

Motivation and Objectives

The Community Assets and Attribute Model (CAAM), derived from the Community Capitals Framework (CCF) (Emery and Flora 2006), helps assess community suitability for biofuel facilities through validated measures of four key social assets: social, human, cultural, and political capitals. The CAAM provides the first reliable, nationally available quantitative measures of these social assets to incorporate into decision-making. As such, it is a valuable tool for decision-makers when assessing community suitability for biofuel facilities. In what follows, we describe the model more in-depth, summarize prior applications of the model, and discuss future applications and implications of the CAAM.

Methods and Materials

The CAAM is an extension of the Community Capitals Framework (CCF) that examines community assets which contribute to the success of community-level projects. The capitals work together to cause a community to "spiral up" and achieve community goals. The CAAM provides measures of three hard-to-measure capitals that have been shown to impact a community's responsiveness to implementation of highly complex technological projects. Due to the difficulties of measuring these assets, they are often left out of important site-selection decisions, yet they are imperative to successful implementation of projects which affect communities.

Through the combination of several national-level datasets, we developed quantitative measures of each social asset at the county level using the most complete indicators of each asset to date (See Table 1 below). Using factor analysis, we developed a single quantitative score for each asset that reflected county rankings on that particular capital (See Table 2 for details). To compare rankings among counties, we created regional benchmarks by calculating the average performance of counties within each Census Region or Division. We argue that counties that rank higher than their regional or divisional average in each asset are more likely to be successful developing and implementing highly complex, technological projects.

Table 1: Quantitative Indicators of the CAAM

	Social Capital	Human Capital	Cultural Capital	
•	Aggregate of religious, civic, business, political, professional, labor, bowling, recreational, golf, and sports organizations divided by population per 1,000	 % live births with low birth weight % adults reporting poor or fair health Income inequality ratio Number of reported 	 Proportion of working population aged 16 and over employed in management, business, science, and arts % aged 25 and older with Bachelor's degree 	•
•	Number of non-profit organizations excluding those with an international approach divided by population per 1,000	 violent crime offenses per 100,000 population Unemployment rate 	or higher	
	Source: Rupasingha, Goetz, & Freshwater (2014)	Source: County Health Rankings (2017)	Source: US Census (2015 5-year averages)	S

Table 2: Factor Analysis Output

Variable	Factor				
Valiabie	1	2	3	4	
Income Inequality	807	.132	019	.092	
Low Birth Weight	623	104	033	.002	
Poor or Fair Health	619	338	190	050	
Unemployed	489	314	090	200	
Violent Crime	472	075	024	062	
Education	003	.994	.011	062	
Creative Class	028	.874	.042	.023	
Voter Turnout 2012	.002	.065	.843	055	
Voter Turnout 2014	.045	080	.837	.110	
Aggregate of Organizations	.031	117	046	.814	
Non-Profit Organizations	033	.089	.111	.563	
Cronbach's Alpha	.790	.909	.838	.678	
Eigenvalue	4.05	1.69	1.32	1.13	
% Variance Explained	33.787	13.272	8.541	6.561	

Note: Values presented here reflect each variable's factor loading on each of the four factors. Bolded values indicate factor loadings above .4, which are used to create factor scores and an index for each factor. These bolded values correspond to the variables used to measure each factor. The factors clearly correspond to human, cultural, political, and social capital, in that order.

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Project # COE-2014-01 The Community Assets and Attributes Model: Refining and Updating Measurements for Social Assets

Political Capital

2012 general election turnout

2014 general election turnout

Source: Dave Leip's Atlas of US Presidential Elections (2017)

Past and Current Applications

PAST:

Previous iterations of the CAAM included measurements for social, human, and cultural capitals only. This previous version of the model was recently applied in the Pacific Northwest to identify potential locations to develop a retro-fitted biorefinery. The CAAM was combined with site-specific biogeophysical measures to assess retro-fitting of pulp mill facilities in the Pacific Northwest. After an initial ranking of facilities based on biogeophysical measures, the CAAM assessed county-level performance on each asset and identified one facility site which out-performed the region on each key asset. The combination of biogeophysical assets and the social assets measured by the CAAM allowed for better assessment of the pulp-mills in question, identification of one facility that is more likely to be successful in the retro-fitting process, and future implementation and support of a biorefinery.

CURRENT:

The new version of the CAAM uses updated data and includes measurements for political capital. The five maps below and to the right show counties in the two Census Divisions of the South Atlantic and East South Central (indicated by gray and white counties, respectively). Counties that exceed their divisional averages are colored in blue, indicating that these counties are potentially suitable locations for biofuel siting. While we do not argue that communities that score under norms in these assets should be ignored by key decision makers, initial development of economically viable and environmentally stable biofuel industries will depend on identifying areas that have the highest likelihood of supporting these facilities. The CAAM identifies these potential communities, and predicts implementation success in those locations, increasing the likelihood of success for the overall supply chain. The final map shows counties that surpass their respective divisional averages for each of the four capitals, highlighting the most ideal locations for biofuel siting in this region of the country.









Future Work and Strategic Application

The improved CAAM requires new tests for validity. To do this, we plan to use case studies in either specific regions of the country or across the entire country to illustrate the CAAM's predictive capacity to explain and identify highly successful and unsuccessful biofuel related project sites in the region. Additionally, while most research with the CAAM has occurred in the Pacific Northwest, plans to expand the application of the CAAM to other areas of the country are in place. We are also in the process of developing strategic applications of the CAAM, taking into account themes that the model currently does not or cannot measure, such as bridging and bonding capital, local support for biofuel initiatives, and political support. Future research also seeks to adapt the CAAM to predicting sustainable outcomes in communities that go beyond just biofuel siting and logistics.

> Authors: Daniel Mueller, Season Hoard, Christina Sanders, Michael Gaffney Lead investigator: M. Wolcott, M. Gaffney, WSU Project manager: J. Hileman, D. Williams, N. Brown, FAA



Current Applications (cont.)

