Canada Post benefits only from receiving presorted mail for dock transfer in monotainers, and mail to be worked should be received on pallets. In both cases, the customer performs more activities by presenting the mail in monotainers. In case number one, the customer performs one more activity. In case number two, the customer performs two more activities.

In our analysis, we enumerated and compared the number of material-handling activities and then quantified the value of sharing monotainers with large customers. To get a preliminary frame of reference, we calculated the benefit for each option, monotainers or pallets. We used the set of major activities we had developed for the value analysis (Figure 1) and multiplied the engineered time standard of each activity by the labor rate.

If the customer's mail comes in a monotainer, Canada Post realizes a positive financial benefit of $8 per trip if it is transferred cross-dock; and $3 per trip if the plant must rework the mail. A trip originates at a customer's facility in central Canada and runs through to the destination plant and includes the return of the empty monotainer to Toronto. In addition to this preliminary calculation of the benefit to Canada Post, we used customer data to determine that customers benefit from the use of monotainers by a fixed amount between $15 and $23 per monotainer.

These results (Figure 3) show that it is always in Canada Post's interest to receive mail in monotainers instead of on pallets. These results reverse the earlier customer results we obtained when we simply enumerated the activities for worked mail: it is always in the customer's financial interest to use monotainers.

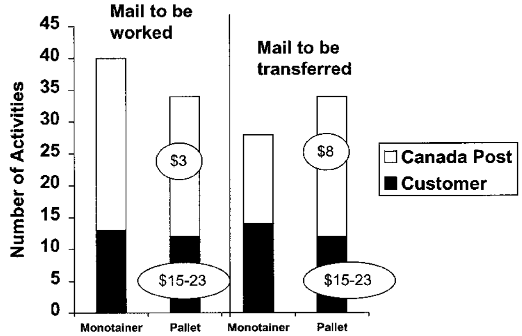

Figure 3: We compared the value of the total number of activities (both the customer's and Canada Post's) for presorted mail to be worked and presorted mail to be dock-transferred, comparing the additional cost to either party of using a pallet. We found that use of a pallet costs a customer between $15–23 (Canadian). We found that Canada Post would pay $3 or $8 more per unit load if the presorted mail were not in a monotainer. We found that even though there are six fewer activities in the supply chain when presorted mail to be worked at a Canada Post plant is shipped using a pallet (34 versus 40), it would cost the supply chain at least $18 ($15 + $3) more to handle it. It would cost the supply chain $23 ($15 + $8) more to dock-transfer presorted mail using a pallet instead of a monotainer.

We used the $8 and $3 benefit to Canada Post to calculate the net present values [Uxa 1994] per one-way trip of monotainers. For customer mail that is dock transferred, the results are neutral at six trips a year (every two months) and increasingly positive as the number of trips increases. At 12 trips per year, the net present value is $3 per trip.

For customer mail that is worked at the origin postal plant, the results are negative for all of the cases we analyzed except the one with the highest number of return

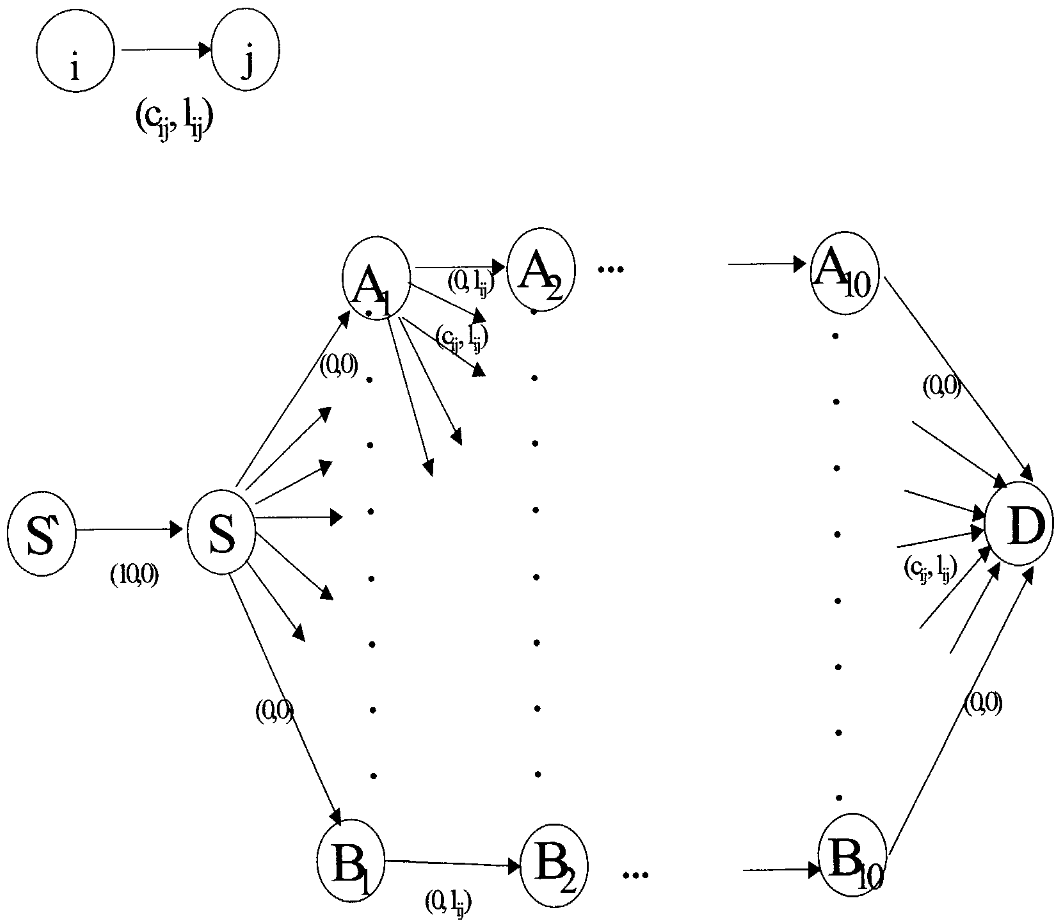

Figure 4: This network represents the movement of empty and full monotainers across the seven geographic regions over the nine-month period.

trips (26 cycles) per year. In this case, the net present value is $0.40 per trip. Canada Post benefits from sharing monotainers with these customers only if they use and return them within two weeks, otherwise it loses money.

This means that for planning monotainer inventory, to get a positive return on its investment, Canada Post must limit customer retention of monotainers to something like the company's own two-week transit-and-return time and insure that the total time for a round-trip is four weeks. We knew that monotainer cycle time varied upwards of six weeks; Canada Post's network cycle capability is constant at two weeks.

Optimizing Inventory Levels

We developed a model (Figure 4) based on a minimum-cost flow problem (Appendix) to be used to plan the distribution of empty monotainers in the postal network. We wanted to determine whether Canada Post had enough monotainers available to meet demand and whether they were in the right place at the right time.

The volume of mail, therefore the number of monotainers in use, is cyclical over a 12-month period. We had three years' data on the movement of full and empty monotainers among the 22 mechanized plants in the network but only nine months of reliable data (April–December 1997) on the number of monotainers exchanged with large customers. We chose the same nine-month period for all data sets in the model and for validation purposes. Excluding January, February, and March from the data used did not overly concern us, because the usage pattern is very stable and predictable. The plants always return all empty monotainers to Toronto in January after the December Christmas peak, and February and March are low utilization months. Canada Post field operations are divided into seven regions. We summed the plant data into the appropriate regions.

We used real data on the monotainers moving between all seven regions as the minimum flow for the month, with the proxy for the cost the distance in kilometers. We used weekly estimates of monotainers returned by customers as a proxy for the minimum flow of full monotainers remaining within the region. We ran the model several times to determine sensitivity to variations in the data. Also, because the model's solution yielded the empty monotainer flow, we compared the model's solution to what had happened in reality over the period studied.

Our most important conclusion was that Canada Post had enough monotainers to meet the demand (Table 1). We were interested in the periodicity of the full and empty monotainer flows. The flows of full monotainers peak in April, May, and October. For the nine months for which we had data (April through December), we found that the company needed a large number of empty monotainers in June, July, and September in central Canada to meet the demand.

Month	Toronto needs	Moved
April	32,000	43,000
May	12,000	42,000
June	42,000	64,000
July	44,000	68,000
August	25,000	44,000
September	49,000	76,000
October	25,000	27,000
November	26,000	32,000
December	0	75,000
Total	255,000	471,000

Table 1: We solved the minimum-cost model to find the optimal distribution of empty monotainers to Toronto for each month from April through December to meet known customer demand. We solved the model to find the total number needed in Toronto (column titled "Toronto needs") and the number that moved in the network during the month ("Moved"). The solution requires Toronto to stock in anticipation of heavy use and reduces the outlying regions' static inventory. In December, the heaviest month for monotainer movement, the solution stocked Toronto ahead of time.

We were interested in the model's sensitivity to variations in customer demand, because one of the recommendations we looked at was to restrict customer access to monotainers to insure that the plants had enough. Once we had a solution, we increased the customer demand in Toronto, solved the model again, and compared the results (Table 2). We concluded that customer demand had little effect on the results. It is much more important to ship, store, and return empty monotainers in time for Toronto's high volume periods than to curb and control customers'

Month	Original solution	Solution with double customer demand in Toronto
April	43,000	42,000
May	42,000	44,000
June	64,000	91,000
July	68,000	61,000
August	44,000	24,000
September	76,000	77,000
October	27,000	27,000
November	32,000	31,000
December	75,000	81,000
Total	471,000	478,000

Table 2: We compared the original optimal solution for the distribution of empty monotainers, using the known customer demand, to the solution when we doubled customer demand in Toronto. We wanted to test the model's sensitivity to customer demand because one option Canada Post was evaluating was to charge customers deposit fees for using monotainers. We knew that Canada Post was meeting only 50 percent of the customer demand in Toronto. The results convinced us that it was critical to get the regional post offices to return monotainers and not so important to limit customer requests.

requests. The optimal solution to the model confirmed again the need for empty monotainers to return to Toronto, particularly from the Western and Atlantic regions.

By comparing the solution to what really happened (Table 3), we showed that the empty monotainers were not in the right place at the right time. When we made the same calculation of mileage for the real scenario and compared the results to those for the optimal solution, we found that the optimal solution was 40 percent cheaper than what really happened.

We clearly demonstrated that the company does not need to increase its stock of

Month	Optimal solution	Actual number exchanged
April	43,000	43,000
May	42,000	57,000
June	64,000	45,000
July	68,000	37,000
August	44,000	48,000
September	76,000	43,000
October	27,000	58,000
November	32,000	42,000
Total	396,000	373,000

Table 3: We compared the optimal solution distribution of empty monotainers by month against what really happened in the network over that time frame. Although the optimal solution distributed more empty monotainers, the optimal solution actually cost, in terms of kilometers traveled, 40 percent less than the actual distribution. We did not include December because the model ended in December.

monotainers to correct shortages. It does need to control and accelerate the return of monotainers from its large users, and to insure that empty monotainers return from the outlying regions in time to meet the high usage periods in the Toronto region. If Canada Post can speed up the flow from customers and back from the outlying regions, it can reduce its operating costs, increase the availability of monotainers to its customers in Central Canada, and solve its chronic monotainer inventory problem.

Today

We presented the conclusions of the study to Canada Post in 1998. It acted on some but not all of our recommendations. As a result of this study, Canada Post set up a dedicated unit in Toronto with responsibility for all its modular containers. The value realized from sharing monotainers is highly sensitive to the number of trips they make per year. Achieving faster (optimal) monotainer return to Toronto continues to elude the group. The unit in Toronto sets quotas for regional monotainer inventory levels. Staff members monitor empty monotainer returns each week using computerized truck-routing data. The outlying regions east and west of Toronto still retain surplus monotainers to store empty hard-sided containers and to feed their local customer demand. Shortages in central Canada continue to consume managers' energy as they struggle to rebalance the inventory.

Using the results of the study, Canada Post bought replacement stock for damaged monotainers. One of the cheapest alternatives we evaluated, a cardboard box with reinforced plastic caps, is now part of the available corporate inventory. Customers in Toronto call a central telephone number to ask for containers in advance; all container allocations in Montreal are coordinated in the same way. These are a few examples of the activities that resulted from the study that overall improved the average monotainer return cycle to Toronto from 30 to 26 days. Any further improvements towards the goal of 20 days will depend on the Toronto unit gaining more autonomy and authority over the empty monotainer inventory in the regions.

Conclusions

Canada Post now recognizes that it has a vested interest in extending the use of monotainers to customers who presort their outgoing mail. The net present value is positive if the cycle time is short. If Canada Post can enforce a short cycle time, the optimization model confirms that it has enough monotainers to meet the monthly demand and that it doesn't need to purchase more. Regional operators must return monotainers to metropolitan Toronto ahead of a peak demand.

Canada Post is now aware that it has enough stock to meet an orderly controlled demand. It is aware that sharing monotainers with customers under certain conditions brings benefits to both parties. The company decided to move slowly to change past practice, particularly as monotainer allocation is a primary point of customer contact. Canada Post is working on replacing past practices with an orderly transition to basic controls and accountability throughout the network. The study served to unambiguously confirm the benefit and clarify the conditions needed to maximize the benefit to both the customer and to Canada Post.

Acknowledgments

We thank Canada Post for the opportunity and for their full cooperation. In particular, the contributions of Canada Post's employees, customers, and suppliers were invaluable in concluding the study.

APPENDIX

Minimum Cost Flow Model (Mathematical Representation)

Over the nine-month period, the objective was to determine the number of empty monotainers that should be returned each month and their distribution. The solution also showed the number of monotainers stored each month by region (Figure 4).

(flow_{ij}) = variable to be determined: the number of monotainers between the nodes i and j.

A = set of arcs.

$K \subset N$: N = set of nodes.

Minimize

$$Z = \sum_{(i,j)\in A} c_{ij^*} \text{ flow}_{ij}$$

Subject to

$$\sum_{i\in K} \text{flow}_{ij} - \sum_{i\in K} \text{flow}_{ji} = 0$$

$$\forall j \in K\text{: } K = S, A_1, Q_1, \ldots, R_{10}, T_{10}, H_{10}, P_{10}, B_{10},$$

$$0 \leq l_{ij} \leq \text{flow}_{ij} \quad \forall (i,j) \in A.$$

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Léo Blanchette, Executive Vice President and Chief Operating Officer, Canada Post Corporation, 2701 Riverside Dr., Suite N1200, Ottawa, Ontario, Canada K1A 0B1, writes: ". . . We used the results of the study to confirm that we had a sufficient quantity, thereby avoiding an unnecessary capital acquisition. We followed many recommendations made by the team, including setting up a dedicated unit in Toronto whose sole responsibility is managing container movement in and out of the region.

"As an additional benefit, we are able to quantify the benefit to the corporation of sharing the containers, and can now work towards setting up the necessary controls to optimize it. The benefit accruing to customers is also of value, as this insight increases our sensitivity to joint dependencies that we can now leverage as we plan for the future."