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A Case Study: Effects of Operational Model Changes on Firm Performance

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A CASE STUDY: EFFECTS OF OPERATIONAL MODEL CHANGES ON FIRM PERFORMANCE

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Business Administration

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by

Jennifer Leanne Cowles

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ABSTRACT

This project follows the implementation of a new supply fulfillment model for a service organization. Research findings provide evidence that a change in operating model can result in an increase in firm performance. The purpose of this project is to study a real-life example of an organization experiencing an increase in firm performance based on a change in operating model. The project utilizes historical data of growth and average costs to determine the environment for the current year experiencing the change in operating model. It is determined that this study reveals a decrease of order costs, increase in data integrity and standardization, and an increase in overall order quality.

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CHAPTER ONE

BACKGROUND

Introduction

Company A, kept anonymous upon request of the organization, is an authorized Xerox dealer that provides office technology solutions. This consists of office products such as printers, copiers, software solutions, and managed print services. For the sake of this project, the focus will be on the managed print services side, or MPS, of this product offering. The MPS model is a program that assesses, analyzes, implements and maintains print outputs. It consists of a Cost-Per-Page pricing model that lowers the expense on the consumer end for service and supplies for an entire fleet. Some of the features of an MPS program are: proactive supply ordering, asset management and monitoring, quarterly fleet utilization reports, live coverage help desk, and consolidated billing.

One of the major components of the MPS program is the management of a fleet of assets. As a business process outsource provider, Company A takes the responsibility of managing, monitoring and servicing any size of fleet. Since Company A started offering an MPS solution to fleet management in 2009, they have increased their management from 1,350 assets to over 23,000 assets, an average increase of 80% per year. With this rapid growth, the MPS solution has dominated Company A’s business.

Another important component of the MPS program is the proactive supply ordering, where we will focus the remaining of our attention. Proactive supply ordering is done through a web-based monitoring program that resides at a client location on a server or desktop, and communicates to a central server that resides at Company A. This monitoring program communicates meter reads for timely billing and service and supply status information for proactive fulfillment. For example, when a device reaches a 10% toner remaining threshold, an alert is triggered for the supply fulfillment department. The benefit of this program is the customer can receive timely service and supplies while having confidence in accurate billing, without any effort of their own.

In a perfect world, all customers report live data to Company A and the Supply Fulfillment department fulfills 100% of the orders, 100% of the time. In a non-perfect world, there is a margin of error where Company A does not fulfill 100% of the orders, 100% of the time. This is the gap that is not only affecting timely delivery of toner and supplies, but also decreasing the margin of profitability on these MPS contracts.

A New Vision for Supply Fulfillment

Due to the rapid changes in the nature of the MPS environment for Company A, new attentions are being focused on the supply fulfillment portion of the MPS contract. Company A has spent much of its attention on the initial sales of the MPS programs, while leaving the people and processes in the same

environment despite the rapid growth in asset management. Since 2009, there has been an average increase of 40% in the number of orders that have flowed through the fulfillment department, as well as an average increase of 40% in total order costs.

The Fulfillment Problem

From 2009 to 2014, Company A did not adapt to its new MPS business in the fulfillment department. Practices that worked when the fleet was only 1,400 assets were not working for a fleet of 20,000. Although they invested in a small warehouse, it was mostly used to store used and new equipment and a small selection of supply products.

Company A made a discovery in November of 2014 that revealed a major problem in fulfillment. They discovered that they had fulfilled over 1,700 orders from 2012 to 2014 that was not their responsibility to fulfill. These orders resulted in unnecessary costs of over $320,000. Considering this was just one component within the fulfillment department, there was good reason to assume there were other problems causing unnecessary costs.

Purpose of the Project

It is the goal of this project to study a real-life example of the effects of a change in an operating model in association with customer fulfillment. The project will analyze a change in operating model according to these two research focuses:

1. How will the new operating model affect total costs?

2. How will the new operating model affect firm performance in fulfillment?

By using research and knowledge available, this project will align the results to the research to determine if this company experienced an increase in firm performance.

The project follows the design and implementation of a new operating model for customer fulfillment at Company A and whether the change resulted in realized cost savings. Measurements will be collected systematically to monitor the progress of the new implementation and recommendations will be made to further increase the benefits of this new model.

Significance of the Project

In 2014, the fulfillment department was responsible for approximately 42,000 supply orders at a total cost of over $4M. This responsibility should be managed closely to avoid the situation of unnecessary costs, as Company A experienced in November of 2014. This project proposes several management and monitoring recommendations that could result in a savings of $2M in supply fulfillment costs. The financial impact alone is worth the attention of this project.

CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

There is a difference between what a company does (produces) and how a company does it (operating model). With market conditions that are constantly changing, it is becoming critical that companies not only assess what they do, but how and why they do it. Research suggests that there is a direct link between a company's operating model and their competitive advantage and business performance (Amit, 2012). An operating model is simply how a company does what they do. It involves a connected system of activities that enables a company to do business with its customers (Amit, 2012). The supply chain is the key player within the operating model. A supply chain is responsible to deliver the results that come from the operating model. It is hypothesized that an agile supply chain, or a supply chain that adapts to changes in the environment quickly and efficiently, has a direct impact on business performance.

Distribution and Agility

In a research article by Arif, Bakkapa, Metri and Sahay (2009), distribution practices were assessed to determine which are critical to an agile supply chain. The focus of the investigation was on manufacturing organizations and how critical factors relating to the distribution network could improve the supply chain

responsiveness. It is hypothesized that there is a link between delivery practices and agility in a supply chain. Additionally, an agile supply chain distribution increases organizational performance. Four factors were considered in this study and analyzed based on their relativity to firm performance: collaborative distribution, order commitment, distribution flexibility and inventory management. Using an analysis of variance, the hypothesis was tested and results show that there was a significant difference in the mean values of performances across these four functions (Arif, 2009, pp. 44). This result supports that delivery practices are associated with higher agility in the supply chain. These results also associated the distribution practices to organizational performance over the four functions as well as two additional core areas: IT-enabled distribution and transparency in the distribution process (Arif, 2009, pp. 45). This supports the hypothesis that there is a positive relationship between an agile supply chain and organizational performance. The limitation to this study is that the data used were from single respondents in an organization. Further research is needed to identify that this is a pattern across the entire supply chain (Arif, 2009, pp. 46).

Integration of Technology

Further research was reviewed to assess the integration of IT with an agile supply chain. In an article by Swafford, Ghosh and Murthy (2008), a study was conducted to assess the relationship between IT integration and firm performance. The focus of the investigation was conducting a survey with Vice

Presidents, Directors, and Plant Managers in manufacturing firms (Swafford, 2008, pp. 291) and assessing the relationships between IT integration, supply chain flexibility, supply chain agility and business performance. Three models were constructed from the collected data to show the relationships between the four factors listed above. The first model recorded there is a linear relationship, where IT integration supports a flexible supply chain, which supports an agile supply chain, which ultimately increases competitive firm performance. The second and third model recorded an integrated relationship with the same results of increasing firm performance. The results of this study further support the hypothesis that an agile supply chain increases firm performance with the added factors of IT integration and a flexible supply chain being major determinants of a successful agile supply chain. The scope of this study does not address some residual questions such as, would samples from different industries produce the same results? Or would the results be consistent with external factors being considered instead of internal factors? Further research could be conducted to further the validity of this study.

Organizational Culture

Expanding one step further into the organizational picture of agile supply chain success is the culture of the organization itself. An article by Malekifar, Taghicadeh, Rahman, and Khan (2014) investigate the relationship between IT competence with the organizational culture and the affect it has on the agility of a

supply chain. The article hypothesizes that IT competence is dependent upon the organizational culture and the culture can influence the flexibility of a supply chain. As we have seen from the second study, a flexible supply chain is an important determinant of an agile supply chain, thus it leads that an organizational culture can influence the agility of a supply chain. The author's frame their findings around two core values in an agile supply chain: sense and response. In their opinion and research, they have found that IT competence helps companies sense the changes in the market environment and respond to those changes efficiently and effectively. Further research by the authors suggest that, although IT competence allows an organization to effectively adapt in uncertain market conditions, the level of competence is in relation to the organizational culture and learning. In the author's findings, they conclude that IT competence has a significant business value for competitive advantage. They also conclude that an organizational culture has a direct impact on IT competence, which positively influences an agile supply chain.

Research Conclusions

There is a study on the Oakland A's that exemplifies the findings in the above articles. The Oakland A's implemented a new operating model for selecting baseball players. According to the article by Wolfe, et al., the implementation of this new model has implications beyond the selection of players for a baseball team. Billy Beane, the general manager of the Oakland

A's, implemented the use of sabermetrics, a statistical analysis tool that ranked players according to their on-base percentage, to offset their low budget in order to recruit players that could build a winning team. From 1998-2006, the Oakland A's winning percentage increased from 47.5 to 56.6% (Wolfe, et al., 2007). The innovation of sabermetrics was the driving force that led to an increase in percent wins with a decrease in the cost per win for the Oakland A's. Billy Bean developed a new, more efficient and effective recruiting model in an organization that is bound by tradition and is hesitant to change. By establishing a culture within the Oakland A's to adapt to changes in the environment, they were able to successfully compete within their industry despite their budget restrictions. This case identifies the importance of implementing innovation into an organization that will result in a competitive advantage while decreasing costs and increasing their firm's performance.

In an article released by Harvard Business Review, a study was conducted with 558 people in organizations with a status of an executive or senior manager that assessed the impact of new technologies on business processes ("Reinventing Business," 2015). The article concludes that the use of new technologies is a key driver for new models of organizations. New technologies are driving increased collaboration and an increase in flexible processes and infrastructure ("Reinventing Business," 2015). As these research articles show, there is a connection between an agile supply chain and an increase in a firm's performance. Through the integration of IT performance and

technology, flexibility and agility, and organizational culture into the supply chain, a company can expect positive results in their performance and competitive advantage.

With these integrations come many obstacles and processes that are not addressed in this research. Further studies can be conducted to assess how a company can become IT competent and how to manage an organizational culture to cultivate a flexible and agile supply chain. Many activities are involved in a supply chain and any one of these activities could be studied independently to see the micro affects in firm performance. It is important to understand the overall connection between these four factors to further increase firm performance.

CHAPTER THREE

OBSERVING THE OPERATING MODEL FOR SUPPLY FULFILLMENT

Introduction

Company A is the largest independent Xerox Corporation Agent-Dealer in California. With a mission to “Transform business one customer at a time… by providing leading solutions that give our customers a competitive edge”, the company has reached sales of $53 million and services over 23,000 assets (FY2014 data). In 2014, over 45,000 supply orders were fulfilled for these assets, with 40% of those being fulfilled directly from Company A’s inventory.

Company A’s customer fulfillment process involves many players including management, staff, vendors and customers. Additionally, it requires heavy reliance on support systems such as CRM software and an ERP system. Company A has an anticipated increase of 73% in the number of assets in the field for 2015, which results in an anticipated increase of 28% in the number of supply orders. Due to the anticipated increase in the number of assets in the field and the increase in orders, Company A has initiated a change in their fulfillment model in order to decrease costs and increase order efficiency.

Overview of Previous Fulfillment Model

In the previous system of order fulfillment, the supply staff had a high amount of freedom in terms of choosing where they would fulfill their orders.

Their default option was to fulfill orders from stock before sourcing items from vendors. If items were out of stock, staff would select the item from a vendor based on lowest cost and availability. Although this approach tried to ensure that if an item was not in stock, it could be purchased at the next lowest cost, staff would not always utilize the low cost approach. Because of frequent stock outs and inconsistent inventory counts, staff would divert orders to vendors where inventory was guaranteed for high turnover items, even if inventory was available. Additionally, many vendors were selected based on availability alone and Company A was not utilizing all of the vendors available to create a true picture of stock prices and availability.

Not only was there little control from the management on where items were being purchased, there was little to no control over stocked inventory. Since the main method of fulfillment under the previous model involved drop-shipping items from the vendors to the customers, the process of fulfillment in this manner was tedious and labor intensive. Staff would be responsible for looking at each vendor's website for current item availability and costs. With over six vendors to choose from, this process made it difficult to process orders during high volume periods or when staff members would be absent.

Considering the lack of visibility into the consumable levels on the previous reporting software, it was difficult for Company A to see real-time data in relation to supply orders. This made it difficult to forecast demand as well as trust that orders were not being created in excess. Among these disadvantages, the

overall process for fulfillment was not conducive to the volume of transactions that were traveling through the department. Due to these and other cost considerations, a change in the fulfillment model became necessary to Company A's future success.

Overview of New Fulfillment Model

Change in an organization can be a very challenging and scary experience for both management and staff. In an article by Phil Merrell (2012), there are six key factors, which he calls the "Big Six", that can determine the success of a change in an organization. In the following, I will examine the approach to the change in the fulfillment model for Company A according to the "Big Six".

The Big Six in Company A's Changing Model

Leadership. Company A's top management stepped in to recover a department that had been overlooked. They took responsibility for the lack of leadership within the supply department and swiftly strategized how to change their situation. With the introduction of new management, Company A demonstrated a commitment to its organizational goals and confidence that this model change will result in positive impacts for the company.

They have taken the steps to get a bigger warehouse, an increase in over 6,000 square feet, a new warehouse manager and a fulfillment manager. With the new management in place, the decisions to move toward holding inventory

and implementing new processes will be closely tracked and continued leadership will be demonstrated over the department.

Communication. Company A has been dutiful in its communications of the new changes to the departments involved. Announcements were made in conjunction with the management changes to the organization and more specifically to the departments involved. Higher levels of communication were given to the specific departments out of necessity in order to keep the staff informed of management and process changes.

Learning. Company A took the initiative to provide training for all current employees on all processes related to their positions. Investments were made in bringing out training professionals for one-on-one and group training sessions specific to job functions. Upper management has made it clear that cross training is available and necessary to the goal of sustaining the new changes. There have been many opportunities extended to all staff to learn more about their positions as well as understand the overall process goals.

Measuring. Company A does not have a history of tracking results on a regular basis. Ad hoc reporting of performance is often completed, but there have not been established measures to assess their performance. Company A would benefit from several measures of performance to assess whether the changes that they have made are in line with the goals that were established.

Involving. Several activities were introduced to involve the staff who would be most affected by the organizational changes. Meetings with the staff and

upper management opened the door for the staff to offer their opinion about current processes and what could be improved. Management took these suggestions and has since implemented many of those in order to make the new processes run smoothly. With the involvement of the staff, it created a sense of ownership of the changes at hand and offered the staff the opportunity to contribute to the overall goals of the new processes.

Sustaining. Company A will be entering the stage of sustaining the changes that are being made in the organization and they will have to make sure that their decisions continue to align with their organizational goals. The hopes of this study is to provide the management with recommendations on how to further improve these changes and ways to maintain the changes that have taken place.

Unification Model Design

Company A is shifting from a coordination operating model to a unification operating model. In the past, Company A has done well with a coordination model because the demand for standard processes has not been significant. With the increase in personnel and the amount of transactions that are coming through the organization, a unification approach needs to be established in order for the business units to standardize processes that are critical to customer service.

There are several factors involved with implementing a unification model. One, the processes within the organization needs to be standardized. In order for the processes to become standardized, Company A needs a complete

understanding of the requirements for the process to work successfully such as, the requirements of the type of labor involved, the type of data that is necessary and the desired output. These requirements will be needed in designing the digital platform that will be used to implement these standardized processes.

The second factor that is important when implementing a unification model is data integrity. Since the business units will be accessing the same data and using the same processes in the transactions, it is extremely important that the data is available and valid. The risks of inconsistent and invalid data are incorrect forecasts, misrepresented financial statements, and skewed result outcomes, just to name a few. Data integrity is critical to standardizing business processes and it must be trusted in order for the management to make informed decisions.

A third factor that is critical to a unification model is the support system. There needs to be a platform available to standardize these processes to achieve the desired efficiency. A support system will be able to store the transactions and be used for analysis and decision-making. Although Company A could benefit from the design of a new support system, attempts are being made to fully utilize the current platform to support the standardized processes, as well as introduce supplemental systems that will aid in the decision making process.

The first attempt in standardization is to evaluate inventory. Company A has shifted their strategy from drop-ship fulfillment to order fulfillment from stock. There are a few advantages to order fulfillment from inventory stock. One, there is a higher level of control over inventory. With proper inventory counts, fulfillment

staff can have real-time data of what items are on hand and their quantities. Having control over inventory also helps controlling item stock outs. Two, when buying items in bulk from the vendor or manufacturer, there are opportunities to save costs on the price per item as well as overall shipping costs per item. Often times, retailers are able to negotiate lower prices with manufacturers when there are items being purchased in bulk. Three, with the advantage of lowering the price per item, retailers can increase their margins. In the case for Company A, negotiating lower prices will be critical in increasing their contract profitability since these items are costs associated with the assets in the field.

Although there are advantages to holding inventory, there are also some disadvantages. Those include needing the capital to invest in the inventory items and having the space to store those items. If inventory counts are not consistently counted, there are possibilities of incorrect amounts of on-hand inventory and this can slow down the order fulfillment process.

CHAPTER FOUR

COMPARISONS OF THE OLD AND NEW OPERATING MODEL

Introduction

The following section will cover the findings and results of implementing a new order fulfillment model as well as the forecasts for the remainder of 2015. There are many factors involved when analyzing a new operating model and the factors chosen to analyze are cost, process standardization, support system integration, data integrity and quality.

Methodology

The data necessary to analyze the five factors listed above are total amount of orders and the costs associated, observations of order fulfillment processes, system resources and capabilities, current item configurations, and on-hand availability. Historical data was captured from 2008 to 2014 to calculate the monthly rates of growth for both the total number of orders and the total costs of orders. The rates of growth were then averaged and grouped by each period per year to arrive at an average rate of growth per calendar period. This average rate of growth per calendar period was used to calculate the expected number of orders and expected cost for each remaining period in 2015.

Data was analyzed to assess the condition under the previous model for the year of 2014 to compare to the changing model in the first quarter of 2015. The historical data starting from 2008 was used to present a forecast of the

conditions for the remaining quarters for 2015 in order to assess the potential impact of the change in operating model. The average costs were found by taking the total cost divided by the total number of orders for each period. Periods are considered to be one full calendar month.

Costs under the Previous Model

The major cost that will be analyzed is the cost per supply item for each order. Since the cost of the item is taken from the contract profitability, this cost can be a significant indicator of the overall profitability of each contract. Using historical data, the average costs and number of orders could be established as a baseline for comparison of the new model. Tables 1, 2 and 3 show the average cost per item, the average number of order and the average total costs per period from the historical data from 2008 to 2014.

Table 1. Historical Average Costs per Item

	2008	2009	2010	2011	2012	2013	2014
January		$93	$113	$87	$93	$118	$95
February		$102	$104	$95	$88	$95	$104
March	$76	$90	$107	$93	$87	$101	$104
April	$55	$99	$107	$87	$88	$93	$102
May	$98	$98	$110	$80	$88	$104	$92
June	$99	$106	$108	$89	$124	$114	$116
July	$74	$104	$114	$105	$136	$106	$117
August	$88	$104	$111	$87	$112	$103	$114
September	$99	$103	$99	$89	$106	$96	$110
October	$96	$103	$99	$95	$114	$96	$108
November	$82	$103	$86	$95	$112	$94	$91
December	$92	$97	$94	$95	$104	$91	$105

	2008	2009	2010	2011	2012	2013	2014
Annual Average Cost per Item	**$86**	**$100**	**$104**	**$91**	**$104**	**$101**	**$105**

Table 2. Total Orders per Period

	2008	2009	2010	2011	2012	2013	2014
January		263	976	1163	1719	2219	2767
February		152	1521	1368	1677	2724	3867
March	219	559	1824	1647	2011	1459	3554
April	105	473	1332	1840	1797	3082	3920
May	182	421	1105	1453	1816	4251	3750
June	188	858	1004	1130	1714	2567	2410
July	204	455	744	884	1154	2657	2127
August	191	898	977	1429	2517	3362	3018
September	203	844	1373	1806	2173	3591	2129
October	281	1225	1459	2094	2371	3064	4229
November	207	987	1298	2016	2069	2275	6764
December	238	1466	1022	1378	1654	1932	3419
Annual Average Number of Orders per Period	**200**	**717**	**1220**	**1517**	**1889**	**2765**	**3496**

Table 3. Total Costs per Period

	2008	2009	2010	2011	2012	2013	2014
January		24,397	110,284	100,845	160,696	262,073	263,730
February		15,449	158,230	129,807	147,709	258,592	403,280

	2008	2009	2010	2011	2012	2013	2014
March	16,565	50,410	195,728	153,308	174,345	147,049	368,992
April	5,809	46,747	142,110	160,236	157,490	286,528	400,791
May	17,766	41,295	121,457	116,038	160,481	440,189	346,741
June	18,548	90,960	108,565	100,222	212,332	293,543	278,738
July	15,009	47,100	84,628	92,821	157,242	280,563	248,627
August	16,836	93,013	108,563	124,566	283,077	346,169	344,431
September	20,169	86,646	136,490	161,440	230,099	344,210	234,825
October	26,860	126,478	144,154	198,106	269,516	294,084	457,612
November	17,023	101,702	111,177	191,303	231,300	213,130	612,751
December	22,005	142,547	96,314	131,186	172,131	176,666	359,935
Annual Average Monthly Costs	**17,781**	**72,229**	**126,475**	**138,323**	**196,368**	**278,566**	**360,038**

From these tables we see that the average number of orders per period for 2014 was 3,496 and the average total cost per period was $360,038.

Costs under the New Model

To understand the change in costs for 2015 that are anticipated under the new fulfillment model, there are a few considerations.

Negotiations

For Company A, vendor negotiations are a major player in the ability to stock inventory due to the decrease in average cost per unit and the reduction in initial capital needed to stock inventory. There are currently 6 vendors used and negotiations were completed with two vendors in Q1 2015.

Negotiations with Vendor 1. Company A was successfully able to negotiate a lower cost on items where price flexibility was not present. These

items were the first priority in negotiations since vendor price and availability showed little variance. These items also do not have a lower cost compatible item available as a substitute. Table 4 below lists the negotiated item costs with Vendor 1 versus their standard cost, showing the actual savings per item and its associated cost discount.

Table 4. Price Negotiations with Vendor 1

Item Number	Standard Price	Negotiated Price	Savings per Item	Percent discount
676K05360	$185.42	$148.00	$37.42	20%
604K73140	$333.34	$194.00	$139.34	42%
126K32220	$266.40	$155.00	$111.40	42%
115R00073	$632.06	$366.00	$266.06	42%
115R00069	$142.04	$114.00	$28.04	20%
115R00063	$300.16	$243.00	$57.16	19%
115R00061	$164.15	$133.00	$31.15	19%
115R00059	$214.40	$173.00	$41.40	19%
113R00776	$160.13	$105.00	$55.13	34%
113R00762	$196.31	$155.00	$41.31	21%
113R00755	$361.13	$311.00	$50.13	14%
113R00674	$410.15	$282.69	$127.46	31%
113R00670	$313.77	$267.00	$46.77	15%
113R00610	$471.25	$324.80	$146.45	31%
109R00847	$252.25	$152.93	$99.32	39%
109R00845	$215.26	$173.00	$42.26	20%
109R00790	$132.39	$107.00	$25.39	19%
109R00783	$89.78	$77.00	$12.78	14%
109R00773	$230.10	$158.59	$71.51	31%
109R00752	$230.10	$158.59	$71.51	31%
109R00731	$477.29	$397.00	$80.29	17%
109R00636	$564.00	$388.88	$175.12	31%
108R01158	$102.61	$72.00	$30.61	30%
108R01151	$71.74	$57.00	$14.74	21%
108R01148	$71.74	$57.00	$14.74	21%

Item Number	Standard Price	Negotiated Price	Savings per Item	Percent discount
108R01053	$145.04	$84.00	$61.04	42%
108R01036	$70.43	$57.00	$13.43	19%
108R00994	$143.38	$123.00	$20.38	14%
108R00993	$98.49	$85.00	$13.49	14%
108R00992	$143.38	$123.00	$20.38	14%
108R00991	$143.38	$123.00	$20.38	14%
108R00990	$143.38	$123.00	$20.38	14%
108R00989	$195.00	$134.40	$60.60	31%
108R00982	$43.68	$35.00	$8.68	20%
108R00977	$158.79	$128.00	$30.79	19%
108R00975	$26.91	$21.00	$5.91	22%
108R00974	$71.76	$57.00	$14.76	21%
108R00973	$89.69	$72.00	$17.69	20%
108R00972	$89.69	$72.00	$17.69	20%
108R00971	$89.69	$72.00	$17.69	20%
108R00930	$138.02	$119.00	$19.02	14%
108R00929	$91.79	$81.00	$10.79	12%
108R00928	$138.02	$119.00	$19.02	14%
108R00927	$138.02	$119.00	$19.02	14%
108R00926	$138.02	$119.00	$19.02	14%
108R00866	$58.06	$46.00	$12.06	21%
108R00865	$36.85	$30.00	$6.85	19%
108R00861	$95.81	$79.00	$16.81	18%
108R00841	$195.00	$134.40	$60.60	31%
108R00832	$389.03	$268.13	$120.90	31%
108R00831	$120.12	$82.79	$37.33	31%
108R00830	$120.12	$82.79	$37.33	31%
108R00829	$120.12	$82.79	$37.33	31%
108R00823	$40.20	$25.00	$15.20	38%
108R00816	$152.09	$122.00	$30.09	20%
108R00815	$22.78	$18.00	$4.78	21%
108R00795	$158.79	$130.00	$28.79	18%
108R00793	$114.57	$94.00	$20.57	18%
108R00777	$142.71	$115.00	$27.71	19%
108R00776	$142.71	$115.00	$27.71	19%
108R00775	$142.71	$115.00	$27.71	19%
108R00774	$89.78	$72.00	$17.78	20%

Item Number	Standard Price	Negotiated Price	Savings per Item	Percent discount
108R00682	$58.91	$33.00	$25.91	44%
108R00535	$49.98	$28.00	$21.98	44%
108R00493	$81.22	$61.00	$20.22	25%
106R03102	$425.45	$208.00	$217.45	51%
106R02777	$75.04	$59.00	$16.04	21%
106R02759	$71.02	$55.00	$16.02	23%
106R02758	$50.92	$39.00	$11.92	23%
106R02757	$50.92	$39.00	$11.92	23%
106R02756	$50.92	$39.00	$11.92	23%
106R02747	$179.56	$86.00	$93.56	52%
106R02746	$349.00	$112.00	$237.00	68%
106R02745	$233.83	$112.00	$121.83	52%
106R02744	$233.83	$112.00	$121.83	52%
106R02740	$345.72	$169.00	$176.72	51%
106R02734	$265.99	$175.00	$90.99	34%
106R02722	$268.00	$216.00	$52.00	19%
106R02624	$26.90	$21.00	$5.90	22%
106R02605	$165.03	$132.00	$33.03	20%
106R02604	$269.07	$216.00	$53.07	20%
106R02603	$269.07	$216.00	$53.07	20%
106R02602	$269.07	$216.00	$53.07	20%
106R02313	$222.88	$180.00	$42.88	19%
106R02311	$129.26	$104.00	$25.26	20%
106R02309	$80.23	$64.00	$16.23	20%
106R02307	$227.13	$180.00	$47.13	21%
106R02244	$89.69	$72.00	$17.69	20%
106R02243	$98.65	$79.00	$19.65	20%
106R02242	$98.65	$79.00	$19.65	20%
106R02241	$98.65	$79.00	$19.65	20%
106R01630	$64.64	$50.00	$14.64	23%
106R01629	$55.41	$43.00	$12.41	22%
106R01628	$55.41	$43.00	$12.41	22%
106R01627	$55.41	$43.00	$12.41	22%
106R01597	$100.50	$79.00	$21.50	21%
106R01596	$103.85	$83.00	$20.85	20%
106R01595	$103.85	$83.00	$20.85	20%
106R01594	$103.85	$83.00	$20.85	20%

Item Number	Standard Price	Negotiated Price	Savings per Item	Percent discount
106R01582	$195.24	$158.00	$37.24	19%
106R01569	$320.94	$260.00	$60.94	19%
106R01568	$393.16	$318.00	$75.16	19%
106R01567	$393.16	$318.00	$75.16	19%
106R01566	$393.16	$318.00	$75.16	19%
106R01535	$313.56	$252.00	$61.56	20%
106R01510	$193.73	$156.00	$37.73	19%
106R01509	$264.59	$213.00	$51.59	19%
106R01508	$264.59	$213.00	$51.59	19%
106R01507	$264.59	$213.00	$51.59	19%
106R01486	$93.80	$75.00	$18.80	20%
106R01485	$72.36	$57.00	$15.36	21%
106R01439	$312.89	$242.00	$70.89	23%
106R01438	$458.28	$372.00	$86.28	19%
106R01437	$458.28	$372.00	$86.28	19%
106R01436	$458.28	$372.00	$86.28	19%
106R01409	$149.41	$119.00	$30.41	20%
106R01374	$103.85	$83.00	$20.85	20%
106R01368	$48.91	$39.00	$9.91	20%
106R01319	$316.91	$256.00	$60.91	19%
106R01318	$316.91	$256.00	$60.91	19%
106R01317	$316.91	$256.00	$60.91	19%
106R01316	$89.78	$72.00	$17.78	20%
106R01294	$129.98	$104.00	$25.98	20%
101R00474	$58.96	$46.00	$12.96	22%
013R00669	$88.98	$54.25	$34.73	39%
013R00668	$844.35	$649.50	$194.85	23%
013R00664	$237.90	$183.00	$54.90	23%
013R00663	$235.30	$181.00	$54.30	23%
013R00662	$260.00	$179.20	$80.80	31%
013R00660	$208.00	$143.36	$64.64	31%
013R00659	$208.00	$143.36	$64.64	31%
013R00658	$208.00	$143.36	$64.64	31%
013R00657	$221.00	$152.32	$68.68	31%
013R00650	$85.15	$65.50	$19.65	23%
013R00603	$226.85	$174.50	$52.35	23%
013R00602	$356.85	$274.50	$82.35	23%

Item Number	Standard Price	Negotiated Price	Savings per Item	Percent discount
013R00591	$250.00	$142.50	$107.50	43%
008R13177	$103.07	$72.00	$31.07	30%
008R13102	$332.80	$256.00	$76.80	23%
008R13089	$26.00	$17.92	$8.08	31%
008R13087	$243.75	$168.00	$75.75	31%
008R13086	$61.75	$42.56	$19.19	31%
008R13085	$251.33	$176.00	$75.33	30%
008R13064	$200.20	$137.98	$62.22	31%
008R13061	$26.00	$17.92	$8.08	31%
008R13041	$118.30	$82.00	$36.30	31%
008R13036	$42.12	$32.40	$9.72	23%
008R12990	$26.00	$20.00	$6.00	23%
008R12988	$243.75	$187.50	$56.25	23%
008R12964	$114.24	$63.00	$51.24	45%
008R12941	$79.17	$61.00	$18.17	23%
008R12925	$131.04	$100.00	$31.04	24%
008R12920	$81.45	$68.00	$13.45	17%
008R12919	$86.32	$63.00	$23.32	27%
008R12912	$92.82	$68.00	$24.82	27%
008R12898	$110.16	$63.00	$47.16	43%
008R12897	$110.56	$80.00	$30.56	28%
008R12896	$26.00	$17.92	$8.08	31%
006R01658	$318.21	$232.50	$85.71	27%
006R01657	$318.21	$232.50	$85.71	27%
006R01656	$318.21	$232.50	$85.71	27%
006R01655	$158.77	$116.00	$42.77	27%
006R01613	$155.36	$119.50	$35.86	23%
006R01605	$168.16	$101.95	$66.21	39%
006R01561	$155.35	$119.50	$35.85	23%
006R01552	$285.35	$196.67	$88.68	31%
006R01551	$194.35	$133.95	$60.40	31%
006R01516	$125.45	$86.46	$38.99	31%
006R01515	$125.45	$86.46	$38.99	31%
006R01514	$125.45	$86.46	$38.99	31%
006R01513	$119.44	$82.32	$37.12	31%
006R01460	$136.50	$94.08	$42.42	31%
006R01459	$136.50	$94.08	$42.42	31%

Item Number	Standard Price	Negotiated Price	Savings per Item	Percent discount
006R01458	$136.50	$94.08	$42.42	31%
006R01457	$83.95	$57.86	$26.09	31%
006R01222	$367.62	$282.79	$84.83	23%
006R01221	$367.62	$282.79	$84.83	23%
006R01220	$367.62	$282.79	$84.83	23%
006R01219	$183.45	$141.12	$42.33	23%
006R01159	$171.60	$87.47	$84.13	49%
006R01146	$231.48	$159.54	$71.94	31%
006R01046	$200.58	$137.75	$62.83	31%
001R00613	$39.00	$26.88	$12.12	31%
001R00610	$162.50	$112.00	$50.50	31%

Results from Negotiations with Vendor 1. From the table above, Company A negotiated an average price reduction of $48.58 per item. According to the average monthly usage of these items, Company A has a potential monthly savings of $42,815.92. Table 5 below demonstrates the monthly financial impact of these savings based on the average monthly usage of each item during 2014. Some items that were negotiated were not used during 2014, but are new items related to models introduced in 2015.

Table 5. Monthly Financial Impact of Negotiations with Vendor 1.

Item Number	Savings per Item	Total Ordered in 2014	Monthly Average	Total Monthly Savings
604K73140	$139.34	1	0	$11.61
126K32220	$111.40	1	0	$9.28
115R00073	$266.06	1	0	$22.17
115R00059	$41.40	1	0	$3.45

Item Number	Savings per Item	Total Ordered in 2014	Monthly Average	Total Monthly Savings
108R00535	$21.98	1	0	$1.83
008R13085	$75.33	1	0	$6.28
006R01605	$66.21	1	0	$5.52
115R00069	$28.04	2	0	$4.67
106R02734	$90.99	2	0	$15.17
108R00975	$5.91	3	0	$1.48
108R00823	$15.20	3	0	$3.80
108R00816	$30.09	3	0	$7.52
008R12896	$8.08	3	0	$2.02
115R00061	$31.15	4	0	$10.38
109R00731	$80.29	4	0	$26.76
108R00973	$17.69	4	0	$5.90
108R00972	$17.69	4	0	$5.90
108R00815	$4.78	4	0	$1.59
108R00971	$17.69	5	0	$7.37
108R00831	$37.33	5	0	$15.55
109R00636	$175.12	6	1	$87.56
108R00974	$14.76	6	1	$7.38
108R00830	$37.33	6	1	$18.67
106R02604	$53.07	7	1	$30.96
106R01628	$12.41	7	1	$7.24
001R00610	$50.50	7	1	$29.46
108R00982	$8.68	8	1	$5.79
106R02605	$33.03	8	1	$22.02
106R02602	$53.07	8	1	$35.38
106R01627	$12.41	8	1	$8.27
008R13036	$9.72	9	1	$7.29
108R00861	$16.81	10	1	$14.01
106R01629	$12.41	10	1	$10.34
013R00602	$82.35	10	1	$68.63
008R12988	$56.25	10	1	$46.88
108R00865	$6.85	11	1	$6.28
106R02603	$53.07	11	1	$48.65
115R00063	$57.16	12	1	$57.16
106R01568	$75.16	12	1	$75.16
113R00670	$46.77	13	1	$50.67

Item Number	Savings per Item	Total Ordered in 2014	Monthly Average	Total Monthly Savings
113R00610	$146.45	13	1	$158.65
106R01630	$14.64	13	1	$15.86
106R01569	$60.94	13	1	$66.02
106R01567	$75.16	13	1	$81.42
106R01566	$75.16	13	1	$81.42
108R00775	$27.71	17	1	$39.26
106R01294	$25.98	17	1	$36.81
008R13086	$19.19	17	1	$27.19
108R00777	$27.71	19	2	$43.87
108R00776	$27.71	19	2	$43.87
008R12990	$6.00	19	2	$9.50
106R01508	$51.59	20	2	$85.98
676K05360	$37.42	22	2	$68.60
106R01438	$86.28	24	2	$172.56
106R01437	$86.28	24	2	$172.56
106R01436	$86.28	24	2	$172.56
106R01509	$51.59	25	2	$107.48
106R01507	$51.59	25	2	$107.48
108R00991	$20.38	26	2	$44.16
108R00990	$20.38	26	2	$44.16
106R01439	$70.89	26	2	$153.60
108R00992	$20.38	27	2	$45.86
108R00930	$19.02	27	2	$42.80
013R00603	$52.35	28	2	$122.15
108R00994	$20.38	29	2	$49.25
013R00660	$64.64	29	2	$156.21
013R00658	$64.64	30	3	$161.60
006R01561	$35.85	31	3	$92.61
008R12925	$31.04	32	3	$82.77
006R01220	$84.83	32	3	$226.21
106R01317	$60.91	33	3	$167.50
013R00659	$64.64	33	3	$177.76
006R01221	$84.83	34	3	$240.35
006R01222	$84.83	35	3	$247.42
109R00783	$12.78	36	3	$38.34
106R01318	$60.91	36	3	$182.73

Item Number	Savings per Item	Total Ordered in 2014	Monthly Average	Total Monthly Savings
108R00774	$17.78	37	3	$54.82
106R01319	$60.91	39	3	$197.96
113R00762	$41.31	44	4	$151.47
108R00795	$28.79	45	4	$107.96
106R01510	$37.73	45	4	$141.49
109R00752	$71.51	46	4	$274.12
106R01486	$18.80	52	4	$81.47
106R01596	$20.85	57	5	$99.04
106R01595	$20.85	57	5	$99.04
006R01146	$71.94	59	5	$353.71
008R13064	$62.22	60	5	$311.10
109R00773	$71.51	61	5	$363.51
006R01219	$42.33	61	5	$215.18
008R13087	$75.75	63	5	$397.69
106R01594	$20.85	64	5	$111.20
106R01368	$9.91	66	6	$54.51
108R00928	$19.02	67	6	$106.20
108R00927	$19.02	68	6	$107.78
108R00929	$10.79	70	6	$62.94
108R00926	$19.02	72	6	$114.12
001R00613	$12.12	72	6	$72.72
013R00657	$68.68	77	6	$440.70
106R01316	$17.78	82	7	$121.50
006R01460	$42.42	85	7	$300.48
008R12941	$18.17	92	8	$139.30
106R01374	$20.85	94	8	$163.33
113R00674	$127.46	96	8	$1,019.68
006R01459	$42.42	99	8	$349.97
006R01458	$42.42	99	8	$349.97
106R02722	$52.00	102	9	$442.00
008R13041	$36.30	104	9	$314.60
106R02311	$25.26	141	12	$296.81
106R01597	$21.50	150	13	$268.75
106R02313	$42.88	155	13	$553.87
013R00591	$107.50	164	14	$1,469.17
108R00493	$20.22	184	15	$310.04

Item Number	Savings per Item	Total Ordered in 2014	Monthly Average	Total Monthly Savings
106R01535	$61.56	195	16	$1,000.35
008R13089	$8.08	200	17	$134.67
006R01552	$88.68	216	18	$1,596.24
006R01046	$62.83	221	18	$1,157.12
006R01457	$26.09	227	19	$493.54
006R01551	$60.40	274	23	$1,379.13
006R01159	$84.13	285	24	$1,998.09
013R00662	$80.80	355	30	$2,390.33
106R02307	$47.13	390	33	$1,531.73
113R00755	$50.13	502	42	$2,097.11
006R01515	$38.99	616	51	$2,001.49
006R01514	$38.99	630	53	$2,046.98
006R01516	$38.99	657	55	$2,134.70
008R13061	$8.08	997	83	$671.31
006R01513	$37.12	1124	94	$3,476.91
106R01409	$30.41	1624	135	$4,115.49

In addition to the negotiation of these items, Company A was able to submit a request for refund for these items purchased at full cost while these negotiations were happening. Based on the total number of items purchased during these negotiations, Company A submitted a request for refund for $292,126.35.

Negotiations with Vendor 2. Company A presented the total number of items purchased from Vendor 2 during 2014 and requested a rebate program for 2015. Vendor 2 granted Company A a rebate of 10% at the end of 2015 if total purchases exceed $800,000, which is the rounded total purchases made from Vendor 2 in 2014. Based on the current purchases from Vendor 2 in 2015,

Company A is forecasted to spend $1,264,000 by the end of 2015. (Forecast given to Company A by Vendor 2). This would result in a rebate of $46,400 at the end of 2015.

Percentage of Growth

The second consideration for the anticipated costs for 2015 is the historical and anticipated rates of growth. By using the historical rates of growth, each period can be forecasted according to the period's average rate of growth to arrive at a forecast for 2015. Table 6 and 7 show the actual rate of growth in the number of orders based and the actual rate of growth in total costs per period based on the historical data.

Table 6. Actual Rate of Growth in Number of Orders per Period Based on Historical Data

	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
January		-16%	-27%	21%	22%	90%	22%
February	2100%	8%	34%	3%	3%	-11%	37%
March	995%	112%	30%	47%	22%	21%	-10%
April	-30%	2%	-28%	-9%	-4%	6%	15%
May	-11%	12%	-16%	-8%	-10%	1%	-2%
June	30%	35%	-10%	-25%	-5%	-33%	-37%
July	-5%	-39%	-23%	-19%	-28%	19%	-9%
August	19%	91%	48%	80%	109%	44%	79%
September	1%	-4%	31%	6%	-13%	-12%	2%
October	8%	47%	-26%	12%	15%	-14%	7%
November	-4%	-27%	22%	0%	-24%	-12%	-26%
December	15%	54%	-22%	-31%	-16%	-16%	16%
Average Rate of Growth	**284%**	**23%**	**1%**	**6%**	**6%**	**7%**	**8%**

Table 7. Actual Rate of Growth in Costs per Period Based on Historical Data

	2008	2009	2010	2011	2012	2013	2014
January		11%	-23%	5%	22%	52%	49%
February		-37%	43%	29%	-8%	-1%	53%
March		226%	24%	18%	18%	-43%	-9%
April	-65%	-7%	-27%	5%	-10%	95%	9%
May	206%	-12%	-15%	-28%	2%	54%	-13%
June	4%	120%	-11%	-14%	32%	-33%	-20%
July	-19%	-48%	-22%	-7%	-26%	-4%	-11%
August	12%	97%	28%	34%	80%	23%	39%
September	20%	-7%	26%	30%	-19%	-1%	-32%
October	33%	46%	6%	23%	17%	-15%	95%
November	-37%	-20%	-23%	-3%	-14%	-28%	34%
December	29%	40%	-13%	-31%	-26%	-17%	-41%
Average Rate of Growth (Cost)	**20%**	**34%**	**-1%**	**5%**	**6%**	**7%**	**13%**

With these historical rates of growth, the anticipated rates of growth can be forecasted based on the average rates of growth for each calendar period. Table 8 shows the average rates of growth based on historical data for each calendar month and Table 9 shows the anticipated total number of orders expected for 2015.

Table 8. Average Historical Rates of Growth per Calendar Period

	Rate of Growth (Orders)	Rate of Growth (Cost)
January	16%	19%
February	15%	13%
March	46%	39%
April	4%	0%
May	8%	28%

	Rate of Growth (Orders)	Rate of Growth (Cost)
June	-1%	11%
July	-18%	-20%
August	53%	45%
September	4%	2%
October	28%	29%
November	-6%	-13%
December	-11%	-8%

Table 9. Forecasted Total Number of Orders for 2015

	Total Orders
January	4359
February	4531
March	4676
April	4357
May	4145
June	3876
July	3306
August	5522
September	5616
October	6015
November	5397
December	5391
Total Orders	**57,189**

Shipping Costs

Since the order fulfillment will be shifting toward order fulfillment from stock, there will be a change in the costs of shipping. The average cost of shipping on a drop-ship order for 2014 was $17.86. The average cost of shipping on a stock order was $2.86. Tables 10 and 11 below show the distribution of the average costs per drop-ship and stock order, respectively. It should be noted that the costs shown below represent all categories of orders, including costs of supply orders.

Table 10. Average Shipping Costs on a Drop-Ship Order for 2014

	Drop-Ship Orders	Total Shipping Costs	Average Cost per Order
January	554	$15,524.14	$28.02
February	733	$16,687.66	$22.77
March	813	$15,120.96	$18.60
April	963	$15,509.39	$16.11
May	606	$8,238.60	$13.60
June	581	$8,201.03	$14.12
July	723	$11,991.03	$16.59
August	1,061	$11,039.75	$10.41
September	1,098	$11,100.59	$10.11
October	524	$5,451.08	$10.40
November	145	$4,413.34	$30.44
December	164	$3,805.83	$23.21
Totals	**9,151**	**$153,183.98**	**$17.86**

Table 11. Average Shipping Costs on a Stock Order for 2014

	Stock Orders	Total Shipping Costs	Average Cost per Order
January	1,317		$0.00
February	1,704		$0.00
March	1,426	$2,258.59	$1.58
April	1,763	$2,308.37	$1.31
May	1,832	$5,494.25	$3.00
June	1,674	$9,814.64	$5.86
July	1,277	$3,830.90	$3.00
August	1,724	$4,821.89	$2.80
September	1,762	$2,337.53	$1.33
October	1,606	$5,521.34	$3.44
November	857	$3,531.74	$4.12
December	1,066	$2,370.00	$2.22
Totals	**18,008**	**$42,289.25**	**$2.87**

Forecasted Costs

There are two options to the forecasted costs for 2015, the anticipated costs that take no consideration of vendor negotiations and the anticipated costs that do take into consideration vendor negotiations. The idea behind the comparison is to show the financial impact of the new model. For the first option, Table 12 shows the anticipated total costs based on the average rates of growth per calendar period.

Table 12. Anticipated Costs without Consideration of Vendor Negotiations

	Cost per Period
January	$520,484
February	$453,247
March	$540,470
April	$540,470
May	$691,801
June	$767,899
July	$614,319
August	$890,763
September	$908,578
October	$1,172,066
November	$1,019,698
December	$938,122
Total Costs	**$9,057,917**

The second option will take into account negotiations with Vendor 1 and Vendor 2. The request for refund with Vendor 1 is for actual purchases made in Q1 of 2015, so the refund, averaged per month, reduces the actual costs. The anticipated rebate from Vendor 2 is averaged for a monthly savings of $3,866. Taking these things into account, Table 13 outlines the anticipated total costs per calendar period.

Table 13. Anticipated Costs with Consideration of Vendor Negotiations

	Cost per Period
January	$346,231
February	$284,536
March	$348,614
April	$348,614

	Cost per Period
May	$540,789
June	$600,701
July	$479,787
August	$697,432
September	$711,458
October	$918,902
November	$798,942
December	$734,717
Total Costs	**$6,810,721**

Forecasted Average Cost per Order. With this new forecasted data, the average cost per order can be calculated for 2015 under both options as listed above. Table 14 shows the average cost per order for both option one and option two.

Table 14. Forecasted Average Cost per Order for 2015 (per option)

	Option 1	Option 2
January	$126	$84
February	$111	$69
March	$111	$72
April	$119	$77
May	$161	$126
June	$190	$148
July	$179	$139
August	$155	$121
September	$155	$121
October	$187	$147
November	$161	$126
December	$148	$116

	Option 1	Option 2
Average Cost per order	**$150**	**$112**

Summary. Considering the average rates of growth per calendar period, the total number of orders that are anticipated for 2015 is 57,189. There are two anticipated cost options for 2015 according to whether or not prices will be negotiated with vendors. The likely option to hold true for Company A's actual costs for 2015 lean toward option 2, since negotiations are already underway. Option 2 results in a total cost of $6.8M for 2015.

In looking at the average costs per order under each option of forecasted costs, the result is a savings of $29 per order. With the total anticipated number of orders for 2015, this results in a potential savings of $2.1M.

Process Standardization and System Integration

Company A currently uses one ERP system to collect all transactional data for fulfillment. Under the previous model, there was only one data point for integrating live device information into the ERP system. That monitoring program only allowed for the transmission of live meter reads for billing purposes. It did not allow for the transmission of consumable information that is needed for a fulfillment transaction. Although there were 17,642 active devices on the previous

monitoring program, there was limited control in monitoring the device consumable levels for fulfillment.

Under the new model, there is a new program available that is able to integrate with the ERP system on multiple levels. The most relevant option of integration is the ability to automatically sync live consumable data through the ERP system and automatically create orders based on the defined level parameters. This function allows for tight control over when the supply order is placed and fulfilled. Designing the parameters of fulfillment is completely customizable and allows for an increase in flexibility with customers who require a higher fulfillment rate.

Since the implementation of the new model, the numbers of assets that are reporting live data have more than doubled. Although there are still devices reporting through the older software, Company A is demonstrating a tighter control on fulfillment practices by transitioning these devices over to the new software. There were a total of 4,921 live assets before January 1, 2015 and there are now over 10,000 devices reporting to the new software. With a little over 23,000 assets in the field, this results in an increase of 25% in order accuracy and visibility. If Company A continues on this path with the new monitoring program, they should have an accuracy rate of 84% by October of 2015.

The new monitoring program is an integral part of standardizing the order fulfillment process since the transaction can be completed with little to no labor

involved. Company A can control at what levels the assets receive a replenishment consumable and thereby control their inventory according to what devices will be coming down the line for replenishment. As the live data is pushed into the ERP system to generate a transaction, there will be accurate history on consumables sent only when needed. This allows for the decrease in unnecessary and erroneous orders.

Quality of Order Fulfillment

It is important to look at the overall quality of order fulfillment in relation to the cost of the items being ordered. Since the previous model allowed for the staff to have a high amount of control over where they purchased the items, seeing the quality of that selection process is important to understand where Company A needs to tighten its processes. With the new model and standardization, this control will shift from the staff to the fulfillment manager who will be responsible for reordering inventory stock. Although the staff will lose some of their control in purchasing, there still may be situations in which they need to make decisions on the spot, so assessing the current quality and where the quality should be is critical to maintain the effectiveness of the new model.

Methodology

The use of P-Charts is relevant to assessing the cost quality of order fulfillment. Data was collected from Q1 of 2014 to Q1 of 2015 and 25 samples were taken from each quarter with 160 orders inspected for quality. The number

of defective orders was considered to be orders where an item was purchased at a higher cost than the lowest cost option for that item. After these items were inspected, the number of defects was recorded to calculate the fraction defective for each subgroup. Once the fraction defective was recorded for each subgroup, the average fraction defective for all subgroups was calculated and used to establish the upper and lower control limits.

The limitation of the categorization of the defective order is that the system does not record when the lowest priced item was out of stock with the associated vendor. This data assumes that there were no stock outs on these items and that all cost options were available at the time of the purchase.

Quality Results

Tables 15 through 19 show the results of the number of defects per subgroup for Q1 2014 through Q1 2015, respectively.

Table 15. Total Fraction Defective per Subgroup for Q1 2014

Subgroup	Number Inspected	Number Defective	Fraction Defective
1	160	110	0.688
2	160	109	0.681
3	160	102	0.638
4	160	104	0.65
5	160	111	0.694
6	160	111	0.694
7	160	104	0.65
8	160	122	0.763
9	160	112	0.7
10	160	112	0.7
11	160	117	0.731

Subgroup	Number Inspected	Number Defective	Fraction Defective
12	160	110	0.688
13	160	107	0.669
14	160	113	0.706
15	160	107	0.669
16	160	115	0.719
17	160	111	0.694
18	160	113	0.706
19	160	97	0.606
20	160	110	0.688
21	160	115	0.719
22	160	107	0.669
23	160	108	0.675
24	160	108	0.675
25	160	105	0.656
Totals	**4000**	**2740**	**0.685**

Table 16. Total Fraction Defective per Subgroup for Q2 2014

Subgroup	Number Inspected	Number Defective	Fraction Defective
1	160	84	0.525
2	160	83	0.519
3	160	93	0.581
4	160	105	0.656
5	160	93	0.581
6	160	94	0.588
7	160	84	0.525
8	160	91	0.569
9	160	91	0.569
10	160	96	0.6
11	160	91	0.569
12	160	94	0.588

Subgroup	Number Inspected	Number Defective	Fraction Defective
13	160	96	0.6
14	160	95	0.594
15	160	106	0.663
16	160	107	0.669
17	160	83	0.519
18	160	86	0.538
19	160	86	0.538
20	160	87	0.544
21	160	92	0.575
22	160	91	0.569
23	160	82	0.513
24	160	98	0.613
25	160	92	0.575
Totals	**4000**	**2300**	**0.575**

Table 17. Total Fraction Defective per Subgroup for Q3 2014

Subgroup	Number Inspected	Number Defective	Fraction Defective
1	160	103	0.644
2	160	110	0.688
3	160	96	0.6
4	160	104	0.65
5	160	99	0.619
6	160	105	0.656
7	160	103	0.644
8	160	92	0.575
9	160	100	0.625
10	160	97	0.606
11	160	100	0.625
12	160	93	0.581
13	160	93	0.581

Subgroup	Number Inspected	Number Defective	Fraction Defective
14	160	108	0.675
15	160	113	0.706
16	160	105	0.656
17	160	100	0.625
18	160	95	0.594
19	160	108	0.675
20	160	100	0.625
21	160	102	0.638
22	160	114	0.713
23	160	95	0.594
24	160	93	0.581
25	160	83	0.519
Totals	**4000**	**2511**	**0.628**

Table 18. Total Fraction Defective per Subgroup for Q4 2014

Subgroup	Number Inspected	Number Defective	Fraction Defective
1	160	91	0.569
2	160	87	0.544
3	160	84	0.525
4	160	90	0.563
5	160	87	0.544
6	160	99	0.619
7	160	94	0.588
8	160	96	0.6
9	160	90	0.563
10	160	95	0.594
11	160	83	0.519
12	160	96	0.6
13	160	93	0.581
14	160	91	0.569

Subgroup	Number Inspected	Number Defective	Fraction Defective
15	160	78	0.488
16	160	93	0.581
17	160	95	0.594
18	160	83	0.519
19	160	91	0.569
20	160	93	0.581
21	160	95	0.594
22	160	106	0.663
23	160	91	0.569
24	160	85	0.531
25	160	79	0.494
Totals	**4000**	**2265**	**0.566**

Table 19. Total Fraction Defective per Subgroup for Q1 2015

Subgroup	Number Inspected	Number Defective	Fraction Defective
1	160	82	0.513
2	160	106	0.663
3	160	87	0.544
4	160	83	0.519
5	160	95	0.594
6	160	78	0.488
7	160	82	0.513
8	160	93	0.581
9	160	94	0.588
10	160	93	0.581
11	160	94	0.588
12	160	90	0.563
13	160	89	0.556
14	160	93	0.581
15	160	90	0.563

Subgroup	Number Inspected	Number Defective	Fraction Defective
16	160	92	0.575
17	160	86	0.538
18	160	96	0.6
19	160	85	0.531
20	160	92	0.575
21	160	92	0.575
22	160	88	0.55
23	160	86	0.538
24	160	92	0.575
25	160	83	0.519
Totals	**4000**	**2241**	**0.56**

Using this data, the upper and lower control limits can be calculated. Table 20 displays the upper and lower control limits for each quarter according to the average number of defects.

Table 20. Upper and Lower Control Limits per Quarter

	Lower Control Limit	Upper Control Limit
Q1 2014	0.575	0.795
Q2 2014	0.458	0.692
Q3 2014	0.513	0.742
Q4 2014	0.449	0.684
Q1 2015	0.443	0.678

As can be seen by the tables above, the overall quality of ordering does improve over the five quarters where data was collected. Additionally, the upper

and lower control limits decrease as another suggestion that the average fraction defective also decreases. Although the quality rating is currently 56%, it is consistent with our previous findings that there is an overall order visibility of 43% available to Company A. As the number of consumable visibility increases, the average fraction defective should decrease. Figure 1 is a graphical representation of this decrease over time.

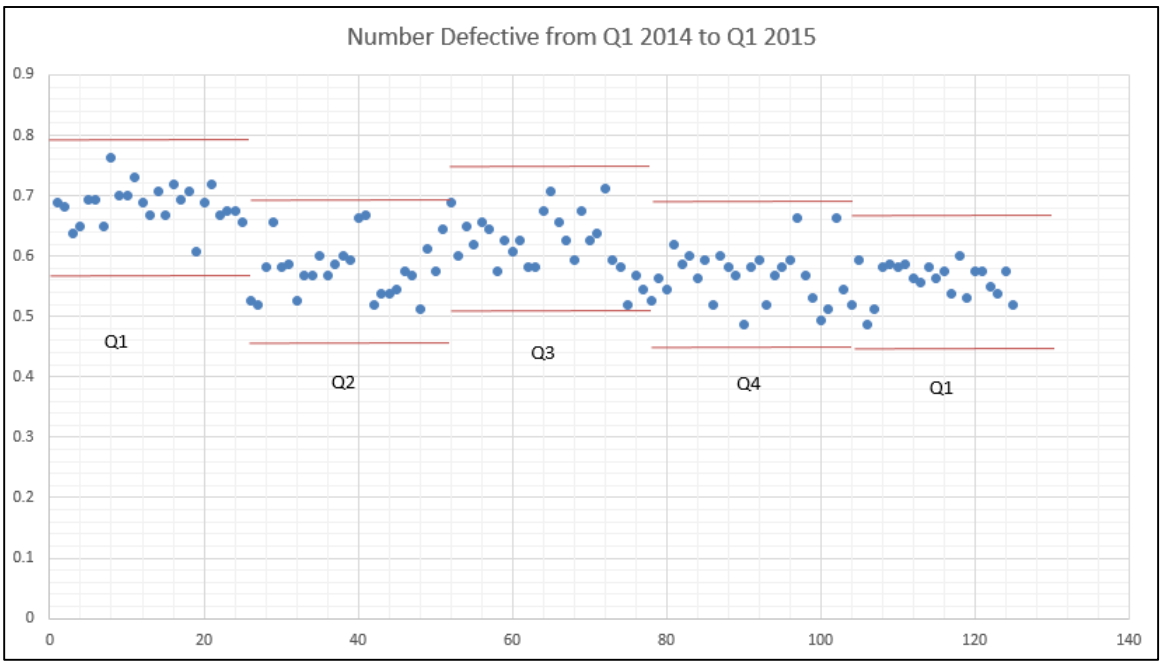

Figure 1. Trend in Quality from Quarter 1 2014 to Quarter 1 2015

Data Integrity

In order to fully adopt an order fulfillment process through Company A's inventory, the data must be reliable. In the early stages of investigation into the accuracy of the data, there were several issues found that affect Company A's ability to see what inventory is available within the ERP system.

Currently, the ERP system has the capabilities to manage stocked inventory levels through the use of minimum and maximum stock amounts. The system can also suggest these stock amounts based on the history of usage. Since the system can only use the order transactions within the system, it will be critical that this history is accurate. The following items pose several issues in allowing the system to generate this information for stocking item inventory:

- Items appearing in inventory that are not physically there
- Items appearing in a Drop-Ship inventory bin from orders that are were processed but not fulfilled
- Duplicate items have been created in the system with order history, affecting the amount that should be ordered for the true item number
- Vendors available to purchase items from are not listed under the correct items at the correct prices
- Sales orders still appearing to be on backorder when the order should have been cancelled
- Purchase orders created for items not actually used

- Items allocated from a drop-ship bin are being received into different warehouses and bins
- Orders are partially fulfilled and the items unavailable are not cancelled, leaving the order partially backordered.

Due to these issues, inventory will be monitored manually through item usage until these items can be cleaned up within the ERP system. It is critical to the success of maintaining inventory that the database reflects the true inventory counts.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the findings in the implementation of the new operating model, conclusions can be drawn according to the two research questions:

1. How will the new operating model affect total costs?

2. How will the new operating model affect firm performance in fulfillment?

The following conclusions show the qualitative findings for both cost savings and order quality.

Cost Savings

As the shift in order fulfillment takes place, the anticipated costs per order are forecasted to be $112 versus $150 for 2015. The anticipated total costs are forecasted to be $6.8M versus $9.06M without vendor negotiations. The total savings for 2015 is anticipated to be $2.26M assuming negotiations are only successful with two available vendors.

The actual realized savings for 2015 from vendor negotiations is $173,241, plus a refund of $292,126 on purchases made while in negotiations with Vendor 1. This results in a total savings of $465,367 in the first four months of 2015.

Order Quality

Company A has seen a 12.5% increase in quality since January 2014. Company A has also seen an increase in order accuracy of 22% based on the total number of assets that have integrated live data into the ERP system since January 2015. At the rate of data integration, Company A should have an asset visibility of 84% by Q3 2015. This implies that their quality rating will shift from .566 defective to .160 defective, resulting in an increase in overall order quality of 40%.

Recommendations

There are several areas in which Company A can further improve their firm performance. The current platform offers several preset alert and reporting systems that can be used to track performance. For the areas where there are not preset reports available, Company A will need to invest in having these reports created in order to help monitor specific areas. The following areas include recommendations where Company A can focus their attention to increase their performance as well as sustain the new model of fulfillment.

Performance Measurements

This first recommendation is for Company A to implement several performance measurements in order to assess their current performance and target problem areas. The areas in relation to order fulfillment that will need

performance measurements are order costs, shipping costs, order quality, and contract profitability.

Order Costs. Total order costs will be one of the most important measurements since this cost can affect contract profitability as well as affect the bottom line for Company A. Table 21 below shows the available alerts that would be beneficial to use in order to monitor the costs being associated with each order placed for the customer and its potential impact to profitability.

Table 21. Alerts for Monitoring Order Costs against Profitability

Alert	**Suggested Use**
Supply Sales	Ensuring toner is properly applied to the customer's contract so profitability reports are accurate
Supply Sales Issues	To identify a new supply order on a contract with low profitability
Inventory Issues	Identify trends on price changes by vendor on individual items, to identify vendors frequently raising prices

Shipping Costs. Although most vendors provide a standard rate for shipping, changes in shipping methods can change the anticipated shipping costs and negatively affect profitability. Although the new operating model is built around the lowest cost options, there could be scenarios in which the fulfillment staff can select alternate methods of shipping. Overnight, second day air and expedited shipping methods are a few examples of the more expensive options available to select on the orders.

The current reporting system does not have an available report to monitor the total shipping costs per order or per customer. Table 22 outlines a recommendation for alert parameters to monitor the change in shipping costs.

Table 22. Recommended Alert to Monitor Change in Shipping Costs.

Suggested Use	First Variable	Second Variable	Third Variable	Result
Monitor Shipping Costs	Fulfillment Method (Drop-Ship or Stock)	Shipping cost	Average shipping cost of item	Percent increase/decrease in average shipping cost

Order Quality. To consistently monitor the quality of ordering as shown in Chapter Four, regular sampling should be conducted to produce the number of items purchased on an order that are more expensive than the lowest cost available. There are two options that are available for this sampling. The first option would be to manually select these samples from historical data. Data could be selected for a prior period and evaluated for quality. The second option would be to create an alert that could monitor the item prices on current orders to assess the quality in real time.

In order for the second option to work, Company A would need a custom alert system created. Table 23 suggests alert parameters to monitor item prices.

Table 23. Recommended Alert to Monitor Item Prices.

Suggested Use	First Variable	Second Variable	Result
Monitor Item Prices	Lowest price available	Purchased price	Percent increase/decrease in price

Through either option one or two, the data can be used to compile a P-Chart to determine the overall order quality as well as the average number of orders where the lowest cost option was not selected. Option two would offer a better opportunity to fix current orders in order to avoid the selection of the higher priced item.

Contract Profitability. Assessing the overall contract profitability will help to identify specific contracts that either have a low or negative margin. Monitoring these profitability margins will help Company A investigate issues that are causing these low or negative margins and have the opportunity to increase these margins.

There are several contract profitability reports available to use. The system offers a preset contract profitability report that compares contract revenue for a specified time period and related costs to provide the contract profitability margin. Along with this system report, Table 24 outlines the following alerts that are currently available to use in relation to contract profitability.

Table 24. Alerts for Contract Profitability

Alert	Suggested Use
Contract Profitability	To identify the current margin for profitability
Contract Management	Alert on contracts with a profit margin % below VariableW% for the last 24 months
Worst Profitable Contract Customers	To identify the worst performing contracts by customer

Data Integrity

Ensuring that the ERP system has accurate data is critical to furthering the success of the new operating model. For the items found to be inconsistent within the ERP system, Company A will need to invest labor hours to have this cleaned up. There are several reports available to use to narrow down the areas that need the most attention. Those reports and their suggested use for data cleanup are listed in Table 25 below.

Table 25. Available Reports to Aid in Data Clean-up

Report	Suggested Use
Inventory item list	To identify duplicates and incorrectly labeled inventory items
Inventory location by warehouse	To identify items received into non-existent physical inventory bins
Inventory items Related items	To identify equipment models that do not have related supply items associated for sales orders.
Inventory item vendors	To identify the current vendors available to purchase items and identify items where vendors are not listed

Vendor Negotiations

Vendor negotiations have proven to be successful in the new operating model with two available vendors. There are five other vendors regularly used for drop-ship fulfillments, as well as at least three additional vendors not currently used for drop-ship orders. The recommendation for the negotiations with these vendors is for Company A to open a bidding process and allow the vendors to bid against each other to offer their lowest prices.

At the current rate, Company A is on track to order at least $53,623 for the rest of 2015 on items that won't be stocked in inventory. If no bidding process were initiated and Company A solely sourced these items from the lowest cost available, according to the new fulfillment model, Company A would save $2,405 per month, for a total of $19,240 for the rest of 2015. With any bidding initiation, Company A could secure an even larger decrease in costs for the rest of 2015.

Limitations of Findings and Conclusions

The recommendations are limited to the findings and conclusions associated with the fulfillment process. There are several other factors that are considered in the contract profitability such as, parts, kits and labor. The cost savings predicted for the company is only related to the reduction in costs for a single department. It is highly recommended that Company A investigate the

other departments to determine the areas where savings are occurring due to the change in operating model, if affected.

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