ABSTRACT

ZERO WASTE CAMPUS DINING

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Cal Poly Campus Dining has a goal of becoming a zero waste entity by providing their customers with alternative methods of disposing their trash. Their current operations produce waste, specifically their methods of packaging the food. Campus dining plans to be more sustainable by providing their customers with reusable containers. The objective of this implementation is to reduce waste produced from one-time use, disposable food containers. The success criteria for the desired system is based around the ability to track and measure the reusable containers to prevent further waste, while providing the user an accommodating environment to ensure they will choose the sustainable option. Our experiment was designed using three objectives: usability, readability, and durability. In order to best accommodate the Cal Poly community, one of the supporting teams calculated the number, and approximate locations, of the return bins that will be collecting the reusable containers. Another supporting team worked on modifying the trash bins currently used at their operations to collect the reusable containers, in order to provide a seamless transition for the customers.

Based on the client's suggestions, we tested two methods of tagging in order to track and measure the reusable containers. The methods tested were barcode and radio frequency identification (RFID) tags. Tests were performed on the containers while containing both tags to measure readability. The tags were read using a direct scanner and an indirect scanner. The ultimate goal was to utilize an indirect scanner in order to avoid an additional task for the current Campus Dining employees. The containers were also tested under different conditions, such as

placing food inside the container, to test the readability of the tags. The results of the RFID tags ranked far superior when compared to the barcode tags. The measured readability with an indirect scanner of RFID and barcode tags was 100% and 4.16%, respectively. The tags were then tested for durability. The reusable containers would need to be washed after each use through Cal Poly Campus Dining's dishwasher, the Stereo Commercial Dishwasher model STPCW-ER. A sample of eleven RFID tagged containers was processed through fifty wash cycles. A quality check was performed to find ten of the eleven containers had no water infiltration on the RFID tag, providing a durability success rate of 91%. The tagged containers were tested again for readability after the fifty wash cycles and all of the tags were read, including the tag that was exposed to water.

In conclusion, it is our recommendation to move forward with the zero waste initiative in replacing the current dining disposable containers with RFID tagged reusable containers. The tags will be able to withstand the current cleaning methods, while providing accurate readings when returned into the designated bins. Campus dining will be able to avoid further waste by removing the need to purchase 177,200 disposable containers annually. A ten-year cost analysis calculated the cost of the implementation to be approximately $120,000, the utility costs to be $55,500, and a depreciated asset cost of $280,000. The total cost of the proposed implementation will result to approximately $450,000 by the end of ten years. In contrast, the current system, using the disposable containers, will result in a cumulative cost of $500,000. The savings after ten years of the proposed system is approximately $50,000.