SMART SOFTWARE METRO TRANSIT

ANALYST
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THE BOTTOM LINE

Minnesota Metro Transit deployed the SmartForecasts tool from Smart Software to handle intermittent demand for equipment parts at the public transportation system. Nucleus found that the inventory optimization (IO) application reduced parts inventory, emergency transshipments, and purchase requisitions while increasing perfect-order levels, thus resulting in higher equipment uptime for the transit system.

ROI: **123%**
Payback: **8 months**
Average annual benefit: **$334,233**

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THE ORGANIZATION

The Minnesota Metro Transit provides public transportation in the Minneapolis-Saint Paul area. The system is a division of the Metropolitan Council, the region's metropolitan planning organization. The transit system averages about 267,000 riders each weekday on its combined network of regular-route buses, light rail and commuter rail.

THE CHALLENGE

When parts are not in stock for a mechanic to repair equipment, it jeopardizes the transit system's ability to provide customer service to commuters. The problem facing Metro Transit was that parts demand was erratic, making it difficult to predict

safety stock levels, thus resulting in excess parts on hand or the sudden need for a replacement order or a transshipment between facilities.

In 2014 management at Metro Transit decided that it needed to ensure on-hand availability of the correct parts while at the same time avoiding excess stock. The system operated a central warehouse for parts and 14 stockrooms. It often found itself having to shuttle inventory between service garages – interbranch orders – to get the needed part into the hands of a mechanic waiting to repair machinery.

Cost : Benefit Ratio | **1 : 3.9**

THE STRATEGY

Managers from the transit system attended an American Production Inventory Control (APICS) conference to investigate forecasting software that would be appropriate for handling intermittent demand. Based on that meeting, it developed specifications and contacted a number of vendors, including Business Forecast Systems ,Demand Works, McConnell Chase, SAS and Smart Software.

Metro Transit selected Smart Software, which is based in Belmont, Mass. The software vendor's solution, SmartForecasts, is designed to calculate inventory settings, especially when demand – in this case the need for repair parts – does not conform to a normal distribution curve. The transit agency chose Smart Software because its tool met the criteria on its request for a proposal. Selection criteria included:

- The use of a minimum of six statistical process to compute dozens of time-series algorithms by stock keeping unit (SKU) and location.

- The ability to compute and present the following information in an understandable format: usage projections, lead time of delivery of inventory, maximum order quantities, inventory turns, economic order quantities (EOQ) and minimum order quantities (MOQ)

- A proven track record of successful use in the service parts industry environment.

- The capability to automatically select a recommended process to support intermittent pull after performing statistical calculations.

- Continuing education on the forecasting software as part of the annual maintenance agreement.

- The ability to exchange data with Metro Transits Enterprise Resource Planning (ERP) system, which is TxBase, for software calculations.

TYPES OF BENEFITS

Direct 61% — 39% Indirect

In April, Metro Transit installed the SmartForecasts application on existing computer servers owned by the Metropolitan Council.

CUMULATIVE NET BENEFIT

|	Year 1	Year 2	Year 3
	277,325	670,140	1,002,700
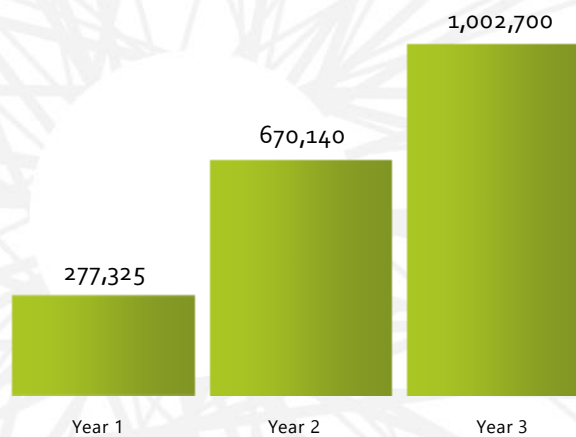
KEY BENEFIT AREAS

Deploying Smart Software's IO solution enabled the transit system to meet its twin objective of improvement in the availability of desired parts while trimming inventory holdings, which totaled $42 million. Due to personnel constraints, during the first six months of software usage, Metro Transit was only able to apply the solution to forecasting about 5 percent of its inventory. Based on the first six months of deployment, key benefits of the project to date include:

- Decreased excess stock, removing $350,000 worth of inventory in the first six months of deployment

- Reduced 15,679 inter-facility transfers of parts in the first six months, freeing up labor for other tasks such as facility upkeep.

- Reduced purchase order costs by using the software to combine parts orders into economic quantity units. The annualized savings on Material Resource Planning (MRP) requisitions is estimated to total $241,000 in the first year.

- Increased the perfect order fill rate from 92.5 to 94 percent in the first six months, meaning that the mechanic was able to have the part he or she needed 94 percent of the time.

- Reduced the amount of obsolete inventory as the software allowed the authority to maintain a stock mix more in line with actual repair needs.

KEY COST AREAS

Costs of the project include software license and maintenance fees, personnel time to implement and support the application, and training and software adjustment costs. Besides the license fee, Metro Transit paid an additional fee to place the developer's software code in a secure escrow account to ensure that the licensee would still have access to the source code.

NET CASH FLOWS

514,825

392,815

332,560

(237,500)

| Initial | Year 1 | Year 2 | Year 3 |
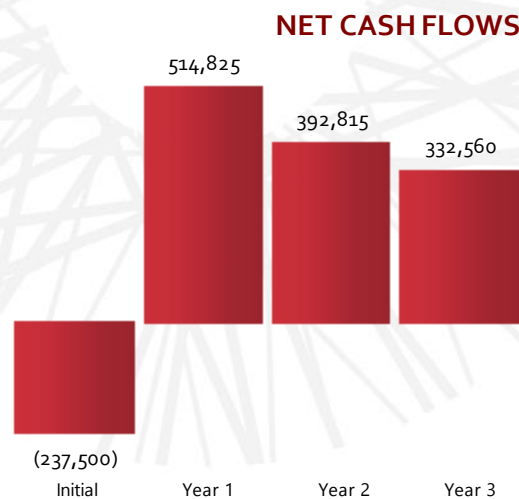
BEST PRACTICES

Metro Transit was able to adopt a data-driven approach to parts reordering. Next, the transit agency had implemented a reordering program setting up stocking parameters. The agency kept one week's worth of parts in the stockroom and one-

month supply in the warehouse. Inventory settings, however, were only adjusted when it had a parts stockout.

With the deployment of SmartForecasts, the materials planning staff at the transit agency has instituted a systematic approach to parts reordering that takes into account intermittent demand. In addition, the software now recommends buying parts in economic order quantities, such that the agency can combine purchase orders, which cost $250 apiece to issue, and use one PO to order multiple components to save money. That practice alone is expected to save the agency $241,020 in MRP requisitions in year one. Because of ordering efficiencies, the savings are expected to be cut in half in year two to $130,510, and in another half to $60,255 in year three of the software deployment.

A side benefit has been that the transit agency has been able to redirect staff time formerly devoted to handling interbranch transfers of parts and emergency shipments to facility maintenance. "By saving on interbranch moves, the personnel can use that time to maintain the warehouse," said Christopher Haefner, manager of material management at Metro Transit. "It's a soft savings. But we would have had to hire an additional person to maintain the warehouse. So, now our warehouse has never looked better."

CALCULATING THE ROI

Nucleus quantified the initial and ongoing costs of the software license, the maintenance and technology escrow fees, personnel time to implement and support the application, and employee training time to calculate the investment in the solution.

Direct benefits quantified included the elimination of excess inventory, a reduction in interbranch transfer costs and a reduction in purchase order requisitions. Indirect benefits quantified were the savings on obsolete inventory.

It should be noted that the benefits calculations are a conservative assessment given that Nucleus used results data from the first six months of software deployment and that Metro Transit has only applied the software's forecasting method to five percent of its inventory holdings at the time this note was written.

FINANCIAL ANALYSIS
Minnesota Metro Transit

Annual ROI: 123%
Payback period: 0.7 years

BENEFITS	Pre-start	Year 1	Year 2	Year 3
Direct	0	376,825	256,315	196,060
Indirect	0	175,000	175,000	175,000
Total per period	0	551,825	431,315	371,060

COSTS - CAPITALIZED ASSETS	Pre-start	Year 1	Year 2	Year 3
Software	145,000	0	0	0
Hardware	0	0	0	0
Project consulting and personnel	0	0	0	0
Total per period	145,000	0	0	0

COSTS - DEPRECIATION SCHEDULE	Pre-start	Year 1	Year 2	Year 3
Software	0	29,000	29,000	29,000
Hardware	0	0	0	0
Project consulting and personnel	0	0	0	0
Total per period	0	29,000	29,000	29,000

COSTS - EXPENSED	Pre-start	Year 1	Year 2	Year 3
Software	0	33,000	33,000	33,000
Hardware	0	0	0	0
Consulting	40,000		1,500	1,500
Personnel	50,000	4,000	4,000	4,000
Training	2,500	0	0	0
Other	0	0	0	0
Total per period	92,500	37,000	38,500	38,500

FINANCIAL ANALYSIS	Results	Year 1	Year 2	Year 3
All government taxes	45%			
Cost of capital	7.0%			
Net cash flow before taxes	(237,500)	514,825	392,815	332,560
Net cash flow after taxes	(195,875)	296,204	229,098	195,958
Annual ROI - direct and indirect benefits				**123%**
Annual ROI - direct benefits only				74%
Net Present Value (NPV)				441,014
Payback period				**0.7 years**
Average Annual Cost of Ownership				117,167
3-Year IRR				124%

All calculations are based on Nucleus Research's independent analysis of the expected costs and benefits associated with the solution.

NUCLEUS RESEARCH