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1. Abstract

Problem Statement

Audit efficiency of Euclid Beverage's warehouse systems and equipment. Based on the audit determine changes we, the IPRO Team think they should implement to improve Operations.

Approach

Visit the site to become familiar with the warehouse processes and create updated maps of these processes. Analyze the maps and other information obtained from visits to find areas to improve efficiency or reduce errors.

2. Background

Problems to be Addressed

Euclid beverage is an Illinois beer distribution center, specializing in miller products. They distribute all throughout the state.

The company believes that it can be more efficient with the way it implements its many processes within the company workings. Unfortunately they have neither the manpower nor time to perform this currently, thus have decided to hire out to a private consulting agency, being the Smooth Brew company.

Technology and Science to be Used

We used process analysis, employee dialogue, and data analysis in order to come up with our results. Process analysis was essential to knowing how to oversee the daily workings of the employees, as well as how to effectively determine whether or not a specific task is being done correctly. Employee Dialogue was our technique of engaging the workers about how they perceive the efficiency of their workplace. Warehouse workers provided considerable insight about areas we may not be able to observe, due to their experience.

Historical Successes and Failures

As we began to research Euclid beverages, we came to find that we are not the first company hired for the specific task of improving warehouse operations. As the new (current) warehouse was being developed, a separate firm was hired to help provide guidelines on how to run the warehouse more efficiently. They provided flowcharts for each step of the distributing process, which we ended up using as guidelines for how we would perform our observing-activity. The flowcharts were very thorough, but we were informed that, since being created before the warehouse became operational, they were used sparingly, and that many of the processes were different than previously recorded on the flowcharts.

Ethical Issues

Ethical issues are bound to arise when working in a corporate environment, so we decided to take these into consideration as we began performing our tasks. Simply put, our primary concern lied with the ability for all members of our group to work in the warehouse, the problem lying in the fact that a number of group-mates were not above 21. Also, as we do our previously defined Employee-Dialogue, it was important that we informed our sources that all information provided to use and relayed back to the higher powers would remain anonymous.

3. Objectives

Overall goal

Identify areas for increased profit or verify areas of current maximization of profit

- Improved efficiency
- Reduced mistakes

Process map

- Official process vs. actual process

4. Methodology

Define the Problems

Identify any wasted resources, such as time, equipment, or product in the operations of a beverage distributor. Determine the sources of waste. Create practical solutions to reduce or remove waste.

Identifying the Problems

To identify problems, the team conducted multiple visits to the client's operations. The project was conducted in several phases: Information Gather, Process Mapping, Identification of Inefficiencies, Creation of Solutions, Testing of Solutions, Presentation to Management.

Phase 1: Information Gathering: During visits the team observed the client's operations. During these visits they also questioned both workers and management. During or between visits relevant documents, such as client documents or industry information was gathered. While gathering information the team divided into sub-teams responsible for particular aspects of the operation.

Phase 2: Process Mapping: Using the gathered information the team mapped out the entire process of the client's operations. This was done with the entire team, though sub-teams supplied information and were responsible for their particular areas. If any

unknown areas were found in the process, additional information was gathered until the overall process could be accurately and completely described.

Phase 3: Identification of Inefficiencies: After the process had been mapped, it was analyzed to find inefficiencies such as wasted labor, loss of product, or equipment problems. In addition to using the process map, the previous observation and questioning also provided information for the identification of inefficiencies. While the inefficiencies were being identified the direct causes were also be determined.

Phase 4: Creation of Solutions: The team, working together, came up with solutions to the direct causes of inefficiency. These were then analyzed for practicality and usefulness.

Phase 5: Filtering of Solutions: Solutions that were deemed practical were tested, depending on the potential value and disruption of the test. Testing was then observed and used to generate additional solutions, effectively repeating phases 1-5.

Phase 6: Presentation to Management: Those solutions which were thought to be practical were included in a final report to management. In addition, the presentation included the process map and identified inefficiencies.

Documentation of Results

All results of observation and testing were documented. Sub-teams were responsible for their own areas of the overall problem. All needed information was stored on iGroups in order to be accessible to the entire team.

Analysis of Results

The team collectively performed an initial analysis of all results and solutions.

Generation of Deliverables

The team divided up all deliverables. They were assigned to individuals or sub-teams along with a date for completion and submission to the team. Large tasks were broken down among several individuals with a separate team member responsible for the compilation of each part into a whole deliverable.

5. Team Structure and Assignments

Team Member	Email Address	Strengths	Skills to Develop	Project Expectations
Soren Haurberg	shaurber@iit.edu	Good problem solver, high level of technical knowledge, good at research and preparation	Delegation/sharing or responsibility amongst team, task organization	Learn about business process analysis and improve teamwork skills
Andrew Kleps	akleps@iit.edu	Appreciation of complexity while still recognizing the need for simplification, Out of the box thinking, Willingness to be wrong	Organization, Understanding of the strengths and weaknesses of team members	As a team we'll find several ways to improve distribution and reduce wasted product. At least some of them will be practical to implement.
Kiyomi Pyle	kpyle@iit.edu	Experience with the loading and delivering process. I work well with groups, good communicator.	Presentation skills, solving problems in a creative and efficient manner.	I don't have a whole lot of experience with this type of project so I might not be able to contribute a lot in that sense but I can carry out all of my tasks to the best of my ability. I am excited to be involved in a real life business project.
Rich Roslund	rroslund@iit.edu	Some leadership training, open mindedness, Programming experience, Prior Ipro Experience	How to think in a business setting, How to work as a consultant	Learn how a brewery works, Learn how to test for efficiency, Learn how to work in a business setting, Accomplish our ipro-defined goals
Basel Sarraf	bsarraf@iit.edu	Analytical skills, previous warehouse work experience, and computer software related issues (development, implementation, installation, as well as training staff).	To be a good team player in a think tank oriented team, to learn about warehousing solutions, and their software solutions.	I expect our team to contribute critical and meaningful solutions for Euclid Beverages' warehouse.
Hee Seo	hseo2@iit.edu	Mathematical Computation, Statistical Analysis and Database management.	Operation management, Public Speaking.	Always be prepared at discussion, Be a good listener, Respect the time and schedule.
Junhyung Song	jsong5@iit.edu	I can program in C++, JAVA and several Web Application Languages(HTML, JAVA SCRIPT, JSP). I know how we can conduct our project successfully, as well. I have experience that I worked in Samsung Electronics so I can suggest many things that are beneficial to work with the real business.	Communication Skill. Presentation Skill. Knowledge for huge, complicated and hierarchical information system design.	I will do my best for everything that is related to this project, especially the part that I have strength. Never delay my tasks. I will earn many experiences out of all project tasks

Kyle Stachowiak	kstacho1@iit.edu	Computers, Software, Programming, Robotics Experience	Marketing ideas	Lots of work, and that I'll get to contribute my strengths in a meaningful way.
Robert Vankley	rvankley@iit.edu	Mechanical Engineering major, business minor, good problem solving skills.	Project organization skills	The project should be interesting, a chance to see a real business operation in action and have a chance to make some positive changes to it.

6. Project Budget

Transportation for customer visits

Nine students need to take the train

- \$48.05 per 10 ride ticket
- 96.10 per visit (10 ride each way)
- 4 customer visits planned

Sub-Total: 4 visits x \$96.10 per visit = \$384.40 estimate for train rides

Two students helping with transport from train station to warehouse

- 22 miles to station plus 6.8 miles from station to warehouse makes 28.8 miles
- 28.8 miles at \$.55 a mile equals \$15.84 one way. Round trip total is \$31.68.
- 4 customer visits planned

Sub-Total: 4 visits x 31.68 = \$126.72

Estimated Transportation Total: \$511.12

ESTIMATED GRAND TOTAL: \$500 - \$600

7. Results

Research and Findings

All research involved visiting Euclid's warehouse and observing their operating process. Along with this they provided management reports, including end of day reports, which turned out to be very valuable for the group. This research provided the information necessary to produce the process flow maps and come up with recommendations for Euclid to improve.

Major Accomplishments

The group was able to accomplish almost everything it set out to do. The first and probably most important accomplishment was the development of the process flow maps. These maps were asked for specifically by Euclid and were necessary for the group to fully understand what was going on in this already highly efficient operating process. A process map was completed for every designated step of the operation.

The next step in the project involved evaluating the process maps and looking for areas of improvement. The group was able to come up with a list of six recommendations that appeared to have the greatest chance of increasing efficiency within the warehouse.

The first, and deemed most important, of these recommendations was to build a database. Euclid had a series of created end of day reports that tracked what they felt were mistakes, however these were all individual files and the information could not be viewed all at once, making it difficult to do any sort of comparison or analysis. The group felt that by consolidating these reports into a database there would be numerous benefits. For example, Euclid could create reports about performance, develop trends to measure performance, visibly see the cost associated with the mistakes, and prioritize the problems. The group then created an excel spreadsheet as a prototype database to prove the concept of how beneficial this could be to the company. All of the end of day reports for the month of March were provided by Euclid, and sorted through to compile them all into one document that could be more easily evaluated. This database could then be used to show how much individual mistakes were costing Euclid every week, month, etc. and how much mistakes were costing them altogether.

Along with this recommendation and subsequent database several other recommendations were developed. These include, utilizing the flexibility of the WMS system to allow filling tasks such as, pick at random and replenish at random. The delay of tasks creates idle workers and manual task generation wastes management time.

Add some measurement metrics for better error tracking. Currently Euclid measures everything by case. It would be beneficial to measure picking errors by both picks and assignments. Measure Euclid delivery errors as an indirect measure of customer satisfaction. However, retain case tracking as a baseline measurement

The group also noticed the QC manager may be a bottle neck for all operations and incidents. During the visits the team observed a continuous queue of workers needing the QC manager. It was recommended to identify reasons for queue and look for opportunities to delegate tasks which are causing the queue.

The survey done indicated that voice recognition works well for picking. This technology could be even more beneficial if employed in others areas as loading, unloading, and replenishment.

Objectives

The group was basically able to complete all objectives set for its self. There may have been objectives that were not met entirely, or in as detail as was originally planned, but still accomplished the general objectives. The only real one that was not fully met would probably be the recommendations. The group did come up with six recommendations for Euclid, and a prototype database, but it would have been nice to be able to investigate the five other recommendations also. This was simply an issue of time, the group simply did not have enough of it in order to do as much follow up research about the feasibility of some of the other suggestions.

Ethics

The biggest ethical problem for the group in acquiring information was keeping the sources confidential. There are many employees at Euclid, and many of them were talked to about what happens in the warehouse. Since not everything may be done as management originally intended it was important not to point out individual people. The group needed to present its information, without presenting where it came from.

8. Obstacles

Obstacles

The group did encounter a few obstacles throughout the semester. One big challenge was the difficulty of site visits. The group really needed to observe the operating process in order to understand it. However, due to the distance and hours of operations this was hard to accomplish. Euclid is located in North Aurora, and it has a 24 hour operation. To complicate this more the process does not operate the same during all of the three shifts. The third shift, that operates late at night, is the only real shift that does a significant amount of picking. Due to this it was necessary to visit during this late at night period of time and most of the student had classes in the morning. Classes themselves were also a problem in planning site visits.

Another issue the team dealt with was our lack information and experience in the matter. No one had ever done any sort of warehouse management in the past and it was difficult to find areas to improve an already highly efficient process. Going along with this, the scope of the problem was very broad.

Finally, a problem that affected not only the research but the presentation of acquired information, especially on IPRO day, was confidentiality. As mentioned previously the group had to acquire information without revealing individual sources. On top of this, there was information Euclid didn't want to be made public knowledge. Due to the highly competitive nature of the industry there were some company secrets that needed to be kept within the walls of Euclid. Both of these made it difficult presenting results. Results had to be presented to Euclid management without pointing out individual people, or groups of people, and also at IPRO day without revealing information Euclid didn't want revealed.

Solutions

Despite the numerous obstacles the group was able to overcome them all and still accomplish a lot. To get around the problem of site visits the group broke down into smaller sub-teams. These teams would then go during necessary times that work best for them and come back to present what they found to the rest of the group.

Since the group had little experience we had to just get out to Euclid and see what was going on in the warehouse.

By breaking down tasks into smaller pieces the team was able to get around the broadness of the problem scope. This was the reason for the way the team structured itself, and how tasks were divide between people.

Since confidentiality was important, and Euclid knew what they didn't want outside sources to know, the group worked with them and had management approve all material used on IPRO day. By doing this the team was able to present most of its information while still maintaining the confidentiality agreement made with Euclid early on.

Preventions

There were not any real team-created obstacles. Because of this none of them could have been prevented or reduced a significant amount. All the problems the team faced were a result of the nature of the project itself.

9. Recommendations

The next step for Euclid should be to attempt to apply some of the recommendations mentioned previously. While the team realizes some of them may not be easily applicable based on Euclid's customer service standards, and other operating procedures, it should investigate further the possibilities of the six recommendations. They may also be able to build off of those with their own ideas or edit parts of the given ones.

10. References

The only real references used during the project were a set of previous process maps that was made by a consulting company when Euclid first acquired most of their technology, and the management reports including the end of day reports used to make the prototype database. Otherwise most of the information acquired came from observing the warehouse operations themselves.

11. Resources

The only real source for spending money was the traveling to Euclid. During the multiple trips to visit the warehouse money was spent on driving and train rides. The only other source of cost was the final report delivered to Euclid management. The report was put together and bound to make it look professional. Otherwise there weren't any other activities that money was spent on.

12. Acknowledgements

The biggest contributors to the team was Euclid themselves. They were very cooperative in getting the team the information required. Management was able to accommodate the team visits and take time out of their busy day and schedules to work with the individual sub-teams as they observed operating procedures in the warehouse.

One person of special notice is Larry Mcgrail, Euclid's Vice President of Operations. He probably dealt with the team the most and really made sure we had everything we needed to get our work done. He also provided the team with material for the booth at IPRO day and in general tried to help the team be its best.