Process Improvement in a Non-Profit Organization

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In September 2009, the team of three Industrial/Manufacturing Engineers was assigned to re-engineer the process at a local non-profit organization, Benton Furniture Share (BFS). Responsible for redistributing furniture and other household items to needy families in the greater Corvallis area, BFS was seeking to implement improvements in their processes. Interpreting the desired outcomes from the sponsor, a list of customer requirements was generated to define the project scope. The main requirements were to: create work instructions in a video format, improve the warehouse layout, develop sustainability metrics, and examine additional changes to the system (that is, implement continuous improvement). A condensed current state map was made and four leverage points for improvement were identified, based on the requirements established by the sponsor. They were information flow, layout, work instructions, and continuous improvement. The deliverables included video and pictorial work instructions that are projected to reduce volunteer training time by 67%. Sustainability metrics were developed that define furniture diverted from waste in terms of a volumetric representation. A new warehouse layout was designed and implemented to efficiently organize BFS’s inventory. Visual indicators were designed and placed to identify the location of items, establishing a standard of organization in the warehouse.

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Background

In September 2009, a team of Industrial and Manufacturing Engineering students were introduced to a project at a non-profit organization called Benton Furniture Share (BFS). Responsible for collecting and redistributing furniture to individuals and families in need, BFS provides a service with little funding and resources. Having a senior project capstone team provided BFS with the resources it needed without using any funding. The team provided the opportunity to identify and implement improvements throughout the organization’s process. Two furniture organizations in the United Kingdom served as a benchmark by which to compare furniture re-use to that of BFS.

Statement of Need

BFS provided the following statement of need to create a building block for the project.

Benton Furniture Share (BFS) is a nonprofit 501(c)(3) agency serving Benton, Linn and surrounding Counties that collects and redistributes donated furniture and household items at no cost to children, families and individuals in need. During the 2007/2008 FY BFS distributed 3,611 items, serving 1,507 individuals, while diverting more than 30 tons of items from the landfill. But, understaffed and relying heavily on volunteers, BFS has not had the resources necessary to optimize its processes, much less develop and document systematic work procedures, and it does not yet capture all of the performance data desirable to attract funding and be accountable to sponsors. BFS would like an engineering team to analyze some subset of current BFS collection and redistribution processes, re-engineer them to improve efficacy, efficiency, and safety as well as capture performance data, and write clear work procedures for staff and volunteers.

Requirements

From the aforementioned statement of need, a list of customer requirements was generated. These requirements were established in discussions with the project sponsor and observations from the project team. These requirements included improved storage space utilization, generation of work procedures, capturing of process performance data, and the development of a continuous improvement process. Based on these customer requirements, engineering requirements were developed by the team to establish verifiable requirements for the project deliverables. A sampling of engineering requirements are: facility layout aisles need to be at least 3-feet wide, video and supplemental written work instructions, work instructions should be written at a 4th grade reading level or below, an outline of a continuous improvement process model, and a volumetric equivalency of the furniture redistributed each year.
Current State
To begin the analysis of BFS, the current state process (i.e., that existing at the project start) was mapped. This included mapping the steps from the acquisition of furniture to its being redirected to an individual or family in need. Mapping this entire process revealed nearly 30 process steps, and to help identify leverage opportunities within the process, a simplified version was generated. These leverage opportunities were organized into four categories: information flow, layout utilization/product flow, work instructions/safety, and continuous improvement, shown in Figure 1.

Figure 1: Proposed Customer Process

Design alternatives were then examined within each of the four categories identified as leverage opportunities, and a feasible design was selected for implementation. Each category is described below.

Information Flow
Information flow through any organization is extremely important, and BFS uses much time and energy in the exchange of information. Paper records were kept and information was repeatedly recorded and re-recorded. Paper records were sorted, organized and updated, and this process took an excessive amount of time.

Layout Utilization/Product Flow
At BFS, the products, i.e., furniture and household items, are stored in a warehouse. Within the warehouse, areas were not marked to identify storage locations by item-type, so item-types were not stored in the same location consistently. This made inventory management difficult and time-consuming and also contributed to spillover of items into areas not allocated to BFS.

Work Instructions/Safety
At BFS there is an ever changing and diverse workforce composed mostly of volunteers. With the turnover of workers that was encountered, there was a need for training, and this fell into the hands of the director of the organization. This could take the director several hours per week, diverting her time away from important activities of running the organization and seeking grants. The volunteers’ capability sets were quite varied. Their formal education ranged from an elementary education to a college education. No work instructions existed in any physical form. The director verbally provided all instruction and training.

One of the main responsibilities of the volunteers is furniture collection and redistribution, which involves lifting, creating a potential risk of injury.

Continuous Improvement
Existing as a non-profit with a goal to become a more sustainable organization, continuous improvement was something BFS wanted to incorporate into their organization. No process existed to solicit suggestions from workers and volunteers, and ideas for improvement that did exist did not have the means or process to bring the ideas to fruition. BFS recognized the need for continuous improvement but did not have the resources to organize and implement it.

Future State
After identifying the current state of operation at BFS, future state improvements were designed and implemented. The improvements are described below.

Information Flow
To reduce the re-recording of information and physical writing and recording of information on paper, an electronic database was developed. Already in process when the project began, an outside volunteer developed the database in conjunction with this project to ensure all improvements were made efficiently. The database mimics the way paper records were kept but allows for a much more organized and effective way to store the information. Information can be queried and looked up much more efficiently, freeing the worker or volunteer to work on other tasks.
### Layout Utilization/Product Flow
To improve upon the organization in the warehouse, visual indicators and marked storage locations were implemented. Signs were created that used both descriptive words of the item, such as couch, table, bed, as well as a picture of the item to be stored in that location. Using the idea of aisle ways and side-by-side item storage, similar to a shopping market, locations were taped off and labeled, creating a fixed area for aisle ways and storage of items. The aisles were created at a width of 3 feet to assure ease and comfort in moving items into and out of storage. Figure 2a and 2b show the warehouse before and after the new floor layout was implemented.

**Figure 2:** Condition of Warehouse Floor with a) Original Layout and b) Redesigned Layout

### Work Instructions/Safety
Formal work instructions were to free up the director’s time. The work experience of the team immediately led to the idea of written work instructions, accompanied by images to visually display key steps.\(^3\) Due to the variance in the education level and learning styles of the volunteer force, the team determined that a work instruction video would be made, and to supplement this, a written version would be developed as a complement. The video would be divided into the different tasks that needed to be accomplished, with accompanying audio to reinforce the correct actions to be taken. Subtitles were included at specific points to emphasize certain aspects of the task at hand.

A topic included in the work instructions was safety while lifting. Lifting techniques for both individual lifting and team lifting were demonstrated, emphasizing the importance of keeping a straight back and bending at the knees. It was emphasized that, when lifting you should keep the object close to your body; also to never do something you are not comfortable doing. Enlist the help of another individual and/or use available equipment, such as a hand truck.

A volumetric representation of furniture diverted from disposal at waste sites was developed, such as

- 1 semi-truck trailer = 266 items, or 1 item = 0.00376 semi-truck trailers
- 1 pick-up truck bed = 10 items, or 1 item = 0.1 pick-up truck beds
- 1 train car = 193 items, or 1 item = 0.0052 train cars

### Continuous Improvement
To be able to solicit and move forward with potential improvement suggestions, a process needed to be developed to facilitate this. A suggestion card was created that could be filled out by any individual working or volunteering at BFS. A process model was developed that mapped out the receipt, evaluation, and implementation of suggestions.\(^4\)

### Results
The implementation of the future state at Benton Furniture Share resulted in some measurable improvements, including a 67% reduction in training time and a volumetric equivalency of 17 cubic feet per item.

### Conclusions
Overall the project focused on leveraging opportunities to improve the current process rather than redesigning it. Through evaluation and frequent sponsor interaction, deliverables were generated to leverage these opportunities and improve the process at BFS. The impacts of the implemented improvements will be felt throughout BFS, from the day-to-day activities to the acquisition of funding for the organization.

Working with a non-profit organization provided an invaluable learning experience and showcased the vast opportunity an Industrial/Manufacturing Engineer can offer as a volunteer.
References