

Thesis Project Portfolio

Producing a Bioplastic from Biodiesel Waste: Poly(hydroxybutyrate) using Crude Glycerol

(Technical Report)

Ethical Case Study of the Practice of Care by a Consumer Healthcare Company: The Case of the Johnson and Johnson Recalls of Children's Tylenol and Motrin

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

My technical work and STS research are related to each other by the expectation to produce products that meet certain specifications to meet the needs of others. Meeting specifications is a crucial part of establishing the efficacy of a product to those intending to use it. While this concept is critical to my technical work and STS research, it is explored differently. Having a proposed specification for the quality of my team's product was a critical guiding force in our design choices. My STS research, however, analyzes the circumstances under which product specifications were not met and the ethical consequences resulting from that situation.

My technical work attempts to design a process plant to produce a sustainable plastic, poly(hydroxybutyrate) (PHB), using crude glycerol as a feedstock to the production process and a carbon source for the bacteria used to produce the plastic product. My capstone team was also interested in designing our process to be sustainable by using a feedstock that is a waste product from another industry and using design principles that account for the minimized use of hazardous chemicals. We scaled up published fermentation kinetic data to design the portion of our project in which bacteria actively produces product. Then, we used mechanical separation design principles and process simulation programs to design the purification process of our product. Finally, we included final processing steps to shape our product into pellets to be marketable to other companies and performed an economic analysis to determine the feasibility of our plant design.

My STS research also explores the ethical aspect of having established standards for products in terms of quality and the consequences when such standards are not honored. I analyzed the ways in which the healthcare company Johnson & Johnson failed to provide attentive, responsible, and competent care to its customers leading to a failure to deliver high-

quality products and a series of product recalls. I applied Tronto and Fisher's idea of the four phases of care in parallel to the process of events that led up to the product recalls by Johnson & Johnson to show that the company was overly engrossed with concerns separate from product quality and lacked both the judgment and organization needed to provide continuous, attentive, responsible, and competent care. The goal of my paper was to systematically approach this incident with a central focus on the virtue of care and assess what means Johnson & Johnson acted immorally on multiple occasions due to a non-robust attitude to operate with care ultimately for its customers.

Working on my technical project and STS research simultaneously has been beneficial in offering additional insight. Designing a process plant with specific goals illustrated to me that engineers can strive to systematically and technically design processes to produce high-quality products. However, my STS research offered an additional perspective in that social management within a project is also crucial to ensure that such quality standards are achieved. Overall, working on these two projects together has allowed me to understand how vital it is to meet and maintain quality standards in the context of producing products intended to be used by others.