GUAYABITOS SUSPENDED FOOTBRIDGE

BRIDGES BETWEEN WORLDS: TECHNOLOGY AND SOCIETY

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By

Dallas Barnes

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SOCIOTECHNICAL SYNTHESIS

How much thought do you give to the bridges you cross every day on your way to work or school? If they didn't exist, would you cross the river gorge or valley and risk your life to get to your destination? In the Guayabitos community of Bolivia, the residents face this dilemma with not just consideration to their own lives, but also those of their children. The non-profit organization Engineers in Action exists to recruit engineers in universities across the U.S. to construct pedestrian footbridges for underserved communities, and this year Guayabitos is their selection. The researcher has worked with Engineers in Action and a team of University of Virginia students to design a suspended footbridge, and focused their STS research on the viability of the bridges socioeconomic impact on the community in light of the COVID-19 pandemic, along with other factors.

To design an entire suspended footbridge within two semesters so that a well-composed set of plans and instructions are ready for construction, the team worked closely with Engineers in Action. The organization provided online learning modules for the multiple stages of design, including AutoCAD design, cross-cultural competency, construction scheduling, and project management. The design phase involved several review calls with alumni and organization representatives. These calls aligned with completion of initial bridge design, design selections and optimization, and construction scheduling and planning for safety precautions. Bridge design consisted of selecting and calculating optimal placement of varying tier abutment designs and materials, followed by construction methods and steps brainstormed with the advice of experienced alumni.

Construction of the bridge is scheduled for June of 2021, so the team is in the process of finalizing the project portfolio and plan. The bridge is a two-tier right abutment, 3-tier left

abutment supporting a steel cable and wooden plank walkway. Labor and a majority of funding will be provided by the local Pojo Municipality, with Engineers in Action providing leadership, engineering, and specified materials funding. Each university chapter is required to fundraise throughout the semester for their contribution to the bridge cost. Unfortunately, due to travel restrictions, the University of Virginia team will be unable to travel to the work site to construct the bridge. However, construction will still commence and follow the drafted designs and schedule. With approval of the alumni mentors, the team's design will be submitted for use in construction.

The research undergone by the researcher followed the analytical style of Pacey's Triangle to determine the feasibility of the bridge providing the desired benefits to the Guayabitos community. Significant data from previous bridge projects show a large amount of socioeconomic gain produced by implemented pedestrian footbridges, including increased access to markets, modern healthcare, and education. Sources used were journals covering the turbulent political climate of Bolivia amidst a pandemic, varying effects of agricultural economies and their connections to modern markets, and ability of isolated communities to expand and adapt to increased opportunity.

Challenges exist in this project beyond those typically presented when bringing an infrastructure project to an isolated community. After a political coup in the federal government in 2019, followed by a repressive regime that damaged blue collar unions and agricultural markets and communities, Bolivian government and infrastructure was devastated by the effects of the pandemic when it struck in early 2020. Isolated communities suffered the most intimately, and must be connected to the rest of the country to recover and grow. The technology needed to build such a connection, the bridge designed in this project, is provided by U.S. engineers.

Organization for the project gives the local municipality an opportunity to benefit from the drive of a community coming together to gather labor and materials. Most importantly, culturally this project allows for the community to interact with engineers of a different nationality, and for the two groups to work, live, and grow together. With the assistance of this project, the researcher believes the local community can expand to more markets and socioeconomic opportunities, as long as the Engineers in Action team members provide quality service and guidance with mindfulness of the struggles of a close-knit community. After examining a trend of diffusion of innovation following an opportunity of social expansion provided to those in isolation, individuals follow the tendency to seek out improved socioeconomic conditions, given time to adapt.

Given a connection to modern markets and social structures in need of recovery and rejuvenation, isolated communities have been witnessed to expand and grow, providing mutual benefit to both communities. Engineers in Action is providing the bridge to allow for the Guayabitos families to take their economic potential to new places and opportunities so that they and the rest of their region can continue to work together to overcome the challenges of the pandemic.

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