



KENNESAW STATE UNIVERSITY

# Lean Process Improvement for a 3PL Distribution Center

## Group Name: Too Logistic



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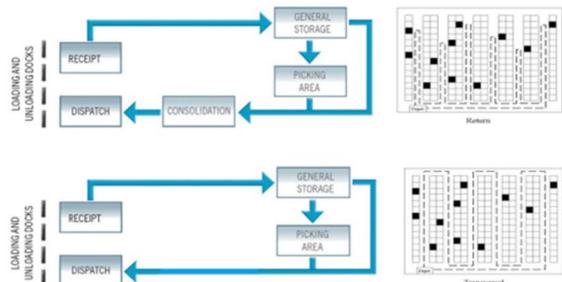
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### ISYE 4900 Senior Design Project

## INTRODUCTION AND OBJECTIVE

This 3PL Company is an American company listed as a top ten global provider of supply chain solutions. This company's success is attributed to a highly integrated network of people, technology, and physical assets. It operates in 30 countries, with over 50,000 customers, including 69 of their clients being Fortune 100 companies. The company's two main operations include transportation and contract logistics. For this project, our group will work out of a McDonough, Georgia distribution center. This 3PL location is a single designated client warehouse that has both a fresh bread side as well as a snack food side.

Figure 1- Current and Proposed Flow Chart



The objective of this project is to implement a process to transition from a floor loading to a palletized system for shipping in order to reduce safety risks, minimize waste in the form of non-value-added material handling and space and damages, improve item throughput efficiency, and reduce labor hours caused by the current floor loaded shipping system.

## APPROACH

At the request of the customer, this 3PL distribution center is required to transition from the current floor loading process to a palletized process. To do this, Too Logistic's objective is to redesign the pick row area in order to be more efficient in order-picking for delivery.

Our team will conduct the DMAIC technique to evaluate the current item picking system. This will allow us to properly identify the best approach for implementation. Too Logistic will follow a strategic approach from conception to closeout to ensure the project scope and requirements are satisfied. Our problem-solving approach will be performed as follows:

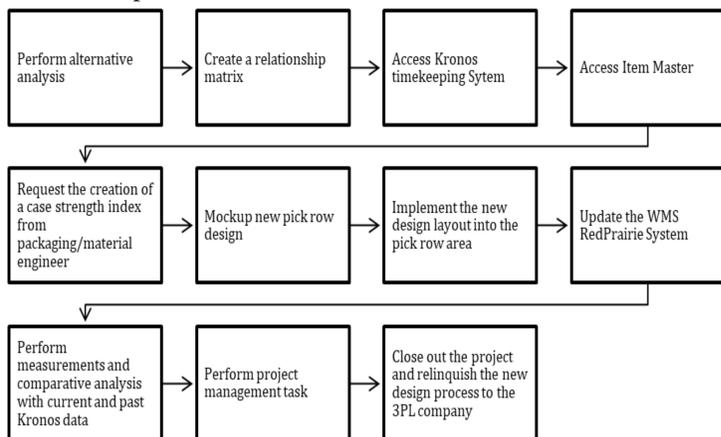


Figure 2 – Alternative Analysis

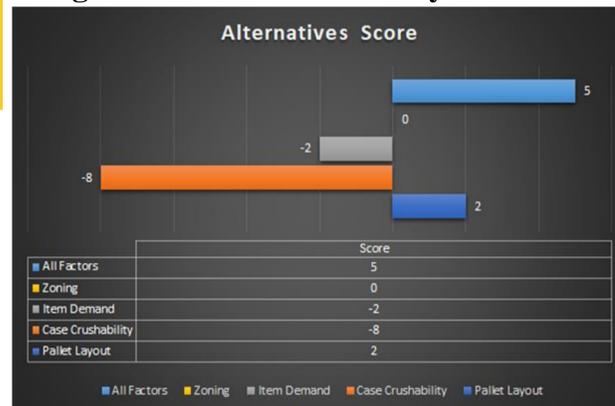


Figure 3 – Relationship Matrix

Relationship Matrix:	Employee Safety	Efficiency	Productivity	Claims and Damages	Total
3 = Very Impactful					
2 = Impactful					
1 = Fairly Impactful					
0 = No Impact					
Pallet Layout (Ti/Hi)	2	3	3	2	10
Case Crushability	3	1	2	3	9
Item Demand	1	2	3	0	6
Zoning for Demand	3	1	1	1	6
All Factors	3	3	2	3	11
<b>Total</b>	<b>12</b>	<b>10</b>	<b>11</b>	<b>9</b>	

Alternative values are based on the positive impact regarding the pick row requirements when considering the building and completion of a pallet.

Figure 4 – TOPSIS Analysis

Alternatives	Cost	Time	Distance	Employee Safety	Efficiency	Productivity	Claims and Damages	Total
Current Layout	8.77	28.45	3462	1	1	1	1	3503
Pallet Layout (Ti/Hi)	8.48	27.52	3216	2	3	3	2	3262
Case Crushability	7.99	25.92	2795	3	1	2	3	2838
Item Demand	7.52	24.39	2391	1	2	3	0	2429
Zoning Demand	5.86	19.01	971	3	1	1	1	1002
<b>Total</b>	<b>38.62</b>	<b>125.29</b>	<b>12835.00</b>	<b>10.00</b>	<b>8.00</b>	<b>10.00</b>	<b>7.00</b>	<b>13033.91</b>

Alternatives	Final Ranking	Best Alternative
Current Layout	0.0007	
Pallet Layout (Ti/Hi)	0.0988	
Case Crushability	0.2678	
Item Demand	0.4299	
Zoning Demand	0.9989	0.9989

Figure 7 – Total Labor Cost and Expected Savings

Pick Row Layout	Current	Pallet (Ti/Hi)	Item Demand	Case Crushability	Zoning Demand	Multi-Factor
Picking Time (min.)	15.33	15.33	15.33	15.33	15.33	15.33
Traveling Time (min.)	13.11	12.18	9.06	10.59	3.68	4.41
Total Time (min.)	28.45	27.52	24.39	25.92	19.01	19.74
Total Distance (ft.)	3462.00	3216.00	2391.00	2795.00	971.00	1164.00
Total Labor Cost Per Order	\$8.77	\$8.48	\$7.52	\$7.99	\$5.86	\$6.09
Total Labor Cost Per Year	\$269,907.93	\$261,066.74	\$231,416.40	\$245,936.08	\$180,381.88	\$187,318.26
Expected Savings Per Year	\$0.00	\$8,841.19	\$38,491.53	\$23,971.85	\$89,526.05	\$82,589.67
Orders Fulfilled Per Week	592	*Average weekly cases handled divided by cases per order (136108/230)				

Figure 5 – Financial Plan

Description	Date	Amount	QTY	Total	Actual Cost	Amount	QTY	Total	Planned Cost
<b>Equipment</b>									
Additional Stretch Wrap Machine	3/9/2020	\$9,995.00	1	\$9,995.00	\$9,995.00	\$15,000.00	1	\$15,000.00	\$15,000.00
Additional Stretch Wrap	2/25/2020	\$54.26	40	\$2,170.40	\$12,165.40	\$45.00	40	\$1,800.00	\$16,800.00
New Pallets for Shipping	2/22/2020	\$6.75	1560	\$10,530.00	\$22,695.40	\$6.75	1560	\$10,530.00	\$27,330.00
<b>Employees</b>									
Supervisor	3/21-3/22	\$230.80	1	\$230.80	\$22,926.20	\$230.80	1	\$230.80	\$27,560.80
Lead	3/21-3/22	\$222.00	1	\$222.00	\$23,148.20	\$148.00	1	\$148.00	\$27,708.80
Replenisher	3/21-3/22	\$222.00	1	\$222.00	\$23,370.20	\$148.00	1	\$148.00	\$27,856.80
<b>Miscellaneous Expenses</b>									
Power to Stretch Wrap Machine	3/9/2020	\$1,514.00	1	\$1,514.00	\$24,884.20	\$1,000.00	1	\$1,000.00	\$28,856.80
Too Logistic Consulting	4/22/2020	\$40,767.07	1	\$40,767.07	\$65,651.27	\$40,767.07	1	\$40,767.07	\$69,623.87
<b>Accumulated Total</b>					<b>\$65,651.27</b>				<b>\$69,623.87</b>

Item	Value
*Too Logistic Rate: Value-Based Pricing at 12% of expected savings	
First Year Cost Per Case Savings	\$274,074.30
Multi-Factor Pick Row Savings	\$82,589.67
Labor Dollars Per Year	\$2,264,837.12
Current Cost Per Case	\$0.320
Expected Cost Per Case	\$0.272
Expected Savings	\$339,725.57
Balance	\$3,972.60

Figure 6 – Quarterly Summary of Cost Per Case

Monthly Average	Q1: Aug	Q1: Sep	Q1: Oct	
Cost Per Case	\$0.287	\$0.309	\$0.328	\$0.307
Cases Handled	139,945	140,767	121,504	134,072
Labor Dollars	\$40,121.00	\$43,523.00	\$39,848.75	\$41,164.25

Monthly Average	Q2: Nov	Q2: Dec	Q2: Jan	
Cost Per Case	\$0.350	\$0.330	\$0.323	\$0.333
Cases Handled	109,748	112,129	150,669	124,182
Labor Dollars	\$38,384.00	\$37,024.75	\$48,673.03	\$41,360.59

Monthly Average	Q3: Feb	Q3: Mar	Q3: Apr	
Cost Per Case	\$0.301	\$0.289	\$0.233	\$0.272
Cases Handled	173,618	172,190	206,885	184,231
Labor Dollars	\$52,235	\$49,748	\$48,233.33	\$50,072.01

Figure 8 – Quarterly Summary of Key Performance Indicators

	Hours	Cases Picked	Rows	Case/Row	Daily Cases/Hr	Rows/HR
Mean	220.10	67285.24	7053.26	9.54	305.70	32.05
Q1	230.78	69343.69	7065.31	9.81	300.47	30.61
Q2	211.11	66414.31	7277.54	9.13	314.60	34.47
Q3	218.28	65998.75	6797.25	9.71	302.35	31.14

## REQUIREMENTS AND SPECIFICATIONS

Through the course of this project, our team will ensure the following process requirements are satisfied:

- The new process should be safer. The current pick row layout requires a double path for material handling equipment (MHE). This factor contributes to the near misses and potential accidents per quarter.
- The redesign should be more efficient. Order pickers should move fluidly through the pick. Moving fluidly through the pick will increase the throughput of items and decrease the overall order lead time.
- The implemented redesign should help with the reduction of waste, damages, and customer complaints. Establishing an improvement plan to increase the integrity of the built pallets will help minimize the potential damages and increase customer satisfaction.
- The redesign should reduce cost. The current floor loading system requires more time that increases the total labor hours and item cost per case at the distribution center.

In order to measure the success of the project, our group established a minimum criterion that needed to be accomplished by the end of the project. Listed below are the categories addressing our minimum success criteria:

- Reduce the labor cost per case from \$0.320 to \$0.295 (8% reduction/improvement)
- Reduce safety near misses by 5%.
- Reduce customer complaints/item damages by 5%.

## RESULTS

While averaging approximately 135,000 cases a week, with a cost per case of \$0.320, this distribution center was spending \$2,264,837.12 annually in total labor cost with \$269,907.93 being contributed to an insufficient pick row layout.

With the implementation of the pick row redesign, we can see a significant reduction in the cost per case from \$0.307 in quarter one to \$0.272 in quarter three. With the further evaluation of quarter three, the cost per case for February, March, and April resulted in \$0.301, \$0.289, and \$0.233, respectively. With the cost per case reduction, this company will see an expected savings of \$274,074.30 for the first year and an additional \$82,589.67 in the following years from a reduction in labor cost.

Both the quarterly cost per case and the post implementation cost per case for April fall within our minimum success criteria of an 8% reduction. Although we did not have the data needed at the time, our team feels that the redesigned pick route that follows a transversal path will significantly reduce the likelihood of near misses with machine handling equipment (MHE). Furthermore, the redesign considers case crushability as a factor that should reflect in a claims and damages reduction. Unfortunately, since we do not have the data to analyze, we cannot confidently confirm the 5% reduction in safety near misses, nor a 5% reduction in claims and damages. For these reasons, we did not meet our minimum success criteria.