

Thesis Project Portfolio

**Production of a Recombinant Spike Protein-Based SARS-CoV-2 Vaccine Using the
Baculovirus Expression Vector System**

(Technical Report)

The Social Groups Invested in Social Media and Democracy

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Over the past year, I have worked on a technical project to design the production of a COVID-19 vaccine. Given that COVID-19 has killed millions of people around the world, my technical project group and I wanted to learn about other vaccine technologies that could contribute to this cause. Our vaccine was made from the baculovirus expression vector system (BEVS) which is both highly efficacious and can be stored at normal refrigeration temperatures. The latter is an essential requirement for vaccinating the world because many countries in Africa lack the cold-chain infrastructure to distribute mRNA vaccines. Moderna and Pfizer COVID-19 vaccines, both mRNA, have to be stored at negative -70 degrees Celsius. To compensate, our COVID-19 vaccine using BEVS can improve vaccination rates in Africa by removing the requirement of ultra-cold storage.

In this technical project, my group and I used a variety of research methods to approximate values for specifications needed to manufacture the vaccine as well as for economic calculations. Our vaccine manufacturing plant will be extremely profitable, yielding a net present value of \$15.6 billion over the lifespan of 5 years. We recommend to pursue this project because it is highly profitable and will create positive outcomes in the world by protecting many living third-world countries from COVID-19.

In my STS project, I explored social media's effect on democracy by using the social construction of technology (SCOT) framework. I was inspired to explore this topic because of recent events such as the 2021 January attack on the US Capital building and former Facebook employee Frances Haugen whistleblowing that Facebook negatively impacts democracies all around the world. These two issues center around social media being used a tool: one for

organizing people into a political rally based on the myth that the election was stolen, and the other for increasing political polarization in the pursuit of profits. By applying the SCOT framework, I identified which social groups were publishing the most information on the topic of social media and democracy in order to see which social groups may be the most influential in the development of new legislation on social media.

In my analysis, I explored the differences in genders, industry, nationality, and years when it came to 3 well-cited papers on the subject of social media and democracy. This was a bibliography analysis which I used Excel and Python to construct charts and graphs displaying the key information. Based on analysis of close to 150 sources, I recommend that we need to include other demographics, like women and those outside of English-speaking countries, to make a well-informed decisions that could impact new legislation.