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The effects of organizations engaging residents in greening vacant lots: Insights from a United States national survey

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ABSTRACT

Background: As vacant lot inventories expand in cities across the U.S., vacant land management organizations require strategies that optimize their functioning while ensuring community benefit. Resident engagement in programs to green vacant land may be one helpful strategy. While resident engagement is often required for vacant land management organizations, few researchers have examined how these organizations engage residents and the effect of these practices on their functioning. We hypothesized that more intensive engagement such as involving residents in planning and implementing greening would be more predictive of organizational functioning than lower level engagement.

Methods: We analyzed data from a national survey of vacant land management organizations from 27 states (N = 68). We assessed three areas of organizational functioning including networking, programmatic, and resource capacity. We used hierarchical regression to test the additive effects of the resident engagement predictor variables including communication, input, involvement in planning, and involvement in implementation on organizational functioning.

Results: Less intensive engagement forms such as communicating and soliciting input were the most popular methods, but our final model indicated that the highest functioning organizations reported the most resident involvement in planning and implementing greening.

Conclusions: Our results support policies and practices that expand resident involvement in greening.

1. Introduction

Property abandonment and vacancy are critical issues affecting cities across the United States that were once prosperous manufacturing centers (Mallach, 2018; National Vacant Properties Campaign, 2005; Vey, 2007). Beginning in the 1970s, policies that incentivized suburbanization and plant closures in the Midwest and Northeast (Accordino & Johnson, 2000; Dewar & Thomas, 2012) led to population loss and a diminished tax base for public amenities. These changes catalyzed cyclical abandonment, property devaluation, and deterioration (Accordino & Johnson, 2000). Communities of color have borne a disproportionate burden of this disinvestment. White flight and discriminatory lending practices such as redlining have kept residents of color isolated in city centers with concentrating poverty (Dewar & Thomas, 2012; Lowe & Thaden, 2016). As properties lost value, and structures remained vacant, cities focused on demolition to mitigate the hazards of abandoned structures and the devaluation of surrounding property (Accordino & Johnson, 2000).

Local, state, and federal investments in demolition, including through the Hardest Hit Program, (U.S. Department of the Treasury, 2019), have resulted in a growing number of vacant lots with an uncertain future, given a lack of adequate funding to maintain them (Anon, 2018; O'Keefe et al., 2020). More than 15% of U.S. cities now consist of vacant land (Bowman & Pagano, 2004) and according to organizations that manage vacant properties (i.e. vacant lots and structures), vacant lot inventories are increasing (O'Keefe et al., 2020). On average, vacant

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lots now make up 75% of vacant property inventories, but organizations anticipate that only 20% of these vacant lots will be redeveloped in the next five years (O'Keefe et al., 2020).

Vacant lots, when left undeveloped and unmaintained, become liabilities for communities with consequences for crime including interpersonal violence (Branas et al., 2013), dumping, and physical disorder (Garvin et al., 2012). Overgrown and deteriorated lots can discourage social interaction, disrupt neighborhood relationships (Garvin et al., 2012), and harm residents' physical and mental health (Augustin et al., 2008; Cohen et al., 2003). Additionally, vacancy challenges the economic vitality of a neighborhood by reducing property values and diminishing tax revenue for protective and human services (Accordino & Johnson, 2000; Heckert & Mennis, 2012). Due to the cyclical nature of disinvestment, redevelopment can take an unexpected amount of time and resources (Schilling & Logan, 2008). As a consequence, residents are left to live in places that negatively affect their health and safety.

Greening programs have emerged as a key strategy to respond to the challenges and opportunities of vacant land (Beauregard, 2012; Schilling & Logan, 2008). These programs support the systematic care and upkeep of vacant lots, and may include professional mowing or engaging residents to keep lots clean and mowed (Beauregard, 2012). Greening can also include repurposing vacant lots for community needs such as managing environmental concerns (e.g. green infrastructure), increasing access to food (e.g. urban agriculture), expanding opportunities for recreation (e.g. parks, trails systems), and increasing civic pride (e.g. murals, food trucks, pop-up establishments) (Carlet et al., 2017; De Sousa, 2014; Németh & Langhorst, 2014). Improving vacant lots through greening may also benefit public health more broadly by deterring violent crime (Branas et al., 2018; Heinze et al., 2018), promoting community health (Branas et al., 2011; South et al., 2015, 2018), increasing community connectedness (Rupp et al., 2019), and restoring economic value (Garvin et al., 2012; Heckert & Mennis, 2012).

In the United States, vacant land management organizations, including government agencies, land bank authorities, nonprofits, and community organizations assume responsibility for greening vacant property. Government agencies and land banks typically own the largest property inventories relative to the other organization types (O'Keefe et al., 2020). Nonprofits and community organizations hold smaller inventories, on average, and are more likely to green properties without owning them (O'Keefe et al., 2020). Organizations that do not own vacant properties use a variety of methods to access them, including leases and license agreements (Anderson & Minor, 2017; Németh & Langhorst, 2014). In a national survey, nearly 30% of organizations reported accessing properties for greening without any formal permission (O'Keefe et al., 2020).

Vacant land management organizations act as community caretakers for important neighborhood spaces, including expanding inventories of vacant lots (O'Keefe et al., 2020). Therefore, resident engagement is potentially a key element of these organizations' work and effectiveness (O'Keefe et al., 2021; Rupp et al., 2021). Engaging residents in promotive interactions to green vacant lots may help restore communities and build busy streets by increasing a sense of pride and belonging and strengthening social ties among residents (Aiyer et al., 2015; Garvin et al., 2012; Rupp et al., 2019). Eliciting resident input through participatory design processes can help to ensure that residents' local knowledge is leveraged. This process can improve decision-making and align greening projects with residents' priorities, needs, and interests (Campbell-Arvai & Lindquist, 2021; Kim et al., 2020). Integrating resident input into designs can help to avoid green gentrification, so that the benefits of greening projects accrue more equitably and support nearby residents as well (Anderson & Minor, 2017;Campbell-Arvai & Lindquist, 2021). Ensuring residents' priorities are addressed can build buy-in and community ownership of projects, increasing the likelihood that they are adopted and sustained with resident support (Faga, 2006; Schilling & Logan, 2008).

While scholars and practitioners widely view resident engagement as beneficial to greening program outcomes (Anderson & Minor, 2017; Campbell-Arvai & Lindquist, 2021; Kim et al., 2020), to date, there has been no evaluation of how vacant land management organizations that green vacant lots engage residents, and how this engagement is associated with their functioning. We conducted the first national study of vacant land management organizations and resident engagement in their mission.

2. Theory

2.1. Organizational functioning

Key areas that are essential to ensure that organizations have sufficient capacity to achieve their missions and ensure long-term program viability include networking, programmatic, and resource capacity (Glickman & Servon, 1998; Wright & Reames, 2020). **Networking capacity** refers to an organizations' ability to work closely with external partners to achieve their mission. It includes the diversity of sectors represented by the network and the types of resources an organization obtains from their network (Glickman & Servon, 1998; Peterson & Zimmerman, 2004). Collaboration enables organizations to specialize, reduce expenses, and seek complementary funding (Glickman & Servon, 1998; Joffres et al., 2004). Vacant land management organizations report relying on partnerships to obtain data and planning resources to acquire and green properties more efficiently and affordably (O'Keefe et al., 2020). Stakeholders from different sectors bring diverse perspectives and information which can support problem solving and building constituencies (Anderson & Minor, 2017; Moss, 2012; Nölting & Mann, 2018). Partnerships can be particularly beneficial for building political will for greening projects because they provide a multi-sector approach that engages shared interests (De Sousa, 2014; Roussos & Fawcett, 2000). Building political will and shared buy in across sectors can help expand resources for managing projects and support their long-term sustainability (De Sousa, 2014; O'Keefe et al., 2021).

Programmatic capacity refers to the types of programs and services offered by an organization. It includes an organization's ability to be responsive by adjusting or expanding programming as new community needs arise (Glickman & Servon, 1998). Conditions on vacant lots vary widely and may require different kinds of remediation and greening (Kim et al., 2018). Organizations that conduct multiple types of greening activities may be better equipped to respond to these contextual needs, align greening activities with residents' interests, and green more lots (Metris Arts Consulting & Center for Community Progress, 2018; Schilling & Logan, 2008).

Resource capacity relates to an organization's ability to generate revenue from diverse sources (e.g. grants, foundation funding, earned revenue) to support and sustain its program activities (Carroll & Stater, 2009; Glickman & Servon, 1998). When organizations rely on too few funding sources, they may be vulnerable to changing market conditions (Glickman & Servon, 1998). Diversification of revenue is a common strategy to reduce resource dependence, protect against financial distress, and increase autonomy to pursue mission-specific goals (Frumkin & Keating, 2011). Diversified funding portfolios of nonprofits are associated with reduced financial volatility (Carroll & Stater, 2009) and a reduced risk of insolvency and program closure compared to organizations with fewer sources (Frumkin & Keating, 2011). Diversifying revenue streams, for example, by incorporating earned revenue, may be especially vital for vacant land management organizations because of their common dependence on unreliable funding sources such as private foundation support.

2.2. Resident engagement in community development and revitalization

In the United States, prized values surrounding citizenship, participation, and democracy create a cultural imperative to engage residents in the decisions that affect their lives (Kamols et al., 2021; Monno &

Khakee, 2012; Teli et al., 2020). These values are reflected in widespread laws and requirements for resident participation among vacant land management organizations. Requirements range from establishing transparency through open-meetings and public reports to ensuring program plans align with community master plans, to mandating resident participation on boards (Alexander & Toering, 2013; City of Detroit, 2020; HUD Exchange, 2020; New York State, 2020; Olens, 2014). Yet, the lack of consistency in these requirements raises questions about the types and intensity of engagement that are needed to benefit communities and enhance organizational functioning.

Resident engagement activities fall along a continuum. Methods of engaging along the continuum involve different levels of resident collaboration, opportunities for dialogue, and influence in decision-making (Arnstein, 1969; International Association for Public Participation, 2018; White, 1996).

The most popular and least intensive method of engagement is communicating with residents to inform them about organizational activities and decisions. Digital communication tools such as social media hold promise for democratizing participation and are increasingly used to reach wide audiences, including those that may be resistant to more traditional forms of participation (Fredericks & Foth, 2013). Digital communication can be a potent approach for sharing information that helps communities assess options, envision their future, and take action (Hearn et al., 2011; Houghton et al., 2015). Yet, leveraging digital communication tools alone may be insufficient to achieve the potential emancipatory benefits of participation, if the process does not prioritize residents' interests (Houghton et al., 2015; Mattern, 2020; Teli et al., 2020).

At the next level of engagement, organizations solicit resident input through activities such as surveys, focus groups, and town-halls (International Association for Public Participation, 2018). Soliciting input from residents early in planning can help ensure residents' visions and priorities are considered and increase public support for plans and programs (Faga, 2006; Garvin et al., 2012; Schilling & Logan, 2008). Organizations that demonstrate how they incorporated resident input in plans and decisions may build trust with residents (International Association for Public Participation, 2018). Yet, a disparity frequently exists between organizations' stated interest in shared decision-making and the degree to which resident input can actually permeate organizations to influence practice and policy (Arnstein, 1969; Kamols et al., 2021). This can be due to organizational preferences for stability over innovation, time and budgetary constraints, privileging expert opinion over local knowledge, or a lack of alignment between organizational and community priorities (Kamols et al., 2021). Showy displays of democratic participation, often involving digital tools such as online surveys or participatory mapping, can lend an air of legitimacy to decisions, but may ultimately amount to engagement theater if institutions are uninterested or unable to integrate the resulting insights and innovations (Kamols et al., 2021; Mattern, 2020).

Resident involvement in program planning is among the most intensive forms of engagement because it increases direct collaboration and expands resident influence in decisions about how best to revitalize vacant land (International Association for Public Participation, 2018; Lowe & Thaden, 2016). High resident involvement in participatory planning has been found to be more effective than low involvement at creating widely-adopted land use and revitalization plans (Faga, 2006; Sagaris, 2014). Residents who are engaged in planning can expand community awareness of greening programs and increase the likelihood that programs are used and sustained (Rémillard-Boilard et al., 2017). Intensive resident involvement in decision-making can also result in expanded community control, as residents develop skills to hold formal leadership positions (Lowe & Thaden, 2016). Yet, robust resident involvement may also inadvertently increase conflict and delays as organizations may need to reconcile competing perspectives and priorities (Houghton et al., 2015; Kimmelman, 2021).

Finally, involving residents in implementing greening may support organizations to green more vacant lots in a cost-effective manner (Heinze et al., 2018) and expand local capacity for sustained stewardship of vacant lots (Garvin et al., 2012). This involvement may also help improve program responsiveness by taking advantage of residents' relationships and knowledge about their neighborhoods (Rémillard-Boilard et al., 2017; White, 1996). Involvement, however, may be less-representative because it is limited to residents who have the time and resources to engage (Robbins et al., 2008). It may also contribute to community burnout by asking too much of residents with multiple demands and few resources (Lowe & Thaden, 2016).

2.3. Present study

Resident engagement may benefit greening organizations by increasing their functioning. We operationalized organizational functioning as having three components: the capacity to network, provide adaptable programming, and obtain diverse sources of revenue. While resident engagement is often required for greening programs, few researchers have examined the specific methods used to engage community residents and their relationship to organizational functioning. We conducted a national survey of organizations that own or green vacant lots to address this gap. We hypothesized that organizational capacity for networking, programming and resource diversification would be highest among organizations that involve residents in planning or implementing greening.

3. Materials and methods

Our study was conducted as part of a five-year study funded by the Centers for Disease Control and Prevention examining the effects of vacant lot greening on community violence, injury, and neighborhood social relationships. The project included an implementation study to document the key components and processes necessary to increase greening program capacity and support organizational functioning. We collaborated with The Center for Community Progress (from here: Community Progress) to conduct a national survey of vacant land management organizations involved in greening vacant lots as part of this implementation study. Organizations surveyed included land bank authorities, nonprofits, government agencies, community organizations (i.e. block clubs), redevelopment corporations (i.e. 501c3), and LLCs. This study was determined exempt (i.e. not human subject's research) by the University of Michigan Institutional Review board.

3.1. Sampling

Organizations were eligible for inclusion in the survey if they held title to an inventory of vacant properties or were involved in greening vacant property (i.e. vacant lots or properties with vacant structures). Organizations were recruited from a listserv maintained by Community Progress that included vacant land management organizations from 41 states that had previously participated in Community Progress programming (n = 589). Twenty-one of the organizations in their list had outdated contact information and no additional contact information for them could be found. Thus, Community Progress contacted 568 organizations to introduce them to the survey study and offer them the option to opt out of the study. Seventeen organizations (3%) opted not to receive the survey. The research team followed up with the remaining 551 organizations to introduce the study design and purpose, invite their participation, and provide the survey link. Thirty-five of these contacts no longer worked at the organization (6%) and emails for five of the organizations bounced back (<1%). Of the remaining 511 organizations, 17 respondents screened out (3%) because their organization did not meet inclusion criteria. We received complete (n = 76) or partial responses (n = 31) from 107 organizations. We did not include the partial responses because they only included information about organizational background and at most one other domain from the

questionnaire.

We recruited an additional 89 organizations through announcements placed in the Community Progress newsletter and Facebook page and referrals from organizations who participated in the survey study. Sixty-three percent (n = 56) of these 89 organizations completed or partially completed the questionnaire, and 43 of these responses were considered complete enough to include in the final sample.

Our final sample included 119 organizational responses. They represent greening organizations from 27 states, Washington D.C. and Puerto Rico. In the final sample, 76 (64%) were recruited through the Community Progress listserv and 43 (36%) were recruited through Community Progress newsletter and Facebook postings, and referrals. Due to missing data on variables needed for this analysis, our analytic sample for the resident engagement analysis was 68. We elected not to impute missing data because we could not assume missingness was random given that local policy and contextual factors that we did not measure may motivate one organization versus another to complete the items.

3.2. Procedures

We administered a one-time, web-based survey through the Qualtrics online survey platform to the organization's executive director or equivalent key contact person within participating organizations. The survey covered a range of topics including staffing, geography, inventory, budget and funding trends, program activities, partnerships, resident engagement, youth engagement, and short answer responses. Each organization was assigned a unique survey link so that the contact person could collaborate with colleagues who were knowledgeable about different aspects of their work to complete their organization's response. Organizations that greened vacant property but did not own an inventory answered a minimum of 37 questions and a maximum of 50 questions, depending on skip logic. Organizations that owned an inventory were prompted to answer additional questions about the properties they held, answering a minimum of 57 question and a maximum of 85 questions. The survey was self-administered online and was available for 3-months. We sent reminder emails and made follow-up phone calls to increase participation in the survey and minimize non-response bias.

3.3. Measures

3.3.1. Resident engagement index

3.3.1.1. Communication. Organizations reviewed a checklist and selected the activities they had used to communicate with residents from the community they served over the past year. Possible activities included door knocking, personal phone calls, informal face-to-face communication, presentations at neighborhood events or meetings, mailings and/or e-newsletter, website or social media accounts (i.e. Facebook, Twitter, Instagram), local media (i.e. radio, TV, newspaper), annual or quarterly reports, and other method (write-in response). Responses were coded 0/1 (No/Yes). We counted the total number of communication activities organizations reported using in the past year. Scores could range from 0 to 9.

3.3.1.2. Input. Organizations reviewed a checklist and selected the activities they had used to solicit input from the residents over the past year. Possible activities included interviews, focus groups, surveys, town hall meetings/community forums, informal discussions, community advisory boards, and other method (write-in response). Responses were coded 0/1 (No/Yes). We counted the total number of input activities organizations reported using in the past year. Scores could range from 0 to 7.

3.3.1.3. Involvement. Resident involvement was assessed with two sets of questions. First, we asked organizations to indicate how they had involved residents in planning and decision-making over the past year. Possible activities included annual program planning, long-term strategic planning, serving on the organization's board, serving on advisory groups (e.g. community advisory board), holding key leadership roles on the staff or board, performing maintenance and/or greening work as a paid staff or volunteer, fundraising, and other method (write-in response). Responses were coded 0/1 (No/Yes). We counted the total number of activities they had involved residents in over the past year. Scores could range from 0 to 8.

Our second measure of resident involvement addressed how organizations engaged residents in implementing greening work as a paid staff or volunteers. For these organizations, we assessed if residents were involved in greening through any of the following activities: site identification, design selection, implementation, ongoing maintenance/stewardship, and other method (write-in response). We counted the total ways residents were engaged in greening. Scores could range from 0 to 5.

3.3.2. Covariates

We also included several potential spurious variables that may be related to both organizational functioning and resident engagement. These included: 1) organization type (e.g. land bank, nonprofit corporation, government agency, or other); 2) number of years since the organization began working with vacant property (e.g. lots, structures); 3) the number of full-time staff; 4) the number of volunteers, and 5) the total organizational budget.

3.3.3. Organizational functioning

We assessed three areas of organizational functioning: networking capacity, programmatic capacity, and resource capacity. We standardized each of these constituent variables described below and summed them to create an overall organizational functioning score.

3.3.3.1. Networking capacity. Networking capacity was assessed with two items: 1) the number of organization types the responding organization partnered with across sectors and 2) the number of different types of resources these partners provided to their programming. Types of partners assessed included law enforcement, city government agency, land bank authority, county government, state government, federal government, small businesses, corporations, other private entities, community organizations, faith-based organizations, nonprofits, educational organizations, and other partner (write-in response). Types of resources obtained from partners included materials/supplies, staffing/personnel, volunteers, training, technical assistance/consulting, evaluation, legal, information technology, data, planning, networking, and other resource (write-in response). Responses were coded 0/1 (No/Yes). Responses were summed across the two items. Scores could range from 0 to 26. The mean for Networking Capacity was 7.3 (STD = 5.3).

3.3.3.2. Programmatic capacity. We included one item to assess the greening activities currently occurring in their geography served, including those performed or contracted by their organization, and those performed or contracted by both their organization and other organizations in their service area. Greening activities assessed included maintenance (e.g. mowing, trash removal), securing vacant property (e.g. board ups, locks), basic landscaping, community gardens, market gardens, green infrastructure, orchard, natural habitat restoration, creative placemaking, pop-up establishments, new small parks, new large parks or trail systems, energy, and other activity (write-in response). We counted the total number of types of activities the organization had engaged in. Scores could range from 0 to 14. The mean for Programmatic Capacity was 5.1 (STD = 3.0).

3.3.3.3. Resource capacity. We included one item to assess the percent of their total organizational revenue that came from different sources. Sources assessed included federal grants, other government grants, foundation grants, corporate grants, earned revenue, donation/gifts, in-kind support, recurring local or county funding (e.g. tax recapture, revolving funds), non-recurring local or county funding (e.g. general fund allocations), and other source (e.g. borrowing, investments) (write-in response). To assess diversified funding, we calculated the total number of funding sources that accounted for 10% or more of the total organizational revenue. The mean for Resource Capacity was 2.3 (STD = 1.1).

3.3.3.4. Organizational functioning score. Consequently, our dependent variable, organizational functioning, was an index of the networking capacity, programmatic capacity, and resource capacity variables. We first standardized the variables and then calculated a sum. The mean was 2.1 (STD = 2.8).

3.4. Calculation: analytic approach

We first calculated descriptive statistics. This included *t*-tests for differences in key characteristics, including our covariates, between organizations that were recruited via the Community Progress listserv, versus other means such as those that responded to advertisements in the Community Progress newsletter, on social media, or that were recruited via referral from survey participants. We then calculated Pearson correlations among dependent and independent variables. We conducted attrition analysis to see how the organizations included in our analysis and those excluded due to missing data differed or not by organization type and other variables that were not missing.

Next, we estimated multiple linear regression models to test for associations between organizational functioning and three measures of resident engagement, while controlling for key attributes. We used hierarchical regression to test the additive effects of the three resident engagement predictor variables as follows:

Model 1: base model with covariates and no engagement predictors
Model 2: base model with covariates and communication engagement predictor
Model 3: base model with covariates and communication and input engagement predictors
Model 4: base model with covariates and communication, input, and involvement-planning engagement predictors
Model 5: base model with covariates and communication, input, involvement-planning, and involvement-greening engagement predictors

We evaluated whether each subsequent model provided a significant improvement to the previous model using the Aikaike's Information Criterion (AIC) to assess R square change, the F-statistic for the difference, and the corresponding p-value for the F-statistic (i.e., F-change). A significant F-change indicates that added variables improved prediction of organizational functioning. All statistical analyses were completed in Stata v15 (StataCorp LLC., 2021).

4. Results

Participant organizations on average had been operating for 26 years, but had only begun greening vacant property in the past 16 years (see Table 1). On average, they employed 70 full-time staff, 10 part-time staff, and 39 volunteers. The majority of participants were either nonprofit organizations (40%), land bank authorities (32%), or government agencies (15%), while the rest were community organizations, redevelopment authorities or other designation (13%). Most participants reported that their organizations perform greening work, and that they own property (65%), while the remaining (35%) conduct greening work but do not own land.

Table 1
Characteristics of survey participant organizations.

	Mean	St. dev
Annual budget (mill)	1.7	7.2
Year began vacant property work	2004	27
Full-time staff (n)	70	311
Part-time staff (n)	10	39
Shared staff (n)	6	43
Volunteers (n)	39	108

We found no significant differences in organizational descriptive characteristics by recruitment method (Community Progress listserv vs. other) except in the length of time reported engaging in vacant property greening. Participants recruited via the Community Progress listserv on average have been doing vacant property greening for a shorter time (9 years) than participants recruited via other means.

4.1. Resident engagement indices

As shown in Fig. 1, the most frequent method of communicating with residents indicated was through formal presentations (76%), followed by website or social media (73%), informal face-to-face (67%), mailings (56%), and less than half of participants indicated that they communicated via local media, reports, door-knocking, or phone calls. The most frequently indicated method for gathering resident input was informal discussion (73%). Next, 54% of participants gathered input via town hall meetings, and fewer than 40% conducted surveys, focus groups or interviews. Approximately 32% of participants indicated gathering input via a community advisory board.

Over 40% indicated that they involved residents via advisory groups (e.g. community board). About a third of participants indicated that they involved residents in long-term strategic or annual program planning and less than one quarter engaged residents in fundraising, or in leadership positions on their staff or board. Over half of these participants indicated that they involved residents in performing vacant property greening activities. Of the listed methods to involve residents in implementing vacant property greening, the most frequent method indicated was via maintenance (43%). Less than 40% of participants indicated that they involved residents in site identification, implementation, and design.

We found evidence of high correlation ($r = 0.81$) between number of full-time staff and organization budget (see Appendices A & B), while the remainder of covariates were uncorrelated ($r < \pm 0.39$). We therefore excluded budget from regression analyses. We did not find evidence of correlation among engagement measures.

4.2. Resident engagement and organizational functioning

Table 2 shows estimates of association between Organizational Functioning and various resident engagement indicators, from regression models adjusted for number of full-time staff, number of volunteers, organization type, and number of years working with vacant property. Additive models with engagement measures, beginning with communication and ending with involvement in greening, showed improved model fit for Models 2 through 5. While Model 4 had the lowest AIC value, Model 5 had a similar AIC value and the highest R square value, which included all forms of engagement. There was a consistent statistically significant, positive association between resident involvement in planning and organizational functioning. Estimates were statistically significant and in a positive direction for communication in Models 2 and for input in Model 3, but became non-significant once involvement in planning was added to Models 4 through 5. In addition, resident involvement in greening was significantly associated with

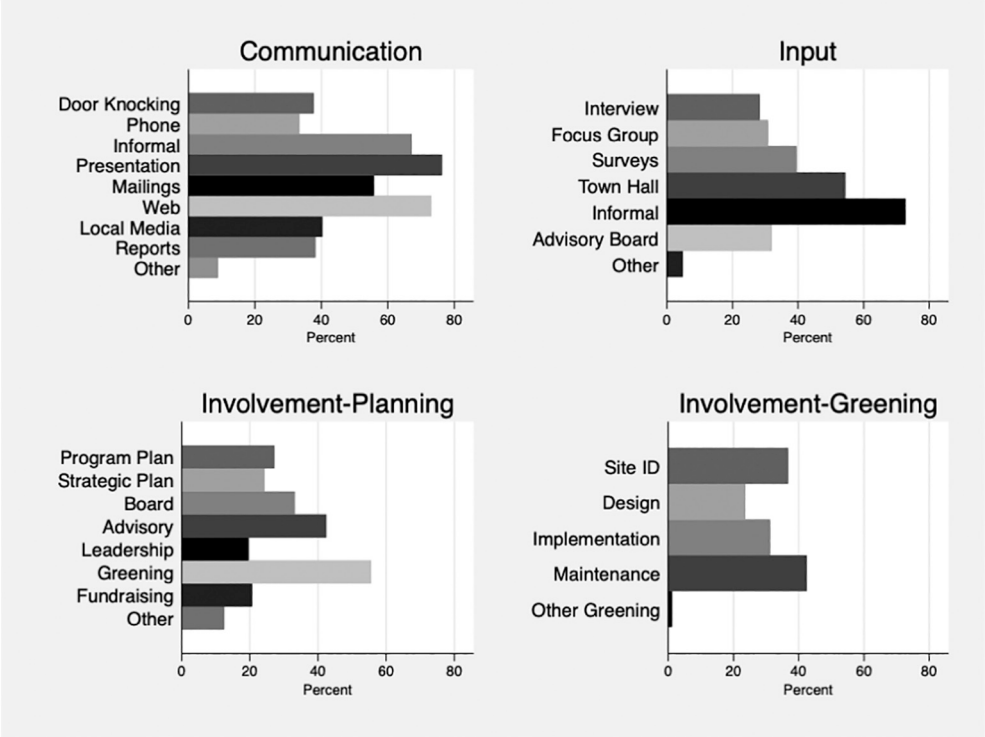

Fig. 1. Percent of organizations (survey participants) that indicated use of resident engagement sub-method (n = 67).

Table 2
Adjusted regression estimates of association between resident engagement and organizational functioning[a,b].

	(1)	(2)	(3)	(4)	(5)
Full-time staff	−0.001	−0.001	−0.002	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Volunteers	−0.001	0.007	0.005	0.004	0.003
	(0.002)	(0.003)	(0.003)	(0.194)	(0.002)
Organization type	0.400	0.242	0.207	−0.130	−0.088
	(0.260)	(0.224)	(0.210)	(0.194)	(0.176)
Years since began vacant lot work	0.010	−0.007	−0.006	0.001	0.004
	(0.016)	(0.012)	(0.148)	(0.010)	(0.009)
Communication		0.496**	0.315	0.130	0.075
		(0.147)	(0.148)	(0.133)	(0.123)
Input			0.620**	0.076	−0.109
			(0.198)	(0.204)	(0.192)
Involvement-planning				0.819***	0.666***
				(0.171)	(0.159)
Involvement-greening					0.653***
					(0.168)
N	101	70	69	69	68
R^2	0.039	0.293	0.387	0.554	0.643
R^2 change		0.254	0.094	0.167	0.089
AIC	540.7	329.0	328.5	292.8	296.8
F(df) change		19.1	8.7	22.9	14.3
		(1,64)	(1,62)	(1,61)	(1,59)
p-value		0.000	0.004	0.000	0.000

[a] Standard errors are shown in parentheses ().
[b] *p < 0.05, **p < 0.01, ***p < 0.001.

organizational functioning.

4.3. Attrition analyses

We conducted attrition analysis among those organizations included in our final analysis (N = 68) and those excluded because of missing data (N = 43). We found that government organizations were more likely to be excluded ($\chi^2 = 11.06$; p = 0.01). In addition, excluded organizations reported lower organizational functioning than those included in the analysis (t = 10.36; p < 0.01). We found no differences between those included and excluded in the analysis on the number of years since they began working with vacant property (t = 0.23; ns), the number of volunteers (t = 0.55; ns) or number of full-time staff (t = 1.64; ns).

5. Discussion

Our results support our hypothesis that higher functioning of vacant land management organizations is associated with greater levels of resident engagement in their work. These effects are present even after controlling for organizational type, number of years working with vacant property, size of staff, and number of volunteers. In addition, our final model indicated that organizational functioning was most associated with the highest level of resident engagement: involvement in planning and implementing the greening activities. It is also notable that indicators of the lower-level resident engagement activities (i.e., communication, input) were not associated with organizational functioning once the higher levels of engagement were entered in the equation. These results provide compelling evidence that resident involvement in planning and implementation plays a vital role in vacant lot greening in communities challenged by vacancy and economic decline.

Several possible mechanisms may explain this relationship. Resident involvement may help organizations expand their networks and identify new partners to further their goals. Broader networks may expand access to funders and resources to enhance program capacity (Glickman & Servon, 1998). Involving residents may support organizations to tap into community priorities for greening vacant land (e.g. food access, creative arts, placemaking), potentially enabling them to diversify program offerings (Schilling & Logan, 2008). Organizations that involve residents may be more successful at advocating for their interests to policymakers and funders because they can more credibly represent the communities they serve (Glickman & Servon, 1998). Funders such as community foundations commonly require resident engagement before they will fund programs and services (Giloth, 2018). Involving residents may therefore increase eligibility and access to funding that help

organizations diversify their revenue sources. Future studies, should examine these and other potential pathways by which resident engagement may support organizational functioning.

We found it was far more common for organizations to engage residents at lower levels such as by communicating or soliciting input. Organizations often prefer more traditional modes of participation that emphasize informing and consulting residents (Mattern, 2020; Monno & Khakee, 2012). These less intensive modes of engagement minimize perceived threats of shared decision-making on organizational autonomy (Beierle & Cayford, 2002; Monno & Khakee, 2012; Moynihan, 2016). Our findings do suggest potential benefits of communicating and soliciting input, and in some cases, this may be the highest degree of engagement that residents care to participate in or that organizations can effectively manage. To avoid the pitfall of engagement theater, organizations engaging at this level may benefit from communicating transparently about how resident input will be incorporated and the outcomes of participation (International Association for Public Participation, 2018; Kamols et al., 2021). Organizations may additionally require staff training to navigate organizational constraints to ensure that innovations generated from participation are not simply co-opted but allowed to shape programs and policies in ways that benefit residents (Kamols et al., 2021).

While it was least common to involve residents in planning and implementing greening, these higher levels of engagement were associated with positive indicators of organizational functioning. Intensive involvement in planning and implementation may require greater time, staff expertise, and resources to coordinate, which may deter organizations from facilitating engagement at this level (Moynihan, 2016). In some cases, such as when residents lack interest or capacity to engage, or in emergency situations when decisions must be made quickly and efficiently to ensure community safety, involvement of residents may be more difficult to achieve (Kimmelman, 2021). Organizations may benefit from striving only for the highest level of engagement that is feasible for their organization and community (Kamols et al., 2021). Nevertheless, our findings linking resident involvement to higher organizational functioning suggest that organizations may benefit from training to increase their readiness to effectively manage the complexities of more intensive resident involvement. Organizations may also benefit from resource support that enables residents to become involved in greening and to sustain their involvement.

The hypothesis tested in this study was inspired by our previous qualitative study of established vacant land management organizations and their partners in three cities (Rupp et al., 2021). Participants in the study reported that resident involvement in their work was helpful for increasing program capacity and sustainability. Our findings are therefore consistent with our prior qualitative work, which increases our confidence in our results. Our results are further consistent with other studies that have linked organizational capacity and resident engagement (Neshkova & Guo, 2012).

5.1. Limitations

While our results support our hypotheses, the study has several limitations that require attention. First, our measures assess only the type and number of activities organizations used to engage residents. They do not assess how frequently organizations employed each resident engagement activity, the reach of these activities, or the degree to which residents elected to engage in these activities. As discrepancies frequently exist between opportunities for engagement and actual resident influence, future studies could explore the level of resident influence on decision-making as a potential predictor of organizational functioning. Similarly, our measures are based on self-report from key organizational personnel, which may introduce bias. Yet analyses with our more general measure of engagement indicated that the various types of engagement explained variation in organizational functioning, as hypothesized. Future research that assesses resident engagement through additional sources (e.g., administrative records, residents' perspectives) may help to examine the relationship between engagement and functioning in greater depth. It would also be useful in future studies to measure additional demographic variables and contextual features (e.g. location or concentration of vacant lots) that may influence resident capacity to engage in vacant lot greening.

A second limitation is that our study was cross-sectional and we are therefore unable to make causal inferences. Although we cannot determine if resident involvement enhances organizational functioning or if high functioning organizations are more equipped to involve residents, our results do suggest that these factors are associated beyond other forms of engagement and relevant control variables. It is also notable that the association of lower levels of engagement with organizational functioning was no longer significant after we included the more involved engagement variables. This suggests that the association between functioning and engagement is primarily driven by residents' involvement in defining and creating the change in their neighborhoods.

A third limitation of our study is that our overall response rate was low. This may limit our generalizability to all organizations involved in greening vacant lots. Nevertheless, our sample did include organizations from 27 states, and is the first and only study of its kind to assess resident engagement practices and organizational functioning among vacant land management organizations involved in greening. This geographic dispersion represents 93% of all states with land bank enabling legislation. It is also the largest survey of greening organizations that goes beyond descriptive information. Notably, the results are consistent with our a priori hypotheses that resident engagement will be associated with organizational functioning.

Our initial sample size was reduced due to missing data on variables necessary for the analysis. The length of survey may have resulted in respondents skipping resident engagement or organizational functioning items, which were located toward the end of the survey. Our attrition analyses indicated that our analytic sample was somewhat different than our overall sample. Government organizations and lower functioning organizations were more likely to be excluded due to missing data. Organizations were excluded if they did not complete resident engagement variables. It is possible that organizations which use fewer resident engagement strategies skipped answering engagement questions because they were less relevant to them. If this was the case, this would actually support our results, because excluded organizations were also lower functioning. Organizations that were included and excluded were similar on all other variables examined.

Finally, while we are not able to say definitively if vacant land management organizations that involve residents can green more land or deliver more beneficial programs, we do suggest that these organizations may be better equipped to address expanding vacant lot inventories given their more diversified partner networks, programmatic offerings, and revenue sources, which are helpful for increasing capacity and supporting long-term sustainability (Frumkin & Keating, 2011; Glickman & Servon, 1998; Schilling & Logan, 2008; Wright & Reames, 2020).

6. Conclusion

Vacant land management organizations serve a vital role in post-industrial cities contending with large inventories of vacant land. While resident engagement is widely considered beneficial for greening program outcomes and is frequently required for vacant land management organizations, few researchers have explored how these organizations engage residents and how different modes of engagement might be related to their functioning. Our study suggests that less intensive but more representative forms of engagement such as communicating and soliciting input were the most popular ways of engaging residents, but that the association between these forms of engagement and organizational functioning decreased when we accounted for the role of involving residents in planning and greening. This suggests the value of

more intense resident involvement in and community voice in planning and implementing programs to green vacant land. Vacant land management organizations face many challenges, such as increasing inventories of vacant lots and few resources to manage them. Efforts to engage, and particularly to involve, community residents may be an avenue to respond to these challenges by enhancing organizational capacity to network, deliver responsive programming, and obtain diverse revenue sources. Yet involving residents may require organizations to expend more resources and have the technical skill to coordinate resident participation in their work. It may also be more taxing for residents in low-resource communities experiencing high vacancy where residents may already have limited time or resources to engage or sustain their engagement. Organizations and communities may therefore require additional training and resource support to facilitate resident involvement. Our findings are based on the first national survey of vacant land management organizations in the U.S. and provide useful guidance to inform future policy and practice.

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CRediT authorship contribution statement

Laney A. Rupp: Conceptualization, Writing – original draft, Writing – review & editing, Project administration. **Michelle C. Kondo:** Conceptualization, Methodology, Formal analysis, Writing – original draft. **Bernadette C. Hohl:** Writing – review & editing. **Evaine K. Sing:** Writing – review & editing. **Alison R. Grodzinski:** Writing – review & editing, Project administration. **Marc A. Zimmerman:** Conceptualization, Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

None.

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Appendix A and B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cities.2022.103669.

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