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Community-engagement-based capstone projects: Lessons learned related to engineering economic analysis

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Lessons Learned from a Portfolio of Community-Engaged Capstone Projects Related to Engineering Economics

Abstract

This paper examines a portfolio of community-engaged capstone projects with teams of interdisciplinary undergraduate engineering students and how they applied engineering economics methods to make decisions during the engineering design process. The paper attempts to distill from faculty observations and review of final team reports and student presentations a set of lessons learned applicable to improving engineering economics education and preparing students to be successful in community-engaged projects. The portfolio of capstone projects addressed an engineering design need to improve the control of excess water in a watershed encompassing a national wildlife refuge within a rural, coastal community increasingly subject to flooding attributed to several factors, including sea-level rise. The capstone teams were assigned individual projects to address how to improve water control and flood management within specific regions of the watershed. Each project required capital investment with ongoing operational and maintenance requirements. This paper examines the challenges project teams experienced specifically related to their use of engineering economics methods in making decisions during the engineering design process and formulates a series of lessons learned that may guide future instructors in planning community-engaged projects with their students.

1 Introduction

Engineering capstone design projects are a critical part of the undergraduate engineering curriculum that binds the training and education received to a real-world application to prepare students for lifelong careers as engineers. Integrating engineering economic analysis into the engineering design and decision-making process should be a critical element of this experience. But evidence has shown that most engineering capstone design teams apply a minimal number of economic analysis methods in the evaluation of their design alternatives. Therefore, as educators, we need to understand the challenges students face in their capstone design projects and assess whether our engineering economic coursework adequately prepares them for the design problems and context they will probably encounter.

This paper examines the challenges related to the application of engineering economic analysis by four capstone teams, all involved in a set of community-engaged projects, focused on addressing flood inundation and water quality problems for a watershed in a rural coastal community in eastern North Carolina. The community is in a region where many of the counties are considered economically distressed and therefore have limited resources and access to engineering expertise to address problems facing the community. Students taking part in the capstone were part of a small engineering program at East Carolina University where students receive a general engineering degree specializing in one of six discipline-focused concentrations. The concept for these projects was to link the expertise of senior engineering students with local knowledge from a small, underserved community that is adapting to sea-level rise. Community engagement for these projects became a challenge with the emergence of the COVID-19 pandemic and the need for social distancing.

Community-engaged learning is a proven pedagogy that has made significant impacts in the engineering disciplines and has provided tremendous opportunities to enhance learning and prepare students for the global workplace [1–5]. Additionally, community-engaged learning contributes to building community capacity by allowing engineering students to apply their training and expertise to an issue or problem of importance. As with most complex community problems, there is a diverse set of interested stakeholders who often possess vastly different ideas on how to address the problem, which can be influenced by how they believe the solution should be paid for. This real-life situation presents a challenge for the students. In certain circumstances, it may also reveal possible shortcomings in their preparation. This paper summarizes the lessons learned for a portfolio of community-engaged capstone projects for a group of interdisciplinary undergraduate engineering teams and their application of engineering economics concepts.

2 Background

Coastal communities in the United States, and elsewhere, are confronting the reality that climate change is causing sea levels to rise and the risk of disastrous or chronic flood inundation is projected to increase in future years. In North Carolina, the coastal inner bank counties located on the Albemarle-Pamlico Peninsula, which consists of Dare, Hyde, and Tyrrell counties, are among the most threatened in the United States in terms of potential landmass loss due to sea-level rise. Hyde County encompasses the Mattamuskeet National Wildlife Refuge, which surrounds the state’s largest freshwater lake, as shown in Figure 1(a). The lake is a 40,000-acre, shallow coastal lake, averaging only 2 to 3 feet in water depth with a bottom just below sea level and outflow to the Pamlico Sound. The refuge offers protection to the region's biodiversity and hosts one of the largest overwintering refuge locations for waterfowl along the Atlantic flyway.

The watershed contributes significantly to the rural prosperity of the region in numerous ways, ranging from tourism by attracting hunters, anglers, and birdwatchers to the vast agricultural activities on the surrounding land. The region suffers from a major ongoing problem that threatens this prosperity: having too much water. Flood inundation associated with major storms, including tropical storms and hurricanes, has become a significant issue for the region, resulting in massive agricultural losses and contributing to water quality impairment. Due to the region's minimal elevation, rising sea levels will further worsen this situation by reducing the outflow of water from the watershed to the Pamlico Sound.

Figure 1: (a) Map of Hyde County, North Carolina, USA, depicting the location of the Lake Mattamuskeet watershed, and (b) image of Hyde County flooding following Hurricane Matthew in October 2016; image courtesy of The Washington Post article published September 15, 2018.

Lake Mattamuskeet's watershed depends upon the passive drainage of water through four canals to the adjacent coastal sound with tide gates to prevent the backflow of saltwater into the lake. This outflow helps flush out the lake and helps regulate lake water levels. This is especially important in late winter and during the late summer during hurricane season. Sea-level rise, which affects the Pamlico Sound, increasingly restricts this outflow and increases the risk of flooding on adjacent agricultural farmland [6].

Problem Description: The watershed has problems with the natural outflow of water due to the lack of elevation and canal restrictions, which are expected to worsen because of sea-level rise. As a result, the water level in the lake is often higher than desired. The lack of outflow contributes to impaired water quality, diminishes the submerged aquatic vegetation consumed by waterfowl, and places the community at increased risk of flood inundation when severe storms occur. This coastal region is subject to frequent natural hazard events, such as tropical storms and hurricanes, which can bring torrential rainfall. Efforts made through a community-led watershed restoration initiative [6] have identified several proposed improvements, including the use of active water management approaches to pump water away from the watershed.

Each capstone student team was presented with a design problem identified by the community and had support to be studied. Brief descriptions of the design problems assigned to the teams are provided below.

- Team 1: Design canal improvements to promote passive water outflow through canal dredging and reconfiguration and examine enhanced water outflow through pumping.
- Team 2: Design a constructed wetland area on private land to divert drainage from flowing toward the lake and allow nitrogen to be retained in a sheet flow wetland.
- Team 3: Design a large-scale sheet flow site for nitrogen retention with pump stations moving water through an agricultural drainage district.
- Team 4: Design a renewable-powered microgrid energy system to support a centralized pumping station to move water northward through a proposed fifth canal.

Traditional capstone project teams have a project sponsor that provides guidance and direction about the engineering design needs. Often the sponsor is the source of the cost or financial numbers used in the economic analysis, or they guide where this information can be obtained. The experience for the community-engaged capstone project teams was much different. These teams were required to engage local community members to obtain local knowledge and observations that would help lead to the development of an engineering design. These community members also helped provide some information that was considered in developing initial cost estimates related to dredging, pump configurations, and general operations. Cost and financial numbers were not always readily available, which required the students to investigate many secondary sources. The design process requires the evaluation of design alternatives, along with the completion of economic analysis. During this period, a substantial portion of the community engagement work had to be completed virtually because of the protocols for the COVID-19 pandemic.

3 Literature

While there is much literature on engineering economics as it relates to engineering education, the related literature on the integration with engineering design and design processes in engineering capstone design courses is limited [7–11]. Dixon and Wilck [12] specifically examined the integration of engineering economic analysis in the engineering design process for capstone projects by performing a comprehensive review and classification of the methods used as detailed in the final capstone project reports. The authors reviewed 48 projects completed over six years, spanning from 2008 to 2013. Using the authors' published results, Table 1 was constructed to summarize across industries and concentrations the frequency of the economic analysis methods used for the 48 capstone projects reviewed. The results revealed that the most used economic analysis methods included the initial project cost, which was used by 31.25% (15 of 48). This was followed by an annual worth and simple payback period both at 25% usage (12 of 48). In 18.8% (9 of 48) of the final project reports reviewed, no economic analysis method had been applied. For the case where no method had been used, the authors explained that in a few instances project sponsors had guided students not to publish these economic analysis results given the proprietary and sensitive nature of this information to their firm; however, these instances seemed to be more of an exception than the rule.

Table 1: Frequency of applied economic analysis methods summarized from Dixon & Wilck [12]

Economic Analysis Method Used	Number Observed	Percentage
Initial Cost (First Cost)	15	31.3%
Annual Worth Analysis	12	25.0%
Payback Period Analysis	12	25.0%
None	9	18.8%
Net Present Value Analysis	8	16.7%
Operations & Maintenance	7	14.6%
Rate of Return (ROR)	4	8.3%
Break-Even Analysis	2	4.2%
Benefit-Cost Ratio	1	2.0%
Future Worth Analysis	1	2.0%

The authors further reported that across these 48 capstone projects the number of applied economic analysis methods in a final capstone project report ranged from 0 to 4 methods, with a mean usage of 1.3 methods. Table 2 below summarizes the distribution of the number of projects observed by the number of applied engineering economic analysis methods from Dixon and Wilck [12].

Table 2: Number of economic analysis methods applied by capstone report (total *n*=48)

Number of Methods Applied	Projects Observed	Percentage
0: No economic analysis method	9	18.8%
1: One economic analysis method	19	39.6%
2: Two economic analysis methods	15	31.3%
3: Three economic analysis methods	4	8.3%
4: Four economic analysis methods	1	2.1%

The results determined from the summarized data provide insight as to the frequency that capstone design teams applied engineering economic methods, and which methods were more commonly used. However, the authors did not provide an explanation or justification as to why the method usage numbers were low, or if the methods were applied properly. Furthermore, they did not offer guidance on whether this should be or could be improved. A review of this past classification and analysis helps to establish a reference measure to which the current community-engaged capstone projects can be measured.

4 Results and Analysis

The final capstone reports for the four community-engaged projects also revealed a limited number of applied economic analysis methods used. A summary for each project is described below.

- Team 1 completed an initial cost estimate, or the first cost, for design alternatives on the canal dredging cleanout, canal reconfiguration, and pump implementation. Using initial cost estimates, the alternatives were ranked based on cost, and a selection recommendation was made. Thus, only one method was applied.
- Team 2 completed an initial cost, or first cost, estimate, and annual operating cost, including operations and maintenance costs (O&M), for design alternatives used to divert

and treat runoff water on private land that otherwise would have entered the lake. The team also considered the replacement cost for pumps and equipment, but the economic analysis was incomplete. Thus, only two methods were applied.

- Team 3 completed an initial cost, or first cost, estimate, and annual operating cost, including operations and maintenance costs (O&M), for design alternatives used to drain water from the lake, transport the water through a drainage district, and deliver it to a large sheet flow area where nitrogen can settle out before being discharged into a water body. The team also considered and evaluated land-use costs as part of their economic analysis. Thus, only two methods were applied.
- Team 4 completed an initial cost, or first cost, for design alternatives using varied power generation and storage capacities for a microgrid energy system to support a proposed centralized pumping station servicing a proposed additional canal to remove water from the lake. The team considered equipment replacement intervals, but the economic analysis was incomplete. Thus, only one method was applied.

No requirements were given to the teams on the number of engineering economic analysis methods they should employ. However, most teams should have been able to use at least two methods (e.g., initial cost, and annual worth analysis) and preferably a third method, such as some type of benefit analysis or assessment. For the four community-engaged capstone project teams the mean was 1.5 methods applied. This mean was slightly higher than what was found in the study by Dixon and Wilck, which found the mean to be 1.3 methods used across the 48 reports. The higher usage should not be surprising since a primary requirement for their community-engaged design project was to furnish an initial cost for public consideration and discussion. Initial cost, or first cost, was the most common method used, followed by annual worth analysis. None of the teams completed any type of benefit analysis or assessment. Table 3 below summarizes the economic analysis methods used by the four community-engaged capstone team projects. Additionally, Table 4 below summarizes the number of economic analysis methods applied by the community-engaged capstone teams.

Table 3: Frequency of economic analysis methods used for community-engaged capstone teams

Economic Analysis Method Used	Number Observed	Percentage
Initial Cost (First Cost)	4	100.0%
Annual Worth Analysis	2	50.0%

Table 4: Number of economic analysis methods applied by community-engaged capstone teams

Number of Methods Applied	Projects Observed	Percentage
1: One economic analysis method	2	50.0%
2: Two economic analysis methods	2	50.0%

The resulting engineering design work completed by the students was informative and benefitted the community. However, regarding the economic analysis, it would have been ideal if all teams had been able to apply at least two economic analysis methods and possibly revealed something more about the economic benefit of their designs. The next section attempts to describe some challenges these capstone teams encountered and how these issues may have influenced their application of the economic analysis methods.

5 Lessons Learned

Throughout the two-semester community-engaged capstone project many discoveries and lessons learned were made related to the use of economic analysis during the engineering design process. These have been organized and described according to the following five categories: (1) design evaluation, (2) project finance, (3) demand predictions, (4) agreements and permitting, and (5) watershed scale. Each category reveals some challenges that influenced the economic analysis. While some potential issues were known beforehand, others were discovered at various phases of the project. Lessons learned, and recommendations for similar projects, are presented at the end of each category section.

1. Design Evaluation:

The three most common economic analysis methods typically used for evaluating water management, environmental, and flood inundation projects are (1) cost-effectiveness, (2) benefit-cost, and (3) socioeconomic impact analysis. Cost-effectiveness analysis identifies the least costly method for achieving specific physical objectives. Benefit-cost analysis determines whether the social benefits of a proposed project or plan outweigh its social costs over the analysis period. This comparison can be displayed as either the quotient of benefits divided by costs (the benefit-cost ratio), the difference between benefits and costs (net benefits), or both. A project is economically justified if the present value of its benefits exceeds the present value of its costs over the life of the project. Socioeconomic impact analysis is broader in scope because it identifies the direct and indirect (secondary) positive and negative effects of an action or project. Using one or more of these methods will depend upon the scope and objectives of the analysis and data.

In most circumstances, a benefit-cost analysis should be the primary method used to justify a project, and cost-effectiveness analysis should be performed to help provide additional information and supporting detail. Unfortunately, determining the benefits associated with flood prevention infrastructure design implementation is a more advanced topic than introduced in an undergraduate engineering economy course. Civil engineering programs may provide students with some exposure to these topics as part of their curriculum, which extends beyond topics introduced in a semester-based engineering economics course. The primary benefit measurement methods include revealed willingness-to-pay, imputed willingness-to-pay, expressed willingness-to-pay, and benefit transfer. These methods are well beyond what is introduced in a one-semester engineering economy course. Similarly, socio-economic impact analysis is an advanced method not introduced in the undergraduate engineering curriculum.

Cost-effectiveness analysis focuses on the costs of achieving or exceeding an aim that can be expressed in specific, non-monetary terms. For example, evacuate at least 'x' acre-feet of water from a service area per day. All other things being equal, the design that removes the needed water quantities at the least cost would be the preferred plan. The costs usually included in a cost-effectiveness analysis are capital and annual operation, maintenance, and replacement. Capital costs refer to the construction or "first costs" of the project, whereas the other costs are incurred to keep the project operational.

Lessons Learned:

1. Community-engaged projects are much different than the types of problems that undergraduate students have been made accustomed to, and a considerable amount of time could be consumed trying to develop a comprehensive understanding of the problem. Faculty advisors have a much greater responsibility than normally to guide the project teams toward the appropriate scope and priorities while being sensitive to the timeline.
2. Capstone teams generally performed well at identifying the initial costs needed to implement a project and get it operational; however, some teams had difficulty in identifying the operation and maintenance costs and the future replacement costs necessary to adequately determine the annualized costs of implementing their project. This was mainly due to the uncertainties about ongoing needs and requirements and setting an appropriate time horizon.
3. Capstone teams had trouble deriving the economic benefits for their projects given the uncertainties about the amount of water to be removed and the expected frequency of demand, as well as the consequence of removal delay needing an extensive assessment of the built-environment and agricultural damages and impacts.

2. Project Finance:

Embedded in the engineering economy curricula is a limited treatment of project finance. At the undergraduate level, project finance is often limited to the concept that funding is available through borrowing from a financial institution at a specified interest rate or through the issuance of bonds. This does not acquaint engineers with more recent, innovative, and flexible approaches to capital and operations finance.

In the case of community-engaged projects, the student capstone teams frequently encountered questions and discussions while interfacing with the community about how such projects would be financed. A troubling issue for these projects is the uncertainty of where funds would come from to pay for these projects and how much might be obtained. The capstone projects certainly helped the community to better understand the cost associated with their designs; however, conversations with community members about their designs often veered into discussion about how such projects would be paid for.

For these projects, another complication is that the lake is owned and managed by the federal government as part of the Mattamuskeet National Wildlife Refuge, which imposes several restrictions. Adjacent landowners, however, have grandfathered access rights allowing them to pump water into and out of the lake; actions which are believed to have an impact on water quality issues. These landowners are also threatened by flood inundation when high water levels in the lake are reached. Once water overspills the boundary of the lake, the question becomes who should pay for the flood water removal from the community? To reduce the flood risk, many landowners view the federal government as being obligated to clean out the drainage canals, back to their original specifications and at no cost to the community, leading to the Pamlico Sound. While many landowners hope for federal assistance or some type of grant, most fear the burden of financing these engineering solutions will be placed upon them.

Lessons Learned:

1. Community-engaged projects frequently do not have committed funds in advance to implement an engineering design while in the conceptual design phase. Community stakeholders and participants may have wide-ranging expectations on what should be funded, the scale of the funding, and strong ideas about who should pay for it. Community engagement with these groups certainly can have a positive or negative influence on the engineering design alternatives developed.
2. Capstone teams engaged with stakeholders and participants had brief encounters where questions and discussions surfaced about how the cost of their engineering designs would be funded, and who would be funding it. Project teams need to be prepared for these encounters and ready to counter that their work is to only develop a set of engineering design alternatives.
3. Capstone teams should receive some coaching from their faculty advisors and involved professional engineers about how funding such projects might occur if the design alternative were to advance onto the detailed design phase. While there is no certainty the design alternative would be funded, this would help the project team members have a better understanding of the process.

3. Demand Predictions:

The watershed and region suffer from the problem of having too much water. The land area has low elevation, making water drainage difficult. Flood inundation caused by severe storms, such as tropical storms or major hurricanes, poses a major risk. Uncertainty about the frequency and severity of such events makes demand prediction difficult for engineering design. Hurricane Matthew, which passed through the region in 2016, is the most well-known disastrous flooding event in recent history for the region and was used as the reference case for the study. Before Hurricane Matthew's arrival, remnants from back-to-back tropical storms saturated the area and filled the watershed. This set the stage for massive flooding in the region when Matthew arrived.

To study such events, the capstone teams developed spreadsheet models to approximate a water budget for the watershed and examine how different conceptual designs responded to demands for water removal. A major complication in modeling the water budget was accounting for the variable canal outflow that depends on the level of the Pamlico Sound stage level. Anticipated sea-level rise will further reduce the outflow in the future. These water budget spreadsheet models were critical for evaluating the engineering designs produced by the capstone teams. They also consumed a significant amount of student and instructor time to complete model verification and validation. Later, when the engineering designs became more developed a hydrologic process model was used to further evaluate these designs.

Lessons Learned:

1. Uncertainty about the frequency and severity of the events requiring the movement of water from the watershed is a for the engineering design. Community stakeholders and participants hold wide-ranging opinions on what is needed, but limited data and process understanding to support the development of robust engineering design alternatives.
2. Capstone teams developed a simple water budget for the watershed using spreadsheet modeling to test the effectiveness of their engineering design alternatives. The spreadsheet models consumed more time than expected for both students and faculty advisors. Implementing the design alternatives in the spreadsheet was often complex and error-prone because of the control mechanisms. Providing students with a brief tutorial on how to complete water budget spreadsheet modeling with some demonstration exercises may have had some

benefits. Knowledgeable support resources, such as a teaching assistant, would be valuable to have helped students in developing their models.

3. Capstone teams included members of various engineering concentration backgrounds (e.g., biomedical, electrical, environmental, industrial, mechanical, etc.…) assigned to a team, with at least one environmental engineering concentration member on each team. Teams must organize themselves with the assignment of responsibilities and tasks that best align with their skills and knowledge to complete the project with efficiency.

4. Agreements and Permitting

The engineering designs developed by the four capstone teams had similar but unique requirements, which affected or transformed land use. Modifications to land use often demand engagement in the domain of complicated regulatory processes or legal negotiations, something undergraduate engineering students generally lack experience or training. For the canal dredging project, this involves obtaining permits, which require environmental impact studies and legal fees, to perform the dredging, removal of dredging spoil (the accumulated sediment and organic matter), and placement in a nearby location, which may require landowner agreement and compensation. For the private land and drainage district projects, this involves obtaining a negotiated agreement for compensation of lost agricultural land and operational costs. The microgrid energy system project involves regulatory permitting for a facility, land use negotiation with compensation, and a power company service connection agreement. Additionally, the design transfer water outside the recognized regional water basin, which requires regulatory approval. Each of these matters introduces potential delay and risk to the possibility of design implementation and significantly adds to project expense. To assist the capstone project teams, an experienced registered professional engineer was retained to advise the teams on several of these complex issues. Because these are complex issues, some engineering designs proposed sought to avoid or minimize these uncertain issues, costs, and delays - perhaps acting in ways not much dissimilar to what most engineering firms do.

Lessons Learned:

1. Community-engaged projects are generally complex and may have numerous dependencies to be satisfied before they can proceed. All capstone teams encountered with their engineering designs some form of a required negotiated agreement or regulatory permitting issue for the

design to be accepted. These were generally either due to land use issues or activities that had some form of environmental impact. Retaining an experienced professional engineer familiar with these issues helped inform and guide students in making their engineering design choices and allowed them to develop an appreciation of the challenges such issues present.

2. Regulatory permitting and negotiated agreements are very complicated and challenging tasks for experienced engineers and these matters can require years or decades to resolve, if ever. For the capstone teams, it is important to develop some reasonable assumptions which might incorporate a range of cost and duration estimates, or placeholder values, to account for regulatory permitting and negotiated agreement on land use.
3. Obstacles, such as regulatory permitting and negotiated agreements, can be discouraging when working toward a favored engineering design alternative. However, these experiences are beneficial for the project teams to encounter and understand that trade-offs do occur in the real world and illustrate how engineering designs are influenced.

5. Watershed Scale

All four engineering designs demonstrate the ability to have a positive effect on the watershed; however, the scale of the problem is quite enormous, and the implementation of an individual design is unlikely to fully address the need. Instead, a combination of engineering solutions will be required. A retrospective study of severe high-water events, such as Hurricane Matthew in 2016, shows these engineering designs would have mitigated the severity of the event, although in varying degrees. With similar initial starting conditions, the designs, if implemented, would still have a floodwater drawdown requiring a few weeks to complete. Many of these engineering designs, if implemented, would help reduce the watershed’s average water level, leaving it in a better position before a major storm. Looking across the engineering designs completed by the four capstone teams, some designs can move more water, but at a considerable initial cost. In future years, the impact of sea-level rise will diminish the effectiveness of some of these designs. Last, public opinion has a strong influence over the designs that will be selected and advanced into the detailed design phase. In certain cases, this influence may not necessarily align with the recommendations made by the engineering designs.

Lessons Learned:

1. In certain circumstances, such as the watershed, the scale of a problem may be so large that a single engineering design alternative may be inadequate, and a combination of engineering designs is required. Developing a portfolio of engineering design solutions and ranking them according to some type of economic benefit analysis may be needed. The selection of engineering design alternatives may also need to consider changing dynamics, such as the impacts caused by sea-level rise.
2. Capstone teams do need guidance in developing possible technical measures of performance against which their engineering design alternatives can be evaluated. The measures of performance need to be able to compare design alternatives fairly across the portfolio of engineering design alternatives and be unbiased.
3. Capstone teams need to appreciate that while their engineering design may not fully solve the problem, their design may serve as an important part of the solution process and make an important contribution toward the desired goal. It is also important to note that engineering design alternatives most favored by the community stakeholders and public may not always be the best or most sustainable solution.

5 Conclusions and Future Work

This paper examines the challenges related to the integration of engineering economic analysis methods in the engineering design process for community-engaged capstone projects. Past work and analysis revealed that most capstone projects apply a minimal number of economic analysis methods in the engineering design process, and sometimes none. The reasons for this vary and may be problem-specific. This study looked at a related portfolio of community-engaged capstone projects to determine how different those outcomes may have been from the results of the past study. While the number of methods applied was only slightly better than in the past study, several observations were made that resulted in the development of a set of lessons learned. The lessons learned were organized and presented in the context of five categories: (1) design evaluation, (2) project finance, (3) demand predictions, (4) agreements and permitting, and (5) watershed scale. In each of these categories, some of the challenges that influenced economic analysis usage were examined and discussed. Additionally, potential improvements that would have allowed the students to progress further with their application of economic analysis were discussed. Results from the experience were used to formulate a series of lessons learned that should increase awareness for future instructors planning community-engaged capstone projects. Future work may involve surveying capstone teams at various points in their experience to determine their decision-making rationale in either embracing or rejecting the use of economic analysis related to their engineering design work.

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