Sacrificing the Future to Save Lives: Triclosan

A Thesis Prospectus, for STS 4500

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By Gabriel Lawrence,

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Technical Project Summary

The name of my technical project is "Wash your hands: Reducing Infection Risk in Anesthesiology Induction." The project aims to create a framework that uses discrete event simulation to reduce infections caused by incorrect anesthesiology induction procedures and contamination. The final software package for UVA health will be completed in Spring 2024. It will include a graphical interface, risk analysis, and probabilistic analysis. The project will be submitted to ISEDS in a conference during Spring 2024, and it is in-progress as of Fall 2023. The technical advisor(s) for this project are Matthew Bolton and a graduate student named Olivia Claire Rose with a sponsor at UVA Health, Micheal Miller; the team for this project is Gabriel Lawrence, Austin Campbell, Sergio Darquea, Bella Holloman, and Neha Pavuluru. The project aims to simulate anesthesiology inductions. To improve patient safety with new measures generated through simulation. And one of those measures is Triclosan, a common external antibiotic.

STS Prospectus

Introduction

This STS research paper will look at the use of Triclosan and its first- and second-order effects and intended and unintended consequences as a sociotechnical system using actor-network theory.

Throughout human history, the treatment of disease has defined the world of medicine. One way of preventing disease is through the disinfection of surfaces.[1] When this method of protection is overused, it loses its ability to protect because the harmful microorganisms that

[1] Fisher et al., “Tackling the Emerging Threat of Antifungal Resistance to Human Health”; “Antibiotic Resistance.”

survive and thrive are those that are resistant to the treatments designed to prevent their spread.[2] "Should antimicrobial products be used to fight infection, when doing so sacrifices the future for the present?" After the COVID-19 pandemic, this question has become more prominent. Institutions are using methods that sacrifice future effectiveness to fight a present threat, and the overuse of disinfecting products is threatening the future's health and safety. Will the evolution of disease uproot our world again? OBJ

Numerous stakeholders, including regulators, consumers, doctors, environmental activists, and medical organizations, shape the discussion over Triclosan. These groups have roles and obligations that shape their viewpoints, objectives, and connections. One example of these relationships is between consumers and the Food and Drug Administration (FDA). To the consumer, Triclosan was a marvel product that prevented infection. However, according to the FDA, Triclosan causes antibiotic resistance while disrupting human hormonal development. OBJ Using the language of Actor-Network theory, Triclosan is a Quasi-Object with complexity that stimulates interactions that are the basis of conflict between distinct groups.

Framework Introduction

Actor-network theory (ANT) argues that everything is a dynamic network of human and non-human actors. Furthermore, ANT is appropriate for this subject because of its material-semiotic approach. Material-semiotic refers to how the social world's behaviors relate to objects. This is because Triclosan acts as an object and a concept. Triclosan's core concept is being a symbol of modernity's convenience and protection. ANT also enables analysis of group dynamics like relationships and duties. Technological determination cannot provide the support

[2] "CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings | Infection Control | CDC."

that an exploration of Triclosan requires as discussed in the three rationales: the ability to analysis network inclusion and quantification, translation, and gradual transformation. OBJ

One of these tools for examining group dynamics is the concept of translation. Translation refers to how actants and actors interact to form meaning. An actant furthers to an object that acts within a network. An actor is a person or institution that influences the use or perception of an actant. This observation makes ANT more appropriate than other frameworks like Social Construction of Technology (SCOT) or Technological Determinism. In Triclosan's case, its translation happens into consumer or medical products. Moreover, manufacturers, consumers, and medical organizations act as the actors of Triclosan. And their usages of Triclosan are comparable: mechanically, but different in impact. OBJ

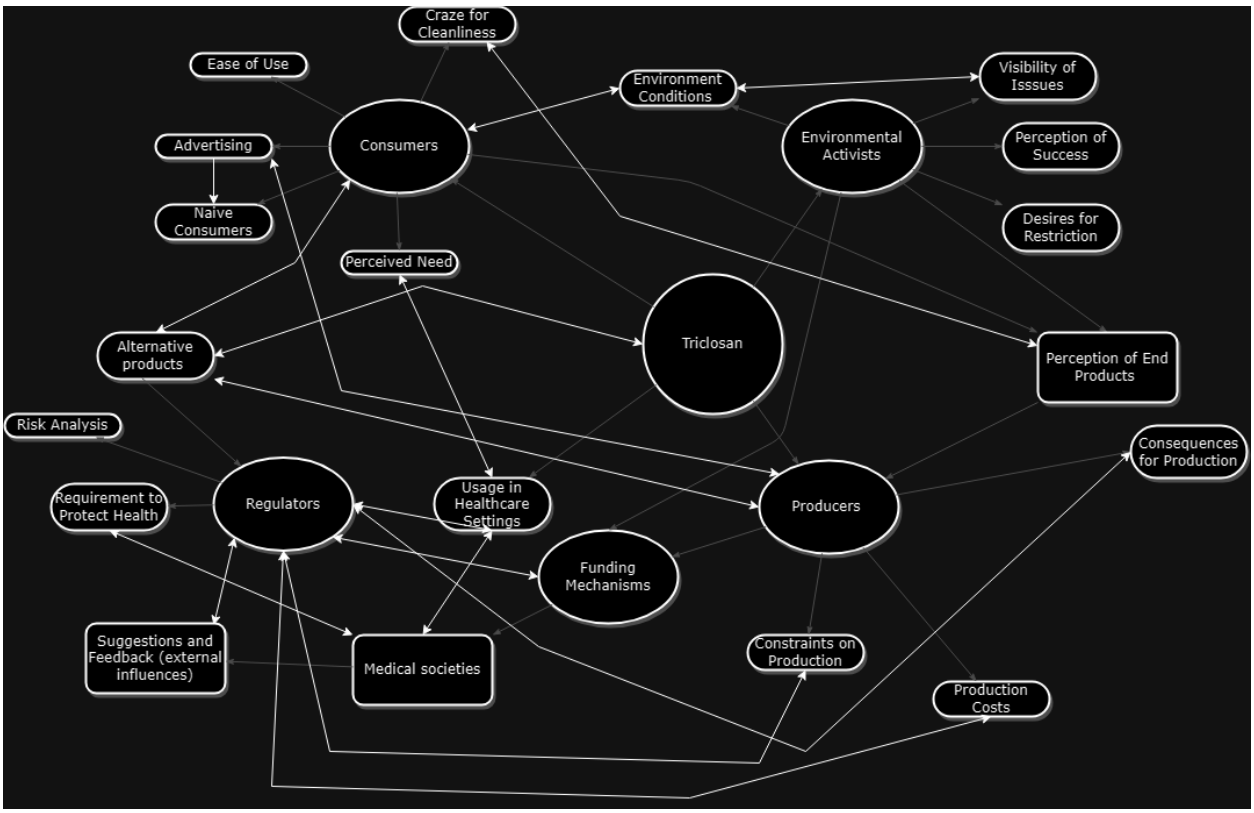

Figure 1: Actor-Network Model of Triclosan

Another element of ANT over other frameworks is reflexivity. Reflexivity refers to circular relationships between cause and effect. In Triclosan's case, society's negative consequences from Triclosan result from reflexivity. An example of reflexivity is that when society uses Triclosan more, it becomes less effective at removing pathogens. This loss of effectiveness makes consumers need more Triclosan for the same protection. And this long-term loss of effectiveness worsens its long-term penalties at the cost of short-term gain. Using ANT allows the paper to pursue the second-order consequences of this event. For example, the opportunity cost of focusing on Triclosan over developing new antimicrobials.

Finally, ANT is superior to other frameworks because of its adaptability. As ANT is flexible, it allows access to group dynamics in unstable conditions. Triclosan is both a "chemical" and a "cleaning agent," causing instability in its meaning. In Western popular culture, chemicals are considered either harmful or scary. [OBJ] Triclosan is for cleaning in the same culture. And it is seen as making the environment clean, an aspiration in Western cultures. Thus, Triclosan is the path for "cleanliness is next to godliness" and a diabolic entity in the same mind. Therefore, ANT furthers the understanding of Triclosan, and its relationship to traditional closure.

In conclusion, ANT is a tool for understanding the relationships between human and non-human actors in a dynamic network. The material-semiotic approach of ANT is appropriate for analyzing the role of Triclosan. Furthermore, ANT is reflexive and adaptable, quantifying Triclosan's societal impacts. Overall, ANT has translation, reflexivity, and flexibility, prerequisites for understanding Triclosan.

The Research Question and Methodology

Sacrificing the Future to Save Lives: Triclosan

Using ANT, we get the following core questions. Is Triclosan effective as an antimicrobial agent? How does Triclosan impact human and environmental health? How much does Triclosan contribute to antibiotic resistance? How do consumer choices affect the translation of Triclosan? And how do regulations affect the meaning and perception of Triclosan? How does Triclosan affect the relationships and responsibilities between the distinct groups involved? What are the consequences of these interactions on the use of Triclosan?

Through these questions, this paper is an outline of Triclosan's network. These questions are significant because Triclosan reveals how society pins convenience against consequence. From these perspectives, Triclosan's use eliminates infection risk with minimal effort. But it produces antibiotic resistance.

This paper constructs its argument through the following methods:

- A comparison of Triclosan's consequences with other external antibacterial agents.
- A literature review of the sociopolitical impacts of Triclosan.
- An international policy analysis and comparison on Triclosan.

The upcoming paper reviews how regulators and medical societies reacted to Triclosan's use. And this paper will study the network around Triclosan and its societal relationships. It also examines the responses of environmental activist groups, manufacturers, and consumers to the policy changes. The upcoming literature review will focus on three aspects of Triclosan's sociopolitical impacts. These include its effects on different actors, the consequences that

originate from its use, and what happens next. The comparison will focus on sociopolitical impacts, health outcomes, and inequality of access for each alternative.

The upcoming paper compares Triclosan to other antimicrobial chemicals. Such as with benzalkonium chloride, chloroxylenol, and chlorhexidine. The comparison aims to expand on ANT's idea of translation, aiming to exhaustively examine it. Moreover, another reason for this comparison is to analyze Triclosan's replaceability. A method of determining replaceability is a comparison of a Quasi-Object with its alternatives. If a Quasi-Object, like Triclosan, has replaceability, it limits its influence and power. Through the lens of translation, this analysis demonstrates how Triclosan, and its sociopolitical impacts are unique among antimicrobial agents. And the comparison helps to explain the context of the research on Triclosan, such as the papers in the literature review.

The literature review uses three sets of studies to determine the consequences of Triclosan. Moreover, the literature review's goal is to explain Triclosan's reflexivity and its effects. There are three sets of studies about Triclosan. The first set talks about how it protects health. The second set looks at Triclosan's behavior in the environment over time. The third set compares Triclosan to other options and their effects. The studies show that Triclosan has immediate health benefits but harms the environment, medicine, and future human health. OBJ The literature review aims to assess the current and future state of the network. It adds context to the policy and response analysis by looking retrospectively and prospectively at the topic.

Finally, the policy-response analysis looks at regulations made by authorities in the United States, European Union, Canada, and Taiwan. It also considers the feedback from the public, industry, and environmental activist groups. The goal is to figure out the current limitations of Triclosan's use, and how they might change in the future. This paper will focus on

specific policies and responses related to Triclosan. And this demonstrates Triclosan's interpretive flexibility and lack of closure. These include the FDA's rule on the "Safety and Effectiveness of Consumer Antiseptics (2017)" [3] with comments from various organizations, the European Union's Assessment Report for Triclosan, Canadian regulations, and Taiwan's Chinese National Standard. The upcoming paper will compare different regulatory systems and cultural contexts using ANT.

Synopsis

Triclosan is widely used in medicine and consumer products to kill germs on people, surfaces, and food storage. However, as the world begins to assess the effects of Triclosan, its relationship with the chemical is evolving. People are now considering the potential long-term effects of its extensive use. The upcoming paper will explore if this change is a rational choice. It will consider the relationship between different actors and Triclosan. It will also examine if this transformation in perception echoes the rise of Triclosan. Triclosan's meaning changes as actors learn more about its effects on health and the environment.

Triclosan shows the importance of discussing the impact of technology on society. It also emphasizes considering the short-term benefits and long-term effects of inventions. Every technology and engineering advancement claims to create or improve the future. Yet, every

[3] 衛生福利部, “The Food and Drug Administration Clarifies Regulations Regarding Triclosan in Cosmetics”; Government of Canada, “Environment and Climate Change Canada - Evaluating Existing Substances - Final Assessment”; “Safety and Effectiveness of Consumer Antiseptics; Topical Antimicrobial Drug Products for Over-the-Counter Human Use”; Government of Canada, “Environment and Climate Change Canada - Risk Management Approach for Phenol, 5-Chloro-2-(2,4-Dichlorophenoxy) - Triclosan”; News ·, “What Happened to Triclosan?”; “Regulations.Gov”; “Understanding BPR - ECHA.”

technological advance comes with trade-offs, even if they are inconspicuous. And the example of Triclosan reminds us of that fact.

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