

Final Report
For the CBA Back Room Study

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1 Summary

1.1 Introduction

CBA initiated the “Back Room Study” to analyze the ordering and receiving processes of member stores. The objectives of the study were to:

- a) Identify and analyze the business processes typically used by CBA retailers to fulfill business-to-business transactions with their suppliers.
- b) Determine the potential for improving current processes through the introduction of specific technologies in the areas of:
 - i) technology *standards* for ordering, receiving, invoicing, payments, etc.
 - ii) recommended *best practices* in receiving, invoicing, payments, and returns.
 - iii) standardized information systems such as EDI and web-based transactions
- c) Develop metrics and benchmarks for future innovation and improvements

1.2 Methodology

The study included the following components:

- a) *A retailer interview process* allowing for two-way interaction and reality checking. A total of nine stores were selected to participate in the interview phase of this study. There were three “Large” (annual sales > \$2M), three “Medium” (annual sales between \$750K and \$2M), and three “Small” stores. At each store, a series of interviews were performed to determine the key store processes involved with ordering and receiving, and the steps occurring within each process. The specific stores visited were selected by CBA. Basic store information is summarized in Appendix A. For complete details see Popken (2005).
- b) *A broad store survey process* to more accurately characterize store processes and fill gaps not covered by the store interviews. To gather data, a web based survey (see Appendix B) was posted on the CBA website. The response was relatively small (64), but when combined with the interview data was sufficient to characterize store processes to the required degree of accuracy.
- c) *Simulation modeling* to derive quantified results for both as-is and to-be systems. Prototypical simulation models were derived from store interviews and observations, and populated with data from the interviews and survey.
- d) *Industry research* into best practices of retailers with similar product dynamics, including non booksellers.
- e) *Cost/benefit analysis* to prioritize improvement alternatives and determine their viability when all relevant factors are considered.

1.3 Results and Recommendations

Four potential improvements were analyzed in detail (Table 1). The estimated annual benefit to the industry (CBA member stores) is shown in the second column. Each improvement is mapped to one or more of four implementation recommendations, shown in the third column. The improvement with greatest potential impact is “Improved/Automated Inventory Control” with estimated annual benefits for the industry of \$14,825,539. This was an unexpected finding due both to its relative magnitude and to the fact that it is more an issue of process control than a process change. The implementation recommendation is for a CPFR-based (Collaborative, Planning, Forecasting and Replenishment) solution, which does require a number of changes to the current ordering processes, both frontlist and backlist. The second ranked greatest improvement is “Automating Entry of New Items” with estimated annual benefits for the industry ranging from \$838,722 to \$2,560,950, depending on how stores currently enter new items into their POS system. The final two improvements analyzed, “Decrease Gift Problem Rate” and “Decrease Discrepancy Rate”, have common recommendations. First, a CBA sponsored supplier certification program would encourage vendors to upgrade the quality of their order-taking and shipping processes. Second individual stores should use a policy of continuous improvement with a focus on reducing errors during ordering and receiving processes. CBA should continue to sponsor workshops and training on this topic. See sections 4.2, “Summary of Cost/Benefit Analysis” and 5, “Discussion and Recommendations” for further details.

| Improvement | Estimated Industry Net Annual Benefit (\$/yr) | Recommendation |
|--------------------------------------|--|--|
| Improved/Automated Inventory Control | \$14,537,239 | Encourage development of industry-wide CPFR system |
| Automating Entry of New Items | \$838,722 to \$2,560,950 | Encourage POS vendors to incorporate needed functionality |
| Decrease Gift Problem Rate by 50% | \$546,444 | CBA Supplier Certification program; Advocate store-level continuous improvement |
| Decrease Discrepancy Rate by 50% | \$104,653 | CBA Supplier Certification program; Advocate store-level continuous improvement |

Table 1. Results and Recommendation Summary

2 Current (“As-Is”) Back Room Processes

Through the interview and survey phases of this study, we gathered information to document the current or “as-is” backroom processes. There were variations in processes between stores due to store size, type of POS system, and store policies. It is not necessary to capture all of these variations to be able to make inferences about the value of potential system improvements. The idea is to capture only the “essential” elements of the systems in the process models. Towards that end, we developed a benchmark “typical” single store process for the Backlist Ordering, Frontlist Ordering, Receiving, and Returns processes. These are then scaled by store size so that results are obtained for “Small”, “Medium” and “Large” bookstores. The results for each store are then combined into a single metric using a weighted average approach¹. (Note that savings are proportional to processing volumes so that larger stores have greater benefits.)

The simulation models incorporate labor costs as outlined in Appendix C. Briefly, the approach applies values from the Bureau of Labor Statistics for the “Book, Periodical, and Music Stores” (NAICS 451200) industry (BLS, 2004).

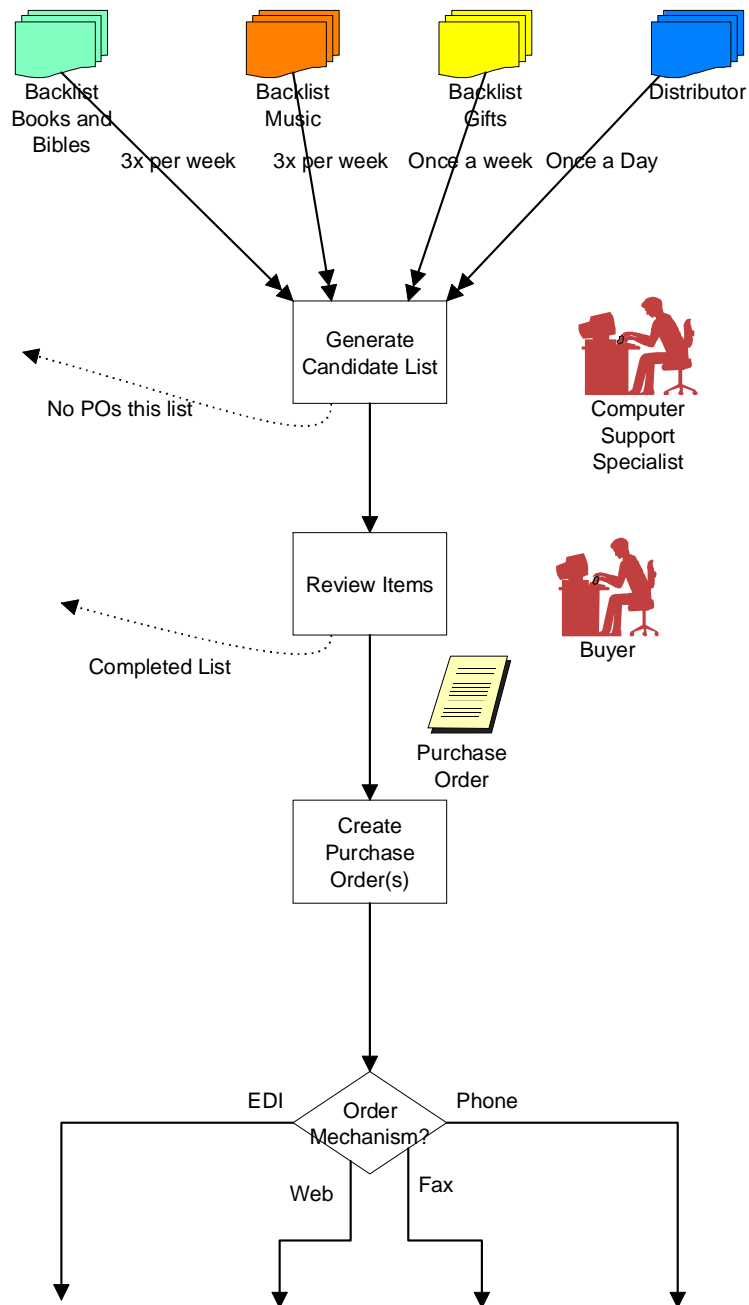
The simulation models are populated with data from the study. Much of the data is represented as statistical probability distributions. The probability distributions are sampled during the course of the simulation so that each simulation “run” represents one of many possible outcomes. Each simulation is run 500 times to generate the distribution of outcomes, characterized by a mean and a standard deviation. The resulting cost data outputs represent only the marginal direct labor costs incurred by value added activities – fixed costs or idle time costs are not included.

¹ To compute the weighted average we first convert the outputs to annual values and then weight the result by the following fractions: Small – 75.09%, Medium – 21.13%, Large – 3.78%. These proportions come from current CBA membership data. Note that 4.94% of stores have unknown sales revenue so the stores that did report are apportioned over the remaining 95.06%.

2.1 Backlist Ordering

2.1.1 Process Flow Diagram

Simulate 1 month of ordering at a typical store (small, medium, and large) per simulation run.



Systems View

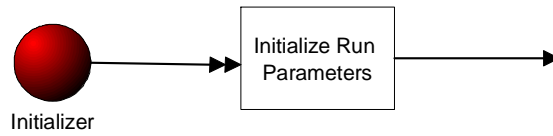
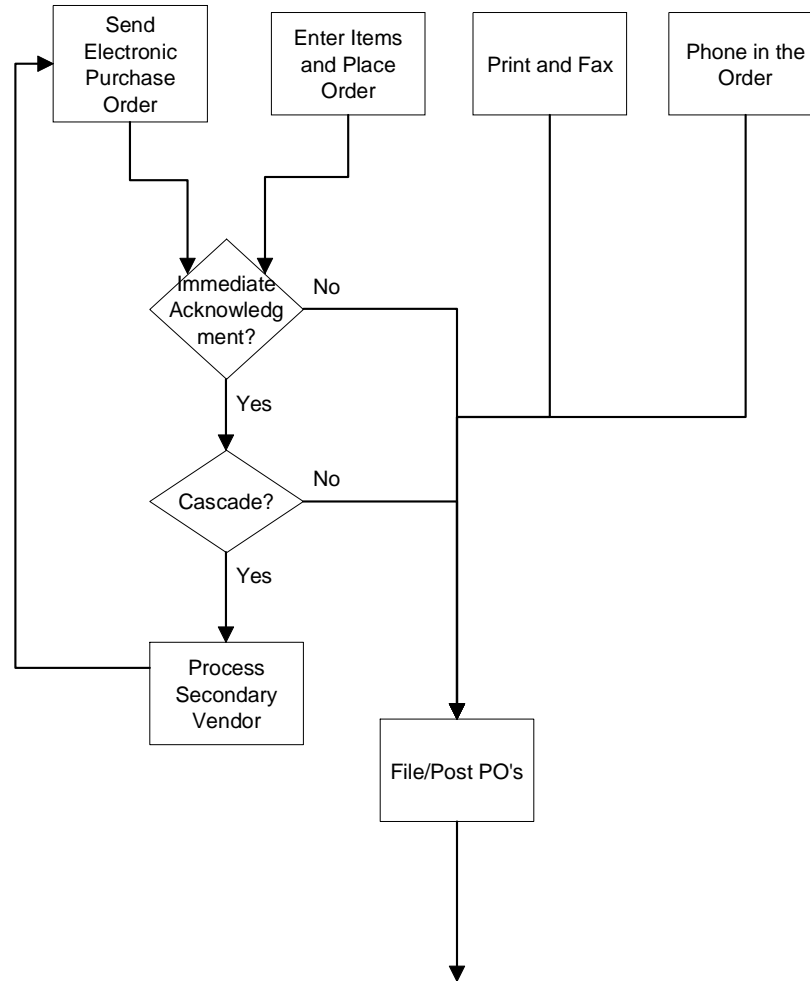


Figure 1. Backlist Ordering Process

2.1.2 Discussion

The process is initiated with specific weekly frequencies for each vendor type. Books and Bibles are ordered up to 3 times/wk, Music is ordered up to 3 times/wk, Gifts are ordered once a week, while Distributor orders are placed daily (Monday – Friday). However, the number of purchase orders generated by each process initiation varies widely and may even be zero. The model has been calibrated so that the total number of purchase orders by vendor type generated in a single month matches the mean and standard deviation provided by the survey data for that store size. Once the candidate list has been generated for a given vendor type, it is reviewed by the buyer, with an average review time of 10 minutes per purchase order (note the candidate list may incorporate a number of purchase orders). After the review and possible adjustment, the computed number of purchase orders is generated. These are transmitted through one of 4 possible transmission modes. Finally, the purchase orders are filed and posted in the system.

2.1.3 Benchmark Input Data

| Parameter | Definition (if applicable) | Type | Specification | Source |
|---------------------------|---|-------------------|---|------------|
| BooksPerMonth | Number of Book POs in a given sample month | Computed Variable | LogNormal(MeanBooksX, StdDevBooksX) X = Small, Medium, Large Small (9.49,16.18) Medium(26.94,26.49) Large (90.59,23.93) | Survey |
| GiftsPerMonth | Number of Gift POs in a given sample month | Computed Variable | LogNormal(MeanGiftsX, StdDevGiftsX) X = Small, Medium, Large Small (4.40,6.44) Medium(10.72,11.10) Large(43.34,25.96) | Survey |
| MusicPerMonth | Number of Music POs in a given sample month | Computed Variable | LogNormal(MeanMusicX, StdDevMusicX) X = Small, Medium, Large Small(7.76,15.46) Medium (12.25,7.18) Large(39.81,13.99) | Survey |
| DistributorPerMonth | Number of Distributor POs in a given sample month | Computed Variable | LogNormal(MeanDistributorX, StdDevDistributorX) X = Small, Medium, Large Small (13.25,16.15) Medium(22.5,18.96) Large(21.17,20.55) | Survey |
| Backlist Books and Bibles | Order process (multiple POs) | Entity | 3 per week (max) | Interviews |
| Backlist Music | Order process (multiple POs) | Entity | 3 per week (max) | Interviews |
| Backlist Gifts | Order process (multiple POs) | Entity | 1 per week (max) | Interviews |
| Distributor | Order process | Entity | 1 per day (max) | Interviews |

Systems View

| | | | | |
|-----------------------------------|---|-------------------|---|------------|
| | (multiple POs) | | | |
| Generate Candidate List | | Activity | Time: Exponential(4) min | Interviews |
| Review Items | | Activity | Time = Gamma(NumPO,10) min (sum of exponentials) | Interviews |
| NumPO | Number of PO's in a given order process | Computed Variable | Poisson(BooksPerMonth/13) Poisson(MusicPerMonth/13) Poisson(GiftsPerMonth/4.33) Poisson(DistributorPerMonth/21.67) | Interviews |
| Create Purchase Order(s) | | Activity | Time = Exponential(1) min per purchase order | Interviews |
| Order Mechanism? | | Decision node | IF ProductCategory = DISTRIBUTOR THEN OrderMechanism = EDI IF ProductCategory = BOOKSANDBIBLES THEN OrderMechanism = D4(45,EDI,5,WEB,45,FAX,5,PHONE) IF ProductCategory = MUSIC THEN OrderMechanism = D4(45,EDI,5,WEB,45,FAX,5,PHONE) IF ProductCategory = GIFTS THEN OrderMechanism = D4(10,EDI,10,WEB,50,FAX,30,PHONE) | Interviews |
| Send Electronic Purchase Order | | Activity | Time = Exponential(1) min | Interviews |
| Enter Items and Place Order (web) | | Activity | Time = Exponential(10) min | Interviews |
| Print and Fax | | Activity | Time = Exponential(5) min | Interviews |
| Phone in the Order | | Activity | Time = Exponential(10) min | Interviews |
| Process Secondary Vendor | | Activity | Time = Exponential(1) min | Interviews |
| Immediate Acknowledgment | | Decision Node | All distributors and web PO's, 50% of other electronic PO's | Interviews |
| Cascade? | | Decision Node | 50% | Assumed |
| File/Post PO's | | Activity | Time = Exponential(1) min | Interviews |
| | | | | |

Table 2. Backlist Ordering Input Data

2.1.4 Outputs

Five hundred simulations (months) were run for each of the three store sizes. Each simulation represents 1 calendar month (average of 730 hours).

| Entity | PO's Processed/Month | Marginal Labor Cost/Month (\$) |
|------------------------------|-------------------------|--------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books and Bibles PO | | |
| <i>Small Store</i> | 8.93; 11.75 | \$65.71; \$75.58 |
| <i>Medium Store</i> | 26.34; 22.91 | \$235.14; \$195.38 |
| <i>Large Store</i> | 89.03; 25.31 | \$1,041.65; \$295.39 |
| Music PO | | |
| <i>Small Store</i> | 8.01; 11.88 | \$48.25; \$60.36 |
| <i>Medium Store</i> | 12.97; 7.86 | \$96.25; \$52.24 |
| <i>Large Store</i> | 40.78; 18.47 | \$359.79; \$130.66 |
| Gift PO | | |
| <i>Small Store</i> | 4.73; 6.52 | \$27.46; \$35.18 |
| <i>Medium Store</i> | 12.08; 11.50 | \$86.91; \$82.17 |
| <i>Large Store</i> | 47.25; 25.39 | \$430.39; \$246.00 |
| Distributor PO | | |
| <i>Small Store</i> | 13.44; 17.19 | \$119.08; \$134.54 |
| <i>Medium Store</i> | 22.50; 20.24 | \$247.05; \$208.51 |
| <i>Large Store</i> | 21.03; 21.32 | \$315.05; \$299.27 |
| Total | | |
| <i>Small Store</i> | 35.10; 26.08 | \$260.52; \$176.79 |
| <i>Medium Store</i> | 73.86; 25.23 | \$665.37; \$317.37 |
| <i>Large Store</i> | 198.08; 45.69 | \$2,146.89; \$522.35 |
| Weighted Annual Total | | |
| | 593.41; 93.22 | \$5,008.40; \$812.89 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$7.42/PO |
| | <i>Medium Store</i> | \$9.01/PO |
| | <i>Large Store</i> | \$10.84/PO |
| | <i>Weighted Average</i> | \$8.44/PO |

Table 3. Backlist Ordering Output Data

2.2 Frontlist Ordering

2.2.1 Process Flow Diagram

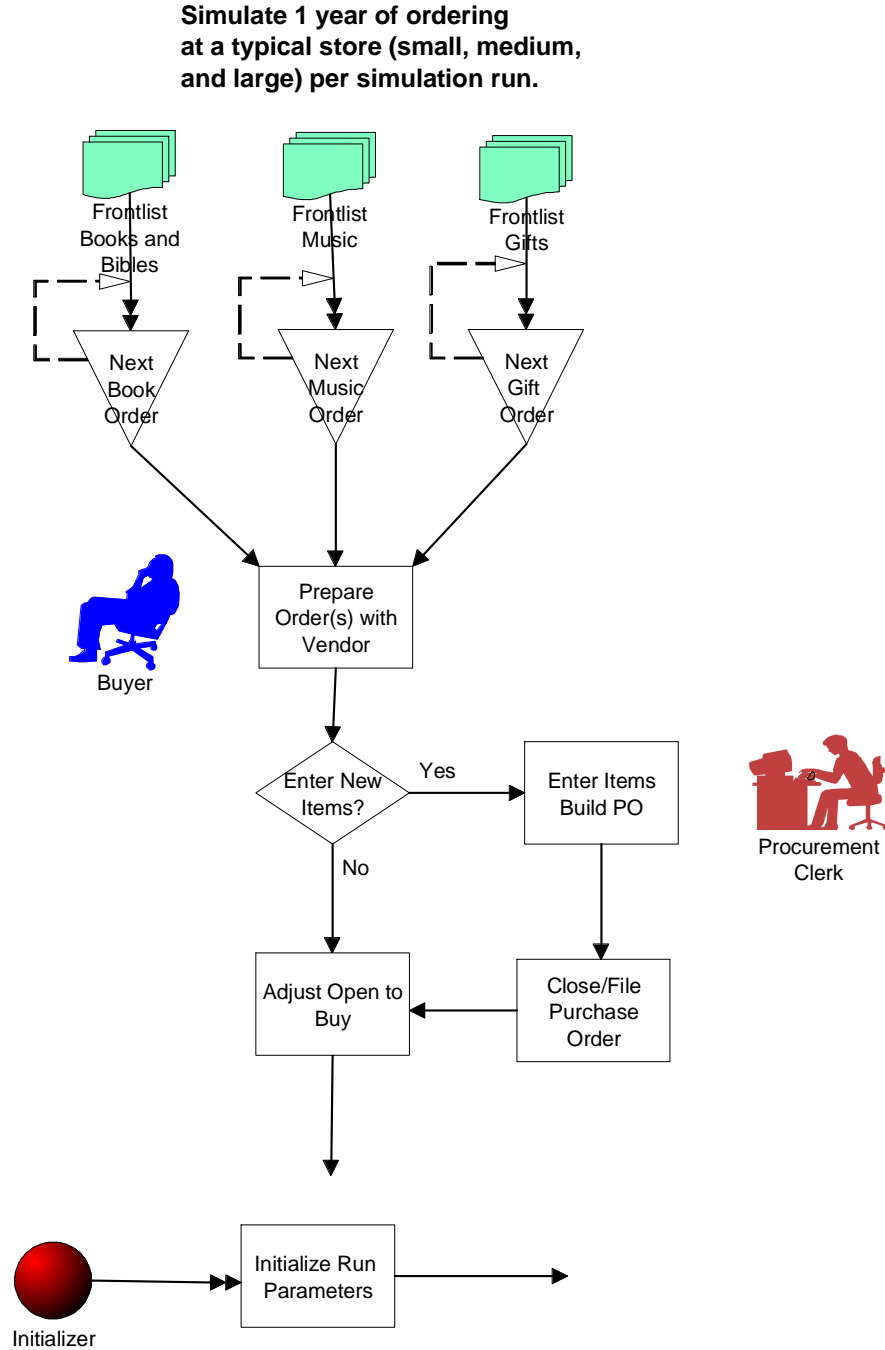


Figure 2. Frontlist Ordering Process

2.2.2 Discussion

This process is initiated with an order frequency distribution that matches the mean and standard deviation determined in the survey for each product type: Books (and Bibles), Music, and Gifts. The buyer then spends time with the vendor – on the phone or in person – preparing the order. If new items are subsequently entered into the POS system, a procurement clerk spends extra time entering item data. Last, the purchase order is entered into the store’s open-to-buy database.

2.2.3 Benchmark Input Data

| Parameter | Definition (if applicable) | Type | Specification | Source |
|------------------------------|--|-------------------|--|------------|
| BooksPerYear | # of Frontlist book orders in a given sample year | Computed Variable | LogNormal(MeanBooksX, StdDevBooksX) X = Small, Med, Large Small(34.15,33.38) Medium(65.17,47.77) Large(147.90,109.98) | Survey |
| GiftsPerYear | # of Frontlist gift orders in a given sample year | Computed Variable | LogNormal(MeanGiftsX, StdDevGiftsX) X = Small, Med, Large Small(18.40,22.32) Medium(52.06,52.61) Large(169.50,149.80) | Survey |
| MusicPerYear | # of Frontlist music orders in a given sample year | Computed Variable | LogNormal(MeanMusicX, StdDevMusicX) X = Small, Med, Large Small(19.43, 19.98) Medium(26.89,12.02) Large(51.00,28.81) | Survey |
| Prepare Order(s) with Vendor | | Activity | IF (ProductCategory = GIFTS) THEN Triangular(15,90,360) min IF (ProductCategory = MUSIC) THEN Triangular(10,100,180) min IF (ProductCategory = BOOKSANDBIBLES) THEN Triangular(20,110,360) min | Interviews |
| Enter New Items? | | Decision Node | Yes if the store enters new items at ordering (rather than receiving). If ProductCategory = GIFTS, store must also enter gifts into POS | Interviews |
| Enter Items Build PO | | Activity | IF (ProductCategory = GIFTS) THEN Triangular(15,102,240) min IF (ProductCategory = MUSIC) THEN Triangular(30,68,120) min IF (ProductCategory = BOOKSANDBIBLES) THEN Triangular(25,120,240) min | Interviews |
| Close/File Purchase Order | | Activity | 5 minutes | Interviews |
| Adjust Open to Buy | | Activity | 1 minute | Interviews |

Table 4. Frontlist Ordering Input Data

2.2.4 Outputs

Each of 500 simulations represents 1 *work* year (2080 hours). For this process, three sets of simulations were run, each representing a different method of handling the way new items are entered into the POS system.

| Entity | Orders Processed/Yr | Marginal Labor Cost/Yr (\$) |
|-------------------------------|----------------------------|------------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books and Bibles Order | | |
| <i>Small Store</i> | 33.39; 33.27 | \$1,644.61; \$1639.95 |
| <i>Medium Store</i> | 60.42; 40.64 | \$3,735.98; \$2504.07 |
| <i>Large Store</i> | 149.36; 97.03 | \$12,313.50; \$8028.34 |
| Music Order | | |
| <i>Small Store</i> | 20.66; 18.27 | \$506.82; \$449.20 |
| <i>Medium Store</i> | 28.06; 12.60 | \$859.73; \$388.51 |
| <i>Large Store</i> | 52.65; 28.30 | \$2,062.97; \$1114.69 |
| Gift Order | | |
| <i>Small Store</i> | 18.10; 19.88 | \$716.61; \$786.44 |
| <i>Medium Store</i> | 50.67; 40.51 | \$2,498.92; \$2344.50 |
| <i>Large Store</i> | 158.34; 116.00 | \$9,964.87; \$7311.72 |
| Total | | |
| <i>Small Store</i> | 72.16; 42.53 | \$2,868.04; \$1851.50 |
| <i>Medium Store</i> | 139.16; 63.59 | \$7,094.64; \$3438.45 |
| <i>Large Store</i> | 360.36; 153.84 | \$24,341.30; \$10897.00 |
| Weighted Annual Total | | |
| | 97.21; 55.74 | \$4,572.80; \$3092.10 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$39.75/Order |
| | <i>Medium Store</i> | \$50.98/Order |
| | <i>Large Store</i> | \$67.55/Order |
| | <i>Weighted Average</i> | \$47.04/Order |

Table 5. Frontlist Ordering - New Items at Ordering, Gifts in System

Systems View

| Entity | Orders Processed/Yr | Marginal Labor Cost/Yr (\$) |
|-------------------------------|----------------------------|------------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books and Bibles Order | | |
| <i>Small Store</i> | 34.38; 29.72 | \$1,701.46; \$1,477.64 |
| <i>Medium Store</i> | 67.09; 46.74 | \$4,142.22; \$2,882.93 |
| <i>Large Store</i> | 137.06; 92.26 | \$11,324.30; \$7,620.79 |
| Music Order | | |
| <i>Small Store</i> | 20.67; 18.27 | \$505.73; \$445.59 |
| <i>Medium Store</i> | 28.05; 12.59 | \$859.97; \$388.27 |
| <i>Large Store</i> | 52.66; 28.37 | \$2,065.37; \$1,117.92 |
| Gift Order | | |
| <i>Small Store</i> | 18.11; 19.89 | \$437.08; \$478.29 |
| <i>Medium Store</i> | 50.72; 47.59 | \$1,588.31; \$1,477.35 |
| <i>Large Store</i> | 158.57; 117.09 | \$6,410.46; \$4,741.32 |
| Total | | |
| <i>Small Store</i> | 73.17; 39.58 | \$2,644.28; \$1,600.10 |
| <i>Medium Store</i> | 145.87; 69.30 | \$6,590.51; \$3,321.47 |
| <i>Large Store</i> | 348.30; 154.36 | \$19,800.20; \$9,165.58 |
| Weighted Annual Total | | |
| | 98.93; 55.60 | \$4,126.60; \$2725.60 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$36.14/Order |
| | <i>Medium Store</i> | \$45.18/Order |
| | <i>Large Store</i> | \$56.85/Order |
| | <i>Weighted Average</i> | \$41.71/Order |

Table 6. Frontlist Ordering - New Items at Ordering, No Gifts in System

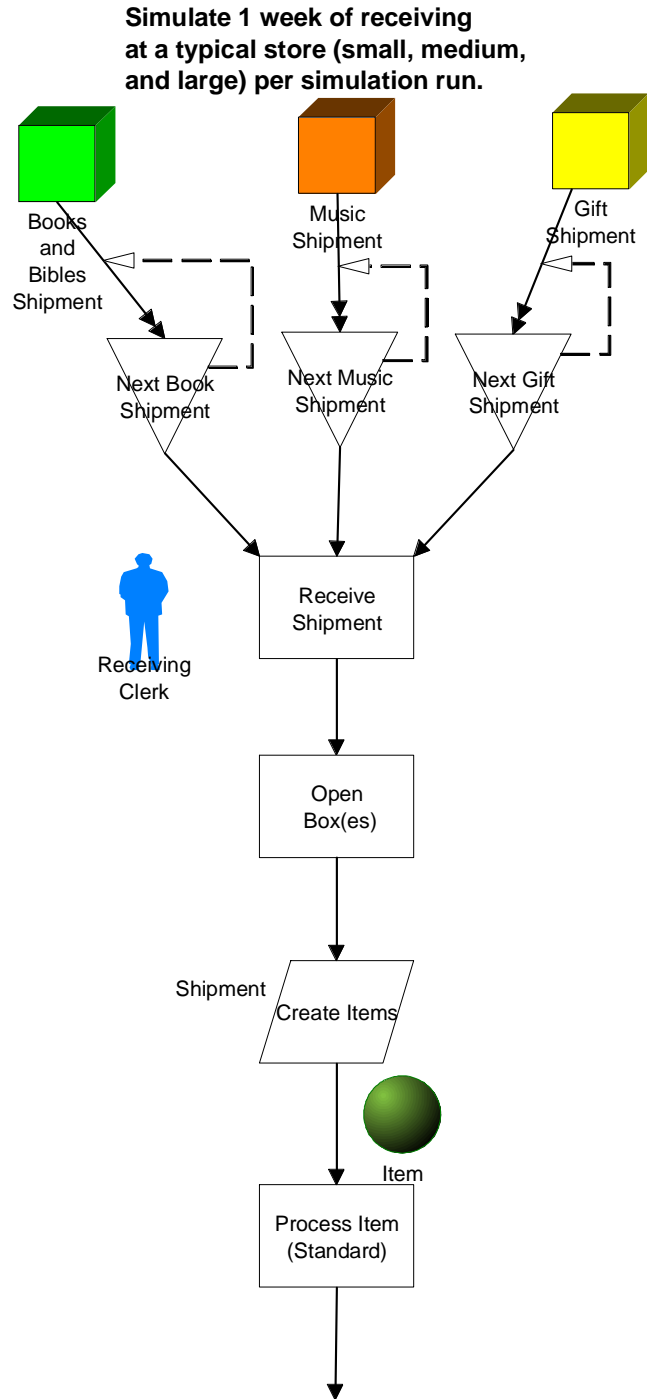
Systems View

| Entity | Orders Processed/Yr | Marginal Labor Cost/Yr (\$) |
|-------------------------------|----------------------------|------------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books and Bibles Order | | |
| <i>Small Store</i> | 33.95; 29.22 | \$1,124.51; \$975.60 |
| <i>Medium Store</i> | 67.15; 50.72 | \$2,842.96; \$2,154.14 |
| <i>Large Store</i> | 143.30; 90.89 | \$8,357.28; \$5,303.67 |
| Music Order | | |
| <i>Small Store</i> | 20.67; 18.27 | \$311.82; \$274.22 |
| <i>Medium Store</i> | 28.08; 12.61 | \$551.66; \$248.25 |
| <i>Large Store</i> | 52.69; 28.42 | \$1,332.38; \$725.00 |
| Gift Order | | |
| <i>Small Store</i> | 18.89; 20.67 | \$437.60; \$477.95 |
| <i>Medium Store</i> | 50.73; 47.59 | \$1,584.92; \$1,490.81 |
| <i>Large Store</i> | 158.58; 117.01 | \$6,400.56; \$4,734.13 |
| Total | | |
| <i>Small Store</i> | 72.76; 38.65 | \$1,873.95; \$1,090.12 |
| <i>Medium Store</i> | 145.96; 69.06 | \$4,979.54; \$2,580.49 |
| <i>Large Store</i> | 354.58; 146.39 | \$16,090.20; \$6,938.66 |
| Weighted Annual Total | | |
| | 98.88; 54.22 | \$3,067.50; \$2,029.60 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$25.76/Order |
| | <i>Medium Store</i> | \$34.12/Order |
| | <i>Large Store</i> | \$45.38/Order |
| | <i>Weighted Average</i> | \$31.02/Order |

Table 7. Frontlist Ordering - No New Items at Ordering

2.3 Receiving

2.3.1 Process Flow Diagram



Systems View

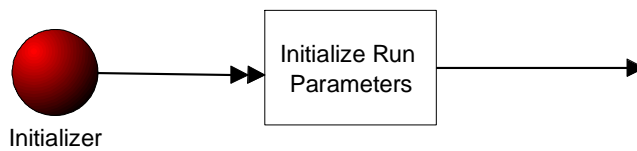
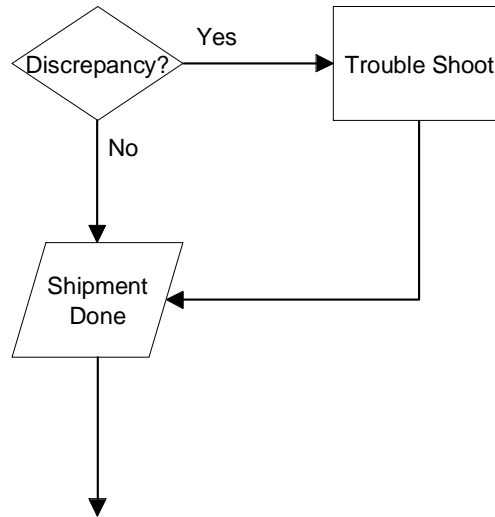
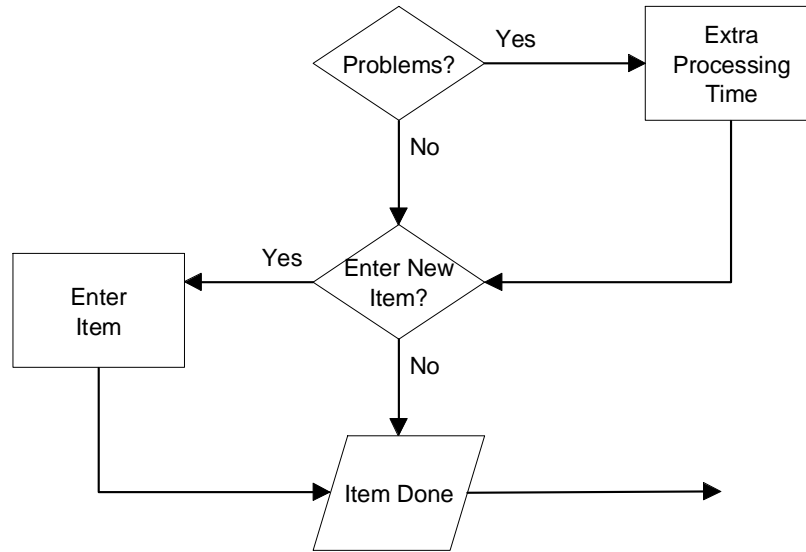


Figure 3. Receiving Process

2.3.2 Discussion

The receiving process generates shipments by product type with a frequency distribution that matches the mean and standard deviation determined in the survey for Books (and Bibles), Music, and Gifts. The shipment is received into shipping, which usually amounts to signing the carriers log, moving boxes, and entering data into the store log. When processing begins, the box is first opened and inspected. Contents are then processed one line item at a time (with an average but highly variable rate of 20 lines per shipment). If the line has a “problem,” extra time (with an average but highly variable rate of 2.5 minutes) is spent resolving the problem. If new items are entered during receiving, an average of 1 minute per line is spent to do so. Finally, if there were any quantity discrepancies in the shipment, time is spent via phone or fax with the vendor to resolve.

2.3.3 Benchmark Input Data

| Parameter | Definition (if applicable) | Type | Specification | Source |
|-------------------------|---|-------------------|--|------------|
| BooksPerWeek | # of book shipments in a given sample week | Computed Variable | LogNormal(MeanBooksX, StdDevBooksX) X = Small, Medium, Large Small, Books (10.29,8.23) Medium, Books (33.49,31.38) Large, Books (88.15,69.99) | Survey |
| GiftsPerWeek | # gift shipments in a given sample week | Computed Variable | LogNormal(MeanGiftsX, StdDevGiftsX) X = Small, Medium, Large Small, Gifts(3.46, 4.35) Medium, Gifts(12.50,11.11) Large, Gifts(36.70,43.23) | Survey |
| MusicPerWeek | # of music shipments in a given sample week | Computed Variable | LogNormal(MeanMusicX, StdDevMusicX) X = Small, Medium, Large Small ,Music(3.42, 2.95) Medium ,Music(10.13,7.84) Large ,Music(21.35,20.80) | Survey |
| Receive Shipment | | Activity | Triangular(1,5,10) minutes | Interviews |
| Open Boxes | | Activity | Triangular(1,5,10) minutes | Interviews |
| Create Items | | Control Node | Exponential(20) lines per shipment | Interviews |
| Process Item (Standard) | | Activity | IF (ProductCategory = GIFTS) THEN Exponential (2) min ELSE Exponential(15) sec | Interviews |
| Problems? | | Decision Node | IF (ProductCategory = GIFTS), use GiftProblemRate, otherwise use NonGiftProblemRate | Interviews |
| GiftProblemRate | % of gift shipments with a receiving issue | Parameter | 24.53% | Survey |

Systems View

| | | | | |
|-----------------------|--|---------------|---|------------|
| NonGiftProblemRate | % of nongift shipments with a receiving issue | Parameter | 5% | Interviews |
| Extra Processing Time | Time per line to resolve receiving issue | Activity | Exponential(2.5) minutes | Interviews |
| Enter New Items? | | Decision Node | Items are entered at this point for stores not doing so at ordering. If ProductCategory = GIFTS, they must also have a policy of entering gifts into their POS system. % new items = (average annual frontlist orders x 3 shipments/order) / (average shipments/year) by ProductCategory and StoreSize. | Interviews |
| Enter Item | | Activity | 1 minute per line | Interviews |
| Discrepancy? | | Decision Node | GiftDiscrepancyRate, BookDiscrepancyRate, MusicDiscrepancyRate | Interview |
| GiftDiscrepancyRate | Percent of gift shipments with qty discrepancy requiring vendor contact | Parameter | 10.44% | Survey |
| BookDiscrepancyRate | Percent of book shipments with qty discrepancy requiring vendor contact | Parameter | 5.9% | Survey |
| MusicDiscrepancyRate | Percent of music shipments with qty discrepancy requiring vendor contact | Parameter | 5.99% | Survey |
| Trouble Shoot | | Activity | Uniform(5,10) minutes | Interviews |
| | | | | |

Table 8. Receiving Input Data

2.3.4 Outputs

Each of 500 simulations represents 1 work week (40 hours). As with Frontlist Ordering, three sets of simulations were run, each representing a different method of handling the way new items are entered into the POS system.

Systems View

| Entity | Shipments Processed | Marginal Labor Cost/Wk (\$) |
|------------------------------|----------------------------|------------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books/Bibles Shipment | | |
| <i>Small Store</i> | 10.62; 7.73 | \$50.34; \$38.03 |
| <i>Medium Store</i> | 32.69; 27.61 | \$174.22; \$148.21 |
| <i>Large Store</i> | 67.84; 36.52 | \$418.34; \$222.04 |
| Music Shipment | | |
| <i>Small Store</i> | 4.01; 2.75 | \$18.79; \$15.35 |
| <i>Medium Store</i> | 10.77; 7.29 | \$55.83; \$38.45 |
| <i>Large Store</i> | 19.97; 16.35 | \$124.71; \$105.20 |
| Gift Shipment | | |
| <i>Small Store</i> | 3.76; 3.69 | \$37.36; \$39.71 |
| <i>Medium Store</i> | 12.29; 9.34 | \$137.28; \$107.22 |
| <i>Large Store</i> | 28.11; 20.48 | \$354.43; \$237.27 |
| Total | | |
| <i>Small Store</i> | 18.40; 8.92 | \$106.50; \$57.17 |
| <i>Medium Store</i> | 55.77; 29.26 | \$367.34; \$177.27 |
| <i>Large Store</i> | 115.92; 36.14 | \$897.49; \$249.30 |
| Weighted Annual Total | | |
| | 1,559.10; 122.81 | \$9,923.60; \$771.40 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$5.79/Shipment |
| | <i>Medium Store</i> | \$6.59/Shipment |
| | <i>Large Store</i> | \$7.74/Shipment |
| | <i>Weighted Average</i> | \$6.36/Shipment |

Table 9. Receiving - New Items at Ordering

Systems View

| Entity | Shipments Processed | Marginal Labor Cost/Wk (\$) |
|------------------------------|----------------------------|------------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books/Bibles Shipment | | |
| <i>Small Store</i> | 10.26; 6.99 | \$53.24; \$37.57 |
| <i>Medium Store</i> | 31.53; 23.78 | \$177.74; \$132.44 |
| <i>Large Store</i> | 67.35; 36.32 | \$430.73; \$219.76 |
| Music Shipment | | |
| <i>Small Store</i> | 4.02; 2.76 | \$21.90; \$17.89 |
| <i>Medium Store</i> | 10.79; 7.30 | \$84.33; \$59.53 |
| <i>Large Store</i> | 19.61; 15.57 | \$129.72; \$104.33 |
| Gift Shipment | | |
| <i>Small Store</i> | 3.76; 3.69 | \$36.71; \$40.15 |
| <i>Medium Store</i> | 12.25; 9.33 | \$138.08; \$107.89 |
| <i>Large Store</i> | 27.59 19.73 | \$346.23; \$229.56 |
| Total | | |
| <i>Small Store</i> | 18.04; 18.49 | \$111.86; \$58.15 |
| <i>Medium Store</i> | 54.58; 25.59 | \$400.16; \$174.68 |
| <i>Large Store</i> | 114.57; 36.42 | \$906.69; \$243.13 |
| Weighted Annual Total | | |
| | 1,529.30; 152.16 | \$10,547; \$763.87 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$6.20/Shipment |
| | <i>Medium Store</i> | \$7.33/Shipment |
| | <i>Large Store</i> | \$7.91/Shipment |
| | <i>Weighted Average</i> | \$6.90/Shipment |

Table 10. Receiving - New Items at Receiving, No Gifts in System

Systems View

| Entity | Shipments Processed | Marginal Labor Cost/Wk (\$) |
|------------------------------|----------------------------|------------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books/Bibles Shipment | | |
| <i>Small Store</i> | 10.73; 8.97 | \$55.31; \$47.83 |
| <i>Medium Store</i> | 31.04; 24.72 | \$173.62; \$137.18 |
| <i>Large Store</i> | 68.89; 37.80 | \$437.18; \$228.68 |
| Music Order Shipment | | |
| <i>Small Store</i> | 4.01; 2.76 | \$21.21; \$16.71 |
| <i>Medium Store</i> | 10.79; 7.28 | \$85.42; \$60.29 |
| <i>Large Store</i> | 19.35; 15.52 | \$127.24; \$105.80 |
| Gift Order Shipment | | |
| <i>Small Store</i> | 3.76; 3.72 | \$38.79; \$42.75 |
| <i>Medium Store</i> | 12.29; 9.47 | \$145.60; \$113.82 |
| <i>Large Store</i> | 26.94; 19.05 | \$361.28; \$236.06 |
| Total | | |
| <i>Small Store</i> | 18.51; 10.04 | \$115.31; \$65.06 |
| <i>Medium Store</i> | 54.12; 26.33 | \$404.64; \$179.05 |
| <i>Large Store</i> | 115.18; 36.26 | \$925.71; \$238.08 |
| Weighted Annual Total | | |
| | 1,543.80; 118.90 | \$10,768.00; \$793.06 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$6.23/Shipment |
| | <i>Medium Store</i> | \$7.48/Shipment |
| | <i>Large Store</i> | \$8.04/Shipment |
| | <i>Weighted Average</i> | \$6.97/Shipment |

Table 11. Receiving - New Items at Receiving, Gifts in System

2.4 Returns

2.4.1 Process Flow Diagram

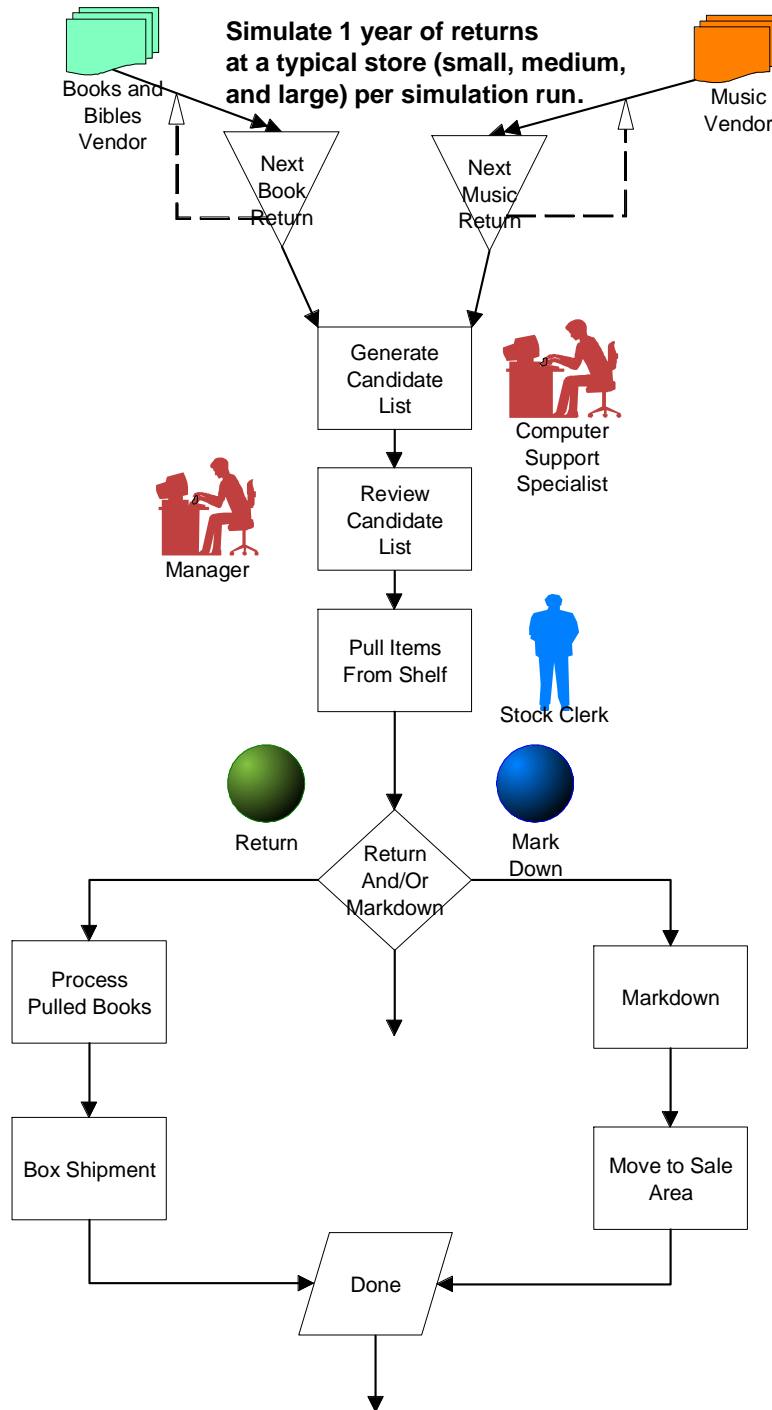


Figure 4. Returns Process

2.4.2 Discussion

This process is initiated at annual frequencies by product type (Books and Music) consistent with interview data. First, a candidate list is generated from the POS system by a computer support specialist. The candidate list is then reviewed by a manager to verify item inclusion and quantities. The adjusted list is used by the stock clerk to physically pull the items from the shelf and relabel. The majority of the items (85%) are returned while the rest are marked down. Returns are processed and boxed for shipment while markdowns are relabeled and moved to a sale area.

2.4.3 Benchmark Input Data

| Parameter | Definition (if applicable) | Type | Specification | Source |
|-------------------------|---|-------------------|---|------------|
| BookReturnsPerYear | Avg. Number of book vendors x returns per vendor | Computed Variable | Small – 52 Medium – 104 Large – Uniform(104,600) | Interviews |
| MusicReturnsPerYear | Avg. Number of music vendors x returns per vendor | Parameter | 12 | Interviews |
| BooksAndBiblesVendor | | Entity | 1 every 2080/Book ReturnsPerYear hours | Interviews |
| Music Vendor | | Entity | 1 every 2080/Music ReturnsPerYear hours | Interviews |
| Generate Candidate List | | Activity | Exponential(5) minutes | Interviews |
| Review Candidate List | | Activity | Exponential(22.5) minutes | Interviews |
| Pull Items from Shelf | | Activity | IF (ProductCategory = MUSIC) Triangular(15,34,60) min ELSE Triangular(15,62,240) min | Interviews |
| Process Pulled Books | | Activity | Uniform (10,15) min per vendor | Interviews |
| Box Shipment | | Activity | Triangular(5,22,60) min per vendor | Interviews |
| Markdown | | Activity | Uniform(15,30) min per vendor | Interviews |
| Move to Sale Area | | Activity | 5 min per vendor | Interviews |

Table 12. Returns Input Data

2.4.4 Outputs

Each of 500 simulations represents 1 work year (2080 hours).

| Entity | Returns Processed | Marginal Labor Cost/Yr (\$) |
|---------------------------------------|--------------------------|------------------------------------|
| | Mean; Std Dev | Mean; Std Dev |
| Books and Bibles Vendor Return | | |
| <i>Small Store</i> | 52; 0 | \$1,345.32; \$57.88 |
| <i>Medium Store</i> | 104; 0 | \$3,200.72; \$96.35 |
| <i>Large Store</i> | 348.82; 139.85 | \$12,833.00; \$5,152.10 |
| Music Vendor Return | | |
| <i>Small Store</i> | 12; 0 | \$224.29; \$21.12 |
| <i>Medium Store</i> | 12; 0 | \$270.19; \$26.05 |
| <i>Large Store</i> | 12; 0 | \$326.26; \$36.41 |
| Total | | |
| <i>Small Store</i> | 64; 0 | \$1,569.61; \$61.18 |
| <i>Medium Store</i> | 116; 0 | \$3,470.91; \$100.57 |
| <i>Large Store</i> | 360.82; 139.85 | \$13,159.30; \$5,155.12 |
| Weighted Annual Total | | |
| | 86.21; 27.19 | \$2,409.40; \$1,004.70 |
| Average Marginal Cost | | |
| | <i>Small Store</i> | \$24.53/Vendor |
| | <i>Medium Store</i> | \$29.92/Vendor |
| | <i>Large Store</i> | \$36.47/Vendor |
| | <i>Weighted Average</i> | \$27.95/Vendor |

Table 13. Returns Output Data

3 Best Practices Review

To help generate process improvement alternatives, we undertook a best practices review to understand how the rest of the bookstore and retail industry is handling similar challenges.

3.1 *Inventory Control and Planning*

Retailing is all about offering the right product at the right place at the right time for the right price (Fisher, et al., 2000). The technology and the data to do this are currently available, yet many retailers are not taking advantage of it. Inventory management is considered by many Christian bookstores to be largely a right brain function based on experience and intuition. However, there are ways to combine the art and science.

Borders uses inventory control software called “Store Replenishment™”, developed by [JDA](#) (see Appendix D). The software uses sophisticated forecasting and order computation algorithms to determine the most profitable order plans. The product is said to consider demand seasonality, order frequency, lead times, vendor minimums, vendor discounts, and service levels in its computations. Service level refers to the probability of items being out of stock.

It is worth noting that Borders’ software vendor, JDA, is the winner of the 2005 VICS Collaborative Commerce Achievement Award for “Best Third Party Provider.” The VICS association honored JDA for its Collaborative Planning, Forecasting and Replenishment (CPFR) solution “that enables retailer-manufacturer partners to synchronize supply chain processes for improved service levels on reduced inventory, increased sales and more efficient logistics order flow.” CPFR is discussed further below.

Barnes and Noble uses an inventory control system developed by i2 technologies, a well known developer of optimization based software products (see Appendix E). The product, i2 for Retail™, is a suite of modules, including Merchandise Planning. Within Merchandise Planning is i2 Replenishment Planner™, a tool that will reportedly:

- Analyze sales data, calculating time-phased forecasts, and creating SKU-level plans
- Calculate dynamic safety stock levels for stores and associated distribution centers
- Provide visibility into the inventory commitment at any point in time
- Manage Replenishing at both distribution center and store level
- Generate plans that reflect actual supply chain capabilities and capacity
- Accounting for seasonal and geographical variances in demand

Systems View

Both the Barnes and Noble and Borders solutions would not directly apply to situations with independent book retailers. The large commercial book store chains have their own distribution system, including distribution centers and centralized buying. However, the concept of making maximal use of data to make forecasts, compute stock levels, and generate orders, is broadly applicable.

A number of retail companies are beginning to use some form of CPFR (Collaborative Planning Forecasting and Replenishment). The key concept of CPFR is that companies and their vendors cooperate through information sharing and process integration to improve the performance of their supply chain interactions to the mutual advantage of both parties. A good overview of the subject can be found in the Collaborative Planning Forecasting and Replenishment (CPFR) process model developed by the Voluntary Inter-Industry Commerce Standards (VICS) association (<http://www.vics.org/topics/cpfr/cpfr>). For a VICS member roster, which includes many well known retailers, see <http://www.vics.org/about/roster/>. The VICS model (VICS, 2004) contains a number of business “scenarios” describing various business-to-business supply chain interactions. The scenario under this standard that applies to the inventory control situation in Christian book stores would be the “Store Replenishment Collaboration” (VICS, 2005). Below is a brief description;

The theory of store replenishment collaboration is sound. Leveraging the insights of both the retailer and manufacturer [vendor] to drive optimal merchandising and replenishment plans at the store shelf, trading partners collaborate on retail events and store POS forecasts. The manufacturer [vendor] and retailer then consider other collaboration points that influence replenishment, such as:

- the demand forecast
- Store clustering
- Store presentation stock/DC safety stock targets
- Assortment optimization
- Order sizing
- Lead times and distribution methods

The output of Store Replenishment Collaboration is an order or series of orders that are committed over a time horizon. The buyer and seller support order generation with their replenishment planning/buying re-buying and production and supply planning organizations respectively. Store collaboration is focused on the closest link to the consumer and consequently directly influences shelf availability. The benefits attributed to Store Replenishment Collaboration include greater visibility to consumer take-away, improved replenishment accuracy, improved in-stocks, overstock reduction, and improved promotional execution. Trading partners have a direct view of how consumers are responding to new products, existing shelf distribution and promotional take-away.

The standard contains two models of store interaction: Retailer Managed Release and Vendor Managed Release. Under the former, the store generally makes an item forecast and initial order plan, with the vendor then suggesting alternatives or possible exceptions. Under the latter, the vendor generates the initial plan, which is then modified by the retailer.

The standard VICS model is most suitable for large vendors and large customers. An individual independent bookstore would not have the resources to establish and maintain

such a system on its own. Two viable approaches would be for bookstore POS vendors to build CPFR into their existing systems, or to use a third-party software acting as an intelligent broker between multiple stores and multiple vendors. A possible starting point for the latter is the “Above The Treeline” software (www.abovethetreeline.com) offered by the company of the same name. The resulting software would likely need to incorporate a blend of concepts from the Retailer Managed Release and Vendor Managed Release models. The store could possibly use the Vendor Managed Release approach for new items (frontlist and recent). After an item has been in the store’s inventory system for several months, it can then be moved to backlist ordering under a Retailer Managed Release approach. During these months, the store could generate enough sales data so that a statistically based forecast using individual store data would provide a valid result. An intriguing possibility is a store-level forecast that combines local store data with aggregated market data. This could essentially provide a unified approach that gradually moves from a primary reliance on vendor data to a reliance on individual store level data as that store generates its own sales history data. Note that any forecast must also be augmented with manual adjustments provided by both store and vendor.

This process would provide a number of significant benefits to the store. First, as the vendor's forecast can be used to set inventory management parameters for new products, less manual buying is needed in the beginning of an item's life cycle. As the forecasts improve there is less need for manual intervention in backlist ordering as well. Second, as the forecasting accuracy improves, the service level of the store increases. This means fewer stock-outs. The improved store service is also the greatest benefit from the vendor's point of view, since reduced stock-out rates translate into increased sales. Third, the improved forecasts should also decrease excess inventory, thereby decreasing inventory holding costs, returns cost, and product obsolescence. Last, such an approach makes it unnecessary for the store to get involved with the details of statistical forecasting.

3.2 Quality Control

Many retailers have difficulty maintaining accurate inventory records (Fisher, et al., 2000). As a result, retailers typically hold more inventory than necessary because of the uncertainties in the true inventory level. One retailer described as “very successful” and a “leader in information systems” found that store records were inaccurate on 71% of its products (Raman, 2000). In addition to causing excess inventories, inaccurate inventory can also lead to lost sales. For example, actual stock-outs may not be detected. Or, items can be in the store, but due to customer reshelving and other issues, the items cannot be found. One bookstore chain found that 19% of their stock-outs were due to this “phantom stock-out” phenomenon (Raman, 2000). Specific methodologies for inventory record accuracy can be found in CBA (2005d), which advocates that bookstores practice “continuous improvement.”

Continuous improvement is a management philosophy that approaches process improvement as a continual process of achieving incremental gains (Chase and Aquilano, 1995). While technology can play a role in continuous improvement, the techniques relate more to organization and management policies and procedures. It also offers sets

of simple tools for diagnosing and addressing problems such as those that lead to the “discrepancies” and “problems” modeled in the “Receiving Process” above (and analyzed below). Tools such as cause-and-effect diagrams and check-sheets can be used to identify and quantify problem sources, while pareto-analysis can help prioritize improvement efforts. These techniques would be applicable to both stores and vendors.

3.3 Industry Benchmarks

The American Booksellers Association (www.bookweb.org) is a not-for-profit organization representing independently owned bookstores. They perform an annual operating survey of member stores. The most recent, publicly available survey (ABA, 2004) summarizes the results from 197 bookstores at 301 locations representing \$451M in annual sales. Comparisons are made to CBA stores via the 2005 Operating Statement Survey, which summarized results from 132 bookstores.

| Metrics | ABACUS | | CBA - Operating Statement Survey | |
|----------------------------------|-------------------|--------------------|----------------------------------|--------------------|
| | Low Profit Stores | High Profit Stores | Average Store | High Profit Stores |
| Inventory Turns | 2.68 | 3.37 | 2.7 | 2.7 |
| Sales Per Selling Sq. Ft. | \$251 | \$405 | \$145 | \$167 |
| COGS % | 60.8% | 59.6% | 61.2% | 60.8% |

Table 14. Selected Metrics from ABA and CBA Store Surveys

Interestingly, the ratio of Cost of Goods Sold to Sales Revenue is relatively flat across all store types. However, the Sales Per Sq. Ft is strikingly lower at CBA survey stores versus ABACUS survey stores. We also see that the most profitable ABACUS stores maintain higher inventory turn rates, 3.37, than CBA or low-profit ABACUS survey stores. The data presents a clear indication that CBA retailers need to improve utilization of current space and inventory holdings to increase sales and profitability, thereby remaining competitive and viable.

4 Cost Benefit Analysis of Potential Changes

In this section we quantify the benefits of a series of possible process changes made to the “as-is” simulation models described in previous sections. In deriving the process related benefits, we use a computational, rather than a simulation approach. The reason is that average benefits are readily computed, while the same benefits could be partially masked by random statistical variation in the simulation outputs. Average process values are taken from the appropriate input data tables. Labor costs are taken from Appendix C. We also examine costs involved in transitioning to the new process such as training or system acquisition.

4.1 Automated Entry of New Items

Determining what front list (new stock) items to buy and in what quantity is a very time consuming process. A single front list order may take anywhere from 30 minutes to six hours to put together. Over the course of a year, a store may place dozens or even hundreds of these orders, depending on store size. This process involves working with a vendor representative in either the store, at a trade show, or over the phone. In some cases, the representative may use a predetermined “package” of titles to include in the order, which along with the precise quantities to order then becomes the subject of negotiation. This appears to be a process almost completely dependent on expert judgment and intuition. In some cases publicly available bestseller lists are consulted as a decision aid.

Entering new items into the POS system is a required but very time consuming next step in front list ordering. Some stores enter this information immediately after an order is placed with the vendor, while others do this at the time of receipt. As discussed above, front list orders can be developed with a vendor representative or over the phone. The representative may be filling out an order sheet, or in many cases, entering the order directly into a laptop computer. In all cases, the requested items already exist in the vendor’s automated system.

A store suggested timesaver would be to have the vendor create an electronic file for the store containing *item data for the order just placed* as well as the resulting purchase order(s). This file could then be imported into the store’s POS system. It appears that some vendors may already have item database files that can be imported into POS systems. This would partially address the automation of entering new item data, but not the purchase order creation. The store interview portion of this study revealed that these databases are currently little utilized. Possible reasons include: incomplete item coverage, new items not in the database at the time of frontlist ordering, avoidance of subscription costs, not knowing the functionality exists or how to use it, differences in item classification, or a (mistaken) management decision that self-entry is more efficient.

4.1.1 Process Benefit Computations

This change would affect “Frontlist Ordering” or “Receiving” processes, depending upon where the store chooses to enter new items into the system. The level of benefit depends on the store policy for entering new items into the system. Some stores enter new item data at the time of the frontlist order, and others at receiving. Some enter gift items into their POS system, while others do not. We assume that no significant training or equipment costs are involved on the part of the store, only differences in processing costs/time as detailed below.

New Items at Ordering – Gifts In System

The following equation template is used to compute labor savings:

Average Annual Labor Savings = (book orders/yr*(minutes per book order/60 minutes per hour) + music orders/yr*(minutes per music order/60 minutes per hour) + gift orders/yr*(minutes per gift order/60 minutes per hour))*procurement clerk wage/hr

Average Small Store Savings

$$(34.15*(120/60) + 19.43*(68/60) + 18.40*(102/60))* \$7.60 = \$924.17$$

Average Medium Store Savings

$$(65.17*(120/60) + 26.89*(68/60) + 52.06*(102/60))* \$8.87 = \$2211.44$$

Average Large Store Savings

$$(147.90*(120/60) + 51.00*(68/60) + 169.50*(102/60))* \$11.18 = \$7174.77$$

Weighted Average Savings

$$(.7509)*(\$924.17) + (.2113)*(\$2211.44) + (.0378)*(\$7174.77) = \mathbf{\$1432.44/yr}$$

New Items at Ordering – No Gifts in System

The following equation template is used to compute labor savings:

Average Annual Labor Savings = (book orders/yr*(minutes per book order/60 minutes per hour + music orders/yr*(minutes per music order/60 minutes per hour))*procurement clerk wage/hr

Average Small Store Savings

$$(34.15*(120/60) + 19.43*(68/60))* \$7.60 = \$686.44$$

Average Medium Store Savings

$$(65.17*(120/60) + 26.89*(68/60))* \$8.87 = \$1426.43$$

Average Large Store Savings

$$(147.90*(120/60) + 51.00*(68/60))* \$11.18 = \$3953.25$$

Systems View

Weighted Average Savings

$$(.7509)*(\$686.44) + (.2113)*(\$1426.43) + (.0378)*(\$3953.25) = \mathbf{\$966.29/yr}$$

New Items at Receiving – Gifts In System

The following equation template is used to compute labor savings:

Average Annual Labor Savings = (book shipments/wk*New Book Rate + music shipments/wk*New Music Rate + gift shipments/wk*New Gift Rate)*20 lines/shipment*(1 minute per line/60 minutes per hour)*receiving clerk wage/hr * 52 weeks/yr

Average Small Store Savings

$$(10.29*0.1915 + 3.42*0.3278 + 3.46*0.3068)* 20* (1/60)* \$7.16*52 = \$515.43$$

Average Medium Store Savings

$$(33.49*0.1123 + 10.13*0.1531 + 12.50*0.2403)* 20* (1/60)* \$8.11*52 = \$1168.95$$

Average Large Store Savings

$$(88.15*0.0968 + 21.35*0.2665 + 36.70*0.2665)* 20* (1/60)* \$9.71*52 = \$4039.91$$

Weighted Average Savings

$$(.7509)*(\$515.43) + (.2113)*(\$1168.95) + (.0378)*(\$4039.91) = \mathbf{\$786.74}$$

New Items at Receiving – No Gifts in System

The following equation template is used to compute labor savings:

Average Annual Labor Savings = (book shipments/wk*New Book Rate + music shipments/wk*New Music Rate)*20 lines/shipment*(1 minute per line/60 minutes per hour)*receiving clerk wage/hr * 52 weeks/yr

Average Small Store Savings

$$(10.29*0.1915 + 3.42*0.3278)* 20* (1/60)* \$7.16*52 = \$383.69$$

Average Medium Store Savings

$$(33.49*0.1123 + 10.13*0.1531)* 20* (1/60)* \$8.11*52 = \$746.70$$

Average Large Store Savings

$$(88.15*0.0968 + 21.35*0.2665)* 20* (1/60)* \$9.71*52 = \$2393.78$$

Weighted Average Savings

$$(.7509)*(\$383.69) + (.2113)*(\$746.70) + (.0378)*(\$2393.78) = \mathbf{\$536.38}$$

4.1.2 Transition Costs

We assume that most of the costs in transitioning to this alternative would initially be borne by POS vendors. This includes software development and any data standardization costs. However, the store benefits are large enough that an increase in maintenance and subscription fees paid by stores to POS vendors could be increased to cover these costs. If annual fees were increased by, say, **\$100/yr**, almost all stores could still benefit significantly, regardless of their item entry policy.

4.2 Decrease Discrepancy Rate

Receiving shipments of books and music is a relatively speedy process at all stores visited. The bottleneck in this process is resolving discrepancies due to either damage or incorrect quantities. All types of shipments suffer from various types of discrepancies such as damaged goods, incorrect ship quantities, incorrect prices, or incorrect discount. Typically, about 6% of book and music shipments and 10.5% of gift shipments were reported to have some sort of discrepancy. A discrepancy is typically resolved with a phone call to the vendor, requiring perhaps 5-10 minutes per incident.

4.2.1 Process Benefit Computations

This change would only affect the “Receiving Process.” In this scenario we assume that discrepancy rates are reduced by half. The following equation template is used to compute labor savings:

Avg. Annual Labor Savings = 0.5 * (book shipments/wk*book discrepancies/shipment + music shipments/wk*music discrepancies/shipment + gift shipments/wk*gift discrepancies/shipment) * (7.5 minutes per shipment/60 minutes per hour)*receiving clerk wage/hr * 52 weeks/yr.

Average Small Store Benefit

$$0.5 * (10.29*0.059 + 3.42*0.0599 + 3.46*0.1044) * (7.5/60) * \$7.16 * 52 = \$27.30/yr$$

Average Medium Store Benefit

$$0.5 * (33.49*0.059 + 10.13*0.0599 + 12.50*0.1044) * (7.5/60) * \$8.11 * 52 = \$102.47/yr$$

Average Large Store Benefit

$$0.5 * (88.15*0.059 + 21.35*0.0599 + 36.70*0.1044) * (7.5/60) * \$9.71 * 52 = \$325.40/yr$$

Weighted Average Savings

$$(.7509)*(\$27.30) + (.2113)*(\$102.47) + (.0378)*(\$325.40) = **\$54.45/yr**$$

4.2.2 Transition Costs

How do we achieve a 50% reduction in quantity discrepancies? In this situation, some of the transition costs would be borne by the vendors. Their motivation for doing this could

be a vendor certification program sponsored by CBA. Vendors would not receive a CBA “seal of approval” until they had brought the quality of their shipping processes, including accuracy rates, up to a required standard.

Stores would also be responsible for making improvements, most feasibly using a “continuous improvement” management strategy. Sources of errors, such as operator error during data entry, could be identified, and the potential for future error minimized. For example, if errors occur mostly with fax or phone orders, the store could increase efforts to convert more ordering to EDI, thus eliminating one or more manual data entry steps. It is difficult to put a value on the transition costs – but we believe it could be accomplished largely by reprioritizing use of current resources.

4.3 Decrease Gift Problem Rate

Receiving shipments of gift orders is very time consuming relative to books and music. Some of this, such as unpacking and unwrapping cannot be avoided. Other problems are due to vendor practices. Problems include:

- Individual units of a single item within a box are not labeled separately.
- Items may have a stock number but no standard UPC code
- Items may have no identifying label at all.
- Packing slip is at the bottom of a shipping case.
- Packing slip may not reference original purchase order number or invoice number
- Invoice is not included with the shipment (sent later).
- Packing list may not have individual prices (retail and/or purchase) needed for labeling

Note that some of these problems apply to non-gift receipts as well, but are much more common with gifts. The impact of these problems is that many gift items require time-consuming investigative research during receiving. Some stores try to reduce problems with gift receipt by not even attempting to capture gifts in the POS system. Of course this creates additional problems of its own in trying to manage gift inventory.

4.3.1 Process Benefit Computations

This change would also only affect the “Receiving process.” In this scenario we assume that gift problem rates (currently averaging 0.2453) are reduced by half. The following equation template is used to compute labor savings:

Avg. Annual Labor Savings = $0.5 * (0.2453 \text{ problems/shipment line}) * \text{shipments/wk} * 20 \text{ lines/shipment} * (2.5 \text{ minutes per line}/60 \text{ minutes per hour}) * \text{receiving clerk wage/hr} * 52 \text{ weeks/yr}$.

Average Small Store Savings

$0.5 * (0.2453) * 3.46 * 20 * (2.5/60) * \$7.16 * 52 = \$131.67/\text{yr}$

Average Medium Store Savings

$$0.5 * (0.2453) * 12.50 * 20 * (2.5/60) * \$8.11 * 52 = \$538.79/\text{yr}$$

Average Large Store Savings

$$0.5 * (0.2453) * 36.70 * 20 * (2.5/60) * \$9.71 * 52 = \$1893.98/\text{yr}$$

Weighted Average Savings

$$(.7509)*(\$131.67) + (.2113)*(\$538.79) + (.0378)*(\$1893.98) = \mathbf{\$284.31/\text{yr}}$$

4.3.2 Transition Costs

How do we achieve a 50% reduction in gift problems? In this situation, transition costs would be mostly borne by the vendors. Their motivation for doing so could be a vendor certification program sponsored by CBA. Vendors would not receive a CBA “seal of approval” until they had brought the quality of their shipping processes up to a required standard. This is similar to the treatment of overall discrepancy rates.

4.4 Improved/Automated Inventory Control

One of the problems found in current ordering and receiving practices is in the area of inventory management. The issue here is “process control” rather than process design. One can have very efficient ordering and receiving processes, but still have poor inventory management. Determining what, when, and how much to order play a major role in determining store profitability. It is apparent that bookstore inventory management is as much art as science. Each store visited has seasoned experts doing an admirable job of inventory management, but with only minimal support from their POS systems.

All POS systems observed in this study support “min/max” inventory control parameters, which are used to manage backlist stock. The idea is that when stock levels fall below the “min,” stock should be ordered up to the “max” (often the two values are the same). This is known as a Reorder Point (ROP) inventory strategy. A candidate restocking order list can be generated by the POS system that shows all items whose stock level is below the “min.” Only one of the nine stores interviewed uses the POS computed min/max values from the candidate list directly as given for ordering purposes. In the store survey (Appendix B), only 44% of respondents indicated use of POS min/max values for ordering purposes. Some stores start with the automatic list, but then manually scrutinize each item to either remove it from the list or adjust the quantity. In the store survey, of those using min/max values, 36% report that “considerable” amounts of adjusting are required (the rest report “some” adjustment). Others do not use the min/max at all, but instead manually scan the entire inventory report on a periodic basis to generate order lists based on their own judgment and intuition. (The store mentioned above using the computed min/max values augments the ordering with this manual technique on a semiannual basis.)

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It should be noted that stores may adjust the suggested maximum due to cash flow concerns; that is, they may not have the free cash to support the full order(s). But this also implies a distrust of the ordering system. If the system were operating correctly, store owners would be more assured that quantities ordered will provide a good return on investment (as measured by GMROI) and will find ways to finance the transactions. Below (Section 4.4.2), we will discuss how an improved system could free up the needed working capital by reallocation from excess inventories.

Similarly, a candidate returns list can be generated that shows all items whose stock level is above the “max” (perhaps with additional demand related screens). Only 25% of store survey respondents indicated use of POS min/max values for generating a candidate returns list. Of these, 60% report that the lists need “considerable” adjustments. Clearly, there is little confidence in “min/max” values computed by the existing POS systems. Most users do not even know how they are computed by their system.

At the heart of any inventory control system is a demand forecast. None of the POS systems supports more than a very rudimentary implied forecasting capability. The “forecast” typically consists of taking the last x periods of demand for a single item, and projecting the average demand from that time span out for another y periods as a demand forecast for that item. For example, ‘assume that next month’s demand is equal to the average for the last two months.’ The user can set the x and y type parameters, but only on a storewide basis. (Users can also usually set the “min/max” values themselves manually on an item-by-item basis.) The result becomes the “stocking level” (min = max) for that item that appears on a candidate order report or returns list. The POS user has no automated way of handling demand trends, seasonality, product life-cycle, or mark-down/sale demand. There is also no automated consideration of the relationship between individual item demand and demand for the category in which the item is placed. There is no link to vendor demand data that could provide market-wide information.

Another alternative approach used by some POS systems for forecasting/inventory control is the use of “strata.” Items fall into one of a set of demand stratum such as 1-10 units, 11-20, etc. over some fixed time period. All items falling in a stratum are given a stock level assigned to that stratum set by the user. This again implies a “forecast” equivalent to the historical demand.

These deficiencies in the POS systems are likely generating large amounts of hidden costs to stores – inventory holding costs (the costs of having too much of something) and lost sales costs (the costs of not having enough of something).

We propose an alternative CPFR based system as discussed in “Inventory Planning and Control” in the “Best Practices Review” section. This system does not currently exist for independent bookstores, but could be developed by modifying existing POS or third-party inventory planning software. The system would be integrated with the store POS system so that real time inventory and sales data could be utilized. The system would provide item level forecasts for both frontlist and backlist items using both store and vendor data. Statistical forecasts would be augmented by adjustments from store and

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vendor personnel providing judgment-based information. The forecasts would then be used by algorithms that compute optimal stocking levels for a given desired service level. These stock levels would provide the basis for ordering decisions and returns decisions. The process would be automated so that complete order and return lists could be generated as needed. Virtually all POS systems already possess the capability to generate purchase orders from candidate order lists. Clearly, a CPFR system would require some form of vendor accountability, such as GMROI metrics² (by vendor, category, etc) on frontlist items whose order quantities are derived from vendor forecasts. There is no single definition of GMROI. For example, there are different ways to compute the average holding cost component

4.4.1 Process Benefit Computations

This alternative has the most pervasive effects, with impacts on “Backlist Ordering,” “Frontlist Ordering,” and “Returns” processes.

Backlist Ordering

In this alternative, we assume that the average time needed to review the candidate buy list is reduced from 10 minutes/vendor (purchase order) to 5 minutes/vendor. No further reduction can be assumed because the store still must spend time making adjustments for unusual circumstances that would not be known via statistical forecasting alone. These include in-store promotions/sales or other local events that might boost or drop sales for particular titles. The following equation template is used to compute labor savings:

Avg. Annual Labor Savings = $0.5 * (10 \text{ minutes per order} / 60 \text{ minutes per hour}) * (\text{book orders/month} * \text{book buyer wage/hr} + \text{music orders/month} * \text{music buyer wage/hr} + \text{gift orders/month} * \text{gift buyer wage/hr} + \text{distributor orders/month} * \text{book buyer wage/hr}) * 12 \text{ months/yr}$

Average Small Store Savings

$(5/60) * (9.49 * \$12.05 + 7.76 * \$9.27 + 7.76 * \$9.27 + 13.25 * \$12.05) * 12 = \$417.89/\text{yr}$

Average Medium Store Savings

$(5/60) * (26.94 * \$15.54 + 12.25 * \$12.05 + 12.25 * \$12.05 + 22.50 * \$15.54) * 12 = \$1063.52/\text{yr}$

Average Large Store Savings

$(5/60) * (90.59 * \$21.27 + 39.81 * \$15.54 + 39.81 * \$15.54 + 21.17 * \$21.27) * 12 = \$3614.43/\text{yr}$

Weighted Average Savings

$(.7509) * (\$417.89) + (.2113) * (\$1063.52) + (.0378) * (\$3614.43) = \mathbf{\$675.14/\text{yr}}$

² There is no single definition of GMROI, for example, there are different ways to compute the average holding cost component. Therefore any CPFR system will need to account for and reconcile these existing formulations before introducing a standard.

Frontlist Ordering

Under this alternative, we assume that the time spent working with book and music vendors to prepare an order is cut by 25% (we assume that gifts remain intrinsically difficult). With better information, both selection of titles and determination of order quantities are simplified. First we note that the current order preparation times have the following mean values, based on the formula for the mean of triangular distributions:

Books and Bibles: $1/3 * (20 + 110 + 360) = 163.33$ minutes

Music: $1/3 * (10 + 100 + 180) = 96.67$ minutes

Gifts: $1/3 * (15 + 90 + 360) = 155$ minutes

The following equation template is used to compute labor savings:

Avg. Annual Labor Savings = $0.25 * (\text{book orders/yr} * (\text{minutes per order/minutes per hour}) * \text{book buyer wage/hr} + \text{music orders/yr} * (\text{minutes per order/minutes per hour}) * \text{music buyer wage/hr} + \text{gift orders/yr} * (\text{minutes per order/minutes per hour}) * \text{gift buyer wage/hr})$

Average Small Store Savings

$0.25 * (34.15 * (163.33/60) * \$12.05 + 19.43 * (96.67/60) * \$9.27 + 18.40 * (155/60) * \$9.27) = \$462.76/\text{yr}$

Average Medium Store Savings

$0.25 * (65.17 * (163.33/60) * \$15.54 + 26.89 * (96.67/60) * \$12.05 + 52.06 * (155/60) * \$12.05) = \$1224.87/\text{yr}$

Average Large Store Savings

$0.25 * (147.90 * (163.33/60) * \$21.27 + 51.00 * (96.67/60) * \$15.54 + 169.50 * (155/60) * \$15.54) = \$4161.24/\text{yr}$

Weighted Average Savings

$(.7509) * (\$462.76) + (.2113) * (\$1224.87) + (.0378) * (\$4161.24) = \mathbf{\$763.60/\text{yr}}$

Returns

Under this alternative, we assume that the frequency of returns is decreased in proportion to the reduction in average inventory (see Cost/Benefit analysis below). This implies a reduction of $33,357/159602 = 20.9\%$. The following equation template is used to compute labor savings:

Avg. Annual Labor Savings = Current labor cost/yr * .209

Average Small Store Savings

$1345.32 * .209 = \$281.17/\text{yr}$

Average Medium Store Savings

$3200.72 * .209 = \$668.96/\text{yr}$

Average Large Store Savings

$$12833 * .209 = \$2682.09/\text{yr}$$

Weighted Average Savings

$$(.7509) * (\$281.17) + (.2113) * (\$668.96) + (.0378) * (\$2682.09) = \mathbf{\$453.86/\text{yr}}$$

4.4.2 Inventory Related Costs/Benefits

We assume that one outcome of improved forecasting and inventory control is a more efficient deployment of inventory resources, that is, an improved ability to stock the right item, at the right place, at the right time. This will come about from a reduction of average stock in some items, and increases of average stock in others. In our analysis, we will also assume no net change in inventory investment dollars. To estimate the net benefits to an average CBA store, we begin by noting the following values from the most recent CBA Operating Statement Survey (CBA, 2005a):

$$\text{Averages Sales Per Store} = \$695,172$$

$$\text{Average Cost of Goods Sold} = .612 \times \text{Sales}$$

$$\text{Average GMROI} = \$1.69$$

The formula for GMROI (Gross Margin Return on Inventory) is:

$$\text{GMROI} = (\text{Sales} - \text{Cost of Goods Sold}) \div \text{Average Inventory}$$

If we assume an “average store” is one in which all operating values are at the average values in the survey, we can say that:

$$\text{GMROI} = (\$695,172 - \$425,444) / \text{Average Inventory} = \$1.69$$

If we solve for “Average Inventory”, we find:

$$\text{Average Inventory} = \$159,602$$

As a double-check, observe that the corresponding inventory turnover is

$$\text{Cost of Sales/Average Inventory} = \$425,444 / \$159,602 = 2.67$$

This value is consistent with the 2.7 average turnover reported in the same survey. At this point we need to make an assumption about an “ideal” inventory turnover. A higher inventory turnover is not always better; too high and you start getting too many lost sales from lack of inventory. We shall assume that the average value, 3.37, for “high profit” stores from the ABACUS survey above reflects a value close to this ideal. This higher inventory turnover indicates lower average inventory for the same cost of sales:

$$\text{Average Inventory} = \text{Cost of Sales/Inventory Turnover} = \$425,444 / 3.37 = \$126,245$$

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implying an average inventory reduction of $\$159,602 - \$126,245 = \$33,357$. This equates to investment that can be redeployed by the store to increase sales (decrease lost sales). It is reasonable to assume that this amount of inventory investment can be redirected profitably. For example, respondents to the out-of-stock question in the CBA Core Inventory Survey reported an average out-of-stock rate of approximately 29% (CBA, 2005b). A CBA affiliated Christian marketing group reported an average out-of-stock rate (of their suggested core inventory) of 43% among a large sample of independent stores (CBA, 2005c). (Note that these out-of-stock values represent two components: a) not carrying recommended titles, and b) not maintaining stock of titles that are carried. The store survey showed that the level of the second component, (b), averages around 13.63%.) Based on this data, we will assume that the average of $\$33,357$ can indeed be redeployed so that it generates at least the same ratio of annual sales to average inventory as the remaining stock; that is:

$$\text{Average Additional Sales} = (\$695,172 / \$126,245) \times \$33,357 = \$183,681.$$

We then assume that the average after tax profit rate (for profitable stores in CBA, 2005a) of 3.7% would provide

$$\text{Average Net Profit} = .037 \times \$183,681 = \mathbf{\$6,796/\text{yr}}$$

This would be the profit in an “average” store with $\$695,172$ in annual sales (as defined in the Operating Statement Survey). We can use an approximation technique to scale this value for store size. Small stores are defined as those with 0 to $\$750\text{K}$ in annual sales revenue. If we use the midpoint of $\$375\text{K}$ as an “average” for small stores, we can estimate the Small store Average Net Profit as $(375,000/695,172) \times 6,796 = \$3,666$. Medium stores are defined as those with sales between $\$750\text{K}$ and $\$2\text{M}$. Using the midpoint of $\$1,375,000$ we can estimate the Medium store Average Net Profit as $(1,375,000/695,172) \times 6,796 = \$13,442$. To estimate the Large store average, we use the fact that $695,172$ should be a weighted average of the three store size specific values. Using our weightings from the CBA membership survey we have $(.7509) \times 3666 + (.2113) \times 13442 + (.0378) \times X = 6796$, where X is the desired quantity. Solving for X we determine that the Large store Average Net Profit = $\$31,823$.

$$\text{Average Net Profit (Small Store)} = \mathbf{\$3,666/\text{yr}}$$

$$\text{Average Net Profit (Medium Store)} = \mathbf{\$13,442/\text{yr}}$$

$$\text{Average Net Profit (Large Store)} = \mathbf{\$31,823/\text{yr}}$$

4.4.3 System Cost

In this section we estimate the marginal installation and subscription costs to a software system implementing the proposed CPFR capabilities. To overcome possible user trust issues, we assume a third-party vendor, not directly affiliated with the current POS vendors - a model exemplified by Above the Treeline. The relevant costs are the marginal costs of including these additional inventory control capabilities into the existing software. Currently, Above the Treeline has a one-time installation cost averaging $\$500$, and a monthly subscription rate averaging $\$50-\100 (Steele, 2005). As a “worst-case estimate,” it is safe to assume that the *marginal* costs would be no greater

than the existing costs, that is, the total future costs must be less than double the current costs. This implies *marginal* costs no greater than **\$500** at installation and **\$75/month (\$900/yr)** on average for the subscription.

4.4.4 Training Costs

Most POS vendors as well as Above the Treeline offer free or low cost training for their products. The largest training cost to stores is the time spent by users. As with “System Costs” above, we seek to estimate the marginal training costs associated with the proposed CPFRR capabilities. The basic training needed to use the current Above the Treeline system is approximately 2 hours (Steele, 2005). However, it would likely require an additional 4 hours to gain familiarization and apply it to the specific store (CBA, 2005e). We shall use these as our benchmark, and assume that the marginal additional training time for CPFRR capabilities is 6 hours. We further assume that each store will need to train three people (manager, frontlist buyer, and backlist buyer). We also assume that this training occurs yearly due to personnel turnover and new software developments. If the training occurs online or at existing CBA conferences then no additional travel costs are involved, implying 18 hours annual training time. According to the CBA survey (CBA, 2005a) the average salary for non-store owner managers is \$26,000/yr or \$12.50/hr.

$$18 \times \$12.50 = \mathbf{\$225/year}$$

4.4.5 Summary

Using the following computation template:

$$\text{Net Benefit} = \text{Process Benefits} + \text{Inventory Related Benefits} - \text{System Cost} - \text{Training}$$

Average Small Store Savings

$$(\$417.89 + \$462.76 + \$281.17) + \$3,666 - \$900 - \$225 = \$3,702.82$$

Average Medium Store Savings

$$(\$1,063.52 + \$1,224.87 + \$668.96) + \$13,442 - \$900 - \$225 = \$15,274.35$$

Average Large Store Savings

$$(\$3,614.43 + \$4,161.24 + \$2,682.09) + \$31,823 - \$900 - \$225 = \$41,155.76$$

Average Net Benefit =

$$(\mathbf{\$675.14} + \mathbf{\$763.60} + \mathbf{\$453.86}) + \mathbf{\$6,796} - \mathbf{\$900} - \mathbf{\$225} = \mathbf{\$7,563.60/yr}$$

There is also a one time installation cost of **\$500**.

4.5 Summary of Cost/Benefit Analysis

The four improvement options are summarized in the table below in order of estimated benefit.

| Option | Transition Cost | Individual Store Values | | | | Industry Net Annual Benefit (\$/yr) ^c |
|---|--------------------------|-------------------------|--------------------------|---------------------------|------------------------------------|--|
| | | Net Annual Benefits | | | | |
| | | Small Store (\$/yr) | Medium Store (\$/yr) | Large Store (\$/yr) | Average Store (\$/yr) ^b | |
| Improved/Automated Inventory Control ^a | \$500 (one time) | 3,702.82 | 15,274.35 | 41,155.76 | 7,563.60 | \$14,537,239^d |
| Automating Entry of New Items | \$100/yr | 283.69 to 824.17 | 646.70 to 2,111.44 | 2293.78 to 7,074.77 | 436.38 to 1,332.44 | \$838,722 to \$2,560,950 |
| Decrease Gift Problem Rate by 50% | Store management refocus | 131.67 | 538.79 | 1,893.98 | 284.31 | \$546,444 |
| Decrease Discrepancy Rate by 50% | Store management refocus | 27.30 | 102.47 | 325.40 | 54.45 | \$104,653 |

Table 15. Cost/Benefit Summary

Notes:

a) Assumes 50% reduction in backlist ordering time, 25% reduction in frontlist ordering time, 20.9% reduction in returns processed, and \$975/yr subscription and training costs.

b) Uses the weights derived from the CBA membership survey: Small – 75.09%, Medium – 21.13%, Large – 3.78% (see footnote 1)

c) Assumes 1,922 stores per the CBA membership survey, i.e., Average Store [value] x 1922 stores

d) Does not include the assumed one-time cost of \$500 x 1922 stores = \$961,000

5 Discussion and Recommendations

5.1 Problems and Discrepancies

We have seen that reduction of error rates during receiving (both “problems” and “discrepancies”) has the least impact in terms of directly measurable marginal labor costs. This is not to say that quality improvement efforts here should not be pursued. For one, the costs computed here are likely to underestimate the total true costs. Errors introduced into the system typically have secondary ripple effects such as the costs of inaccurate inventory records. In addition, correcting problems with incoming shipments is a highly visible irritant to those dealing with them, as it is correctly perceived as wasted and unproductive time. Wages paid at Christian stores tend to be below market value – a tradeoff gladly made by employees – thus some of the costs of wasted time are borne directly by the employees and thus not measured. There are several recommendations related to these areas. First, CBA should initiate a *supplier certification* program. Bookstores would have access to supplier ratings, and would find it in their interest to do business with certified vendors. Vendors would then find it in their interest to improve the quality of their order taking and shipment processes. There would likely be a greater move to EDI by both parties as it would automate more activities now subject to manual data entry and subsequent human error.

There has been some discussion of a supplier certification program by the Christian Product Standards Group (CPSG, 2004). This discussion has focused on EDI standards and electronic submission of product data (the latter could actually benefit the “Automating Entry of New Items” issue discussed below). These standards should be a component of supplier certification, but separate *quality-based* criteria are also needed. These would necessitate some form of sampling/data collection to monitor vendor compliance. There are numerous sources of information on designing a supplier certification program. See, for example, Maass (1990), or seminars provided by the American Management Association (<http://www.amanet.org/seminars/>).

The second recommendation is that individual stores pursue policies of “*continuous improvement*” with regard to ordering and receiving processes. The focus needs to be on eliminating possible sources of error – automating manual processes; careful selection of vendors, considering not just price but quality, reliability, and timeliness (or whether they are “certified” as suggested above); more inventory cycle counting; and error diagnosis and tracking tools such as cause-and-effect diagrams and pareto-analysis.

5.2 Automating Entry of New Items

The *process* change with greatest impact is automating the entry of new (“frontlist”) items. The impact is great because, first, item entry is time-consuming, whether done at receiving or ordering. Second, new item entry is done frequently. During the store interview phase of this study, several wondered why this information could not be

provided by most vendors in electronic format at the time the order was placed, and then imported directly into their POS system. This study recommends that CBA encourage suppliers to provide this data as a standard part of frontlist ordering, and encourage POS vendors to provide a simple import capability for the data. Suppliers could perhaps be motivated by making this a part of supplier certification. POS vendors could be motivated by a justified increase in system maintenance and subscription prices paid by stores (we assume \$100/yr in the analysis).

5.3 Improved/Automated Inventory Control

The change with overall greatest impact, improved/automated inventory control, is less a process change than a *process control change*. It is arguably the most difficult to achieve as it relies on a hypothesized information system that does not currently exist. The closest current product is the web-based Above The Treeline software. It has the capability to integrate with most store POS systems and already has access to sales data from a number of vendors. It lacks a full blown CPFR capability as well as the ability to make sophisticated forecasts from historical data. This study recommends that software vendors be encouraged to develop their products in this direction as the potential benefits are relatively large. This is *not* a recommendation for Vendor Managed Inventory (VMI), but a middle ground incorporating a combination of Retailer Managed Release and Vendor Managed Release as described earlier in this report (see section 3.1). It provides the best way to compete with the sophisticated and proprietary inventory control systems used by major chain bookstores. Clearly this will require careful consideration of store requirements and preferences. Processes must be developed whereby stores and vendors cooperate to develop joint forecasts and collaborate to develop purchase orders. The system will require accountability metrics, such as GMROI by vendor, category, etc, so that stores will be willing to give up a certain amount of control. In return they would enjoy reduced inventory costs (holding and lost sales), more efficient ordering, and reduced returns.

6 References

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Appendix A: Summary Store Data From Store Interviews

| Store | Address | Store POC | Phone | E-mail | Date of Visit |
|--------------------------------|---|--------------------------|--------------------------|--|---------------|
| High Volume | | | | | |
| Cedar Springs Christian Stores | 504 N. Peters Rd Knoxville, TN 37922 | Link McGinnis | (865) 690-5253 | Link@csChristian.com | 8/1/2005 |
| Christian Supply Inc. | 1600 John B White Sr Blvd Spartanburg, SC 29301 | Chuck Wallington | (864) 595-2626 x215 | cwallington@covenantgrp.net cwallington@christiansupply.com | 8/23/2005 |
| Lighthouse Christian Store | 3008 N. Bellflower Blvd. Long Beach, CA 90808-3701 | Mark Bingle | (562) 425- 1211, 1214 | mark@lighthousestores.com | 9/19/2005 |
| Mid Volume | | | | | |
| Grapevine Books | 5634 Fm 1960 Rd. W Houston, TX 77069-4202 | Gary, Margie Woerhmann | (281) 440-8353 | gary@grapevinebooks.com | 8/8/2005 |
| The Master's | 810 E. 21 st St., Ste. A Clovis, NM 88101 | Michael Covington | (505) 762-1924 | Michael@themastersonline.com | 7/27/2005 |
| Open Door | 3125 S 3rd Pl Terre Haute, IN 47802-3785 | Ron Forster | (812) 238-1047 | opendoorin@aol.com | 8/29/2005 |
| Low Volume | | | | | |
| Christian Treasures | 10791 Jones Rd. Houston, TX 77065 | Richard, Betty Gillespie | (281) 469-0991 | Richard@Christian-treasures.com | 8/9/2005 |
| New Covenant Christian Supply | 59 Pine Lake Rd. La Porte, IN 46350 | Sherri Litza | (219) 326-5610 | newcovenant@csinet.net | 8/25/2005 |
| Shepherd's Door | 35 Turtle Creek Dr Ashville, NC 28803-3152 | Peggy Davis | (828) 274-3353 | shepherds_door@bellsouth.net | 9/13/2005 |
| | | | | | |

Table 1. Store Contact and Visit Information

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| Store | City | Number of Employees (Full Time/Total) | Years in Operations (Current Location/ Total) | POS | Sq. Ft (Sales/Total) |
|---------------------------------------|-------------|--|---|---------|-------------------------------|
| High Volume | | | | | |
| Cedar Springs Christian Stores (3) | Knoxville | 18/40 (60 at all 3 stores) | 10/29 (main store) | IRT | 17,000/30,000 (main store) |
| Christian Supply Inc. | Spartanburg | 45/70 | 9/51 | Custom | 21,000/35,000 |
| Lighthouse Christian Store (4) | Long Beach | 14/43 | 24/60 | IRT | 12,000/15,000 (main store) |
| Mid Volume | | | | | |
| Grapevine Books | Houston | 5/22 | 21/28 | BSM | 10,000/12,000 |
| The Master's | Clovis | 3/14 | 2/20 | BSM | 5500/8000 |
| Open Door | Terre Haute | 12/25 | 10/21 | IRT | 7000/9000 |
| Low Volume | | | | | |
| Christian Treasures | Houston | 2/10 | 5/14 | BSM | 3450/3750 |
| New Covenant Christian Supply | La Porte | 1/7 | 8/18 | BSM | 2800/4000 |
| Shepherd's Door | Asheville | 1/2 | 16/16 | Booklog | 2000/2200 |
| | | | | | |

Table 2. Summary Store Characteristics

Appendix B: Store Survey Form

CBA "Back Room" Research: Helping Christian Stores Thrive

CBA and operational-research firm Systems View are identifying ways to cut operational costs from business-to-business transactions--one of several initiatives to keep Christian stores operating profitably. This survey is part of a study that included visits to nine independent retail stores to assess order-processing problems and costs. Results will help develop solutions to improve efficiency, reduce costs, and improve sales.

Please take a few minutes to complete these 21 questions. They should be easy based on your experience in ordering and receiving merchandise. This information is very important to confirm findings from store visits and to identify ways for Christian retailers to continue their work and mission.

All submitted information is confidential and only reported in aggregate as part of the final research report.

This research is an unprecedented cooperative effort funded by CBA, retailers, and suppliers. Survey sponsors include CBA, the Covenant Group, the Parable Group, and suppliers, EMI CMG, Pubnet, Spring Arbor Distributors, Thomas Nelson Publishing, Tyndale House Publishers, Word Entertainment, and Zondervan.

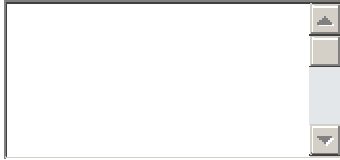
Basic Store Data

1. Store Name

2. Contact Name (optional, in case we need to contact you):

3. Phone or Email:

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4. City:



5. State (please use the two letter state code):



6. Type of POS system:

- Book Store Manager
- Booklog
- IBID/IRT
- Other:

7. 2004 Sales Revenue (\$):



8. 2004 Cost of Goods Sold (\$):



The following questions will distinguish orders and shipments by major product types of

books and Bibles, music, and gifts.

Ordering

9. Backlist Order Volume: Approximately how many total backlist orders (separate Purchase Orders) per average month do you place?

| | |
|---------------------------------------|----------------------|
| Books and Bibles | <input type="text"/> |
| Music | <input type="text"/> |
| Gifts | <input type="text"/> |
| Mixed Product Types (via distributor) | <input type="text"/> |

10. Frontlist Order Volume: Approximately how many total frontlist orders per year do you place? (This includes orders placed with a vendor rep whether in store, at a trade show, or over the phone. A single visit with a salesperson representing multiple vendors counts as *one* order):

| | |
|------------------|----------------------|
| Books and Bibles | <input type="text"/> |
| Music | <input type="text"/> |
| Gifts | <input type="text"/> |

11. Order Preparation Time: The amount of time you spend preparing a frontlist order is likely to vary considerably, depending on the vendor. Can you provide a range of times (min, max, and average) you *typically* spend preparing the frontlist order? Include any time you spend organizing information prior to the visit or conversation with the vendor representative.

| | Minimum preparation time (in hours) | Maximum preparation time (in hours) | Average preparation time (in hours) |
|------------------|---|---|---|
| Books and Bibles | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Music | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Gifts | <input type="text"/> | <input type="text"/> | <input type="text"/> |

Receiving

12. Receiving Volume: Approximately how many shipments (separate Packing Lists) per average week do you process?

| | |
|------------------|----------------------|
| Books and Bibles | <input type="text"/> |
| Music | <input type="text"/> |
| Gifts | <input type="text"/> |

13. Receiving Time: The amount of time you spend processing a shipment is likely to vary considerably, depending on vendor, size of the order, and whether there are problems with the shipment. Can you provide a range of times (min, max, and average) you typically spend processing a single shipment?

| | Minimum processing time (in minutes) | Maximum processing time (in minutes) | Average processing time (in minutes) |
|------------------|--|--|--|
| Books and Bibles | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Music | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Gifts | <input type="text"/> | <input type="text"/> | <input type="text"/> |

14. Discrepancy Rate: Approximately what percent of shipments has a quantity discrepancy (wrong amount shipped or damaged items) that requires contacting the vendor?

| | (%) |
|------------------|----------------------|
| Books and Bibles | <input type="text"/> |
| Music | <input type="text"/> |
| Gifts | <input type="text"/> |

15. Gift Problem Rate: Approximately what percent of *gift shipments* requires extra processing time due to lack of correct and complete labeling or packing slip information? Examples include no UPC code, no pricing information, no reference to original purchase order or invoice number, or no label.

Gift Problem Rate (%):

Inventory Management

16. Do you use the min/max parameters computed by your POS system to generate a candidate set of items for backlist ordering?

- Yes
- No

17. If you answered "yes," how much review or modification of the items or quantities do you make prior to generating the purchase order(s)?

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- None
- Some
- Considerable

18. Do you use the min/max parameters computed by your POS system to generate a candidate set of items for returns?

- Yes
- No

19. If you answered "yes," how much review/modification of the items or quantities do you make prior to pulling the items?

- None
- Some
- Considerable

20. Average Inventory Value: This question requires computing your average inventory value from four quarterly values. Using end-of-quarter balance sheets from 2004, compute Average Inventory Value (calculate Q1 Inventory Value + Q2 Inventory value + Q3 Inventory Value + Q4 Inventory Value, divided by 4)

Average Inventory Value (\$):

21. Out-of-Stock Rate: Approximately what percent of "core inventory" items in your POS system is currently out-of-stock? Core inventory is defined here as items you intend to continue to carry and keep in stock at your store.

Out-of-stock rate (%):

Appendix C: Labor Costs

During the store interview phase, labor costs were collected for the individuals performing the documented activities in the process flow models. The stores did not constitute a large enough sample to compute average labor costs by labor category with any degree of statistical accuracy. Instead, we first obtained average labor costs from the Bureau of Labor Statistics for relevant occupations within the Book, Periodical, and Music Stores (NAICS 451200) Industry (BLS, 2004) shown in Table B1 below.

| Table B1 - Bureau of Labor Statistics Hourly Wage Data (National Aggregate) Book, Periodical, and Music Stores (NAICS 451200) | | | | | |
|--|--|------------------------|------------------------|------------------------|------------------------|
| Occupation | Occupation Group | 10th | 25th | 50th | 75th |
| Wholesale and Retail Buyer | Business and Financial Operations | 9.27 | 12.05 | 15.54 | 21.27 |
| General and Operations Manager | Management | 15.88 | 19.74 | 25.77 | 35.00 |
| Shipping, Receiving, and Traffic Clerks | Office and Administrative Support | 7.16 | 8.11 | 9.71 | 11.48 |
| Procurement Clerks | Office and Administrative Support | 7.60 | 8.87 | 11.18 | 13.99 |
| Stock Clerks and Order Fillers | Office and Administrative Support | 6.21 | 7.24 | 8.37 | 10.09 |
| Computer Support Specialists (Computer Support Staff) | Computer and Mathematical Science | 8.30 | 11.76 | 14.82 | 18.11 |

The store interview data was sufficient to select appropriate percentiles to apply to this study. It was apparent that wages tended to increase with store size and that wages tended to be lower than the industry averages. Accordingly, wages from the BLS 10th, 25th, and 50th percentiles are applied to Small, Medium, and Large CBA member stores respectively. An exception is made for Book Buyers, whose wages are assumed to come from the 25th, 50th, and 75th percentiles respectively. The store interviews illustrated that the Book Buyer position tended to have relatively higher pay (often the store manager was also the Book Buyer). Overall, the results were a close match to the interview data. It is logical to see wages at these stores being mostly below nationwide industry averages. First, many CBA member stores are located in lower cost areas rather than in larger urban centers. Second, many individuals interviewed stated they are willing to work at Christian Bookstores for pay less than their market value – seeing their work as a mission instead of a job.

Appendix D: Borders Store Technology

Borders Writes Book on Merchandise Optimization

[Borders](#) is anything but your typical bookstore. Brothers Louis and Tom Borders founded their first bookstore in 1971 in Ann Arbor, Michigan. The store originally sold used books but soon added new books. As titles were added, Louis developed tracking systems for the growing inventory. It's been said that the former MIT student stumbled upon the system while trying to create a software program to predict horse race winners. In the mid-1970s, the brothers formed Book Inventory Systems to market the system to other independent bookstores.

Today, the chain boasts more than 1,200 retail stores including 435 Borders superstores, 780 mall-based Waldenbooks stores, and more than 35 UK-based Books etc. shops. Recently, the leading bookseller began implementing several [JDA](#) Portfolio Strategic Merchandise Management solutions that it licensed in Q4 2003. Borders will now rely on JDA Seasonal Profiling by Intellect, Advanced Warehouse Replenishment by E3, and Advanced Store Replenishment by E3 to help its buying team forecast demand, pinpoint the sales seasonality of titles, and also automate the store and warehouse replenishment process.

JDA's solution will provide a technologically advanced set of tools to help Borders Group more efficiently market to its more than 30 million global customers within the \$60 billion worldwide consumer market for books, music and movies. In addition to providing buyers with enhanced information, JDA's Seasonal Profiling solution will enable Borders to create targeted promotions based on more than 2,000 seasonal buying patterns.

While many retailers talk about optimization, only a small percentage are actually utilizing the predictive and descriptive mathematical modeling that these solutions can offer. By blending the science of advanced data mining with the art of merchant savvy, companies can improve their bottom line through optimized product planning, inventory distribution and other critical supply chain processes. By synchronizing store and distribution center-level inventory using JDA's Advanced Replenishment applications, Borders Group plans to improve in-stocks, increase service levels, and optimize inventory throughout its supply chain.

(Top of the Net, March 2004)

Appendix E: Barnes and Noble Store Technology

Algorithm, Anyone?

FROM PUBLISHING TRENDS (DECEMBER 2002)

Despite being ritually deemed “the bane of the publishing industry” and “one of the costliest aspects of the business,” the problem of book returns remains an estimated \$7 billion thorn in the industry’s side. Last year, **BISG** figures show, the average adult trade hardcover return rate was 37.5%, up 3% from the year before. Publishing’s response? “There is no statistical measure” for forecasting frontlist book demand at the world’s largest publishing house, says a knowledgeable source, while “gut-feel” remains the crude weapon of choice to battle supply-chain surfeit.

If **Barnes & Noble** has its way, action on ramping down returns may get shoved to the front burner. Two years ago, B&N went live with an inventory control system from [i2 Technologies](#), which has introduced “very sophisticated statistical forecasting algorithms” to gauge title-by-title demand, says **Anant Mahale**, i2’s Program Director in Consulting. Replacing what was described as an ad hoc system, B&N’s new program tracks about 100,000 titles that contribute 80% of the bookseller’s business. Based on past order history, seasonality models, and other algorithms, the system also takes into account the vagaries of supplier lead-times — in effect, studying wholesaler or publisher shipping errors and creating a special model for each vendor — to predict how much inventory B&N needs to keep in stock. Mahale says the system, now operating at two distribution centers, has helped B&N slash its inventory levels yet keep customers happy. B&N executives have confirmed that the chain may well cut inventory levels 30–40%, saving \$4 million annually, on top of a one-time \$13 million inventory reduction.

To be sure, other vendors prowl the supply-chain space — among them **Manugistics**, which has been working with **Scholastic**, as well as **TMS** and its **Bookmaster** system, whose US clients include **Columbia University Press** — and there’s always the data provided by **Bookscan** to help monitor sales. But algorithm advocates say the industry’s holy grail — and a strategy B&N has “expressed a lot of interest” in — may lie in what’s known as a “collaboration solution,” whereby a distributor and publisher work off of the same forecast, so that publishers have advanced visibility into the distributor’s needs.

Mike Shatzkin’s Idea Logical Company, on the other hand, has worked with nine publishers this year on an analysis of one chain’s sales data. He thinks the returns problem is due to too many decisions, and not enough bandwidth to make them. “Barnes & Noble and **Borders** are trying to manage 100 million stock levels with a minimal level of automation,” he says. “What can be done at the distribution center level is important, and can make a critical difference to fill

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rates and inventory carrying costs. But high returns come principally from the impossibility of making timely decisions on a title-by-title, store-by-store basis.”

At B&N, anyway, the proof's in the profits. The bookseller cited “improved margins” and “cost controls” in announcing its third-quarter profit last month. And a filing from **bn.com** trumpeted higher gross profit and gross margin due to “an increase in the Company’s internal fulfillment rate” as well as “more efficiency in fulfillment and customer service operations.”

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