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A Value-Focused, Strategic Stakeholder Engagement Model

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Abstract: There are not many tools that exist to guide strategic stakeholder engagement. The United States Army Corps of Engineers (USACE) is seeking to develop novel analytic solutions to guiding strategic stakeholder engagements for USACE senior leadership at headquarters and major subordinate command (MSC), divisional levels. Objectives for this research include analyzing the strategic stakeholder environment for USACE leaders to understand the complexity of the system and to develop a novel decision model to help prioritize senior leader engagement with Congressional, public, private, and professional society and academic partners. The methodology for this research included the Systems Decision Process (SDP) with a focus in systems thinking and decision analysis. The model developed was an additive value model used to compare different courses of action for strategic stakeholder engagement and considers how every engagement delivers value to the USACE enterprise by considering the attributes of quality project delivery, recruitment, and retention of the USACE workforce, and partnership building.

Keywords: Stakeholder Engagement, Additive Value Model, Sensitivity Analysis

1. Introduction

USACE's Strategic Engagement Working Group is looking for a tool to guide USACE's leaders in strategic stakeholder engagement. They desire a quantitative tool that complements existing staff analysis processes that assist senior leaders understand who their key stakeholders are, where to engage them, and how frequently to engage with them. This way, USACE can orient themselves in the direction of their stakeholders' interests and attend meetings and shape engagements with a specific purpose in mind. It is common that the same stakeholders attend multiple meetings based on historical precedence, so optimizing the strategy to focus and prioritize time spent with many layers of important stakeholders can be a complex challenge. Augmentation to existing processes should help senior leaders achieve mission goals while building a robust network of valued partners important in delivering infrastructure solutions for the nation.

2. Background

The USACE mission is to "deliver vital engineering solutions in collaboration with [their] partners, to secure our Nation, energize our economy, and reduce disaster risk" (Spellmon, 2023). Furthermore, one of the four pillars that make up the foundation of USACE is "improve partnering and strengthen relationships" (Spellmon). Strengthening relationships with key stakeholders is important for the success of USACE's mission, and therefore, tools which guide strategic stakeholder engagement are necessary and must be dynamic as the project portfolio evolves.

There are not many sources describing stakeholder engagement methods. One of the few articles named "Redefining stakeholder engagement: from control to collaboration" described two models: the control model and the collaboration model. The control model supports the idea that stakeholders pose a risk for corporation, and so stakeholders are monitored, assessed, and managed (Sloan, 2009). Listening to the concerns informs them on corporate activities and performance to mitigate potential problems with stakeholders. The collaboration model supports the idea that stakeholders are a source of opportunity for corporations, and managers and stakeholders should work and learn from each other (Sloan). Another article called "Best

Practices for Stakeholder Engagement for Government R&D Organizations" explained conceptual strategies for stakeholder engagement to include identify and prioritize stakeholder engagements, diversify stakeholder relationships, improve stakeholder communication, increase stakeholder engagement activities, manage stakeholder expectations, increase value to stakeholders, and assess relationships with stakeholders (Beam et al., 2022).

A third article "MAPTkit: An environmental management decision-tool for inclusive, equitable and representative stakeholder attribute mapping" described a study and framework for stakeholder analysis including the six stages of identifying the problem, type, role, mapping, connections analysis, and establish relevance (Hoare et al., 2023). The study started by identifying possible stakeholders, and then collecting data from them through interviews, focus groups, surveys, workshops, informal conversation, informative analysis methods, field study, social network analysis, and sampling strategies. MAPTkit mapped attributes of the stakeholders using a visualization such as a four cornered matrix, a scatter plot, a grid, radar charts, and Venn diagrams (Hoare et al.).

A fourth article named "Stakeholder engagement strategy for an ongoing research program in rural dementia care: Stakeholder and researcher perspectives" described an example of a stakeholder strategy used for the Rural Dementia Action Research Program. A council of members held the summit including different sectors and geographic areas to promote more active engagement with stakeholders. Participants could share information and knowledge about other rural dementia research and best practices (Morgan et al., 2022). Stakeholders invited to the summit included individuals living with dementia and family members, a diverse range of health care providers and administrators, Ministry of Health representatives, Alzheimer Society staff and leadership, and others (Morgan et al.).

Evaluating the performance of stakeholder engagement tools elicited multiple articles including the Rural Dementia Summit article. Following the annual Rural Dementia Summit, participants would complete an anonymous paper-based evaluation where they rate various aspects of the summit and answer open-ended questions about the impact of the summit (Morgan et al., 2022). The results of these surveys expressed the percentage of positive ratings and a thematic analysis for the open-ended questions. For twelve summits, the results of the evaluations depicted positive ratings ranging from 97%-100%, and the themes found included hearing diverse perspectives, building connections and relationships, collaborating for change, developing research and practice capacity, and leaving recharged (Morgan et al.).

The publication "Protocol for assessing stakeholder engagement in the development and evaluation of the Informed Health Choices resources teaching secondary school students to think critically about health claims and choices" presents new learning resources implemented into an education system, and the evaluation of success of the stakeholder engagements (Nsangi et al., 2020). The stakeholders in this study were the secondary school teachers and students. For this study, criteria was determined for success to include whether the stakeholders were informed and engaged to an appropriate extent, the approaches of informing and engaging that were used were appropriate and work as expected, the level of involvement was appropriate, the input was appropriate and work as expected, the intended outputs were delivered and appropriate, the intended outcomes were achieved, and the appropriateness of group make-up and if important voices were missing or not represented (Nsangi et al.). Networks and advisory groups would decide how to define "appropriate" for the success criteria, and the project team would receive feedback from stakeholders and the research team through questionnaires and interviews. A coded spreadsheet presents findings based on importance and impact on the engagement process (Nsangi et al.).

This literature review demonstrates how there are not very many existing tangible tools for strategic stakeholder engagement. There are some theories on how best to engage with stakeholders, but no solid method guiding when, how, and where to engage with them. Therefore, this study is relevant to developing a tangible and effective way to decide which stakeholders an organization should engage with, where to engage with them, and how to engage with them depending on the values and goals of the organization and its stakeholders.

3. Methodology

Approaching strategic stakeholder engagement from a new angle, using the SDP enables the consideration of the stakeholder's needs and wants and quantifies their values so that the decisions made by the organization are the best value-focused decisions. The literature reviews conducted indicate other methods for stakeholder engagement did not consider such values or quantify them. The methodology begins with the Systems Decision Process (SDP) to include a focus in systems thinking and decision analysis to develop an additive value model for strategic stakeholder engagement which evaluates stakeholders based off assigned values and a sensitivity analysis. The SDP has four stages: problem definition, solution design, decision making, and solution implementation. It is a collaborative, iterative, and value-based decision process, and applied during any system life cycle stage (Driscoll et al., 2023). The SDP uses value-focused thinking, in which a clear understanding of values contributes to the development of alternatives. Values are principles used for evaluating consequences of action and inaction of alternatives. Stakeholder analysis helps identify the objectives, functions, requirements, and constraints for the system (Driscoll et al.). Research in addition to stakeholder analysis helps to understand the problem at hand, identify people

and organizations relevant to that problem, and determine the needs and wants of the key stakeholders. As commonly found in other stakeholder engagement methodologies, common methods for stakeholder analysis include interviews, focus groups, and surveys (Driscoll et al.). To gather an understanding of USACE leader needs and wants for strategic stakeholder engagement, a series of informal interviews helped to elicit insights. These discussions enabled the identification of the functions, objectives, and values for the system.

A qualitative value model was developed from the background research and understanding of the challenge as seen in Figure 1. This model depicts the most principal functions and objectives for the system including value measures that evaluate the performance of the system and objectives attainment (Driscoll et al., 2023). The first step is to identify a fundamental objective, which is a clear, concise statement of the reason for the project to be performed (Driscoll et al.). Then, functions describe what the system must do, objectives provide the goals of the stakeholder describing a directional preference for the behavior of the system, and value measures tell how well an alternative supports an objective (Driscoll et al.). For this problem, the fundamental objective is to identify a strategic leader engagement quarterly plan that provides value. The functions are to create a robust pipeline of talent for USACE, to strengthen USACE's political project partners, and to satisfy the user's understanding of the project aims. The objective for creating a robust pipeline of talent is to maximize recruitment, with value measures including the number of applications for USACE, the number of job fairs USACE attends, and the number of prior conferences and presentations that USACE has given. The objective for strengthening political project partners is to maximize active participation in project delivery, with value measures as the number of congressional engagements USACE has, the power and interest value that a stakeholder has, and the number of meetings USACE has with their stakeholders. The last function of satisfying user understanding of project aims has the objective of maximizing public awareness of project aims, measured through the value measures of survey data and the number of positive press releases related to USACE and their projects.

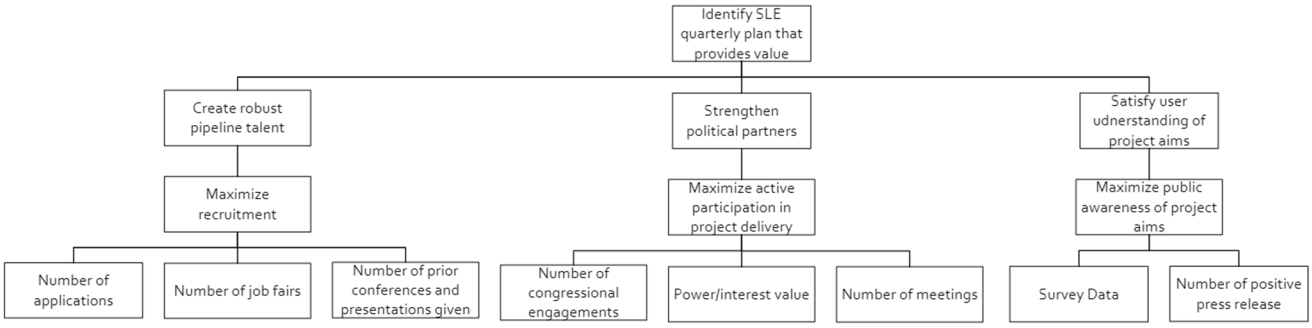

Figure 1: Qualitative value model for strategic stakeholder engagement

Quantitative value modeling consolidates the weightiest decision maker values for the system, measures for estimating performance, value functions, and a total value return estimate. An additive value model represents the parametric model in the SDP and accomplished using MS Excel (Driscoll et al., 2023). A value function is "a real-valued mathematical expression defined over an evaluation criterion (attribute, value measure) that represents an alternative's goodness (value return) across the levels of a value measure scale." Value measure scores x_i translate into value scores $v_i(x_i)$ ranging from 0-100 (Driscoll et al.). A range of historically backed raw data returns the raw data input, as seen in Figure 4, allowing for the calculation of a total value return quantity V_i.

Number of applications (count)		Number of job fairs (count)		Number of prior conferences and presentations given (count)		Number of congressional engagements (counts)		Power/interest (average value)		Number of meetings (count)		Survey data (Average star rating out of 5 stars)		Number of positive press releases (count)	
x_i	$v_i(x_i)$	x_i	$v_i(x_i)$	x_i	$v_i(x_i)$	x_i	$v_i(x_i)$	x_i	$v_i(x_i)$	x_i	$v_i(x_i)$	x_i	$v_i(x_i)$	x_i	$v_i(x_i)$
1	0	0	0	0	0	10	0	0	0	0	0	1	0	5	0
12	25	2	25	10	25	20	25	2.5	25	5	25	2	25	10	25
20	50	3	50	15	50	30	50	5	50	10	50	3	50	15	50
31	75	4	75	20	75	40	75	7.5	75	15	75	4	75	20	75
45	100	10	100	25	100	50	100	10	100	25	100	5	100	25	100

Figure 2: Raw data and return values for value functions

Using this data, value functions can be created for each residual value measure using the provided raw data and corresponding stakeholder values from Figure 2. These value functions are one method for converting the raw data into a value matrix by reading across from the y-axis with the raw data over to the function, then reading down to the x-axis with the values. The other method for converting the raw data to a value matrix is by using the excel function $= ValuePL4()$ which uses linear interpolation on the value function tables and returns a value score for each value measure for each course of action (Driscoll et al., 2023). The values are determined by stakeholders and vary depending on each value measure. For this model, the raw performance data that will be converted into a value matrix is provided by the courses of action that are being evaluated. Each course of action provides different raw performance data values that are then evaluated using the value functions. For the purposes of testing this stakeholder tool, three courses of action with notional data were created.

The value matrix is then converted into a weighted value matrix. This is done using swing weights and global weights. After assigning a swing weight to each value measure based off of stakeholder values, the global weight for each value measure is then calculated by dividing the swing weight for each value measure by the sum of the swing weights. This is seen in equation 1, where w_i is the global weight for value measure *i,* and f_i is the swing weight for value measure *i* (Driscoll et al., 2023).

$$w_i = \frac{f_i}{\Sigma f_i} \tag{1}$$

After the global weights are calculated for each value measure, Equation 2 is used to compute a weighted value matrix from the value matrix, where V_n is the total value of course of action *n,* and *M* is the number of value measures $f_m(x_{n,m})$. The value score of the n^{th} course of action on the m^{th} value measure from the value matrix is multiplied by the global weight for the m^{th} value measure, w_m (Driscoll et al., 2023). The resulting weighted value matrix and the total system value for each course of action is in Figure 3 below.

$$V_n = \sum_{m=1}^{M} w_m f_m(x_{n,m}) \tag{2}$$

	Value Measures								
Candidate Solutions	**Number of applications**	**Number of job fairs**	**Number of prior conferences and presentations given**	**Number of congressional engagements**	**Power/interest**	**Number of meetings**	**Survey data**	**Number of positive press releases**	**Total system value**
COA 1	12.02	6.19	8.18	7.58	8.08	3.23	3.32	8.97	45.28
COA 2	10.79	3.54	5.00	9.09	17.58	7.07	2.58	12.71	53.07
COA 3	7.18	5.60	1.14	4.85	14.14	6.67	2.95	14.20	39.57
Ideal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 3: Weighted value matrix of the value measures for COA 1, COA 2, and COA 3.

4. Analysis

Analysis on which course of action accommodates the system's objectives the best represents the first of the final steps. From the weighted value matrix in Figure 3, a stacked bar chart in Figure 4 helps the USACE leaders visualize the differences in value between the three courses of actions to further apply value-focused thinking. A stacked bar chart depicts the weighted differences between the different courses of action while displaying the roles played by each individual value measure in the total value score of the course of action (Driscoll et el., 2023). The greater the height of the of the stacked bars, the higher the value of that course of action. COA 2 produces the highest stack bar, giving it the greatest total value to a USACE leaders given the proxy scenarios. Further, the value measure for power and interest value has the thickest bar, representing value by our key stakeholders, and therefore contributes the most to the total value of the course of action. It is most important for USACE stakeholders to have an elevated level of power and interest in the projects.

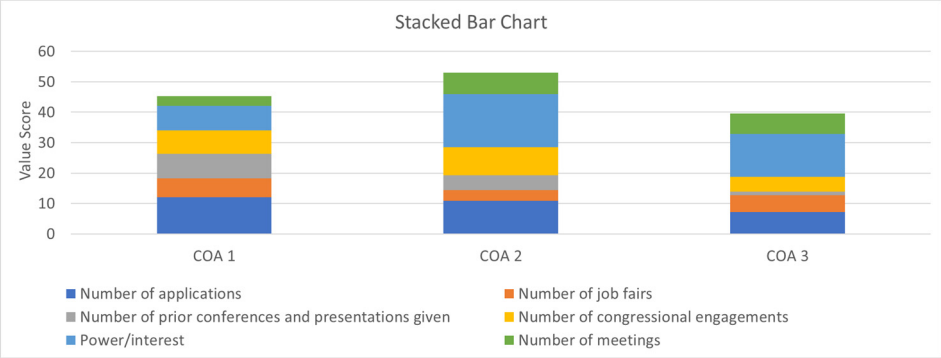

Figure 4: Stacked Bar Chart for the weighted values for COA 1, COA 2, and COA 3

The model considers cost in addition to value when it comes to stakeholder engagement. For this, a Cost vs. Value chart presents net present values modeling for each course of action, to simulate integrated cost analysis in strategic stakeholder engagement. These values are all notional for the purpose of validating model's performance and usefulness. Costs from engaging with stakeholders can come from any costs inquired from meeting with stakeholders including direct costs such as travel, conference fees, and per diem, and indirect costs such as general and administrative support from public affairs, legal, and other supporting staff. This chart and its corresponding table enable visualization of the trade space in Figures 5 and 6 below. Based on this Cost vs. Value chart, COA 2 is the most optimal solution because it has the highest value and is the second least expensive solution. The cost of this alternative would be worth the resulting value score because the COA would meet the objectives of the system the most and satisfy the key stakeholders' needs and wants the most. COA 1 would not be feasible, despite being the least expensive, because it has the lowest value. Furthermore, COAs 2 and 3 create the pareto optimal frontier, which COA 1 is below making it not a feasible alternative.

Candidate Solutions	Total Value	NPV
COA 1	45.28	$1,200,000.00
COA 2	53.07	$800,000.00
COA 3	39.57	$450,000.00

Figure 5: Table with total values and net present values for COA 1, COA 2, and COA 3

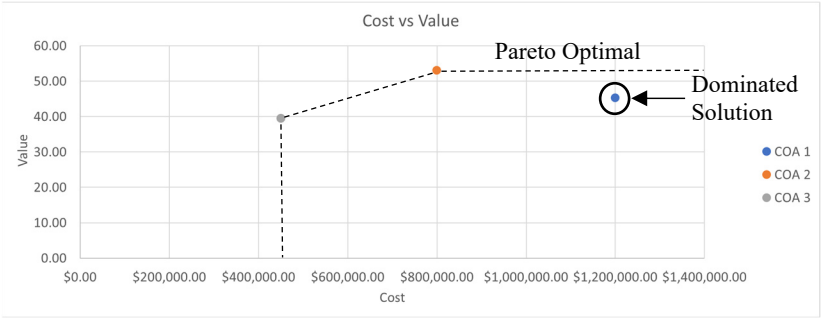

Figure 6: Cost vs. Value chart for COA 1, COA 2, and COA 3

Finally, each value measure receives a sensitivity analysis. According to Driscoll et al., sensitivity analysis is used to determine if a change in one of the variables will change the preferred solution (2023). A one-way sensitivity table plots the swing weights and the total value scores for each course of action, and if the solution lines do not cross, then the preferred solution is not sensitive to the weights and would not change. If the lines do intersect, then the preferred solution is sensitive to the weights and could change (Driscoll et al.). For example, as depicted in Figure 7, the lines do not intersect so the value

measure of number of applications is not sensitive to the weights and changing it would not change the preferred solution. This represents domination by COA 2. However, as seen in Figure 8, the value measure of the power and interest value is sensitive to the weights and changing them could change the preferred solution. A point of decision indifference in COAs 2 and 3 occur around a swing weight of seventeen. These sensitivity analyses only represent value, and they do not represent cost.

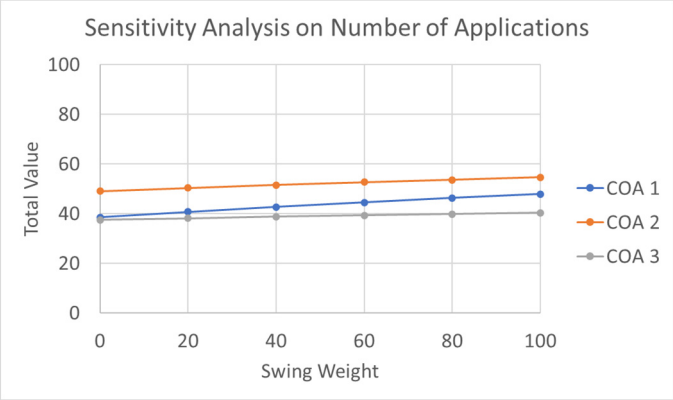

Figure 7: Sensitivity analysis for the number of applications

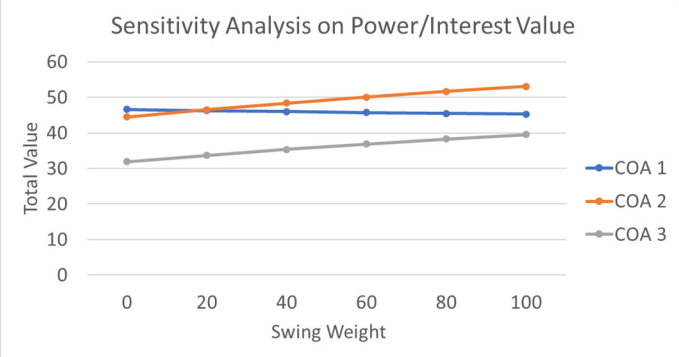

Figure 8: Sensitivity analysis for the power/interest value

5. Conclusions and Future Work

This model represents one way to analyze different courses of actions and is novel in that it incorporates raw historic engagement and projected cost data. It is scalable and allows for normalization across many distinct types of engagement strategies. Finally, it does present a slightly different approach from traditional Power-Interest oriented models and avoids individual stakeholder sensitivities by focusing on a series of events over a time continuum. It is flexible in that USACE leaders might adjust the value measures and weights used to analyze the alternatives, as well as the alternatives themselves. When the value measures and alternatives adjust, the corresponding weights and values in the model will change. Leaders at HQs, MSC, or District levels will have to choose their own value measures scores based on historical data and calculate the corresponding swing weights.

Limitations of the model exist in its reliance on historic data needs to refine value functions, and predictive data needs to generate the raw inputs for future engagement COAs. Unit processes which incorporate strategic leader and subject matter expertise along with a strong network of project partnerships might offset these limitations. In addition, use of the System Useability Scale (SUS) represents a validation tool to assess for useability and ease of use for USACE employees and would represent an improvement in its evaluation and adjustment (Lewis, J. R., 2018). Overall, this model will help guide USACE in strategic stakeholder engagement and contribute to the success of the mission of USACE.

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