

Memorandum

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To: Dr. John Nazemetz, IEM 4913 Instructor

From: Taylor Mastin

Subject: Honors Contract

Within this report, my contributions are as follows:

- Current Situation
- Setup Process
- Accounting System

AN INVESTIGATION OF IMPROVEMENT OPPORTUNITIES FOR WEE-CYCLE BARTLESVILLE, LLC. IN BARTLESVILLE, OKLAHOMA

***An Oklahoma State University
School of Industrial Engineering and Management
Senior Design Project Report***

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Submitted in partial fulfillment of the requirements of the course, IEM 4913, Senior Design and the Baccalaureate degree requirements of the School of Industrial Engineering and Management at Oklahoma State University

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Executive Summary

The purpose of this report was to determine potential improvements to the operations and processes used during the set up and execution of the Wee-Cycle Bartlesville consignment sales. After identifying the areas of potential improvement, the report provides analysis and recommendations for the following areas: checkout line, sale floor organization, volunteer roles, setup processes, opportunities for additional revenue, and the accounting system.

The team was introduced to the current situation through discussion with Wee-Cycle Bartlesville owner, Sara Freeman, and observation of the August 2016 sale. Sara identified her biggest concern to be the length of the checkout line during peak shopping hours of the sale. Additionally, she expressed interest in upgrading her current display equipment to accommodate more items. Volunteer roles, setup processes and an accounting system were other areas with potential improvement.

In order to collect data related to the checkout line, the team observed peak shopping hours during the August 2016 sale. During the observations, the team identified a lack of consistency in the checkout processes of the various cashiers. Some cashiers completed transactions much faster than others, resulting in the team's recommendation to establish and use a standardized cashier process based on that of the fastest cashier. In addition, a volunteer helping bag items is recommended to decrease transaction time.

To address Sara's interest in upgrading her sale floor equipment, the team observed the current clothing racks, tables and other display equipment used at the August 2016 sale. Her current clothing racks are a combination of saddle racks and Creform racks, with Creform racks having the ability to hold twice as many clothing items per linear foot. After weighing the cost to convert the remaining racks from saddle to Creform, the team recommends replacing all saddle racks with Creform racks. Along with the clothing racks, Wee-Cycle Bartlesville also displays items on standard 8-foot tables. The team also identified potential gain in display space if a simple shelf was placed on top of the display tables to allow for the display of additional items.

Sara is often the first resource volunteers and customers seek out when a problem or question arises. She expressed great interest in being able to manage her sale, rather than spread herself thin working a register, briefing volunteers, and answering customer questions. To address this concern, the team focused on improving the volunteer roles. Roles currently lack definition and volunteers lack training, which limits the volunteer's understanding of their responsibilities. The team developed and documented volunteer role definitions and a brief training guide, the use of which are recommended to reduce confusion and questions to Sara.

Another potential area investigated for improvement was the setup process. At this time, consignors drop off their items on either Tuesday or Wednesday based on the first letter of their last name anytime between 12:00 p.m. and 7:00 p.m. Because consignors decide when to drop off their items, Sara and her staff experience idle time due to the variation in consignors' arrival times. To limit the employee idle time, the team recommends assigning consignor drop-off times. This change will allow Wee-Cycle Bartlesville to better anticipate how much time is needed for setup, and potentially open the sale a day early.

Finally, Wee-Cycle Bartlesville does not have a formal accounting system. To address this, the team created an Excel-based accounting system which allows Sara to quickly enter and easily see her expenses and revenues. The accounting system can help capture expenses and identify cost trends and potential revenues in future Wee-Cycle Bartlesville operations.

Implementing these changes requires a \$3,068.12 investment and implementing the changes will provide an estimated \$12,066.19 in additional revenue at the next sale for Wee-Cycle Bartlesville.

1.0 INTRODUCTION

This report documents the investigation into the operations, equipment, layout, and processes used during the set up and execution of the Wee-Cycle Bartlesville consignment sale events. The investigation was based on the proposal agreed upon by the team and Wee-Cycle Bartlesville, found in Appendix A.

1.1 COMPANY BACKGROUND

Wee-Cycle Bartlesville is a consignment sale business specializing in quality child and baby items at reasonable prices. Wee-Cycle Bartlesville was established in 2012. It is a for-profit LLC, owned and operated by local resident Sara Freeman. Consignors register to sell their items through the Wee-Cycle Bartlesville website. Consignors receive 70% of the revenue generated by their items, while Wee-Cycle Bartlesville receives the remaining 30%. “The goal of Wee-Cycle is to offer quality infant, children and maternity items at a fraction of the price you would pay in a store.” (<http://www.wee-cyclebartlesville.com/about-us.html>).

1.1.1 Sale Information

Wee-Cycle Bartlesville hosted their first consignment sale in 2013, with two sales annually ever since. Sales are conducted in February and August. The February sale focuses on Spring/Summer clothes, toys and baby necessities. The August sale focuses on Fall/Winter clothes and back-to-school items. In 2016, Wee-Cycle Bartlesville expanded its operations to include a third sale in November, which focused on Christmas and holiday toys and clothing.

Each sale is comprised of a two-hour volunteer-only VIP sale, two-day public sale and a discount sale. The VIP Sale takes place on Thursday evening and the sale is open to the public on Friday and Saturday. The discount sale takes place during the final four hours of the Saturday sale day.

Independent vendors rent floor space for \$75.00 for the duration of the sale. Wee-Cycle Bartlesville does not receive any revenue from vendor sales made during the sales days. The typical vendor is a local resident who sells and promotes their products during the sale. Vendor space is allocated along the perimeter of the main sale room, as seen in Appendix B. Another third party offering during the sale is a concession stand located in the main sale room. The concession stand is managed by the fairgrounds and serves as another mean of customer satisfaction. Wee-Cycle Bartlesville does not receive any revenue from the concession sales.

1.1.2 Employee Information

Sara Freeman and her husband Bryan Freeman, Vice President of Logistics, do the long-term planning and purchasing of equipment and facilities for Wee-Cycle Bartlesville. Paid employees are utilized at various times throughout the sale process. During the two setup days, two employees are responsible for ensuring items meet quality standards. Five paid cashiers operate the registers for the two days of the public sale. Other than the aforementioned employees, Wee-Cycle Bartlesville relies on volunteers for the execution of the sale process. Volunteers assist shoppers during the main sale and Sara during the setup and tear-down processes.

1.2 FACILITY OVERVIEW

The Washington County Fairgrounds building is the site of the Wee-Cycle Bartlesville consignment sales. The building has been the site of the consignment sales since the second event in 2013. The building is the largest public facility within a reasonable distance of Bartlesville, offering 17,800 square feet of usable space. The space is split between two rooms, both of which Wee-Cycle Bartlesville uses to display and sell the consignment items. The entrance to the facility is located on the east side, which opens into a foyer leading to the main rooms on the north and south sides. The facility provides both a men's and women's restroom and ample parking accommodations, as seen in the image on the next page.



Figure 1: Washington County Fairgrounds Building via <http://www.google.com/maps>

1.3 PROJECT TEAM

The project team consists of three senior-level Industrial Engineering and Management students at Oklahoma State University who are able to seek advice from two faculty advisors and an Industrial Advisory Board mentor. The project team members are Jacob Hart, Taylor Mastin, and Erin Nash.

2.0 PROJECT METHODOLOGY

The initial methodology for project execution was reviewed and modified throughout the project in order to ensure the team incorporated new information into the project plan. The initial methodology and its revision are provided below.

2.1 INITIAL METHODOLOGY

2.1.1 Initial Observations

The plan for project execution was to begin with a review of the written project overview submitted by Wee-Cycle Bartlesville. This project overview was to detail and briefly describe how the business worked and the issues which were present. Then, the team was to meet with Sara Freeman to gain an understanding of the business and clarify any areas of initial confusion. After the initial meeting, the team was to visit the August 2016 sale to begin to collect data and identify issues.

2.1.2 Collect Data

Information about setup processes, checkout processes, volunteer information (including number, roles, training, and assignments), and historic operating and equipment costs was desired. The team planned to visit the August 2016 sale where a GoPro video camera would be set up to collect video of the of the cashier processes so a time and motion study of the cashiers could be performed to set a baseline against which the team would analyze methods of improving the performance of the customer checkout process. In addition, the current sale floor layout was to be drawn for each sale room, volunteer information sheets were to be gathered, setup processes were to be documented using a flowchart, and the historical operating and equipment costs were to be collected.

2.1.3 Identify Issues

Using the data collected, the team planned to identify issues within the consignment sale processes. The team planned to search for issues associated

with the checkout line, volunteer assignments, sales floor layout, and setup processes.

2.1.4 Generate Alternatives

Once issues were identified, the issues were to be addressed by generating alternatives which would resolve them. These alternatives were to be generated by benchmarking other sales and team brainstorming. Other sales (including Belles and Beaus in Lexington, South Carolina and Adorable Affordable in Stillwater, Oklahoma) were benchmarked by observation of the sale and discussions with the owner of the sales. Adorable Affordable was observed by the team and Belles and Beaus was observed by the Industrial Advisory Board mentor.

2.1.5 Evaluate Alternatives

The alternatives generated were to then be evaluated based on their ability to improve operational efficiency, customer satisfaction, time to check out, number of items on display, and sell through.

2.1.6 Create Recommendations

Based on the evaluation of the alternatives generated, recommendations for Wee-Cycle Bartlesville were to be created and compiled.

2.2 REVISIONS TO INITIAL METHODOLOGY

The steps in the initial methodology were followed, but the sequence to which they occurred slightly shifted. The team had originally planned each event to occur sequentially, so when one step was complete, the next would begin. Many of the steps were executed in parallel. Some of the issues with the sale began to be identified as early as the initial observations. Each issue identified followed the sequence of alternative generation then alternative evaluation, but each issue was addressed as it was identified. Each issue was addressed individually, so while one issue was having its alternatives evaluated, another would be in the generate alternatives phase. Once all issues finished alternative evaluation, the

evaluations were compiled so comprehensive recommendations could be created.

3.0 CURRENT SITUATION

3.1 SALE LOGISTICS

Historically, each Wee-Cycle Bartlesville sale has followed the same process for setup, sale days and tear down.

3.1.1 Pre-Setup Processes

The pre-setup process begins when consignors register online at <http://www.wee-cyclebartlesville.com/consignors.html>. After registering, consignors enter all of their items into the inventory system, along with a price for each item. The minimum selling price is \$2.00 per item. Then, consignors print their tags using a personal computer and printer and attach the tags to their items according to the guidelines at <http://www.wee-cyclebartlesville.com/tagging.html>. These steps must be completed before the consignor can drop off the items at the Washington County Fairgrounds building.

3.1.2 Setup Processes

The setup process begins when Wee-Cycle Bartlesville begins setting up on Monday. Racks are loaded from a storage building in Sara Freeman's backyard into a U-Haul and brought to the fairgrounds building. Inmates of Dewey County complete community service at the Washington County Fairgrounds on Mondays, so Wee-Cycle Bartlesville utilizes them to set up the racks and the display tables. Tables are provided by the facility. The inmates arrange the racks and tables per instructions from Sara Freeman. She is on-site and guides them throughout the setup.

Drop off days for consignors are Tuesday and Wednesday. Consignors with last names ending with A-M are assigned to Tuesday 12:00 p.m. to 7:00 p.m. and N-Z to Wednesday 12:00 p.m. to 7:00 p.m. On their assigned day, consignors bring their items to the building. Upon arrival, consignors organize their clothing items

on racks while loose items, such as toys, are organized on a table. Wee-Cycle Bartlesville employees check the items to ensure they meet the quality standards, i.e. no stains, rips, etc. The employees have been trained by Sara and use the experience they have from previous sales. They have been employed since the first sale. Once the items have been checked, rejected items are returned to the consignors. After this, consignors leave and volunteers organize the clothing on the sale floor by gender and age. Toys, shoes, and other non-hanging items are displayed on tables. On Thursday, the last day for setup, the items are organized by volunteers to ensure the clothes are all facing the same direction on the racks and the tables have no empty spaces. Upon completion of these tasks, the sale floor is ready for shoppers.

3.1.3 Sale Day Processes

On Thursday, the VIP Sale takes place from 6:00 p.m. to 8:00 p.m. The VIP Sale is exclusive to volunteers and is the incentive for people to volunteer. At 5:30 p.m., Sara Freeman turns on the registers and inspects the sale floor one last time to ensure it is ready. Then, cashiers arrive at their assigned register. At 6:00 p.m., the doors open.

On Friday, the public sale runs from 8:00 a.m. to 8:00 p.m. Again at 5:30 p.m., Sara turns on the registers and inspects the sale floor to ensure items are displayed correctly and fixes them if they aren't. Once the doors open, the five paid cashiers manage the registers. Volunteers are responsible for maintaining the sale floor by making sure the tables look full and clothes haven't fallen off the racks. They are also responsible for assisting cashiers with bagging items when needed throughout the day. At previous sales, peak shopping hours were from 9:00 a.m. to 1:00 p.m.

On Saturday, the same processes occur. However, the sale hours differ. The public sale is from 8:00 a.m. to 3:00 p.m. From 3:00 p.m. to 4:00 p.m., there is a VIP discount sale. At this time, volunteers who worked two or more shifts are allowed to shop. There are no volunteers working from 3:00 p.m. to 4:00 p.m. Any item marked DISCOUNT is discounted at 50% during this time. At 4:00 p.m.,

the discount sale is opened to the public and it runs until 8:00 p.m. After 4:00 p.m., volunteers complete the same tasks as they do during the main sale.

3.1.4 Tear Down Processes

On Sunday, volunteers organize the items that didn't sell by consignor. Then, consignors pick up their items between 12:00 p.m. and 4:00 p.m. All items left after 4:00 p.m. are donated to local charities. Local charities pick up the items. Finally, the racks are loaded into a U-Haul by volunteers and returned to the storage building.

3.2 PROBLEM BACKGROUND

Since its establishment, Wee-Cycle Bartlesville has significantly grown in popularity. The first sale in April 2013 had 85 consignors and a revenue of \$17,000.00, as compared to the August 2016 sale that had 238 consignors and a revenue of \$53,857.50. While the growth has generated increased sales and profit, it has also been accompanied by an increased wait times for shoppers which, at times, can approach an hour. This increased wait time was reduced at the August 2016 sale from one hour to 40 minutes. Changes contributing to the reduction included: the addition of two registers, two new laptops to accommodate the new registers, new cash boxes (five) which open automatically for transactions, new receipt printers (five) which print receipts faster than the previous standard computer printer and a new bagging process. The bagging process uses large tubs (see below) lined with large plastic bags, allowing cashiers to quickly deposit items into the bag after scanning.



Figure 2: Large Tub

http://www.osh.com/medias/sys_master/images/images/8878907785246/B-6871008-1432554666273-515x515.jpg

The key issues identified and discussed in sections 4.0-9.0 are the checkout line, sale floor organization, volunteer roles, setup process, opportunities for additional revenue, and an accounting system.

4.0 CHECKOUT LINE

The primary concern of Wee-Cycle Bartlesville is the length of time customers currently wait in the checkout line. The rapid growth in sales volume has resulted in a long checkout line, especially during peak shopping hours. The long checkout line was addressed by collecting data, generating alternatives, evaluating alternatives, and creating recommendations.

4.1 CHECKOUT LINE DATA COLLECTION

4.1.1 Data Collection Methodology

The team was interested in gathering information about the transaction time of customers, the number of items customers purchase, the payment methods, and the types of items customers purchase (large items, toys, clothing, etc.). This data was gathered using outputs of MySaleManager.net, the Wee-Cycle Bartlesville register software.

The team was also interested in gathering information about the method cashiers use to process transactions. A GoPro video camera was set up above the registers during the sale in order to capture this information. The GoPro recorded the VIP sale on Thursday night from 6:00 p.m. - 7:00 p.m. and the public sale on Friday from 8:30 a.m. - 9:30 a.m.

4.1.2 Data Collected

Register system data was provided by Sara Freeman in two different spreadsheets. The first spreadsheet was a Master Sales File that included specific information about each transaction, such as detailed information about specific items purchased within each transaction. The names and descriptions of the fields in this file can be seen in Table 1. A portion of the Master Sales File data can be seen in Appendix C.

Field Name	Field Description	Defined By
RECID	The Record ID is a unique consecutively assigned integer assigned to each entry in a database.	System
TRANSACTION ID	The Transaction ID is a unique consecutively assigned integer assigned to each transaction.	System
CONSIGNORID	The Consignor ID is a unique random integer assigned to each consignor.	System
ITEMID	The Item ID is a unique consecutively assigned integer assigned to each item.	System
DESCRIPTION	This field is a brief description of the item being sold.	Consignor
CATEGORY	This field is a larger group into which an item falls.	Wee-Cycle
SIZE	This field is typically only applied to clothing and dictates the age group for clothing. For non-clothing items, it is automatically assigned either "0" or "Leave Blank".	Consignor
REGPRICE	The Regular Price is the normal selling price of the item.	Consignor
SELLPRICE	The Sell Price is the price at which the item was sold. This field will differ from REGPRICE if the item was sold at a discount.	System
TAXAMT	The Tax Amount is the TAXPCT multiplied by the SELLPRICE.	System
TAXPCT	Tax Percent is the sales tax rate for the location of the sale. In August 2016, the tax rate was 8.5% for the State of Oklahoma.	System
ISDISCOUNT	This field indicates if an item is eligible to be sold at a discount during the discount sale. The field will say "Yes" or "No", depending on its eligibility.	Consignor
ITEMNOTE	The Item Note is a combination of the Item ID and the Consignor ID.	System
OPERATORID	The Operator ID is the name of the cashier who completed the transaction.	Wee-Cycle
TRANSACTIONDATE	The Transaction Date is a single time stamp associated with each transaction that says the date and time at which the transaction occurred.	System
WORKSTATION ID	The Workstation ID is the name of the laptop used to complete the transaction.	System

Table 1: Master Sales File Column Details

The second spreadsheet was a Master Transaction File that included general information about each transaction such as payment type, item count and change due. The names and descriptions of the fields in this file can be seen in Table 2. A portion of the Master Transaction File can be seen in Appendix C.

Field Name	Field Description	Defined By
RECID	The Record ID is a unique consecutively assigned integer assigned to each entry in a database.	System
TRANSACTIONID	The Transaction ID is a unique consecutively assigned integer assigned to each transaction.	System
TRANSACTION_DATE_LONG	The Transaction Date Long is the specific date and time a transaction occurs.	System
TRANSACTION_DATE_SHORT	The Transaction Date Short is only the date the transaction occurs. This does not include the time.	System
ITEMCOUNT	The Item Count is the number of items purchased in a transaction	System
PURCHASE_AMT	The Purchase Amount is the pre-tax cost of goods sold.	System
TAX_AMT	The Tax Amount is the total of the amount of tax dollars to be added to a sale.	System
PAYTYPE(1,2,3,4)	This field consists of four columns (Pay Type 1, Pay Type 2, Pay Type 3, Pay Type 4) which indicate the method of payment. Inputs include either "Cash", the brand of credit card (MasterCard, Visa, etc.), or it can be blank. When a customer pays with multiple payment methods, Pay Types 2-4 are filled sequentially with the respective codes.	Cashier
AMOUNTTEND(1,2,3,4)	Similar to Pay Type, this field consists of four columns (Amount Tendered 1, Amount Tendered 2, Amount Tendered 3, Amount Tendered 4) which indicate the amount a customer pays on each form of payment	System
AMOUNTDUE	The Amount Due is the sum of the Purchase Amount and Tax Amount.	System
CHANGEDUE	Change Due is the difference between the Amount Due and the total of the Amount Tendered.	System
OPERATORID	The Operator ID is the name of the cashier who completed the transaction.	System
WORKSTATIONID	The Workstation ID is the name of the laptop used to complete the transaction.	System
ADJAMOUNT	Adjusted Amount indicated the dollar value a transaction was manually adjusted by.	Cashier
ADJREASON	The Adjusted Reason indicates the reason as to why a payment amount was manually altered.	Cashier
TAXEXEMPT	Tax Exempt indicated whether a customer is exempt from paying sales tax or not. This is indicated by either "Yes" or "No".	Cashier

Table 2: Master Transaction File Column Details

The Thursday evening video footage captured walkthroughs of both the main sale and large item rooms. This video included footage detailing item location and sale floor layout. Video was also captured Thursday evening recording the cashiers and their checkout processes. The video footage from Friday also recorded the cashiers and their checkout processes. The footage also showed how customers interact with the cashiers.

4.2 IDENTIFY CHECKOUT LINE ISSUES

During the initial meeting with Sara Freeman, she stated that customers were, at times, waiting over an hour in line before checking out at a register. The checkout process uses a single line which feeds into five registers. When a cashier has completed a transaction, they call for the next customer in the line. In order to determine what was causing this long wait time, the team had to discover whether this issue was due to only certain customers taking a long time to check out or if all customers take a long time to check out. Determining this root issue would determine the primary cause of the long checkout line.

First, the team needed to determine the transaction times of customers since it was not provided directly through either the Master Sales File or the Master Transaction File. The transaction timestamps from the Master Transaction File were used in order to calculate the transaction times of customers. This calculation was done by operating under the assumption that when a consistent line was present, the timestamp of a transaction could be subtracted from its successor's timestamp, resulting in the total transaction time. The data was filtered to only include transactions between 9:00 a.m. and 11:00 a.m. on the first day of the public sale, as this time was known to have a consistent line during the August 2016 sale. The remaining data was then separated into independent registers. Then, transaction times were estimated by subtracting the timestamp of a transaction from its successor's timestamp. These values were compared with those found in the sale day video observations by finding which data points matched which customer. The customers were then timed with a stopwatch. These times were compared with the calculated transaction times and were found to be consistent.

Then, the relationship between the number of items purchased and the transaction time was observed. Figure 3 displays this relationship by use of a regression line. This graph shows that in general, customers who purchase more items take longer to check out. The regression line equation pictured on the figure says that when a customer purchases X number of items, it takes Y seconds to check out. Some variation around the transaction time exists. For

example, one customer who purchased 5 items took only 68 seconds to check out while a different customer who purchased 5 items took 683 seconds (11.4 minutes) to check out. To determine the extent of this variation, the data was to first be normalized by removing the trend from the data. This was done by dividing each transaction time value by the value of the corresponding estimated transaction time as calculated by the regression equation. For example, one data point shows that a customer purchased one items and took 74 seconds to check out. In order to normalize this value, first the number of items the customer purchased was plugged into the regression equation ($6.6168 * 1 + 102.39 = 109$ seconds). Then, the actual time was divided by the calculated time to result in the normalized value ($74 / 109 = 0.679$).

Once this calculation was performed for all data points, the standard deviation of the data was found to be 0.518 which converts to 56.5 seconds. This conversion was done in order to gain a concrete understanding of the standard deviation in units of seconds. In order to calculate this conversion, the standard deviation value had to be re-trended by multiplying the standard deviation value by the result of the regression equation ($0.518 * 109 \text{ seconds} = 56.5 \text{ seconds}$). This shows that a large difference in transaction time can exist between customers, so this variability should be investigated.

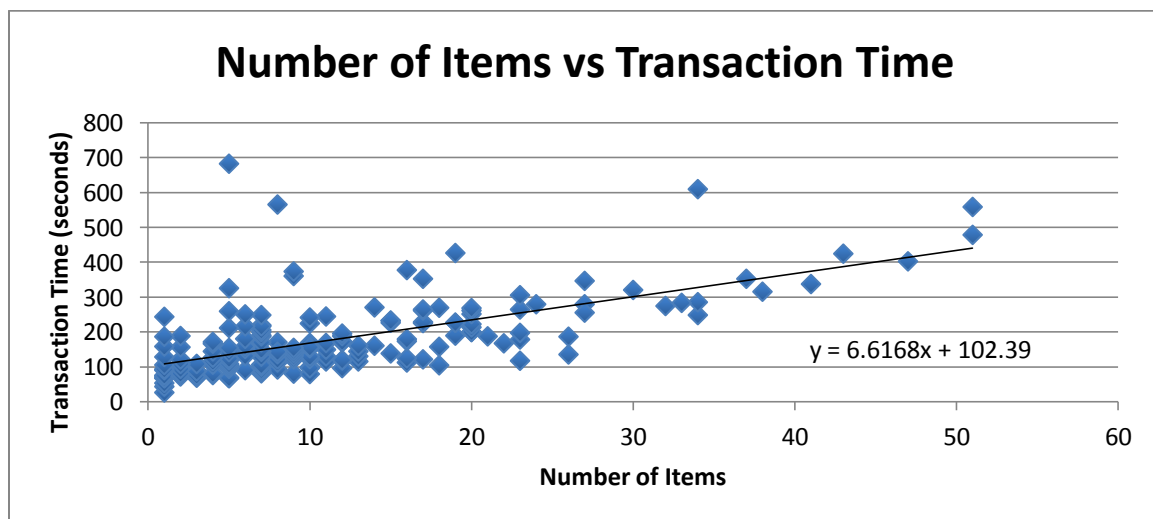


Figure 3: Number of Items vs Transaction Time

4.3 CHECKOUT LINE ALTERNATIVE GENERATION

4.3.1 Alternative Generation Methodology

Alternatives for the checkout line were generated through independent idea generation by each member of the team. The alternatives generated by each individual were then compiled and proceeded to be evaluated if determined to be a feasible method to reduce the maximum wait time of an individual customer. The alternatives are listed below.

4.3.2 Alternatives Generated

The team identified five primary alternatives which could reduce the maximum wait time of an individual customer:

1. A large items only register to allow customers who only purchase large items to check out faster
2. Hiring an additional employee to serve as a cashier to allow Sara Freeman to manage all areas of the sale without leaving a register idle
3. An additional volunteer during peak shopping hours who would sort and arrange items so cashiers can scan items faster
4. Signs at registers to get the attention of customers waiting in line faster
5. A defined and documented cashier process so slower cashiers would know the fastest method of checking out customers, which would reduce their checkout time

4.4 CHECKOUT LINE ALTERNATIVE EVALUATION

4.4.1 Large Items Only Line

For the August 2016 sale, Wee-Cycle Bartlesville considered having a register exclusively for the checkout of large items. The alternative removes one register from the main sale room and places it in the large item room. This plan was not implemented during the August 2016 sale, but was investigated by the team.

In order to determine the effectiveness of a register for the exclusive use of large item only transactions, each transaction in the Master Sales File spreadsheet was analyzed to determine the number of transactions in which only large items

were purchased. Of the 4,170 transactions over the duration of the sale, only 23 transactions (0.55%) exclusively contained large items. These few transactions took only an average of 77.5 seconds to process. Moving a register to only manage these few transactions would result in the large item only register to be idle the majority of the time, while the main line would have one fewer register which would cause the main line to increase in length as the overall number of customers served per hour would decrease. Because of this, the large item only line was deemed to be ineffective in reducing the maximum wait time of a customer in line.

4.4.2 Hire an Additional Employee

While observing the sales day video, the team noticed multiple instances when Sara Freeman had to step away from the register she manages and assist with other aspects of the sale, leaving her register idle. Some of the reasons she steps away from her register are training volunteers upon their arrival, assisting other cashiers when errors arise in the system (for reasons unknown), assisting individual vendors or customers, or a multitude of other unforeseeable issues which arise. The proposal to hire an additional cashier would relieve Sara from register operation and allow her to manage all aspects of the sale without leaving a register unattended as she addresses issues that arise.

Whenever an issue arises, Sara's register goes idle, which causes the checkout line to grow. The video showed 9 instances of Sara stepping away from her register over the course of one hour, taking an average of 55 seconds to resolve each issue. Adding an additional employee as a cashier instead of Sara serving as a cashier would reduce each customer's transaction time by an average of 5.5 seconds. This was found by multiplying the average time to resolve an issue (55 seconds) by the number of issues in an hour (9 instances) then dividing this value by the average number of customers served in an hour (90 customers/hour). Adding an additional cashier for only the duration of the peak shopping time from 8:00 a.m. to 12:00 p.m. would be an additional \$60.00 in employee costs. This additional employee would also free Sara to manage the sale as a whole and be free to roam the sale floor during the duration of the sale.

4.4.3 Add a Volunteer to Prepare Items for Scanning

During peak shopping hours, customers have waited up to an hour to check out. Currently, cashiers must organize items before they can scan the barcodes and they spend a good percentage of the transaction time ensuring that all hangers and barcodes are facing the same direction on clothing. While watching the videos, it was observed that cashiers spend an average of 25 seconds each time they need to straighten the customer's items. The cashier straightens the customer's items one in three transactions as seen in the sale day video. Adding a volunteer to help customers prepare their items before reaching the register can help speed up the transaction time of customers by 8.33 seconds on average. Since this role is a volunteer, no costs or significant risk exists in the addition of this role.

The additional role, in this evaluation, is referred to as the ITEM PREP ATTENDANT. Below is the job description intended for the volunteers who will serve in this role, to be read prior to their arrival at the sale:

ITEM PREP ATTENDANT

- As the ITEM PREP ATTENDANT, you are responsible for assisting shoppers immediately before the checkout process.
 - ITEM PREP ATTENDANT responsibilities are as follows:
 - Help shoppers organize clothing and align all hangers to face the same way (clothing racks available to hang clothes and help ensure tags are on the same side and hangers are facing the same direction)
 - Return any items shoppers decide not to purchase to a SALE FLOOR ATTENDANT
 - Be alert and let shoppers know when a register becomes available
 - Remain in the item prep area until the next volunteer comes to relieve you
 - If you are the first ITEM PREP ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately go to the area south of the registers (indicated by the red "X" on Figure 7).
 - If you are relieving a volunteer ITEM PREP ATTENDANT, check in at the table by the registers (main sale room), put on your volunteer apron, and immediately go to the area south of the registers to relieve the previous volunteer ITEM PREP ATTENDANT. Please arrive for your shift 5 minutes before it is scheduled to begin.

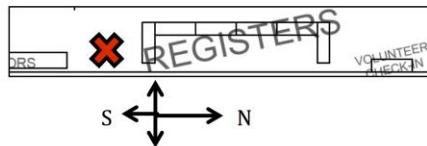


Figure 4: Item Prep Attendant Job Description

4.4.4 Place Signs at Registers

While watching the video recordings of the cashiers, the team noticed there is often a delay between customers arriving at a cashier following completion of the

preceding customer's transaction, resulting in idle time for the cashier. When one customer has finished checking out, the cashier would often have to wave and get the attention of the next customer in line. This delay occurred during 25% of transactions and took 5 seconds each time it occurred. These values were found by observation of the sale day videos.

A small vertical sign that sets on the register table (similar to number placeholders at many restaurants as seen in Figure 5) should help shorten the time between customers. Cashiers currently have to get the customer's attention and communicate that the register is available, but a simple flip of a sign from red to green should capture the customer's attention faster. Adding a sign will also save cashiers energy by reducing the effort required to get the customers attention. Determining whether a preceding customer is finished checking out can be difficult to determine while a customer is in line, so this clear signal will eliminate this confusion. These types of signals and their effectiveness can be seen at stores like T.J. Maxx. The signs should be flipped as the cashier hands the customer their items.

Placing signs at registers could benefit the sale by decreasing time between shoppers checking out and ultimately lead to a shorter wait time. Adding these signs should reduce the average check out time by 1.25 seconds. Sets of six 20" sign placeholders, similar to restaurant table placeholders, are available on amazon.com for \$9.99 (seen in Figure 5).

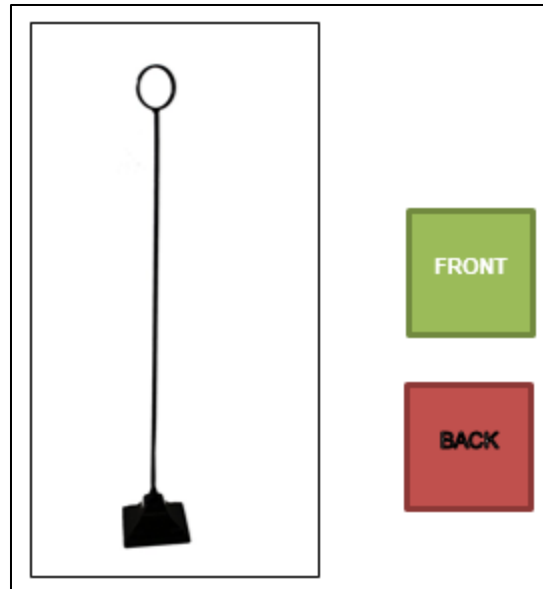


Figure 5: Register Sign and Placeholder

4.4.5 Define and Document Cashier Process

While watching the sales day video, the team observed that each cashier scans and bags items differently. The team decided to determine if one method of scanning was better than the others, then define and document this process so that all cashiers could follow this fastest method.

In order to discover the fastest cashier checkout process, the team first analyzed the data to determine which server was the fastest. First, item quantity per transaction for each cashier was compared to ensure similarity. If one cashier had many transactions with several items while another cashier had many transactions with few items, comparisons of their transaction times would not be representative of the effectiveness of their scanning process unless normalized for item count. Each cashier was discovered to have similar distributions of items per transaction, so valid comparisons could be made easily. The histograms showing the distribution of items per transaction for each cashier are shown in Appendix D.

Next, each transaction time was compared in order to discover which cashier had the lowest average transaction time. The cashier with the lowest average transaction time would also have the best method of scanning and bagging

items. The average transaction time for Cashier 1 was 194.6 seconds per transaction, Cashier 2 was 229.9 seconds per transaction, Cashier 3 was 171.0 seconds per transaction, Cashier 4 was 161.6 seconds per transaction, and Cashier 5 was 169.8 seconds per transaction. The team viewed the video recorded with the GoPro in order to study the scanning process of Cashier 4 since she had the lowest average transaction time. This process was reviewed by the team, and it was determined that this cashier did in fact have the best method of scanning and bagging items and is shown below. The defined cashier process has also been included as a cashier training guide in Appendix E.

1. Lay all clothing items in scanning area and ensure all tags are facing upward. The open side of each hanger should be facing left.
2. Holding the barcode scanner in your left hand, scan the barcode of the top item.
3. Without setting down the barcode scanner, use your right hand to grab the hanger of the scanned item and fold the item towards yourself.
4. Repeat steps 2 and 3 until all clothing items are scanned
5. Set the barcode scanner down and place all clothing into item tub.
6. After scanning all clothing items, scan all other items.
7. Place all items in tub after they are all scanned

If each cashier were to implement this checkout process, the average checkout time would be reduced by 24 seconds per customer. This value was found by finding the average difference of each cashier's transaction time from the average transaction time of Cashier 4. In comparison to Cashier 4, Cashier 1 was on average 33.0 seconds slower, Cashier 2 was 68.3 seconds slower, Cashier 3 was 9.4 seconds slower, and Cashier 5 was 8.2 seconds slower. The average of these values (and the 0 second difference for customers with Cashier 4) was 24 seconds, which would be the average checkout time reduction per customer.

4.5 CHECKOUT LINE RECOMMENDATION

Based on the evaluation of alternatives, the team recommends adding an item prep attendant so cashiers can scan items faster, using signs at each register to get the attention of customers waiting in line faster, using the defined cashier checkout process so slower cashiers can know the fastest method of checking out customers, and hiring an additional employee to allow Sara Freeman to manage all areas of the sale without leaving a register idle as means of reducing the maximum customer wait time in the checkout line. If all of these methods are implemented, they should reduce the transaction time of each customer by an average of 39.08 seconds (5.5 seconds + 8.33 seconds + 1.25 seconds + 24 seconds). This reduction in transaction time will result in a 19.4% reduction of the maximum wait time for a customer. The total cost associated with these recommendations is \$70. The use of a large item only line is not recommended due to its inability to significantly reduce the maximum customer wait time in the checkout line.

5.0 SALE FLOOR ORGANIZATION

This section discusses the sale floor organization investigation, data collected, alternatives established, and final recommendations. Items such as toys, games, and shoes are stacked and many items are displayed on the floor beneath tables. Shoppers are still able to view and purchase items beneath the tables, but it is not as convenient as items on the tables.

5.1 SALE FLOOR DATA COLLECTION

5.1.1 Data Collection Methodology

Data was collected through direct observation of the August 2016 Wee-Cycle Bartlesville sale. Data was also collected from the GoPro video footage of the August 2016 sale. While visiting the August sale, sketches detailing the layouts of the two sale rooms were created. Using these sketches, the team documented the room layouts in AutoCAD, seen below. Register and display equipment was also observed and documented and can be found in section 5.1.2 as Table 3.

In addition to direct observation, Pam Pollock, manager of the Washington County Fairgrounds, provided facility dimensions of 159' 6" x 78' 9" for the main sale room and 49' 8" x 78' 9" for the large item room.

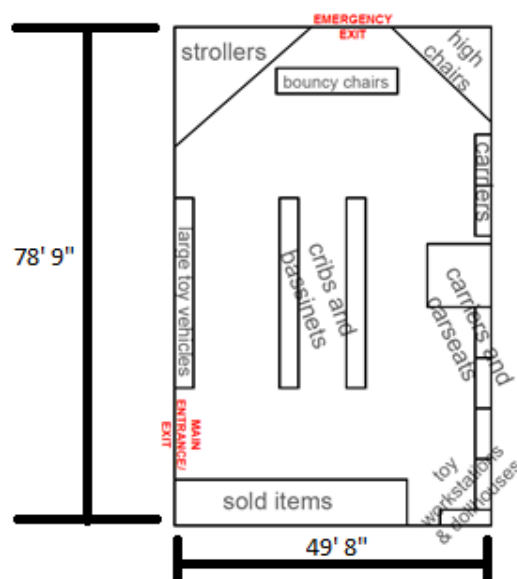


Figure 6: Large Item Room Layout

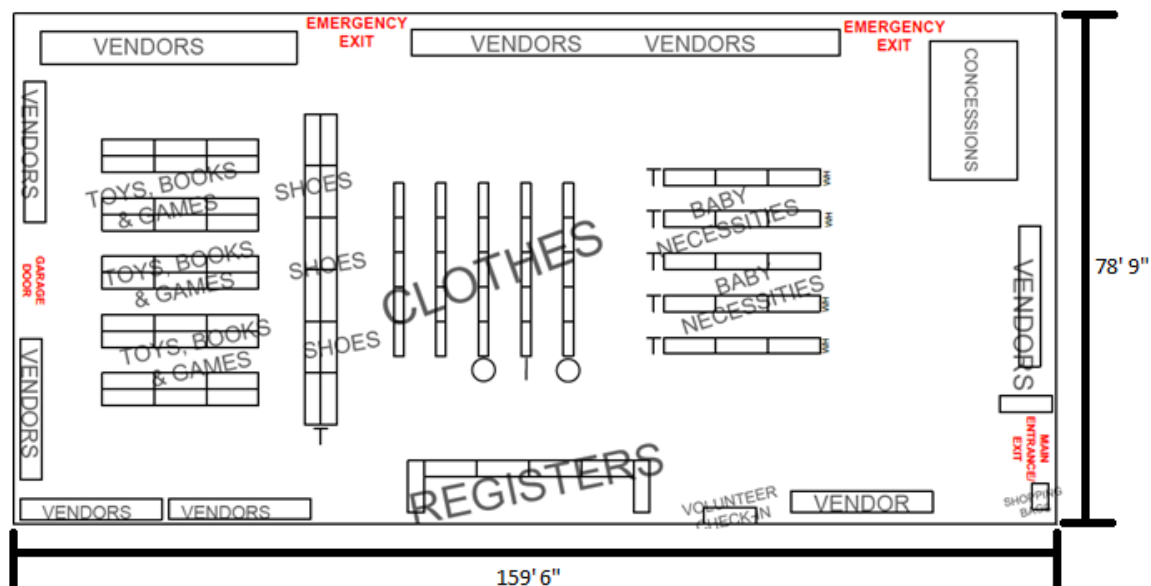


Figure 7: Main Sale Room Layout

5.1.2 Data Collected

The primary equipment used to display items includes standard 8-foot folding tables, clothing racks and baskets. The Washington County Fairgrounds building provides up to 100 8-foot tables. Wee-Cycle Bartlesville provides Creform clothing racks, round racks, Z racks and laundry baskets to display sale items.

At the August 2016 sale, 57 standard 8-foot tables were used in the main sale room to display items. Baby necessities accounted for 15 tables, toys, books, & games were displayed on 30 tables, and 12 tables were used to display shoes. In the main sale room, an estimated 300 square feet was dedicated to baby necessities, 240 square feet was dedicated to shoes, and 600 square feet was dedicated to toys, books, & games. In the large item room, only seven standard 8-foot tables were used equating to 140 square feet of table space dedicated to large items. Six tables were dedicated to the register space for the checkout process. Overall, Wee-Cycle Bartlesville used 71 tables to display sale items. The tables that were not used by Wee-Cycle Bartlesville were used by vendors to set-up their shop space. Using additional tables was not an option for analysis because all tables provided were used.

Wee-Cycle Bartlesville provides the equipment and software for the checkout process. This includes laptops, cash boxes, receipt paper, receipt printers, handheld barcode scanners, Square technology readers and the MySaleManager.net support. Note that although there are five registers, there is only one square stand. The square stand was purchased by Sara Freeman before the February 2016 sale and it did not seem to have a significant impact on the checkout time, so more were not purchased.

Table 3 illustrates the quantity of specific items within the generic categories of checkout process equipment, display equipment, transportation equipment and resources for shoppers.

Checkout Process Equipment	Cash Boxes	5
	Epson Printers	5
	Receipt Paper Rolls	160
	Register Laptops	5
	Handheld Barcode Scanners	5
	Refurbished iPhones	3
	Square Technology Readers	5
	Square Stand	1
Display Equipment	Creform Clothing Racks	16
	Round Racks	3
	Rolling Z Racks	3
	Standard 8-foot Tables	100
	Regular Printer for Signage	1
Transportation Equipment	U-Haul	1
Resources for Shoppers	IKEA Bags	100

Table 3: Equipment Quantities

Currently, Wee-Cycle Bartlesville separates item types into two rooms. Detailed layouts of the two rooms are found in Appendix B. The north (large item) room displays strollers, cribs, large toy sets, baby bouncers and changing tables. The south (main sale) room displays clothing, toys, movies, books, shoes, new parent supplies and baby necessities. The checkout area is located in the main sale room along the east wall. Volunteer check-in is also located along the east wall,

while vendors line the remaining north, south and west walls of the main sale room. There are no vendors located in the large item room. The large item room also contains a holding area for large items that have been sold and are waiting for pick up.

5.2 SALE FLOOR ORGANIZATION ALTERNATIVE GENERATION

5.2.1 Alternative Generation Methodology

In order to determine the various options available, the team benchmarked Wee-Cycle Bartlesville against other consignment sales and brainstormed alternatives independently. The team visited Adorable Affordable in Stillwater, Oklahoma and Ashley Estes, team mentor, visited Belles and Beaus in Lexington, South Carolina. Our benchmarking and brainstorming resulted in the following alternatives:

1. Condensing the checkout line, as observed at Adorable Affordable
2. Display items on shelves, an idea brought to the team's attention by Sara Freeman
3. Eliminate vendors, as observed at Adorable Affordable
4. Eliminate the large item room
5. Replace saddle racks with Creform racks

5.3 SALE FLOOR ORGANIZATION ALTERNATIVE EVALUATION

5.3.1 Condense the Checkout Line for Additional Space

Currently, the checkout line builds as seen in Figure 8. Altering the line to zig-zag in a square- or rectangle-shaped area has potential advantages including less traffic and less floor space necessary to hold the shoppers waiting to check out.

In order to evaluate this alternative, various layouts were discussed to accommodate the alternate line. The team considered leaving the line in its current location, but that would mean eliminating vendors. Moving the registers to the north wall was also considered, but because of the permanent concession stand structure there is not enough floor space. Wide aisles are vital to the flow because many shoppers come to the sale with strollers, which makes a

condensed line unrealistic. It is difficult to maneuver strollers around tight corners and narrow aisles, especially if the shopper also has many items. Because of the current layout and potential difficulty for customer movement, it was determined that a condensed checkout line is not beneficial for Wee-Cycle Bartlesville.

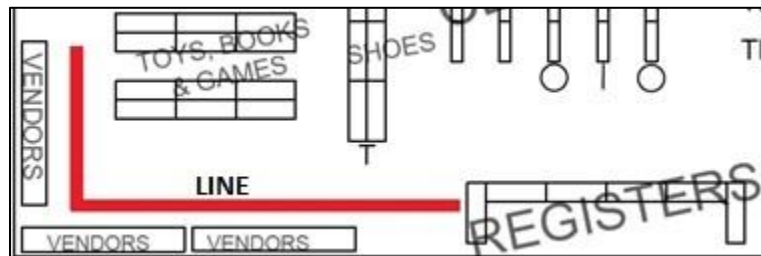


Figure 8: Current Checkout Line Location

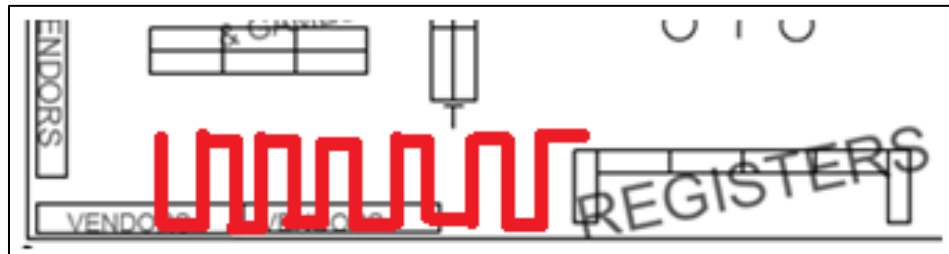


Figure 9: Condensed Line in Current Location



Figure 10: Register Scenarios on North Wall

5.3.2 Use Shelves to Display Items

Currently, all of the table space is utilized. Toys, books and games are stacked and shoes are displayed in laundry baskets making it difficult for customers to view all of the items.

In order to add additional display space, items can be placed on simple wood-and-bucket shelves as seen in Figure 11. A shelf, made of two buckets at each end of a board, adds a level to the display tables and each shelf can increase display space available by 8 square feet. Each shelf would require two five-gallon paint buckets and one $\frac{3}{4}$ " x 1 ft x 8 ft board; both can be found at Lowe's for \$2.98 and \$4.07, respectively.

The following analysis is based on the current sale floor display table utilization of 6 table lengths currently used in the shoe section and 15 table lengths of display space currently used in the toys, book, & games section. Using the five-gallon plastic paint buckets as a base for the board could add 48 square feet of display space in shoes and 120 square feet of display space in toys, books and games. Assuming an additional four pairs of children's shoes can be displayed per square foot, this would allow for 192 additional pairs of shoes on display. If 80% of an additional 192 pairs of shoes are sold at the minimum selling price of \$2.00 per item, \$92.16 would be gained in revenue at future sales. Assuming two items per square foot of shelf space in the toys, books and games section, an additional 240 items could be displayed. If 80% of the additional 240 items are sold at the minimum selling price of \$2.00 per item, \$115.20 would be gained in revenue at future sales. The revenue expressed is after the Consignor-Wee-Cycle Bartlesville profit split. The sale significantly grows in magnitude every year, making it realistic to consider additional items from consignors.



Figure 11: Display Shelf Example

5.3.3 Eliminate Vendors

Vendors occupy the majority of the space on the north, south and west walls of the main sale room. Eliminating vendors would create more display space, allowing Wee-Cycle Bartlesville to display more items throughout the sale floor. Adorable Affordable in Stillwater and Belles and Beaus in Lexington do not rent space to vendors.

Creating more display space would allow Wee-Cycle Bartlesville to accept, display and sell even more consigned items. When considering this alternative, the customer perspective was held in high regard. From observation, customers enjoy visiting vendors and looking at the items they sell at Wee-Cycle Bartlesville. The vendors also provide additional sale promotion because they advertise the sale as they promote their products. Although an additional 580 square feet of display space would be available if vendors were eliminated, it was decided to not recommend removing vendors because of the customer satisfaction and advertising they provide Wee-Cycle Bartlesville.

5.3.4 Eliminate Large Item Room

Eliminating the large item room would decrease the facility rental cost. This could be accomplished by displaying large items in the main sale room rather than in a separate room.

In order to evaluate this alternative, it was considered to eliminate the concession offering and use the permanent concession counter to display items. This option was not practical, however, because the concession counter is roughly 24" taller than the standard display table, making it difficult and unsafe for customers to view items.

Only 0.01% of customers bought exclusively large items at the sale without purchasing any items from the main sale room, so the large item room does not currently pull shoppers from the main sale room.

Although facility cost would decrease by \$967.50, it is not practical to eliminate the large item room because Wee-Cycle Bartlesville gained an estimated \$1,427.10 in revenue exclusively from large items sold at the August 2016 sale.

5.3.5 Replace Saddle Racks with Creform Racks

Wee-Cycle Bartlesville displays the majority of clothing on two types of racks: saddle racks and Creform racks, shown below. All other clothing (specialty clothing) that does not fit on the racks including dresses, coats, and costumes, is displayed on T Racks. The amount of hanging space provided by the T Racks is sufficient for specialty clothing sold. There is 60 feet of hanging space in the form of saddle racks. Wee-Cycle Bartlesville already utilizes Creform racks, and converting the remaining saddle racks to Creform racks can significantly increase the amount of display space for clothing on the sale floor.



Figure 12: Saddle Racks



Figure 13: Creform Racks

<http://www.wee-cyclebartlesville.com/>

Maintaining the same sale floor layout at future sales, purchasing 60 feet of Creform racks to replace the saddle racks would be a more efficient use of the vertical space available. Because the sale is continually growing, it is reasonable to anticipate more clothing items in future sales. The cost to replace 60 feet of saddle racks with Creform racks is \$1,200.00. Creform racks have the ability to hold 600 items every five feet versus saddle racks, with only half the capacity (300 items per five feet). 60 feet of saddle racks has the ability to hold \$2,160.00

in Wee-Cycle Bartlesville revenue while 60 feet of Creform racks has the ability to hold \$4,320.00 in Wee-Cycle Bartlesville revenue. This revenue is calculated assuming that every item hanging on the rack is priced at the minimum selling price of \$2.00 per item.

	Saddle Racks	Creform Racks
Capacity (per 5 ft)	300 items	600 items
Potential Revenue	\$2,160.00	\$4,320.00

Table 4: Saddle Racks vs Creform Racks

5.4 SALE FLOOR ORGANIZATION RECOMMENDATION

After evaluating the alternatives, recommended alternatives for the sale floor are to display items on shelves and replace saddle racks with Creform racks to display clothing items. Adding shelves and adding Creform racks are recommended because of their practicality and potential to increase revenue by \$2,367.36 (\$92.16 + \$115.20 + \$2,160.00) at future sales.

6.0 VOLUNTEER ROLES

This section discusses the volunteer roles and the data collected, alternatives established and recommendations regarding volunteer assignment definition and training.

6.1 VOLUNTEER ROLES DATA COLLECTION

6.1.1 Data Collection Methodology

The volunteer assignments are determined in MySaleManager.net. Volunteers view and sign up for available shifts prior to the sale. The majority of the data collected concerning volunteers came from MySaleManager.net and was obtained via Sara Freeman. Data was collected from the Work Schedule report, which included shifts from the August 2016 sale, and their status (FILLED or OPEN), volunteer name and phone number (if filled), and the date the shift was filled. See Appendix F for scanned images of the Worker Schedule Report.

6.1.2 Data Collected

Data was collected regarding volunteer solicitation, assignments, training, and work times in order to evaluate the current volunteer utilization. Volunteer incentives include access to the VIP sale and the opportunity to shop the discount sale early. To shop at the VIP sale, a volunteer must work one two-hour shift. To shop the discount sale, a volunteer must work two or more shifts. Volunteers register for two-hour shifts through the Wee-Cycle Bartlesville website. They are assigned to specific shifts during setup and sorting, VIP sale prep, main sale, discount sale prep, discount sale, sorting for pick up and tear down & pick up. Specific volunteer tasks during their shift(s) are defined upon arrival.

Volunteer shifts begin every two hours during the main sale and each shift contains four positions. Currently, there are no specific tasks identified for volunteers working at the main sale. From observation, Sara Freeman spends roughly fifteen minutes during shift turnovers briefing volunteers on how they can help. Because there is no formal definition of volunteer roles, Sara determines their utilization on the fly at each shift turnover. Over the course of the public sale, directing volunteers adds up to nearly three hours of her time.

6.2 VOLUNTEER ROLES ALTERNATIVE GENERATION

6.2.1 Alternative Generation Methodology

In order to determine the various options available, the team visited two other consignment sales. At both sales, the owners provided insight on volunteer utilization. Personal volunteering experience was also taken into account. One of the team members volunteered at the Oklahoma State Athletics Remember the Ten Run in April 2016, and received detailed information of responsibilities prior to arriving. The information included the meeting location, time, and responsibilities for the various volunteers. Volunteers could preview roles and descriptions before signing up. Roles included support for the check-in process, course set-up process, water stations for runners along the course, and clean-up after the event. The predetermined responsibilities made the event run efficiently

and avoid confusion or misunderstanding for volunteers. The previous experience and observation of the sale served as a foundation for the team's alternative generation. The following alternatives were determined:

1. Use of volunteer role definitions
2. The utilization of a brief training guide

6.3 VOLUNTEER ROLES ALTERNATIVE EVALUATION

Each alternative had the potential to yield: decreased stress, reduced time spent training, and a mutual understanding between Wee-Cycle Bartlesville and its volunteers.

6.3.1.1 Define Volunteer Roles

Formally defining volunteer roles prior to the sale may not directly impact profit, but it can save both volunteers and Sara Freeman a significant amount of time and stress during the sale. The area that most requires definition are the volunteer roles at the main sale.

The following role titles were determined: sale floor attendant, register attendant, and large item attendant.

6.3.1.2 Develop Training Guide for Volunteers

The use of a training guide detailing the volunteer assignments could greatly aid in creating consistency from sale to sale and a mutual understanding of the responsibilities between the volunteers and Wee-Cycle Bartlesville. The team designed a simple document to be used as a guide and made accessible on the Wee-Cycle Bartlesville website. It could also be available for reference at the volunteer check in table at the sale. Having a guide for volunteers with a brief description of responsibilities can eliminate the time Sara Freeman spends training volunteers as they arrive for their shifts. Volunteers are to receive and become familiar with their role and description prior to their arrival. Images of the volunteer training guide established by the team are displayed below as well as in Appendix E.

SALE FLOOR ATTENDANT

- As the SALE FLOOR ATTENDANT, you are responsible for ensuring that the sale floor is presentable at all times. Make sure the clothing is evenly distributed on the various display racks and maintain an organized appearance of items on display tables. This position moves throughout the entire sale floor in the main sale room.
 - If you are the first SALE FLOOR ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately begin walking and tidying/organizing the sale floor.
 - If you are relieving a volunteer SALE FLOOR ATTENDANT, check in and meet the previous volunteer at the check in table by the registers (main sale room), put on your volunteer apron and immediately begin walking and monitoring the sale floor. Please arrive for your shift 5 minutes before it is scheduled to begin.
 - When your shift has 5 minutes left, head to the volunteer check in table to meet your relief volunteer. You will give the relief your apron and fill them in on any significant things to watch out for on the sale floor.
 - If you are the last SALE FLOOR ATTENDANT of the day, return your volunteer apron to the volunteer check in table when the last customer in line checks out or if there is no line, as soon as the sale closes.

Figure 14: Sale Floor Attendant Job Description

REGISTER ATTENDANT

- As the REGISTER ATTENDANT, you are responsible for assisting shoppers and cashiers during the checkout process.
 - If you are the first REGISTER ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately go behind the register counter to offer assistance to cashiers.
 - If you are relieving a volunteer REGISTER ATTENDANT, check in and meet the previous volunteer at the check in table by the registers (main sale room), put on your volunteer apron, and immediately go behind the register counter to offer assistance to the cashiers. Please arrive for your shift 5 minutes before it is scheduled to begin.
 - If you are the last REGISTER ATTENDANT of the day, return your volunteer apron to the volunteer check in table when the last customer in line checks out or if there is no line, as soon as the sale closes.
 - REGISTER ATTENDANT responsibilities are as follows:
 - Prepare checkout bags by lining the large, round tubs with the large clear plastic bags
 - Always make sure every register has a clear bag available at all times (you can line tubs with multiple bags at a time)
 - Ensure that customers know when the next register is available
 - When your shift has 5 minutes left, head to the volunteer check in table to meet your relief volunteer. You will give the relief your apron and fill them in on any significant things to watch out for in the register area.

Figure 15: Register Attendant Job Description

LARGE ITEM ATTENDANT

- As the LARGE ITEM ATTENDANT, you are responsible for ensuring that the large item room is presentable at all times.
 - If you are the first LARGE ITEM ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately report to the large item room.
 - If you are relieving a volunteer LARGE ITEM ATTENDANT, check in and meet the previous volunteer at the check in table by the registers (main sale room), put on your volunteer apron, and immediately report to the large item room. Please arrive for your shift 5 minutes before it is scheduled to begin.
 - In the large item room, you will assist shoppers buying large items. Once a shopper decides to buy a large item, move it to the "SOLD ITEMS" section next to the exit. You will know an item is sold if the bottom portion of the tag is gone (this is how shoppers claim large items). When you are not moving large items, remain near the sold items section to assist shoppers as they load their item(s) into their car. NOTE: a large item MUST remain in the large item room until it is paid for, otherwise it cannot leave the room. When your shift has 5 minutes left, head to the volunteer check in table to meet your relief volunteer. You will give the relief your apron and fill them in on any significant things to watch out for in the large item room.
 - If you are the last LARGE ITEM ATTENDANT of the day, return your volunteer apron to the volunteer check in table when the last customer in line checks out or if there is no line, as soon as the sale closes.

Figure 16: Large Item Attendant Job Description

There is an additional cost to implement and print a training guide for reference at the sale. While volunteers will have to sacrifice time up front to read the guide, it is brief and straightforward and will save them the time spent waiting for an assignment. Other than the aforementioned, there are no significant costs or risks identified. There is no benefit in adopting one method over the other or in doing nothing; therefore, implementing both is reasonable.

6.4 VOLUNTEER ROLES RECOMMENDATION

It is recommended to implement the defined volunteer roles and training guide created by the team. Both alternatives are practical for future sales because they have the ability to result in improvements by saving Sara Freeman the nearly three hours she currently spends briefing volunteers during the public sale.

7.0 SETUP PROCESS

This section discusses the setup process and the data collection methodology, data collected, alternatives established, and recommendations.

7.1 SETUP PROCESS DATA COLLECTION

7.1.1 Data Collection Methodology

The first step was to understand the current setup process. This was done by interviewing Sara Freeman, who described each day, as detailed in section 2.1.1. This interview provided the data used in the setup process investigation. Next, the team did research on the Wee-Cycle Bartlesville website to gain more insight into the consignor pre-setup procedures. The Wee-Cycle Bartlesville website (<http://www.wee-cyclebartlesville.com.html>) explains how consignors register, print tags and prepare items for the sale. This information enabled the team to understand the steps that occur prior to the Wee-Cycle Bartlesville's setup process. To be able to quantify any alternatives generated, employee costs during the setup was needed. Sara was the point of contact for this information.

7.1.2 Data Collected

The employee cost data was provided by Sara Freeman. During the two consignor drop-off days, Wee-Cycle Bartlesville utilizes two employees for seven hours, 12:00 p.m. to 7:00 p.m. Employees are paid \$15.00 per hour. The total employee costs for the consignor drop-off days is \$420.00.

7.2 SETUP PROCESS ALTERNATIVE GENERATION

7.2.1 Alternative Generation Methodology

To generate alternatives, the team decided to benchmark by visiting other children's consignment sales. The team visited Adorable Affordable in Stillwater. While there, the team was able to speak with the owner of the sale and ask her some questions. She gave insight into how she does consignor drop off; instead

of consignors arriving at any point during drop-off hours, consignors sign up for a designated time.

7.2.2 Alternatives Generated

In order to eliminate idle time, the team considered the following alternative:

1. Assign consignor drop-off times
 - a. Change number of hours
 - b. Change number of employees

7.3 SETUP PROCESS ALTERNATIVE EVALUATION

7.3.1 Assigned Consignor Drop-Off Times

The alternative is to have consignors sign up for drop-off timeslots. Through the Wee-Cycle Bartlesville website, consignors would sign up for a 30-minute timeslot with consignors arriving every 15 minutes to each station. Sara Freeman stated that drop-off usually takes 30 minutes per consignor. Each station consists of a paid employee, who completes the item quality check.

Consignor Drop-Off Times	Number of Stations	Increase in Employee Cost
12:00 p.m. – 7:00 p.m.	5	\$630.00
8:30 a.m. – 7:00 p.m.	3	\$525.00
10:00 a.m. – 7:00 p.m.	4	\$660.00

Table 5: Consignor Drop-Off Times vs. Number of Stations and Employee Cost

Currently, employees work from 12:00 p.m. to 7:00 p.m. Maintaining the same drop-off hours, there will need to be five stations to be able to process 250 consignors over the two-day period. For Wee-Cycle Bartlesville to be able to process all of the consignors but work the same number of hours, three more paid employees are necessary. This would add \$630.00 in employee costs, however, this would eliminate idle time on the drop-off days. Instead of a large number of consignors showing up at the same time, they would be evenly distributed throughout the two days.

By altering the drop-off hours to 8:30 a.m. to 7:00 p.m., only one station would need to be added. This would increase employee cost by \$525.00. Conducting

consignor drop-off from 10:00 a.m. to 7:00 p.m., two stations would need to be added and the increase in employee cost is \$660.00.

7.4 SETUP PROCESS RECOMMENDATION

The team recommends that Wee-Cycle Bartlesville implement assigned consignor drop-off times from 12:00 p.m. to 7:00 p.m. and add three employees. Assigning consignors drop-off times reduces the idle time for Wee-Cycle Bartlesville employees.

8.0 OPPORTUNITIES FOR ADDITIONAL REVENUE

This section discusses the opportunities for additional revenue. The data collection methodology, data collected, alternatives established, and recommendations are described.

8.1 OPPORTUNITIES FOR ADDITIONAL REVENUE DATA COLLECTION

8.1.1 Data Collection Methodology

Cost information about the building rental fees, employee costs, and equipment costs during the setup was needed. To gain this information, Pam Pollock, manager of the Washington County Fairgrounds, was contacted. She provided the rental fees for each room for each day during setup. When Wee-Cycle Bartlesville is not open to the public, Sara Freeman is charged half of the regular price for the two rooms. Sara provided the employee and equipment costs.

The Master Transaction File, provided by Sara, was also used to acquire the transaction data needed.

8.1.2 Data Collected

The cost data provided by Pam Pollock is displayed in the table below (Table 6). For the main sale room, the regular price is \$500.00 per day. The large item room costs \$215.00 per day at regular price.

	Main Sale Room	Large Item Room
Monday	\$250.00	\$107.50
Tuesday	\$250.00	\$107.50
Wednesday	\$250.00	\$107.50
Thursday	\$250.00	\$107.50
Sunday	\$250.00	\$107.50
Total	\$1,250.00	\$537.50

Table 6: Facility Rental Costs During Setup per Day

The total cost to rent the rooms for setup is \$1,787.50.

During the two consignor drop-off days, two employees work for seven hours, 12:00 p.m. to 7:00 p.m. and are paid \$15.00 per hour. The total employee costs for the consignor drop-off days is \$420.00. A U-Haul trailer is needed to move the

racks from the storage building to the Fairgrounds. This costs \$250.00. The total cost for the setup days is \$2,457.50.

From the Master Transaction File, the total number of transactions during peak shopping hours, the average number of items per transaction, and the average price of an item were attained.

8.2 OPPORTUNITIES FOR ADDITIONAL REVENUE GENERATION

8.2.1 Alternative Generation Methodology

To generate alternatives for Wee-Cycle Bartlesville's setup process, the team gather ideas from Sara Freeman. Ideas were also brainstormed by the team individually and then combined and clarified.

8.2.2 Alternatives Generated

The team considered the following alternatives:

1. Opening the public sale an additional day to allow more time for customers to shop
2. Charging an admission fee for a portion of the sale

8.3 OPPORTUNITIES FOR ADDITIONAL REVENUE EVALUATION

8.3.1 Additional Public Sale Day

The first alternative is to open the sale to the public an additional day. By opening the sale, a day early, there is an increase in the total time customers can shop and potentially buy more items. If more items are sold, the sell through and revenue would increase. By opening to the public on Thursday, the VIP sale would need to be moved to Wednesday evening.

By opening the sale to the public a day early, Wee-Cycle Bartlesville will be charged the full rental price for Thursday. This increases the building cost by \$357.50 and the total employee cost by \$15.00 per cashier multiplied by the number of hours the sale is open. The table below shows a comparison of the cost of the sale (building and employees) versus the number of hours the sale is open.

Number of Hours Open	Total Increase Cost of Employees	Total Increase in Cost of Building	Total Increase in Cost
4	\$300.00	\$357.50	\$657.50
5	\$375.00	\$357.50	\$732.50
6	\$450.00	\$357.50	\$807.50
7	\$525.00	\$357.50	\$882.50
8	\$600.00	\$357.50	\$957.50

Table 7: Additional Costs vs. Additional Sale Time

During the August sale, the total number of transactions during the peak shopping hours, Friday 9:00 a.m. and 1:00 p.m., was 312. To calculate the number of transactions per hour, the total number of transactions during the peak shopping hours was divided by the total number of hours. The result was 78 transactions per hour, as documented in the equation below.

$$\begin{aligned} & \text{Number of transactions during peak shopping hours per hour} \\ &= \frac{312 \text{ transactions}}{4 \text{ hours}} = 78 \text{ transactions/hr} \end{aligned}$$

Using the Master Transaction file provided by Sara Freeman, the average number of items per transaction was calculated to be 11 items per transaction and the average price per item was \$4.71. By using the average number of transactions per hour, the average number of items per transaction, the average price of \$4.71 per item, and the number of hours the sale is open, the estimated revenue for Wee-Cycle Bartlesville is shown in Table 8. The possible revenue reflects the 30% of the total profit that Wee-Cycle Bartlesville receives.

Number of Hours Open	Possible Wee-Cycle Bartlesville Revenue
4	\$4,849.42
5	\$6,061.77
6	\$7,274.12
7	\$8,486.48
8	\$9,698.83

Table 8: Estimated Revenue vs. Additional Sale Hours

$$\text{Revenue} = 4 \text{ hours} * 78 \frac{\text{transactions}}{\text{hour}} * 11 \frac{\text{items}}{\text{checkout}} * \frac{\$4.71}{\text{item}} * 30\% = \$4,849.42$$

To determine the number of new customers needed to provide enough revenue to cover the increase in expenses, the total increase in cost was divided by the product of the average number of items per transactions, the average price of an item, and the Wee-Cycle Bartlesville 30% profit split. This is detailed in the equation below.

Number of Hours Open	Number of New Customers Needed to Cover Expenses
4	42
5	47
6	52
7	57
8	62

Table 9: Number of Hours Open vs. Number of New Customers Needed

$$\text{Number of New Customers Needed} = \frac{\$657.50}{11 \frac{\text{items}}{\text{checkout}} * \frac{\$4.71}{\text{item}} * 30\%} = 42 \text{ new customers}$$

It can be assumed that customers will continue to arrive and purchase items during the additional hours of the sale because Wee-Cycle Bartlesville continues to grow with each consignment sale. The first sale in April 2013 had \$40,000 in inventory, 85 consignors, and sold \$17,000 worth of items. The August 2016 sale had \$115,026.50 in inventory, 238 consignors, and sold \$53,857.50 worth of items. Because of historical sale growth, it is reasonable to assume that the number of new customers needed to cover expenses will arrive. Regardless of the number of hours the sale is open, the potential increased revenue for Wee-Cycle Bartlesville is greater than the increased building and employee costs.

8.3.2 Admission Fee

The second alternative is to charge an admission fee for a portion of the public sale. Charging customers a small fee could have a large impact on profit. The team decided to evaluate a fee of \$3.00, \$5.00 and \$10.00. A \$5.00 admission fee was suggested by Sara Freeman. The team evaluated a \$3.00 and \$10.00 fee to give Sara more options.

To evaluate this alternative, the team decided to consider charging during the peak shopping hours, Friday 9:00 a.m. to 1:00 p.m., and charging during the entire sale. By analyzing the transaction data from the August sale, it was determined that there were 351 transactions during the peak shopping hours and 1,060 transactions during the entire sale. Using the GoPro video footage from the August 2016 sale, the team found the average number of customers per transaction to be 1.133 customers per transaction. The team chose to round this value to the nearest whole number, resulting in one customer per transaction. Assuming that each transaction means one admission fee, the estimated revenue is seen in the table below (Table 10).

Admission Fee	Estimated Wee-Cycle Bartlesville Revenue	
	Open Peak Shopping Hours Only	Open Entire Sale
\$3.00	\$1,053.00	\$3,180.00
\$5.00	\$1,755.00	\$5,300.00
\$10.00	\$3,510.00	\$10,600.00

Table 10: Estimated Revenue vs. Admission Fee

The risk with charging an admission fee is the loss of customers who do not want to pay the fee. Because an admission fee has never been charged at Wee-Cycle Bartlesville before there is no way to quantify the number of customers lost.

8.4 OPPORTUNITIES FOR ADDITIONAL REVENUE RECOMMENDATION

The team recommends that Wee-Cycle Bartlesville implement assigned consignor drop-off times and adding a public sale day. Assigning consignors drop-off times reduces the variability in the arrival time of consignors and the idle time for Wee-Cycle Bartlesville employees. The addition of a public sale day has the potential to increase the Wee-Cycle Bartlesville's 30% of revenue by at least \$3,295.12, which is an 20% increase.

The team does not recommend charging an admission fee because there is not enough information to support it as a beneficial change.

9.0 ACCOUNTING SYSTEM

This section discusses the data collection, alternative generation, evaluation and recommendations concerning the accounting system.

9.1 ACCOUNTING SYSTEM DATA COLLECTION

9.1.1 Data Collection Methodology

The methodology for the accounting system data collection was to understand the current system through interviews and collect cost and revenue data through research. Sara Freeman was interviewed to understand the current system. She also did research to collect the cost and revenue data. This data was then provided to the team.

9.1.2 Data Collected

From their interview with Sara Freeman, the team learned there is no system which formally documents expenses and revenues. This allowed the team to be creative with the development of an accounting system. Requirements for the system are accuracy and ease of use. If the system is inaccurate, it will not be beneficial to Wee-Cycle Bartlesville. Because Sara has a limited amount of time, the system must be easy to use.

The expense and revenue categories are listed below in Table 11. The facility costs include the building rental and the employee cost. Each register consists of a cash box, an Epson printer, a roll of receipt paper, a laptop, a handheld barcode scanner, a refurbished iPhone and a Square technology reader. The Square technology reader, paired with an iPhone, allows customers to pay with credit cards. Some of the registers use a Square stand, which is a stand for both the iPhone and Square technology reader (Figure 17). Each laptop utilizes MySaleManager.net, the register software, via Wi-Fi. The Wi-Fi and software costs are constant regardless of how many registers are in service.



Figure 17: Square Technology

Some of the equipment costs are for the two different types of racks Wee-Cycle Bartlesville utilizes. Wee-Cycle Bartlesville uses yard signs placed around Bartlesville to advertise upcoming sales. Wee-Cycle Bartlesville also has six revenue streams, in addition to the revenue from the sale.

Facility Cost	Building Rental
	Employee Cost
Register Cost	Cash Box
	Epson Printer
	Receipt Paper
	Register Laptop
	Handheld Barcode Scanner
	Refurbished iPhone
	Square Technology Reader
	Square Stand
	Software
	Wi-Fi
Equipment Cost	Creform Clothing Rack
	Rolling Z Rack
	T Rack
	Saddle Rack
	U-Haul (per sale)
	Yard Sign
	Hangers
Miscellaneous Cost	Taxes
	T-shirts
	Additional Supplies
End of Sale Cost	Sales Tax
	Consignor 70% (sales dependent)
Revenue Streams	Vendor Fee
	Goody Bag Insert
	Receipt Sheet
	Banner Space
	Hangers
	Consignor Fee
	Revenue from Sale

Table 11: Expense and Revenue Categories

9.2 ACCOUNTING SYSTEM ALTERNATIVE GENERATION

9.2.1 Alternative Generation Methodology

In order to generate alternatives for an accounting system, the team brainstormed the possible inputs needed and outputs desired by Sara Freeman.

The inputs would be the Wee-Cycle Bartlesville expenses and revenue. The output desired is an income statement. From these inputs and output, the team suggested alternatives. The alternatives were to use Microsoft Excel or QuickBooks to collect revenue, expenses, and generate an income statement.

9.2.2 Alternatives Generated

The alternatives generated for the accounting systems are:

1. Microsoft Excel - Enter sale expense and revenue totals for each sale
2. Microsoft Excel - Enter transaction information for each sale
3. Microsoft Excel - Enter sale expense and revenue totals for each year
4. Microsoft Excel - Enter transaction information for each year
5. QuickBooks

9.3 ACCOUNTING SYSTEM ALTERNATIVE EVALUATION

MySaleManager.net collects register data and provides the data in the form of Microsoft Excel spreadsheets. Wee-Cycle Bartlesville also uses Microsoft Excel to capture data and identify sell through. Because Wee-Cycle Bartlesville does not use QuickBooks but does use Microsoft Excel, an accounting system based in Microsoft Excel was determined to be the better option.

9.4 ACCOUNTING SYSTEM DESIGN

The accounting system is Microsoft Excel-based with multiple sheets, as seen in Figure 18. The sheets are instructions, a 2016 income statement that combines the individual sale income statements and five sheets that are repeated and color coded for each sale. The first sheet is instructions on how to use the accounting system. The 2016 income statement sheet combines the February sale income statement, the August sale income statement and the November sale income statement. This shows Sara the total expenses, revenue and her net income for each fiscal year. The five sheets for each sale are a data entry sheet, an end of sale stats sheet, an expenses sheet, a revenues sheet and an income statement.

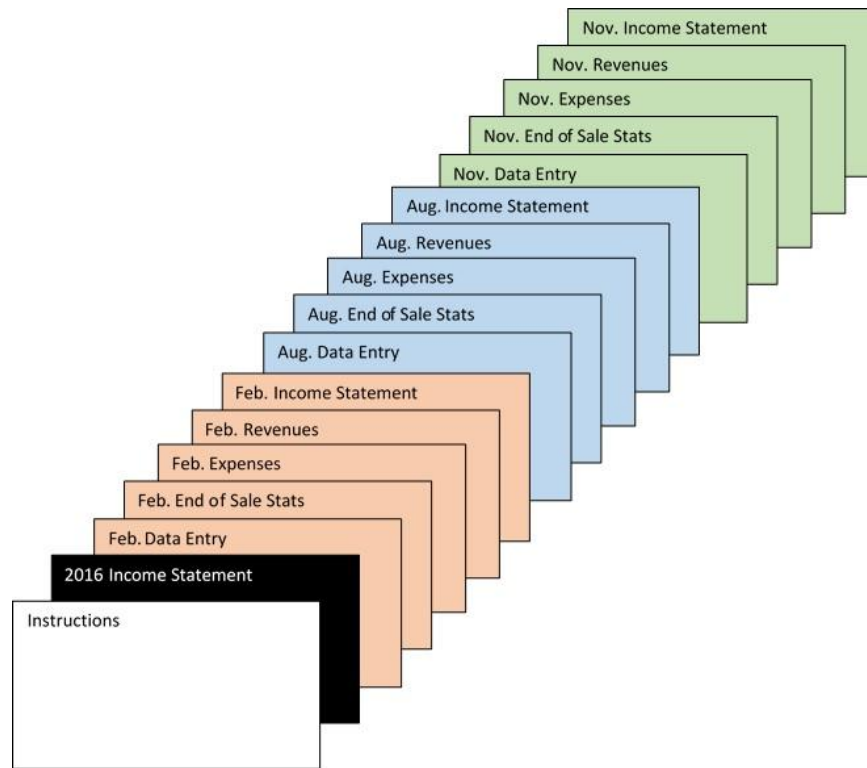


Figure 18: Microsoft Excel Sheet Layout

The information in the data entry sheets is manually entered by Sara Freeman. As seen in Figure 19, Sara Freeman enters the date of the transaction, a description and the amount.

	A	B	C	D	E	F
1				\$ 1,000.00		
2	Date	Description	Amount	Balance	Tag	
3	01/01/17	Cash Box	(\$50.40)	\$949.60	Cash Box	
4	01/02/17	Vendor signed up	\$75.00	\$1,024.60		
5				\$1,024.60		
6				\$1,024.60		
7				\$1,024.60		
8				\$1,024.60		
9				\$1,024.60		
10				\$1,024.60		
11				\$1,024.60		
12				\$1,024.60		
13				\$1,024.60		
14				\$1,024.60		
15				\$1,024.60		
16				\$1,024.60		
17				\$1,024.60		
18				\$1,024.60		
19				\$1,024.60		
20				\$1,024.60		
21				\$1,024.60		
22				\$1,024.60		
23				\$1,024.60		

Figure 19: Accounting System Data Entry Sheet

She then assigns the transaction a tag using the drop-down box. The tag puts the transaction into a category. Categories are the different possible expenses and revenues, as seen in Table 11. Examples of the tags include Facility, Employee, Cash Box, Vendor and Consignor Fee. These categories allow the five expense tables (Figure 21), a revenue table (Figure 22) and an income statement (Figure 23) to automatically populate once the category is selected. The tables allow Sara to quickly and easily track her cash flows overall and within each category. The system also tracks the account's current balance. Because of this, Sara will need to enter the starting balance of the account in the yellow box above the Balance column (Figure 19).

The End of Sale Stats sheet is supplied by MySaleManager.net. A portion of the sheet is seen below in Figure 20. After the sale is complete, Sara will copy and paste the Microsoft Excel file that MySaleManager.net outputs into the End of

Sale Stats sheet in her accounting system/workbook. This sheet is used to populate the sales tax, the consignor 70% of the revenue, and the total revenue from the sale on the expense and revenue tables.

Wee-Cycle			
Sale Statistics			
8/30/2016 15:10			
Revenue Statistics:			
Total Revenue (excl. Sales Tax)	\$53,857.50		
Revenue Per Registered Consignor	\$267.95		
Revenue Per Checked-in Consignor	\$226.29		
Revenue Per Day:			
8/25/2016	\$10,692.50		
8/26/2016	\$30,513.00		
8/27/2016	\$12,408.50		
8/28/2016	\$243.50		
Overall Discounts at Register	\$0.00		
Sales Tax Collected By Rate:			
8.50%	\$4,589.00	on sales of \$53857.50	
total of tax-exempt transactions:	\$0.00		
Sales Tax Collected By Rate Per Day:			
8.50%	\$4,589.00	on sales of \$53857.50	
Shopping Statistics:			
Total Checkouts	1067		
Average Purchase Amount	\$50.38		
Average Nbr Of Items Per Checkout	11		
Checkouts Per Day:			
8/25/2016	118		
8/26/2016	590		
8/27/2016	349		
8/28/2016	10		

Figure 20: End of Sale Stats Sheet

The expense sheet is the five expense tables: Facility and Employee Cost, Register Costs, Equipment Costs, Miscellaneous Costs and End of Sale Costs. The revenue sheet is the revenue table reflecting all of the Wee-Cycle Bartlesville revenue streams. When a tag is selected, the corresponding table is updated, as seen in Figure 21 and Figure 22. Each table has its own total which allows Sara to quickly see which type of expense was the greatest and her total revenue for the sale.

FACILITY AND EMPLOYEE COST	
Building Rental	\$ -
Employee Cost	\$ -
Total	\$ -

REGISTER COSTS	
Cash Box	\$ (50.40)
Epson Printer	\$ -
Receipt Paper	\$ -
Register Laptop	\$ -
Handheld Barcode Scanner	\$ -
Square Technology	\$ -
Square Stand	\$ -
Software	\$ -
WiFi	\$ -
Total	\$ (50.40)

EQUIPMENT COSTS	
Creform Clothing Rack	\$ -
Rolling Z Rack	\$ -
U-Haul	\$ -
Yard Signs	\$ -
Hangers	\$ -
Total	\$ -

MISCELLANEOUS COSTS	
Taxes	\$ -
T-shirts	\$ -
Additional Supplies	\$ -
Total	\$ -

END OF SALE COSTS	
Square Swipe Tax	\$ -
Sales Tax	\$ -
Consignor 70%	\$ -
Total	\$ -

Figure 21: Expense Tables on the Expenses Sheet

REVENUE	
Vendors	\$ 75.00
Goody Bag Insert	\$ -
Receipt Sheet	\$ -
Banner Space	\$ -
Consignor Fee	\$ -
Hangers	\$ -
Revenue from sale	\$ -
Total	\$ 75.00

Figure 22: Revenue Table on the Revenue Sheet

The income statement sheet is populated from the expense and revenue tables. An income statement will assist Sara when she is filing taxes.

Wee-Cycle Bartlesville, LLC			
Income Statement			
End of August Sale			
Revenues			
	Vendors	\$	75.00
	Goody Bag Insert	\$	-
	Receipt Sheet	\$	-
	Banner Space	\$	-
	Consignor Fee	\$	-
	Hangers	\$	-
	Revenue from Sale	\$	-
	Total Revenues		\$ 75.00
Expenses			
	Facility Expenses		
	Facility Rental	\$	-
	Employee Cost	\$	-
	Register Expenses		
	Cash Box	\$	(50.40)
	Epson Printer	\$	-
	Receipt Paper	\$	-
	Register Laptop	\$	-
	Handheld Barcode Scanner	\$	-
	Square Technology	\$	-
	Square Stand	\$	-
	Software	\$	-
	WiFi	\$	-
	Equipment Expenses		
	Creform Clothing Rack	\$	-
	Rolling Z Rack	\$	-
	U-Haul	\$	-
	Yard Sign	\$	-
	Hangers	\$	-
	Miscellaneous Expenses		
	Taxes	\$	-
	T-shirts (total)	\$	-
	Additional Supplies	\$	-
	End of Sale Expenses		
	Square Swipe Tax	\$	-
	Sales Tax	\$	-
	Consignor 70%	\$	-
	Total Expenses		\$ (50.40)
Net Income			<u>\$ 125.40</u>

Figure 23: Income Statement Sheet

The data entry sheet can be manually updated daily, weekly or as transactions occur. This allows Sara to have a running balance and keep accurate records of what she spends, what she receives, and when those exchanges happen.

This accounting system keeps all of the information about Wee-Cycle Bartlesville's fiscal year expenses and revenues in one place. To begin using the

system for additional years, Sara needs to save it as Accounting System 20XX.xlsx instead of Accounting System 2016. Also, the name of the 2016 Income Statement sheet and the cell A3 on the 2016 Income Statement sheet would need to be updated to 2017 instead of 2016. This provides Sara with a complete accounting system for each year she is in business.

9.5 ACCOUNTING SYSTEM RECOMMENDATION

The team recommends Wee-Cycle Bartlesville begins using the Microsoft Excel-based accounting system provided on the flash drive and in the Dropbox file shared with Sara Freeman. By using this, Wee-Cycle Bartlesville can track expenses and revenues. The system allows Sara to identify her cash flows and better assess operations. The system also permits Sara to record all her accounting information for each fiscal year in one Microsoft Excel workbook.

10.0 SUMMARY OF RECOMMENDATIONS

The table displays our final recommendations for each key issue evaluated. The implementation cost for the register signs, shelves and Creform racks is a one-time cost. Although the estimated revenue for the shelf implementation is less than the implementation cost, the use of the shelves at two or more sales based on the evaluation detailed in the report allows Wee-Cycle Bartlesville to make a profit. The additional cashier, consignor drop-off shifts and additional sale day will be an expense for every sale; however, the estimated revenue gained from these recommendations far outweighs the cost.

Key Issue	Recommendation	Cost		Benefit	
		One Time	Every Sale	Estimated Revenue (Per Sale)	Intangible Benefits
Checkout Line	Add Item Prep Attendant	\$0.00	\$0.00	\$0.00	Reduced Checkout Time
	Add Register Signs	\$9.99	\$0.00	\$0.00	Reduced Checkout Time
	Add a Cashier	\$0.00	\$60.00	\$0.00	Reduced Checkout Time
Sale Floor Organization	Utilize Shelves	\$210.63	\$0.00	\$207.36	
	Utilize Creform Racks	\$1,200.00	\$0.00	\$2,160.00	
Volunteer Roles	Use Roles Defined by Team	\$0.00	\$0.00	\$0.00	Reduced Time Spent Training
	Use Training Guide Designed by Team	\$0.00	\$0.00	\$0.00	Reduced Time Spent Training
Setup Process	Implement Consignor Drop-Off Shifts	\$0.00	\$630.00	\$0.00	Reduced Employee Idle Time
Opportunities for Additional Revenue	Add a Sale Day	\$0.00	\$957.50	\$9,698.83	
Accounting System	Implement Accounting System	\$0.00	\$0.00	\$0.00	Formally Document Historical Cash Flows
TOTAL		\$1,420.62	\$1,647.50	\$12,066.19	

Table 12: Recommendations

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APPENDIX A – PROPOSAL

Below is the proposal mutually agreed upon by the team and Sara Freeman. The document expresses the original understanding of the problem and methodology proposed by the team.

Wee-Cycle Consignment

September 2016

Investigation of Improvement Opportunities of Consignment Sale Processes

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1.0 Background

Wee-Cycle Bartlesville is a for-profit business specializing in consignment sales of child and baby clothing and necessities at reasonable prices. Established in 2012, Wee-Cycle Bartlesville hosted their first consignment sale in 2013 and has hosted two sales annually since. Sales are conducted in both February and August. The February sale focuses on Spring/Summer clothes, toys, and baby necessities. The August sale focuses on Fall/Winter clothes and back-to-school items. The sales are held in the Washington County Fairground Building in Dewey, Oklahoma. This facility is the largest in the vicinity at 17,800 square feet.

Wee-Cycle utilizes three types of labor: paid workers, volunteers, and Dewey County inmates. Dewey County inmates set up the facility on the Monday prior to the sales day in exchange for community service hours. These inmates are overseen by two paid employees. Paid employees also work the days of the consignment sale as cashiers. Volunteers are a key factor in Wee-Cycle Bartlesville's operations. Volunteers sign up online for designated two-hour shifts. Volunteer incentives include access to a pre-sale, which is exclusive to volunteers, and the ability to bring an additional shopper to the presale, if the volunteer has signed up for multiple shifts. At any point during the sale, four volunteers are available and are responsible for assisting cashiers, maintaining the sales floor and verifying the purchases of large items (e.g. strollers, cribs, play pens, etc.). The roles and scheduling of volunteers is an area of opportunity as there are times when too many volunteers are present, and other times there are not enough.

The rapid growth in customers at the sale has resulted in a long checkout line, especially during peak hours. The checkout process uses a single queue line which feeds into all five registers. When a cashier has completed a transaction with a customer, they then call for the next customer in the line. The waiting time in line can last over an hour for an individual customer. Wee-Cycle Bartlesville has implemented new equipment (including cash boxes, receipt printers, and computers) at each register as well as increasing their register count from three to five. New bagging processes have also been developed to increase the speed of check out. The goal of these changes was to reduce the length of the check out line.

Investigation of Improvement Opportunities of Consignment Sale Processes

The quick growth in number of items has resulted in a lack of space on the sale floor. Some items must remain in storage underneath tables until ample space is available for the items to be on display. Wee-Cycle has invested in some new clothing racks so that more clothes can fit in the same vertical area. The company has also begun using a second room in the event center to make room for large items such as cribs, strollers, and play areas.

2.0 Problem Statement

After the new bagging processes and registers were implemented, the speed of individual check out was increased. However, the line was still very long, so new methods are to be investigated in order to further reduce individual checkout time as well as the overall checkout line.

The organization of the building is also a concern. In order to continue to facilitate a growing number of products the organization of the facility should be addressed so that more items are on display and less items are in storage underneath racks and tables.

Wee-Cycle Bartlesville does not currently have a prepared budget for the consignment sales. A detailed cost sheet of previous sales as well as budgets for future sales shall be prepared in order to provide a more accurate basis for future sales.

The volunteer scheduling system should be adapted to organize volunteers so that all roles are covered. Roles and duties of volunteers should be explicitly stated so that volunteer check in is faster. Set up and tear down processes should also be investigated in regards to both processes and roles and duties of workers in order to reduce the amount of time required.

3.0 Anticipated Methodology/Tasks

The project shall begin with a project understanding phase. This shall be achieved by client meetings followed by sale day observation. The project understanding phase shall be followed by a data collection and analysis phase.

The data collection and analysis phase shall consist of:

- Performance of a time and motion study of cashiers to collect the time of a customer transaction and the range/distribution of number of items per customer transaction during the most recent sale so that the number of cashiers and the wait time of the customers can be analyzed.
- Analysis of sales history to determine the current growth rate of sales and project sales to guide sales floor design and assess its adequacy in the future.
- Drawing of the current sale floor layout compared with the number of items in a category
- Assessment of current roles and assignments of volunteers and analysis of number of customers per time period to determine the number of volunteers necessary at a given time

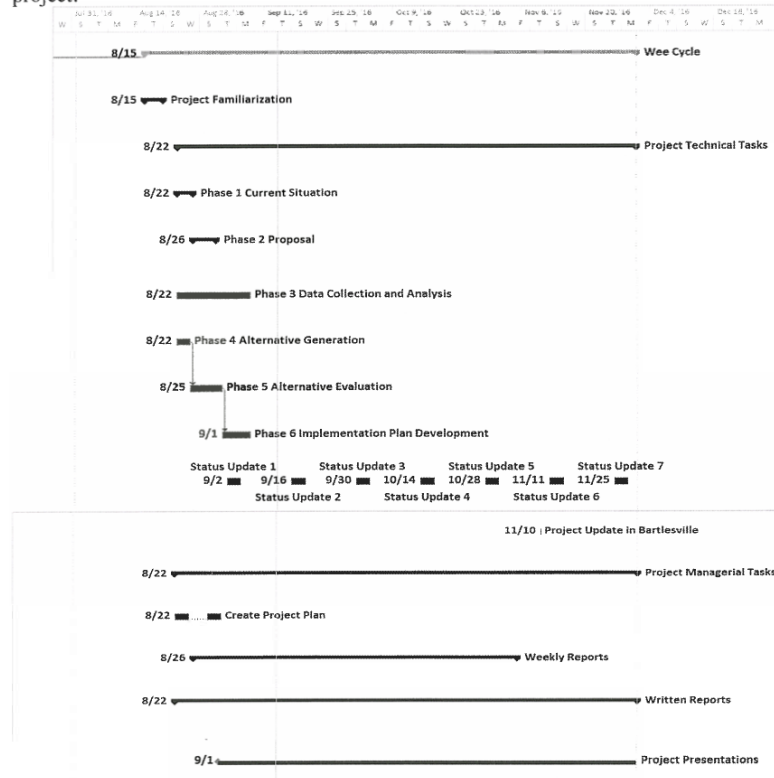
Investigation of Improvement Opportunities of Consignment Sale Processes

- Evaluation of setup procedures to establish a detailed timeline of setup oriented tasks and analysis of value-added work versus non-value-added work.
- An analysis of historical equipment and operating costs of consignment sale and how those costs impact sales and profit.

After the data is collected and analyzed, alternatives will be generated and evaluated for their ability to improve operational efficiency, customer satisfaction, and sell through. Recommendations for check out, volunteer check in, and set up process improvement will be provided

4.0 Anticipated Schedule

The following schedule details when we anticipate completion of key tasks for the overall project:



Investigation of Improvement Opportunities of Consignment Sale Processes

5.0 Anticipated Deliverables

Deliverables will include (but are not limited to) the following:

- Bi-weekly status updates on project work
- A Report and presentation detailing:
 - Current and suggested sales floor maps
 - Current and suggested cashier checkout processes
 - Current and suggested volunteer assignments
 - Current and suggested set up and tear down procedures
 - All data
 - All data analyses
 - Suggested budgeting process improvements

6.0 Anticipated Benefits

The proposed analysis and recommendation when implemented is expected to result in, but is not limited to, the following:

- A decrease in maximum check out queue time per customer, with a target of 20 minutes or less per customer
- An increase in the number of items on display on the sale floor
- A reduction in setup and sorting time

7.0 Risks and Risk Mitigation Strategy

The following risks and risk mitigation strategies are proposed:

Risk	Mitigation Strategy
Insufficient availability of Sara for team questions and discussion	Bi-weekly phone calls with Sara
Sarah unavailable/not responding	Research through website, contact Pam (building manager), gain third point of contact from Sara
Cash register data is unavailable	Use video recording from sale day visit to manually collect data
Results of project are not applicable to November sale due to difference in merchandise	Apply results appropriately to the different sales events

Investigation of Improvement Opportunities of Consignment Sale Processes

Endorsements – Endorsement below acknowledges receipt and acceptance of the proposal of a Senior Design Team from Oklahoma State University's School of Industrial Engineering and Management. Project will be executed on a 'best effort' basis and no warranty is stated or implied. All modifications to this proposal shall be provided, in writing, to all signatories for approval and acceptance.

On Behalf of Wee-Cycle Bartlesville


Sara Freeman


Date

On Behalf of Senior Design Team


Jacob Hart


Taylor Mastin

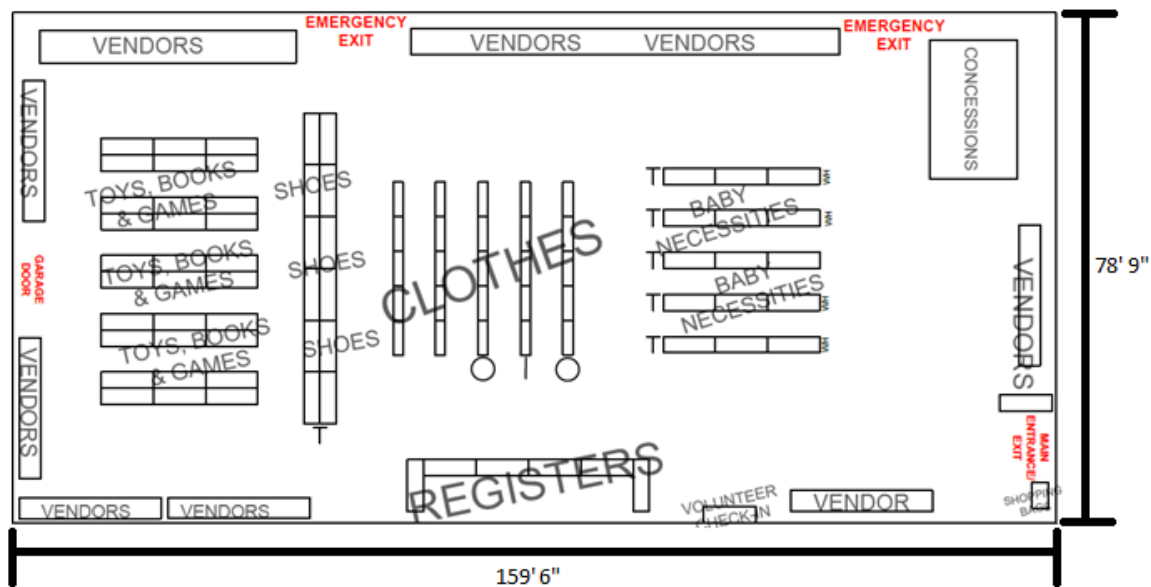

Erin Nash

14 SEPTEMBER 2016
Date of Last Signature

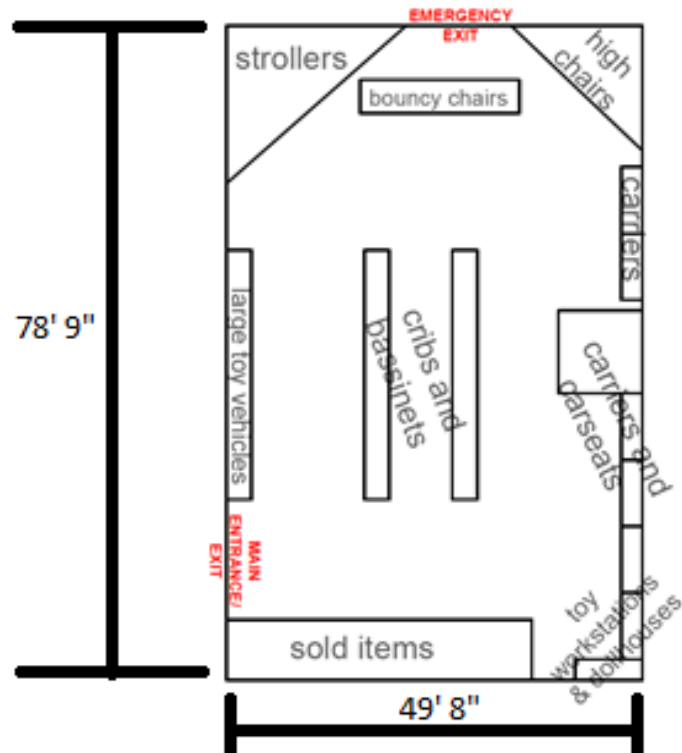
APPENDIX B – SALE FLOOR LAYOUTS

Below are figures created by the team which show the layout of the sale floor. They provide valuable insight including location of the vendors, registers and items. The layouts were created solely for the team to have a point of reference when recalling the location of the items.

This is the main sale room. As seen, this room displays toys, books, games, shoes, clothes, baby necessities and registers. The vendors are located on the perimeter of the room.



This is the large item room. As seen, this room displays strollers, cribs, bassinets, high chairs, carriers, car seats, bouncy chairs, large toy vehicles, toy workstations and dollhouses. Sold items are moved from their display space to the corner near the exit.



APPENDIX C – DATA FILES

The figures below are samples of the two data files provided by Wee-Cycle Bartlesville from MySaleManager.net. Section 1 is the Master Sales File with detailed information about items within each sale while Section 2 is the Master Transaction File which contains information about the payment associated with each transaction. For more information about the data files, refer to section 4.1.2. For full copies of the files, see the attached CD.

SECTION 1: MASTER SALES FILE

RECID	TRANSACTIONID	CONSIGNORID	ITEMID	DESCRIPTION	CATEGORY	SIZE	REGPRICE	SELLPRICE	TAXAMT	TAXPCT	ISDISCOUNT	ITEMNOTE	OPERATORID	TRANSACTIONDATE	WORKSTATIONID
1	1	1000	882	G9 Fleece jacket/New w/ tags	Coats - Boys	6	\$10.00	\$10.00	\$0.85	8.50%	No	(c/1000 i/882)	sara	8/25/16 12:03	HOK6SY1
2	2	1211	1061	snowballs	Toys	0	\$3.00	\$3.00	\$0.26	8.50%	No	(c/1211 i/1061)	sara	8/25/16 16:19	BLAPTOP
3	3	1000	882	G9 Fleece jacket/New w/ tags	Coats - Boys	6	-\$10.00	-\$10.00	-\$0.85	8.50%	No	[ME] Refund (c/1000 i/882)	sara	8/25/16 16:20	BLAPTOP
4	4	1075	192	brown boots	Accessories	13	\$4.00	\$4.00	\$0.34	8.50%	No	(c/1075 i/192)	Bryan	8/25/16 16:24	HOK6SY1
7	7	1403	208	Sport jacket	Clothing - Girls	7	\$3.00	\$3.00	\$0.26	8.50%	No	(c/1403 i/208)	bryan	8/25/16 16:36	LAPTOP-5EU
8	8	1190	76	Smart max magnet/Build ing set	Shoes - Girls	0	\$5.00	\$5.00	\$0.43	8.50%	No	(c/1190 i/76)	karen	8/25/16 16:38	LAPTOP-403
9	9	1104	539	Owl Footed Jammies	Clothing - Girls	5T	\$3.00	\$3.00	\$0.26	8.50%	No	(c/1104 i/539)	anthony	8/25/16 17:58	LAPTOP-5EU
10	10	1480	201	Graco good 2 grow/Sit to stand double stro	Strollers	0	\$120.00	\$120.00	\$10.20	8.50%	No	[FR][PV] (c/1480 i/201)	anthony	8/25/16 18:09	LAPTOP-5EU
11	11	1211	1132	princess chair	Baby Equipment	0	\$10.00	\$10.00	\$0.85	8.50%	No	(c/1211 i/1132)	anthony	8/25/16 18:21	LAPTOP-5EU
12	11	1443	249	Youth Purple Monkey/Desk and Chair	Furniture	See Description	\$10.00	\$10.00	\$0.85	8.50%	No	(c/1443 i/249)	anthony	8/25/16 18:21	LAPTOP-5EU
13	11	1621	5	old navy jeans	Clothing - Girls	2T	\$3.00	\$3.00	\$0.26	8.50%	No	(c/1621 i/5)	anthony	8/25/16 18:21	LAPTOP-5EU
14	11	1621	61	old navy jeans	Clothing - Girls	2T	\$3.00	\$3.00	\$0.26	8.50%	No	(c/1621 i/61)	anthony	8/25/16 18:21	LAPTOP-5EU
15	11	1367	161	PINK GAP JEANS/GAP JEANS	Clothing - Girls	2T	\$6.00	\$6.00	\$0.51	8.50%	No	(c/1367 i/161)	anthony	8/25/16 18:21	LAPTOP-5EU
16	11	1190	51	2 pink pants	Clothing - Girls	3T	\$4.00	\$4.00	\$0.34	8.50%	No	(c/1190 i/51)	anthony	8/25/16 18:21	LAPTOP-5EU
17	11	1211	1206	horse	Accessories	0	\$20.00	\$20.00	\$1.70	8.50%	No	[ME] (c/1211 i/1206)	anthony	8/25/16 18:21	LAPTOP-5EU
18	12	1341	212	Infant Jumper	Toys	0	\$12.00	\$12.00	\$1.02	8.50%	No	[ME] (c/1341 i/212)	Bryan	8/25/16 18:28	HOK6SY1
19	12	1521	3	Rainforest Jumperoo/Fisher-Price	Baby Equipment	0	\$20.00	\$20.00	\$1.70	8.50%	No	[ME] (c/1521 i/3)	Bryan	8/25/16 18:28	HOK6SY1
20	12	1180	1045	Dino stripe onesie/pants	Clothing - Boys	Newborn	\$3.00	\$3.00	\$0.26	8.50%	No	(c/1180 i/1045)	Bryan	8/25/16 18:28	HOK6SY1
21	12	1551	223	2 Zipper PJs - /Dino and Blue Stripe	Clothing - Boys	0-3 Months	\$4.00	\$4.00	\$0.34	8.50%	No	(c/1551 i/223)	Bryan	8/25/16 18:28	HOK6SY1
22	12	1417	264	Gerber 2 pc Sleeper/W/ hat (basketball)	Clothing - Boys	0-3 Months	\$2.00	\$2.00	\$0.17	8.50%	No	(c/1417 i/264)	Bryan	8/25/16 18:28	HOK6SY1
23	12	1597	317	Ralph Lauren Jumper	Clothing - Boys	3 Months	\$3.50	\$3.50	\$0.30	8.50%	No	(c/1597 i/317)	Bryan	8/25/16 18:28	HOK6SY1
24	12	1482	76	Long Sleeve Onesies/Blue /Gray Stripe & Cars	Clothing - Boys	0-3 Months	\$3.00	\$3.00	\$0.26	8.50%	No	[ME] (c/1482 i/76)	Bryan	8/25/16 18:28	HOK6SY1
25	13	1367	670	XBox 360 Game/Hot Wheels	Accessories	Leave Blank	\$8.00	\$8.00	\$0.68	8.50%	No	(c/1367 i/670)	karen	8/25/16 18:28	LAPTOP-403
26	13	1367	644	Skateboard	Accessories	Leave Blank	\$7.00	\$7.00	\$0.60	8.50%	No	[ME] (c/1367 i/644)	karen	8/25/16 18:28	LAPTOP-403
27	14	1569	131	Paw Patrol/10 episodes	DVDs	0	\$5.00	\$5.00	\$0.43	8.50%	No	(c/1569 i/131)	anthony	8/25/16 18:30	LAPTOP-5EU
28	14	1377	190	Camo Shoes	Shoes - Boys	5	\$5.00	\$5.00	\$0.43	8.50%	No	(c/1377 i/190)	anthony	8/25/16 18:30	LAPTOP-5EU
29	14	1123	440	Nike Black Hoodie/Jacket	Clothing - Boys	5	\$6.50	\$6.50	\$0.55	8.50%	No	(c/1123 i/440)	anthony	8/25/16 18:30	LAPTOP-5EU
30	14	1642	11	Under Armour Pants/Gray and black	Clothing - Boys	5	\$6.00	\$6.00	\$0.51	8.50%	No	(c/1642 i/11)	anthony	8/25/16 18:30	LAPTOP-5EU
31	14	1642	12	Under Armour Pants/Black	Clothing - Boys	5	\$6.00	\$6.00	\$0.51	8.50%	No	(c/1642 i/12)	anthony	8/25/16 18:30	LAPTOP-5EU
32	14	1046	2089	Nike/Gray Pants	Clothing - Boys	5	\$6.00	\$6.00	\$0.51	8.50%	No	(c/1046 i/2089)	anthony	8/25/16 18:30	LAPTOP-5EU
33	14	1306	340	Levi Jeans	Clothing - Boys	4	\$8.00	\$8.00	\$0.68	8.50%	No	(c/1306 i/340)	anthony	8/25/16 18:30	LAPTOP-5EU
34	14	1306	309	Carhartt Hoodie/Camo	Clothing - Boys	4	\$8.00	\$8.00	\$0.68	8.50%	No	(c/1306 i/309)	anthony	8/25/16 18:30	LAPTOP-5EU
35	14	1046	2095	Under Armour/Black Pullover	Clothing - Boys	5	\$6.00	\$6.00	\$0.51	8.50%	No	(c/1046 i/2095)	anthony	8/25/16 18:30	LAPTOP-5EU
36	14	1507	50	Levi's slim straight	Clothing - Boys	4	\$6.00	\$6.00	\$0.51	8.50%	No	(c/1507 i/50)	anthony	8/25/16 18:30	LAPTOP-5EU
37	14	1503	146	camo long sleeve	Clothing - Boys	4	\$2.00	\$2.00	\$0.17	8.50%	No	(c/1503 i/146)	anthony	8/25/16 18:30	LAPTOP-5EU
38	14	1602	11	Nike Red Mesh 5C	Shoes - Boys	5	\$6.00	\$6.00	\$0.51	8.50%	No	(c/1602 i/11)	anthony	8/25/16 18:30	LAPTOP-5EU
39	15	1211	1206	horse	Accessories	0	\$20.00	\$20.00	\$1.70	8.50%	No	[ME] (c/1211 i/1206)	sara	8/25/16 18:31	BLAPTOP
40	15	1304	1103	Disney Princess Toy Box/Chair Pink	Toys	Leave Blank	\$8.00	\$8.00	\$0.68	8.50%	No	(c/1304 i/1103)	sara	8/25/16 18:31	BLAPTOP

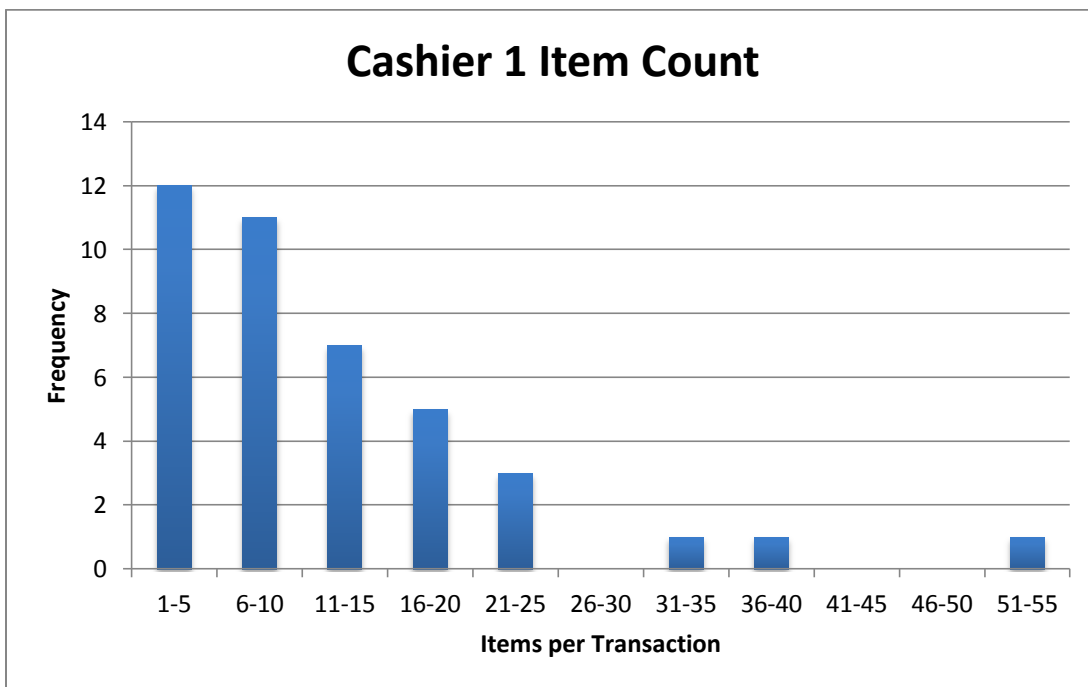
SECTION 2: MASTER TRANSACTION FILE

RECID	TRANSACTION_ID	TRANSACTION_DATE	TRANSACTION_LONG	TRANSACTION_SHORT	ITEM_COUNT	PURCHASE_AMT	TAX_AMT	PAYTYPE1	AMOUNT_TEND1	PAY_TYPE2	AMOUNT_TEND2	PAY_TYPE3	AMOUNT_TEND3	PAY_TYPE4	AMOUNT_TEND4	CHANGE_DUE	OPERATOR_ID	WORKSTATION_ID	ADJ_AMOUNT	ADJ_REASON	TAX_EXEMPT
1	1	8/25/16	12:03	8/25/16	1	\$10.00	\$0.85	Cash	\$10.85		\$0.00		\$0.00		\$0.00	\$10.85	sara	HOK6SY1	\$0.00	No	No
2	2	8/25/16	16:19	8/25/16	1	\$3.00	\$0.26	Cash	\$3.26		\$0.00		\$0.00		\$0.00	\$3.26	sara	BLAPTOP	\$0.00	No	No
3	3	8/25/16	16:20	8/25/16	0	-\$10.00	-\$0.85	Cash	-\$10.85		\$0.00		\$0.00		\$0.00	-\$10.85	sara	BLAPTOP	\$0.00	No	No
4	4	8/25/16	16:24	8/25/16	1	\$4.00	\$0.34	Cash	\$4.34		\$0.00		\$0.00		\$0.00	\$4.34	Bryan	HOK6SY1	\$0.00	No	No
7	7	8/25/16	16:36	8/25/16	1	\$3.00	\$0.26	Cash	\$3.26		\$0.00		\$0.00		\$0.00	\$3.26	bryan	LAPTOP-5EU	\$0.00	No	No
8	8	8/25/16	16:38	8/25/16	1	\$5.00	\$0.43	Cash	\$5.43		\$0.00		\$0.00		\$0.00	\$5.43	karen	LAPTOP-403	\$0.00	No	No
9	9	8/25/16	17:58	8/25/16	1	\$3.00	\$0.26	Cash	\$3.26		\$0.00		\$0.00		\$0.00	\$3.26	anthony	LAPTOP-5EU	\$0.00	No	No
10	10	8/25/16	18:09	8/25/16	1	\$120.00	\$10.20	Visa	\$130.20		\$0.00		\$0.00		\$0.00	\$130.20	anthony	LAPTOP-5EU	\$0.00	No	No
11	11	8/25/16	18:21	8/25/16	7	\$56.00	\$4.76	Visa	\$60.76		\$0.00		\$0.00		\$0.00	\$60.76	anthony	LAPTOP-5EU	\$0.00	No	No
12	12	8/25/16	18:28	8/25/16	7	\$47.50	\$4.05	Visa	\$51.55		\$0.00		\$0.00		\$0.00	\$51.55	Bryan	HOK6SY1	\$0.00	No	No
13	13	8/25/16	18:28	8/25/16	2	\$15.00	\$1.28	Visa	\$16.28		\$0.00		\$0.00		\$0.00	\$16.28	karen	LAPTOP-403	\$0.00	No	No
14	14	8/25/16	18:30	8/25/16	12	\$70.50	\$6.00	MasterCard	\$76.50		\$0.00		\$0.00		\$0.00	\$76.50	anthony	LAPTOP-5EU	\$0.00	No	No
15	15	8/25/16	18:31	8/25/16	9	\$58.50	\$4.98	Discover	\$63.48		\$0.00		\$0.00		\$0.00	\$63.48	sara	BLAPTOP	\$0.00	No	No
16	16	8/25/16	18:33	8/25/16	4	\$13.50	\$1.15	Cash	\$20.65		\$0.00		\$0.00		\$0.00	\$14.65	sara	BLAPTOP	\$0.00	No	No
17	17	8/25/16	18:34	8/25/16	15	\$49.00	\$4.17	Visa	\$53.17		\$0.00		\$0.00		\$0.00	\$53.17	anthony	LAPTOP-5EU	\$0.00	No	No
18	18	8/25/16	18:35	8/25/16	8	\$34.00	\$2.89	Visa	\$36.89		\$0.00		\$0.00		\$0.00	\$36.89	sara	BLAPTOP	\$0.00	No	No
19	19	8/25/16	18:37	8/25/16	14	\$88.00	\$7.48	Visa	\$95.48		\$0.00		\$0.00		\$0.00	\$95.48	karen	LAPTOP-403	\$0.00	No	No
20	20	8/25/16	18:43	8/25/16	41	\$145.50	\$12.46	Cash	\$100.00	Visa	\$57.96		\$0.00		\$0.00	\$157.96	Bryan	HOK6SY1	\$0.00	No	No
21	21	8/25/16	18:41	8/25/16	25	\$106.00	\$9.02	Visa	\$115.02		\$0.00		\$0.00		\$0.00	\$115.02	sara	BLAPTOP	\$0.00	No	No
22	22	8/25/16	18:43	8/25/16	27	\$101.00	\$8.59	Visa	\$109.59		\$0.00		\$0.00		\$0.00	\$109.59	anthony	LAPTOP-5EU	\$0.00	No	No
23	23	8/25/16	18:43	8/25/16	17	\$62.50	\$5.32	Visa	\$67.82		\$0.00		\$0.00		\$0.00	\$67.82	karen	LAPTOP-403	\$0.00	No	No
24	24	8/25/16	18:47	8/25/16	26	\$123.00	\$10.51	Cash	\$133.51		\$0.00		\$0.00		\$0.00	\$133.51	Bryan	HOK6SY1	\$0.00	No	No
25	25	8/25/16	18:45	8/25/16	1	\$85.00	\$7.23	Cash	\$100.00		\$0.00		\$0.00		\$0.00	\$92.23	karen	LAPTOP-403	\$0.00	No	No
26	26	8/25/16	18:45	8/25/16	24	\$95.00	\$8.08	Visa	\$103.08		\$0.00		\$0.00		\$0.00	\$103.08	sara	BLAPTOP	\$0.00	No	No
27	27	8/25/16	18:49	8/25/16	4	\$181.00	\$15.40	Cash	\$200.00		\$0.00		\$0.00		\$0.00	\$196.40	Bryan	HOK6SY1	\$0.00	No	No
28	28	8/25/16	18:47	8/25/16	3	\$11.00	\$0.94	Visa	\$11.94		\$0.00		\$0.00		\$0.00	\$11.94	sara	BLAPTOP	\$0.00	No	No
29	29	8/25/16	18:48	8/25/16	11	\$71.00	\$6.04	Cash	\$80.00		\$0.00		\$0.00		\$0.00	\$77.04	anthony	LAPTOP-5EU	\$0.00	No	No
30	30	8/25/16	18:52	8/25/16	9	\$31.00	\$2.65	Visa	\$33.65		\$0.00		\$0.00		\$0.00	\$33.65	Bryan	HOK6SY1	\$0.00	No	No
31	31	8/25/16	18:49	8/25/16	1	\$5.00	\$0.43	Visa	\$5.43		\$0.00		\$0.00		\$0.00	\$5.43	sara	BLAPTOP	\$0.00	No	No
32	32	8/25/16	18:50	8/25/16	11	\$71.00	\$6.04	Cash	\$90.00		\$0.00		\$0.00		\$0.00	\$77.04	karen	LAPTOP-403	\$0.00	No	No
33	33	8/25/16	18:51	8/25/16	15	\$147.00	\$12.50	Cash	\$160.00		\$0.00		\$0.00		\$0.00	\$159.50	anthony	LAPTOP-5EU	\$0.00	No	No
34	34	8/25/16	18:54	8/25/16	13	\$98.00	\$8.33	Cash	\$106.33		\$0.00		\$0.00		\$0.00	\$106.33	karen	LAPTOP-403	\$0.00	No	No
35	35	8/25/16	18:57	8/25/16	46	\$174.50	\$14.84	Visa	\$189.34		\$0.00		\$0.00		\$0.00	\$189.34	sara	BLAPTOP	\$0.00	No	No
36	36	8/25/16	19:00	8/25/16	52	\$206.50	\$17.56	Visa	\$224.06		\$0.00		\$0.00		\$0.00	\$224.06	anthony	LAPTOP-5EU	\$0.00	No	No
37	37	8/25/16	19:02	8/25/16	17	\$91.50	\$7.78	Cash	\$100.00		\$0.00		\$0.00		\$0.00	\$99.28	sara	BLAPTOP	\$0.00	No	No
38	38	8/25/16	19:06	8/25/16	43	\$135.50	\$11.61	Visa	\$147.11		\$0.00		\$0.00		\$0.00	\$147.11	Bryan	HOK6SY1	\$0.00	No	No
39	39	8/25/16	19:04	8/25/16	6	\$162.00	\$13.77	Cash	\$200.00		\$0.00		\$0.00		\$0.00	\$175.77	sara	BLAPTOP	\$0.00	No	No
40	40	8/25/16	19:08	8/25/16	3	\$12.00	\$1.02	Visa	\$13.02		\$0.00		\$0.00		\$0.00	\$13.02	Bryan	HOK6SY1	\$0.00	No	No

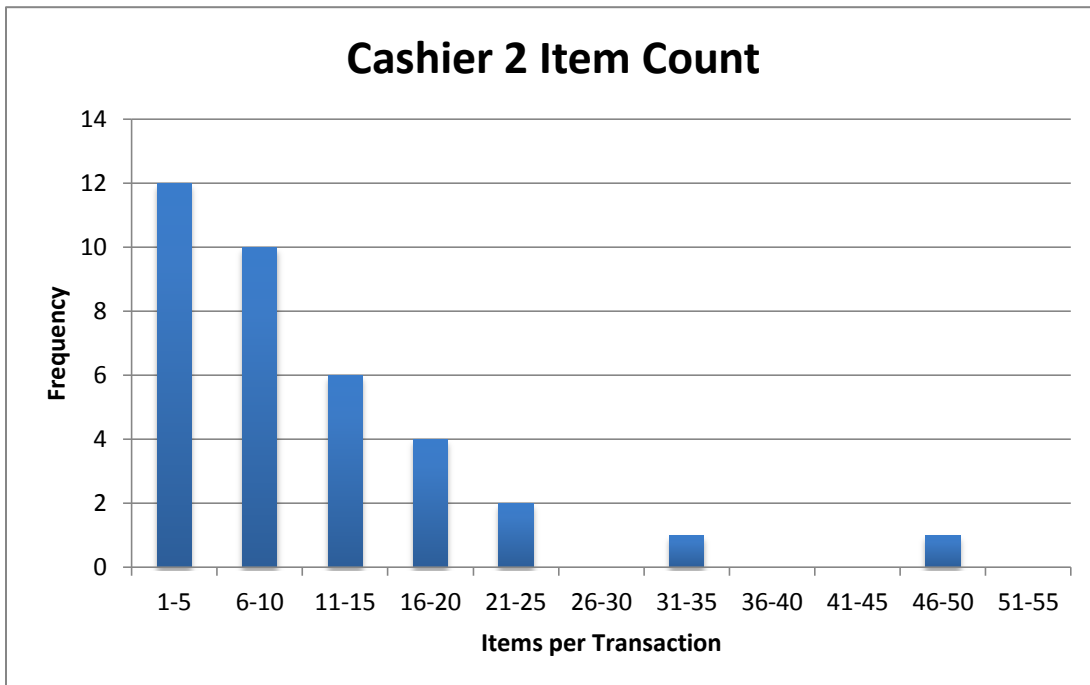
APPENDIX D – CASHIER HISTOGRAMS

The figures below are the histograms showing the distribution of the number of items per customer each cashier served. These were used to ensure similarity of item count so the average transaction times for each cashier could be compared to determine the effectiveness of each cashiers scanning process. Names of each cashier have been replaced with Cashier 1,2,3,4, or 5 in order to preserve the privacy of the individual.

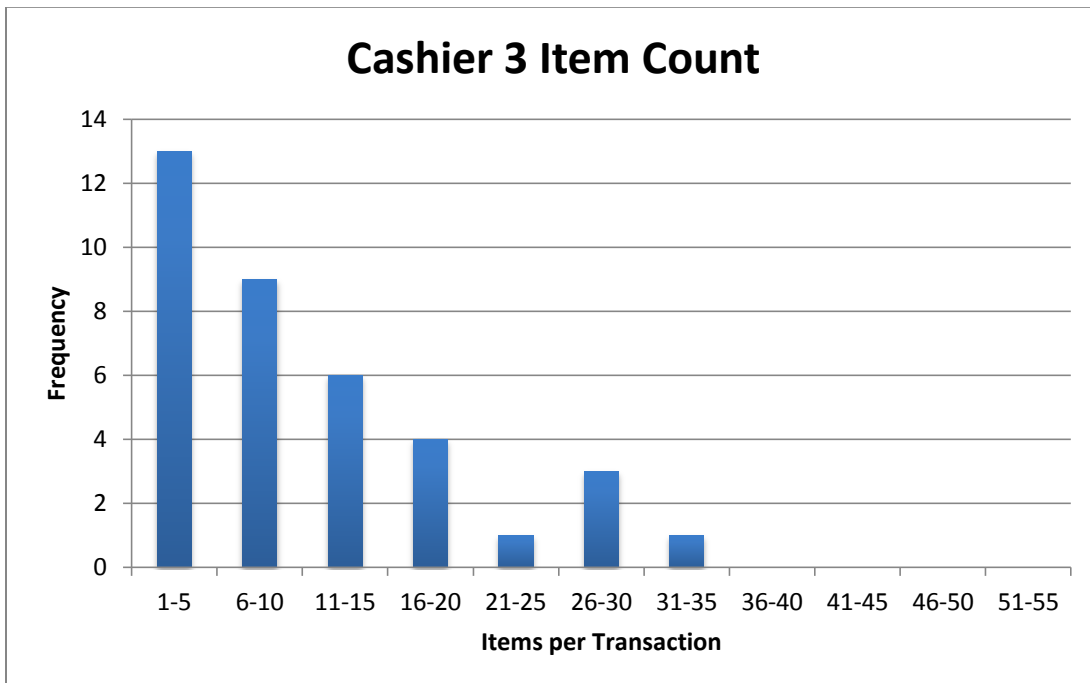
Cashier 1:



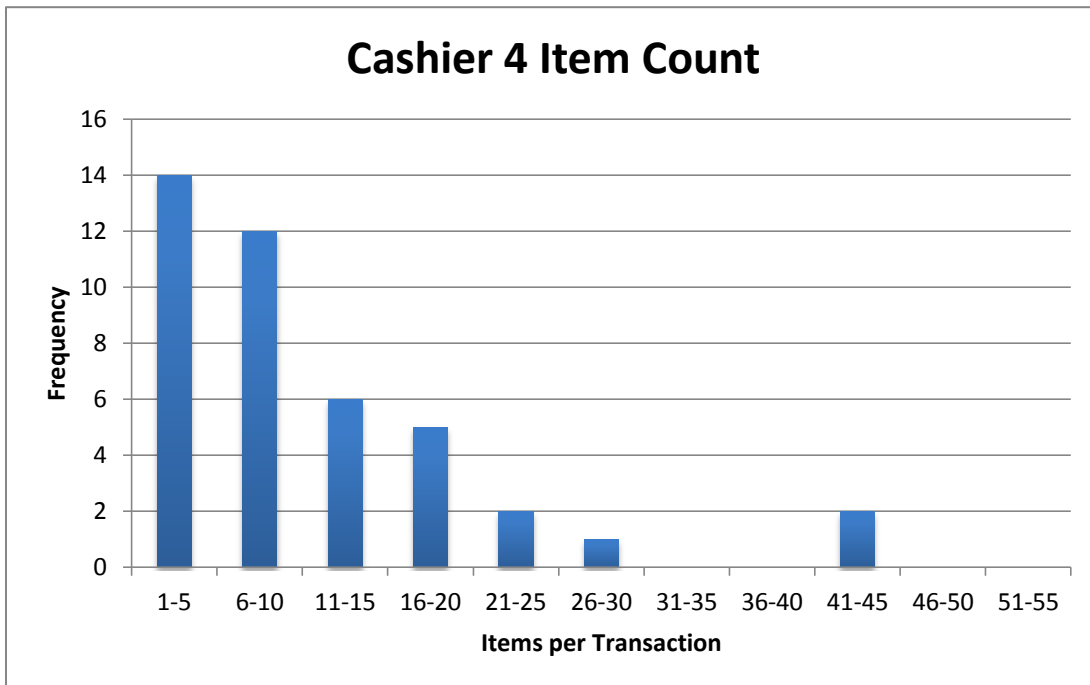
Cashier 2:



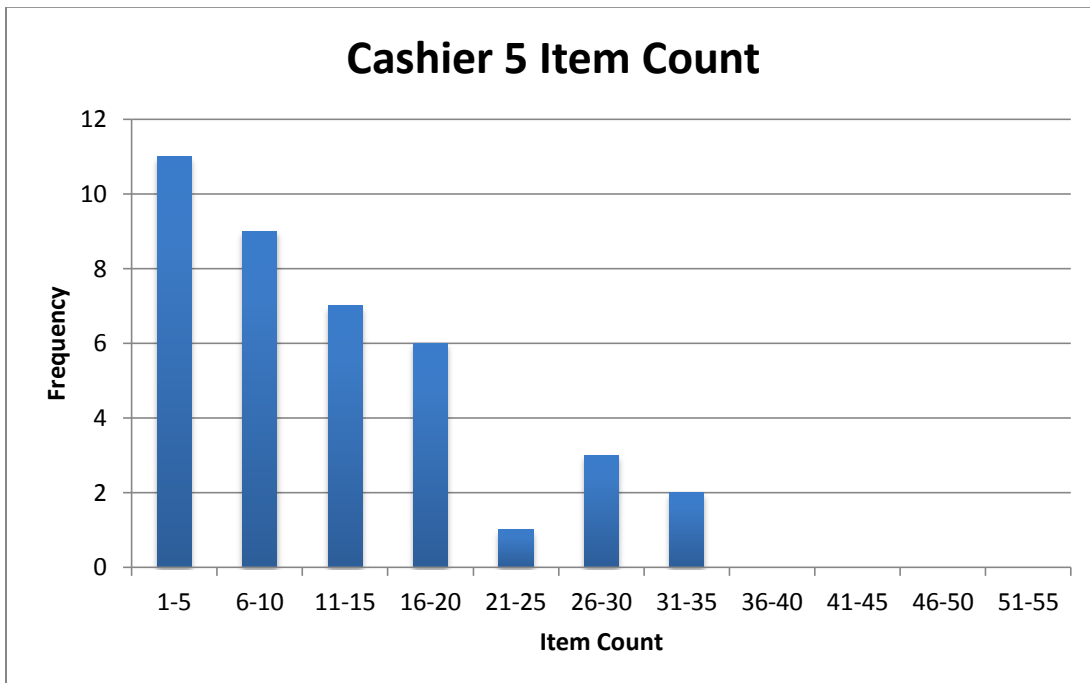
Cashier 3:



Cashier 4:



Cashier 5:



APPENDIX E – TRAINING GUIDES

The following sections are examples of the guide to be provided to cashiers and volunteers if the recommendations detailed in sections 4.4 and 6.4 are implemented. The Cashier Training Guide gives step-by-step instructions of the transaction process. The Volunteer Training Guide gives volunteers an understanding of their responsibilities at Wee-Cycle Bartlesville.

SECTION 1: CASHIER TRAINING GUIDE

CASHIER

- As the CASHIER, you are responsible for managing a register, scanning customer's items and processing payments.
 - CASHIER responsibilities are as follows:
 - Greet customer and lay all clothing items facing the same direction in the scanning area
 - Scan clothing items by the following process:
 1. Scan barcode on clothing item with item scanner in left hand
 2. Using your right hand, grab the hanger of the scanned item and fold. Do not let go of the hanger.
 3. Scan barcode of next item
 4. Repeat steps 2 and 3 until all clothing items are scanned
 5. Set item scanner down and place clothing into item bucket
 - After scanning clothing items, scan all other items
 - After scanning all other items, place them in the item bucket
 - Ask customer for payment and process it accordingly
 - Hand customer their items and wish them a good day
 - When checking in for your shift, meet Sara at register area and receive your register assignment.
 - Item scanning area should be directly left of the register, with the item bucket directly on your left. Buckets should be lined with large clear trash bags and have flyers inserted by REGISTER ATTENDANT.

SECTION 2: VOLUNTEER TRAINING GUIDE

SALE FLOOR ATTENDANT

- As the SALE FLOOR ATTENDANT, you are responsible for ensuring that the sale floor is presentable at all times. Make sure the clothing is evenly distributed on the various display racks and maintain an organized appearance of items on display tables. This position moves throughout the entire sale floor in the main sale room.
 - If you are the first SALE FLOOR ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately begin walking and tidying/organizing the sale floor.
 - If you are relieving a volunteer SALE FLOOR ATTENDANT, check in and meet the previous volunteer at the check in table by the registers (main sale room), put on your volunteer apron and immediately begin walking and monitoring the sale floor. Please arrive for your shift 5 minutes before it is scheduled to begin.
 - When your shift has 5 minutes left, head to the volunteer check in table to meet your relief volunteer. You will give the relief your apron and fill them in on any significant things to watch out for on the sale floor.
 - If you are the last SALE FLOOR ATTENDANT of the day, return your volunteer apron to the volunteer check in table when the last customer in line checks out or if there is no line, as soon as the sale closes.

REGISTER ATTENDANT

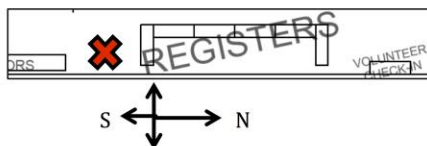
- As the REGISTER ATTENDANT, you are responsible for assisting shoppers and cashiers during the checkout process.
 - If you are the first REGISTER ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately go behind the register counter to offer assistance to cashiers.
 - If you are relieving a volunteer REGISTER ATTENDANT, check in and meet the previous volunteer at the check in table by the registers (main sale room), put on your volunteer apron, and immediately go behind the register counter to offer assistance to the cashiers. Please arrive for your shift 5 minutes before it is scheduled to begin.
 - If you are the last REGISTER ATTENDANT of the day, return your volunteer apron to the volunteer check in table when the last customer in line checks out or if there is no line, as soon as the sale closes.
 - REGISTER ATTENDANT responsibilities are as follows:
 - Prepare checkout bags by lining the large, round tubs with the large clear plastic bags
 - Always make sure every register has a clear bag available at all times (you can line tubs with multiple bags at a time)
 - Ensure that customers know when the next register is available
 - When your shift has 5 minutes left, head to the volunteer check in table to meet your relief volunteer. You will give the relief your apron and fill them in on any significant things to watch out for in the register area.

LARGE ITEM ATTENDANT

- As the LARGE ITEM ATTENDANT, you are responsible for ensuring that the large item room is presentable at all times.
 - If you are the first LARGE ITEM ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately report to the large item room.
 - If you are relieving a volunteer LARGE ITEM ATTENDANT, check in and meet the previous volunteer at the check in table by the registers (main sale room), put on your volunteer apron, and immediately report to the large item room. Please arrive for your shift 5 minutes before it is scheduled to begin.
 - In the large item room, you will assist shoppers buying large items. Once a shopper decides to buy a large item, move it to the "SOLD ITEMS" section next to the exit. You will know an item is sold if the bottom portion of the tag is gone (this is how shoppers claim large items). When you are not moving large items, remain near the sold items section to assist shoppers as they load their item(s) into their car. NOTE: a large item MUST remain in the large item room until it is paid for, otherwise it cannot leave the room. When your shift has 5 minutes left, head to the volunteer check in table to meet your relief volunteer. You will give the relief your apron and fill them in on any significant things to watch out for in the large item room.
 - If you are the last LARGE ITEM ATTENDANT of the day, return your volunteer apron to the volunteer check in table when the last customer in line checks out or if there is no line, as soon as the sale closes.

ITEM PREP ATTENDANT

- As the ITEM PREP ATTENDANT, you are responsible for assisting shoppers immediately before the checkout process.
 - ITEM PREP ATTENDANT responsibilities are as follows:
 - Help shoppers organize clothing and align all hangers to face the same way (clothing racks available to hang clothes and help ensure tags are on the same side and hangers are facing the same direction)
 - Return any items shoppers decide not to purchase to a SALE FLOOR ATTENDANT
 - Be alert and let shoppers know when a register becomes available
 - Remain in the item prep area until the next volunteer comes to relieve you
 - If you are the first ITEM PREP ATTENDANT of the day, check in at the table by the registers (main sale room), put on your volunteer apron and immediately go to the area south of the registers (indicated by the red "X" on Figure 7).
 - If you are relieving a volunteer ITEM PREP ATTENDANT, check in at the table by the registers (main sale room), put on your volunteer apron, and immediately go to the area south of the registers to relieve the previous volunteer ITEM PREP ATTENDANT. Please arrive for your shift 5 minutes before it is scheduled to begin.



APPENDIX F – AUGUST 2016 VOLUNTEER SHIFT DETAILS

The images below are scanned Worker Schedule Reports for the week of the August 2016 sale. The title above each group of text represents the position and time for which the individual is signed up. The column on the left indicates whether or not the shift is filled, while the column on the right indicates when the individual signed up for the shift. Last names and phone numbers have been removed from the center column to protect the identity of the individuals.

There are 16 open volunteer shifts throughout the setup, sale, and tear down. One recommendation that could minimize unfilled shifts is the implementation of an admission fee. This is an incentive for volunteers because they will not have to pay to get into the sale.

Wee-Cycle Bartlesville

Worker Schedule Report
Monday, August 22, 2016
Total Workers: 151

Tuesday, August 23, 2016 12:00:00 PM - 8:00:00 PM Inventory Staff

Status	Worker	Date Filled
FILLED	Desiree	7/8/2016
FILLED	Erin	7/8/2016

Tuesday, August 23, 2016 12:00:00 PM - 2:00:00 PM Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Amber	7/11/2016
FILLED	Jennifer	7/7/2016
FILLED	Rachel	7/2/2016
FILLED	Sabra	8/5/2016

Tuesday, August 23, 2016 2:00:00 PM - 4:00:00 PM Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Carol	8/12/2016
FILLED	Ronni	8/11/2016
FILLED	Jeanifer	8/10/2016
FILLED	Candace	7/16/2016

Tuesday, August 23, 2016 4:00:00 PM - 6:00:00 PM Set-Up and Sorting

Status	Worker	Date Filled
FILLED	LeAnne	8/21/2016
FILLED	Caitlin	8/6/2016
FILLED	Carolyn	7/5/2016
FILLED	Angela	7/4/2016

Tuesday, August 23, 2016 6:00:00 PM - 8:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Brenda	7/5/2016
FILLED	Ann Marie	7/5/2016
FILLED	Kaisha	7/4/2016
FILLED	Amanda	7/1/2016

Wednesday, August 24, 2016 12:00:00 PM - 8:00:00 PM
Inventory Staff

Status	Worker	Date Filled
FILLED	Desiree	7/8/2016
FILLED	Erin	7/8/2016

Wednesday, August 24, 2016 12:00:00 PM - 2:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Mara	7/2/2016
FILLED	Rachel	7/2/2016
FILLED	Chelsea	8/20/2016
OPEN		

Wednesday, August 24, 2016 2:00:00 PM - 4:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Alyssa	7/10/2016
FILLED	Lacy	8/3/2016
FILLED	Jeannie	7/4/2016
OPEN		

Wednesday, August 24, 2016 4:00:00 PM - 6:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Dawn	7/23/2016
FILLED	Jodi	7/18/2016
FILLED	Sarah	7/18/2016
FILLED	Lauren	7/18/2016
FILLED	Laura	7/11/2016
FILLED	Heather	8/2/2016

Wednesday, August 24, 2016 6:00:00 PM - 8:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Lee Ann	8/11/2016
FILLED	Cherilyn	7/1/2016
FILLED	Gabriella	7/1/2016
OPEN		

Thursday, August 25, 2016 9:00:00 AM - 1:00:00 PM
Inventory Staff

Status	Worker	Date Filled
FILLED	Desiree	7/8/2016
FILLED	Erin	7/8/2016

Thursday, August 25, 2016 10:00:00 AM - 12:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	Jeannie	7/4/2016
FILLED	Bonnie	7/3/2016
FILLED	Jada	7/1/2016
FILLED	John	7/1/2016

Thursday, August 25, 2016 12:00:00 PM - 2:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	<u>Cathy</u>	7/2/2016
FILLED	<u>Dawn</u>	7/1/2016
FILLED	<u>Nicole</u>	7/1/2016
FILLED	<u>John</u>	7/1/2016

Thursday, August 25, 2016 2:00:00 PM - 4:00:00 PM
Set-Up and Sorting

Status	Worker	Date Filled
FILLED	<u>Katie</u>	7/1/2016
FILLED	<u>Jennissue</u>	7/3/2016
FILLED	<u>Shirley</u>	7/1/2016
FILLED	<u>Pam</u>	7/1/2016

Thursday, August 25, 2016 4:00:00 PM - 6:00:00 PM
VIP Sale Prep

Status	Worker	Date Filled
FILLED	<u>Shirley</u>	7/1/2016
FILLED	<u>Pam</u>	7/1/2016
FILLED	<u>Jordan</u>	7/1/2016
FILLED	<u>Katelynn</u>	7/1/2016

Thursday, August 25, 2016 6:00:00 PM - 8:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Karen</u>	8/11/2016
FILLED	<u>Bryan</u>	8/11/2016
FILLED	<u>Emily</u>	8/11/2016
FILLED	<u>Sara</u>	6/2/2016

Friday, August 26, 2016 8:00:00 AM - 10:00:00 AM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Karen</u>	8/17/2016
FILLED	<u>Sydney</u>	8/11/2016
FILLED	<u>Lynn</u>	7/19/2016
OPEN		

Friday, August 26, 2016 8:00:00 AM - 10:00:00 AM
Cashier

Status	Worker	Date Filled
FILLED	<u>Emily</u>	7/8/2016
FILLED	<u>Lisa</u>	7/8/2016
FILLED	<u>Karen</u>	7/5/2016
FILLED	<u>Jill</u>	7/5/2016
FILLED	<u>Sara</u>	6/2/2016

Friday, August 26, 2016 10:00:00 AM - 12:00:00 PM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Katie</u>	7/29/2016
FILLED	<u>Brooke</u>	7/21/2016
FILLED	<u>Pamela</u>	7/18/2016
FILLED	<u>Michal</u>	7/1/2016

Friday, August 26, 2016 10:00:00 AM - 12:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Sara</u>	7/8/2016
FILLED	<u>Emily</u>	7/8/2016
FILLED	<u>Lisa</u>	7/8/2016
FILLED	<u>Karen</u>	7/5/2016
FILLED	<u>Jill</u>	7/5/2016

Friday, August 26, 2016 12:00:00 PM - 2:00:00 PM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Jennifer</u>	8/19/2016
FILLED	<u>Melissa</u>	8/13/2016
FILLED	<u>Krista</u>	8/12/2016
FILLED	<u>Eloise</u>	8/17/2016

Friday, August 26, 2016 12:00:00 PM - 2:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Karen</u>	8/11/2016
FILLED	<u>Stephanie</u>	8/11/2016
FILLED	<u>Jill</u>	8/11/2016
FILLED	<u>Sara</u>	7/8/2016
FILLED	<u>Emily</u>	7/8/2016

Friday, August 26, 2016 2:00:00 PM - 4:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Sara</u>	8/11/2016
FILLED	<u>Stephanie</u>	8/11/2016
FILLED	<u>Emily</u>	7/8/2016
OPEN		

Friday, August 26, 2016 2:00:00 PM - 4:00:00 PM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Nora</u>	8/20/2016
FILLED	<u>Jennifer</u>	8/19/2016
FILLED	<u>Melissa</u>	8/13/2016
FILLED	<u>Nicole</u>	8/12/2016

Friday, August 26, 2016 4:00:00 PM - 6:00:00 PM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Allyson</u>	8/10/2016
FILLED	<u>Mindy</u>	8/8/2016
FILLED	<u>Whitney</u>	8/16/2016
FILLED	<u>Angela</u>	7/4/2016

Friday, August 26, 2016 4:00:00 PM - 6:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Jennifer</u>	8/13/2016
FILLED	<u>Stephanie</u>	8/11/2016
FILLED	<u>Sara</u>	8/11/2016

Friday, August 26, 2016 6:00:00 PM - 8:00:00 PM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Abby</u>	7/19/2016
FILLED	<u>Jennifer</u>	7/19/2016
FILLED	<u>Morgyn</u>	7/18/2016
FILLED	<u>Heather</u>	7/2/2016

Friday, August 26, 2016 6:00:00 PM - 8:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Sara</u>	8/11/2016
FILLED	<u>Stephanie</u>	8/11/2016
FILLED	<u>Darah</u>	7/8/2016

Saturday, August 27, 2016 8:00:00 AM - 10:00:00 AM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Lee Ann</u>	8/11/2016
FILLED	<u>Tasha</u>	7/14/2016
FILLED	<u>Kirsten</u>	7/1/2016
FILLED	<u>Mikayla</u>	7/1/2016

Saturday, August 27, 2016 8:00:00 AM - 10:00:00 AM
Cashier

Status	Worker	Date Filled
FILLED	<u>Sara</u>	8/11/2016
FILLED	<u>Stephanie</u>	8/11/2016
FILLED	<u>Darah</u>	7/8/2016
OPEN		

Saturday, August 27, 2016 10:00:00 AM - 12:00:00 PM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Allison</u>	7/26/2016
FILLED	<u>Jaci</u>	7/16/2016
FILLED	<u>Kayla</u>	7/8/2016
FILLED	<u>Mikayla</u>	7/1/2016

Saturday, August 27, 2016 10:00:00 AM - 12:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Sara</u>	8/11/2016
FILLED	<u>Stephanie</u>	8/11/2016
OPEN		
OPEN		

Saturday, August 27, 2016 12:00:00 PM - 2:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Sara</u>	8/11/2016
FILLED	<u>Stephanie</u>	8/11/2016
OPEN		
OPEN		

Saturday, August 27, 2016 12:00:00 PM - 2:00:00 PM
Main Sale

Status	Worker	Date Filled
FILLED	<u>Alesia</u>	8/9/2016
FILLED	<u>Elizabeth</u>	8/3/2016
FILLED	<u>Jaci</u>	7/16/2016
OPEN		

Saturday, August 27, 2016 2:00:00 PM - 4:00:00 PM
Discount Sale Prep

Status	Worker	Date Filled
FILLED	<u>Jennissue</u>	7/3/2016
FILLED	<u>Jessica</u>	7/1/2016
FILLED	<u>Gabriella</u>	7/1/2016

Saturday, August 27, 2016 2:00:00 PM - 4:00:00 PM
Cashier

Status	Worker	Date Filled
FILLED	<u>Stephanie</u>	8/17/2016
FILLED	<u>Sara</u>	8/17/2016

Saturday, August 27, 2016 4:00:00 PM - 6:00:00 PM
Cashier - Discount Sale

Status	Worker	Date Filled
FILLED	<u>Sara</u>	8/11/2016
FILLED	<u>Bryan</u>	8/11/2016
FILLED	<u>Hollie</u>	8/20/2016

Saturday, August 27, 2016 4:00:00 PM - 6:00:00 PM
Discount Sale

Status	Worker	Date Filled
FILLED	<u>Kimbley T</u>	8/10/2016
FILLED	<u>Claire J</u>	7/5/2016
OPEN		

Saturday, August 27, 2016 6:00:00 PM - 8:00:00 PM
Discount Sale

Status	Worker	Date Filled
FILLED	<u>Hollie</u>	8/20/2016
FILLED	<u>Heather</u>	8/13/2016
OPEN		

Saturday, August 27, 2016 6:00:00 PM - 8:00:00 PM
Cashier - Discount Sale

Status	Worker	Date Filled
FILLED	<u>Sara F</u>	8/11/2016
FILLED	<u>Bryar</u>	8/11/2016

Sunday, August 28, 2016 8:00:00 AM - 10:00:00 AM
Sorting for Pick-Up

Status	Worker	Date Filled
FILLED	<u>Heather C</u>	8/7/2016
FILLED	<u>Brandi C</u>	8/3/2016
FILLED	<u>Amanda J</u>	8/2/2016
FILLED	<u>Emily J</u>	8/2/2016
FILLED	<u>Sabrina</u>	7/7/2016
FILLED	<u>Jeanifer R</u>	7/7/2016

Sunday, August 28, 2016 10:00:00 AM - 12:00:00 PM
Sorting for Pick-Up

Status	Worker	Date Filled
FILLED	<u>Lacey</u>	8/13/2016
FILLED	<u>Amanda J</u>	8/2/2016
FILLED	<u>Cristina C</u>	7/19/2016
FILLED	<u>Sabrina</u>	7/12/2016
OPEN		
OPEN		

Sunday, August 28, 2016 12:00:00 PM - 2:00:00 PM
Tear Down & Pick Up

Status	Worker	Date Filled
FILLED	<u>Aimee</u>	8/6/2016
FILLED	<u>Lacy</u>	8/6/2016
FILLED	<u>Christy</u>	7/29/2016

Sunday, August 28, 2016 2:00:00 PM - 4:00:00 PM
Tear Down & Pick Up

Status	Worker	Date Filled
FILLED	<u>Pamela</u>	7/18/2016
FILLED	<u>Karrie S</u>	7/6/2016
OPEN		