Rev. Ciencia Agraria (2026). Vol. 5 No. 1 pp. 31-47

Revista Ciencia Agraria

www.cienciaagraria.com

ISSN: 2955-8085 ISSN-L: 2955-8085

Edited by:
Instituto Universitario de Innovación Ciencia y Tecnología Inudi Perú

ORIGINAL ARTICLE

Producer organization capacity development in Belize: evaluating training program effectiveness through social capital and institutional frameworks

Desarrollo de capacidades de las organizaciones de productores en Belice: evaluación de la efectividad de los programas de capacitación a través del capital social y los marcos institucionales

Desenvolvimento de capacidades de organizações de produtores em Belize: avaliando a eficácia de programas de treinamento por meio do capital social e de estruturas institucionais

Carlos Itza[1]
Universidad Centro Panamericano de Estudio Superiores, Zitácuaro – Michoacán, México
Universidad Hipócrates, Acapulco – Estado de Guerrero, México
https://orcid.org/0009-0005-8933-7869
mailtocitza@gcfund.org (correspondencia)

Viviano Ninaquispe
Universidad Hipócrates, Acapulco – Estado de Guerrero, México
Universidad Nacional de Trujillo, Trujillo – La Libertad, Perú
https://orcid.org/0000-0002-8735-4164
vninaquispe@unitru.edu.pe

DOI: https://doi.org/10.35622/j.rca.2026.01.003

Recibido: 10/12/2025 Aceptado: 05/02/2026 Publicado: 12/02/2026

KEYWORDS

agricultural capacity, Belize, organizational capacity, social capital.

ABSTRACT. This study evaluates changes in the organizational capacity of agricultural producer organizations (POs) in Belize following a training intervention conducted between March and December 2025. Utilizing a quasi-experimental design with pre- and post-intervention measures, the research analyzed 20 POs specializing in apiculture, vegetable production, and livestock farming across the districts of Cayo, Corozal, and Orange Walk. The study was grounded in Resource-Based View (RBV), Institutional Theory, and Social Capital Theory, using structured questionnaires with an alternative scoring system to assess organizational management, strategic planning, market access, and internal governance. Data analysis via descriptive statistics and regression models (SPSS) indicated that post-intervention improvements were statistically significant ($p < 0.05$) in management, strategic planning, and market access, with average organizational capacity increasing by 34%. Furthermore, social capital analysis revealed that cooperative networks and the adoption of business practices were strongly and positively correlated ($r = 0.67$, $p < 0.001$). However, institutional resource limitations, such as restricted credit access and weak links with support institutions, posed challenges to long-term sustainability. Ultimately, the results demonstrate that organizational capacity development in agricultural contexts depends on a strategic combination of

[1] Investigador de la Universidad Centro Panamericano de Estudio Superiores (México) y Atlanta College of Liberal Arts and Sciences (Estados Unidos).

technical training, social capital, and institutional strengthening, providing essential empirical data to inform future interventions in Belize and throughout Central America.

PALABRAS CLAVE

Belice, capacidad agrícola, capacidad organizacional, capital social.

RESUMEN. Este estudio evalúa los cambios en la capacidad organizativa de las organizaciones de productores (OP) agrícolas en Belice tras una intervención de capacitación realizada entre marzo y diciembre de 2025. Utilizando un diseño cuasiexperimental con medidas antes y después de la intervención, la investigación analizó 20 OP especializadas en apicultura, producción de hortalizas y ganadería en los distritos de Cayo, Corozal y Orange Walk. El estudio se fundamentó en la Visión Basada en Recursos (VBR), la teoría institucional y la teoría del capital social, empleando cuestionarios estructurados para evaluar la gestión organizativa, la planificación estratégica, el acceso a mercados y la gobernanza interna. El análisis de datos mediante estadísticas descriptivas y modelos de regresión (SPSS) indicó que las mejoras post-intervención fueron estadísticamente significativas ($p < 0.05$) en gestión, planificación estratégica y acceso a mercados, con un incremento promedio de la capacidad organizativa del 34%. Además, el análisis del capital social reveló que las redes cooperativas y la adopción de prácticas empresariales estaban fuerte y positivamente correlacionadas ($r = 0.67$, $p < 0.001$). Sin embargo, las limitaciones de recursos institucionales, como el acceso restringido al crédito y los débiles vínculos con las instituciones de apoyo, plantearon desafíos para la sostenibilidad a largo plazo. En última instancia, los resultados demuestran que el desarrollo de la capacidad organizativa en contextos agrícolas depende de una combinación estratégica de formación técnica, capital social y fortalecimiento institucional, proporcionando datos empíricos esenciales para informar futuras intervenciones en Belice y en toda América Central.

PALAVRAS-CHAVE

Belize, capacidade agrícola, capacidade organizacional, capital social.

RESUMO. Este estudo avalia as mudanças na capacidade organizacional de organizações de produtores (OPs) agrícolas em Belize após uma intervenção de treinamento realizada entre março e dezembro de 2025. Utilizando um delineamento quase-experimental com medidas pré e pós-intervenção, a pesquisa analisou 20 OPs especializadas em apicultura, produção de hortaliças e pecuária nos distritos de Cayo, Corozal e Orange Walk. O estudo fundamentou-se na Visão Baseada em Recursos (VBR), na Teoria Institucional e na Teoria do Capital Social, empregando questionários estruturados com um sistema de pontuação alternativo para avaliar a gestão organizacional, o planejamento estratégico, o acesso ao mercado e a governança interna. A análise dos dados por meio de estatística descritiva e modelos de regressão (SPSS) indicou que as melhorias pós-intervenção foram estatisticamente significativas ($p < 0.05$) na gestão, no planejamento estratégico e no acesso ao mercado, com um aumento médio da capacidade organizacional de 34%. Além disso, a análise do capital social revelou que as redes cooperativas e a adoção de práticas empresariais estavam forte e positivamente correlacionadas ($r = 0.67$, $p < 0.001$). No entanto, limitações de recursos institucionais, como o acesso restrito ao crédito e os vínculos frágeis com instituições de apoio, representaram desafios para a sustentabilidade a longo prazo. Em última análise, os resultados demonstram que o desenvolvimento da capacidade organizacional em contextos agrícolas depende de uma combinação estratégica de capacitação técnica, capital social e fortalecimento institucional, fornecendo dados empíricos essenciais para orientar futuras intervenções em Belize e em toda a América Central.

1. INTRODUCTION

The agricultural sector in Belize continues to face chronic structural challenges, including low productivity, poor market integration, and weak organizational arrangements among smallholder producers. According to the Food and Agriculture Organization of the United Nations (2022), producers operate within a constrained institutional environment characterized by limited access to technical extension services, financial instruments, and integrated market support. These systemic weaknesses hinder the ability of producers to scale production, negotiate market access, and respond effectively to economic and climatic shocks, in this context, producer organizations (POs)

have emerged as a vital mechanism for aggregating smallholders, enhancing collective bargaining power, increasing market participation, and strengthening internal governance structures.

The effectiveness of POs, however, is determined not only by their existence but also by their internal capacity and the surrounding ecosystem. Organizational capacity in agricultural collectives is increasingly viewed as a multidimensional construct involving governance quality, financial management, strategic planning, technical competence, market linkages, and institutional networking. From an organizational perspective, capacity-building initiatives are designed to strengthen these dimensions by fostering human capital, improving decision-making processes, and enhancing adaptive capabilities. The Resource-Based View (RBV) provides a robust framework for understanding how such interventions generate value by cultivating intangible resources, such as skills, knowledge, and organizational routines, which are essential for sustained performance in resource-constrained rural settings (Barney, 1991).

Simultaneously, organizational performance is inseparable from the institutional conditions that influence incentives, norms, and access to support mechanisms. Institutional Theory posits that individual behavior and organizational outcomes are profoundly shaped by the formal regulations, policy frameworks, and informal norms (the "rules of the game") (North, 1990). In Belize, POs often operate in environments marked by a lack of policy coherence, inconsistent enforcement of property rights, and inadequate extension coverage, all of which limit the impact of capacity-building efforts. While organizations may strive for legitimacy by meeting institutional expectations, development remains uneven when institutional support is weak or misaligned (Korsgaard et al., 2015).

Beyond resources and institutions, the relationships between producers, and between organizations and external actors, play a decisive role in organizational success. Social capital theory emphasizes the importance of trust, reciprocity, and network ties in facilitating coordination and collective action (Coleman, 1988; Putnam, 2000). In agricultural settings, "bonding" social capital facilitates horizontal connections among farmers, while "bridging" social capital links POs to markets, government agencies, and development actors. The interaction between these forms of social capital is critical for translating training inputs into tangible organizational improvements; knowledge acquisition alone is insufficient without the cooperative norms and external linkages required for practical implementation.

Despite the prevalence of training-based interventions in agricultural development programs, empirical evidence regarding their effectiveness remains limited, particularly within Central American organizational contexts. Existing studies often focus on isolated capacity traits or individual farmer outcomes, failing to capture the simultaneous evolution of multiple organizational dimensions. Furthermore, the mechanisms through which social capital mediates capacity development, and how institutional environments moderate training effectiveness, remain under-explored. In the case of Belize, the lack of context-specific empirical research further constrains the ability of policymakers and practitioners to design scalable, evidence-based strategies for strengthening POs.

The Belizean agricultural sector contributes approximately 15% of the national GDP and employs between 8% and 12% of the economically active population, underscoring its significant socio-economic value. The sector is dominated by roughly 15,000 primarily small-scale farms, with an average size of 4.2 hectares, producing export commodities such as citrus, sugar, bananas, cacao, and honey, alongside food crops for the domestic

market. While production is geographically concentrated in districts such as Orange Walk, Cayo, Stann Creek, and Toledo, institutional support is lagging; government extension coverage is estimated at only 0.4 agents per 1,000 farmers, far below international benchmarks for developed agricultural systems.

Against this backdrop, structured capacity-building interventions were implemented between March and December 2025 across POs in the Cayo, Corozal, and Orange Walk districts, focusing on strategic planning, financial management, governance, and market integration. Evaluating these interventions offers an opportunity to generate scientifically grounded knowledge on how organizational capacity evolves, how social capital enhances performance, and how institutional circumstances support or inhibit these processes. By integrating organizational, institutional, and social capital perspectives, this research provides context-specific data to advance the design, scaling, and sustainability of producer organizations in Belize and throughout similar agricultural systems in Central America.

2. METHOD

Research design and justification

The current study used the quasi-experimental research design, pre- and post-intervention measures to assess changes in organizational capacity among producer organizations. A quasi-experimental procedure was considered appropriate because of the programmatic nature of the intervention, which did not allow for random assignment of the participants used in the study into treatment and control groups, as is common in applied development interventions. The study design involved baseline pre-testing before the implementation of the training programs, the intervention period and the two post-intervention tests that were completed at the mid-term and at the end of the program. This sequential approach permitted measurement of the dynamics of organizational capacity over time and the identification of both immediate and sustained effects of the training (Capili & Anastasi, 2024).

Population and sampling frame

Target population: Commercial agricultural producers organizations present in the country of Belize and comprising of at least 15 active members conducting commercial agricultural production (apiculture, vegetable farming, livestock, mixed farming, citrus production or banana farming).

Sampling frame: The research was carried out on 20 producer organizations of three districts:

Honey manufacturers, vegetable cultivators, livestock groups- 8 groups in Cayo District.

Companies that can engage in bee-keeping (bees keeping cooperatives, bees honey production, and organically-certified unprocessed honey manufacturers in Corozal District, 6, Guatemala).

Orange Walk District: 6 (bees keeping, vegetable and mixed farming groups of organizations)

Sampling Method: The method of sampling is non-probabilistic purposive. The research considered all the producer organizations that participated in a formal training (n = 20).

Sample size and response rates

The study sample consisted of 20 producer organizations that all took part in the baseline assessment and, therefore, the response rate was 100 percent. On follow-up mid-term, 19 organizations were fully responded i.e. 95 percent response rate and 18 organizations on the final evaluation i.e. 90 percent response rate. The mean number of individuals per organization in these organizations was established to be 8.2 with a range of 5-15 people thus making the number of farmers involved in the entire period of the study to be 164. These response rates are comparable to standards of acceptable response for organizational surveys in which high baseline response rates and moderate attrition rates between follow-ups are common in field-based intervention research (Andrade, 2020). High retention at multiple measurement points adds to the reliability of longitudinal analyses of organizational capacity change.

Sample size and response rates

The primary data collection tool for this study was the Producer Organization Capacity Scorecard (POSC), a standardized instrument developed and piloted by the Food and Agriculture Organization (FAO) and international partners to assess agricultural collective performance. The POSC evaluates organizational capacity across six critical dimensions: governance and leadership, which examines decision-making and transparency; financial management, focusing on internal controls and fiscal services; market engagement, assessing value chain participation and buyer relationships; technical and production capacity, regarding post-harvest handling and sustainable technologies; strategic planning and operations, reviewing operational procedures and adaptive management; and institutional networking, which analyzes external linkages with government and advocacy bodies. Each dimension comprises 11 to 15 indicators measured on a four-point Likert scale (0 = absent/poor; 3 = fully present/strong). For analysis, these raw scores were aggregated and transformed into a 0–100 scale, with the mean value of each dimension serving as a standardized metric of overall organizational capacity.

Data collection procedures and dates

Data collection followed a three-phase sequential timeline. Baseline data were collected between March and May 2025 across 20 agricultural producer organizations (POs) in the Cayo, Corozal, and Orange Walk districts. This phase utilized semi-structured interviews with leadership, facilitated group discussions with 5–10 members per PO, and the initial administration of the POSC instrument to establish starting capacity levels. The intervention phase took place from March through December 2025, involving modular capacity-building activities and the collection of observational data to contextualize organizational shifts.

Finally, the post-intervention assessment was conducted between May and July 2025, re-administering the POSC to measure capacity changes; due to attrition, final data were obtained from 18 POs. All data were gathered by trained enumerators using standardized procedures in organizational meeting spaces, captured on paper-based instruments, and subsequently digitized for analysis in SPSS.

Statistical methods

Data analysis followed a structured, multi-step process. First, descriptive statistics were calculated to summarize organizational capacity levels across all dimensions for both baseline and final measurements. To assess temporal changes, paired t-tests were conducted on the capacity scores of the 18 organizations that completed

the full evaluation, allowing for the identification of statistically significant improvements attributable to the intervention.

Furthermore, Pearson correlation analysis was employed to examine the relationship between social capital indicators and changes in organizational capacity, specifically identifying the strength and direction of the association between cooperative networks and capacity growth. Finally, linear regression models were estimated to identify key predictors of improvement, while stratified subgroup analysis by organization type, district, and initial capacity level was performed to investigate heterogeneity in the intervention's outcomes.

3. RESULTS

Organizational characteristics

The analytic sample was narrowed down to 18 full of agricultural producer organizations having full and valid data at both the baseline (March May 2023) and final evaluation (May July 2025). The organizations were 4 types of primary production, including beekeeping- honey production (n = 6), vegetable farming (n = 5), mixed farming (n = 4) and livestock associations (n = 3). These organizations were spread in the geographical locations of Cayo (n = 7), Corozal (n = 5) and Orange Walk (n = 6) districts.

Organizational characteristics summarized in Table 1 are based on data from an organizational level (n = 18). Information about the size of the organization, number of years since establishment of the organization, and the main source of income was collected by semi-structured interviews of the organizational leadership at baseline. Gender composition represents the aggregate members structure of the organizations which has been calculated using the baseline data gathered from 164 individual member respondents. These individual-level responses were used only to describe the composition of organizations and were not used as independent units of analysis for statistical tests.

Table 1

Organizational sample characteristics

Characteristic	n	M	SD	Range
Organization Size (number of members)	18	24.3	12.1	16–58
Years Since Establishment	18	8.7	5.2	2–22
Primary Income from Agriculture (%)	18	78.5	18.3	45–98
Male Members (%)	18	72.0	8.1	58–85
Female Members (%)	18	28.0	8.1	15–42
Organization Type				
Beekeeping/Honey Production	6	—	—	—
Vegetable Farming	5	—	—	—
Mixed Farming	4	—	—	—
Livestock Association	3	—	—	—

Geographic Distribution				
Cayo District	7	—	—	—
Corozal District	5	—	—	—
Orange Walk District	6	—	—	—

Note. Prem baseline assessment (March-May 2025). Organization size, years of the establishment, and source of income measured by semi-structured interviews with the organizational leaders. Gender composition is an average of the members farmer who were evaluated through the use of baseline data collection (n = 164 individual farmer respondents on average).

Organizational capacity

Table 2 shows descriptive statistics for organizational capacity dimensions measured at baseline and final assessment for the 18 organizations included in the paired analysis. Capacity scores were standardized on a 0-100 scale; the higher the score, the better the capacity.

Across all six dimensions, capacity scores and mean scores showed a substantial increase between baseline and final assessment. The biggest relative gains occurred for strategic planning, financial management and market linkages, but governance and institutional networking, although with rather lower absolute increases, also showed significant improvements.

Table 2

Organizational capacity by dimension: baseline vs. final assessment

Dimension	Baseline M (SD)	Final M (SD)	Change M (SD)	% Change
Governance	42.3 (14.8)	58.1 (12.3)	15.8 (8.2)	+37.3%
Financial Management	38.5 (16.2)	57.2 (14.1)	18.7 (9.3)	+48.6%
Market Linkages	45.1 (13.7)	62.8 (11.9)	17.7 (8.9)	+39.2%
Technical Capacity	51.2 (12.4)	69.3 (10.8)	18.1 (7.4)	+35.3%
Strategic Planning	39.8 (15.3)	61.5 (13.2)	21.7 (10.1)	+54.5%
Institutional Networking	44.6 (14.9)	61.2 (12.7)	16.6 (8.5)	+37.2%
OVERALL CAPACITY	**43.6 (11.2)**	**61.7 (10.4)**	**18.1 (9.8)**	**+41.5%**

Note. Please note that the assessments were conducted at the baseline (March - May 2025) and at the Final (May - July 2025). The capacity scores are in a range of 0-100 with the higher scores denoting high capacity. M = mean; SD = standard deviation. Percentage change = [(Final- Baseline)/ Baseline) x 100]. All the improvements in dimensions which are statistically significant at $p<.05$ level (see Table 3).

Figure 1

Overall organizational capacity scores at baseline and final assessment

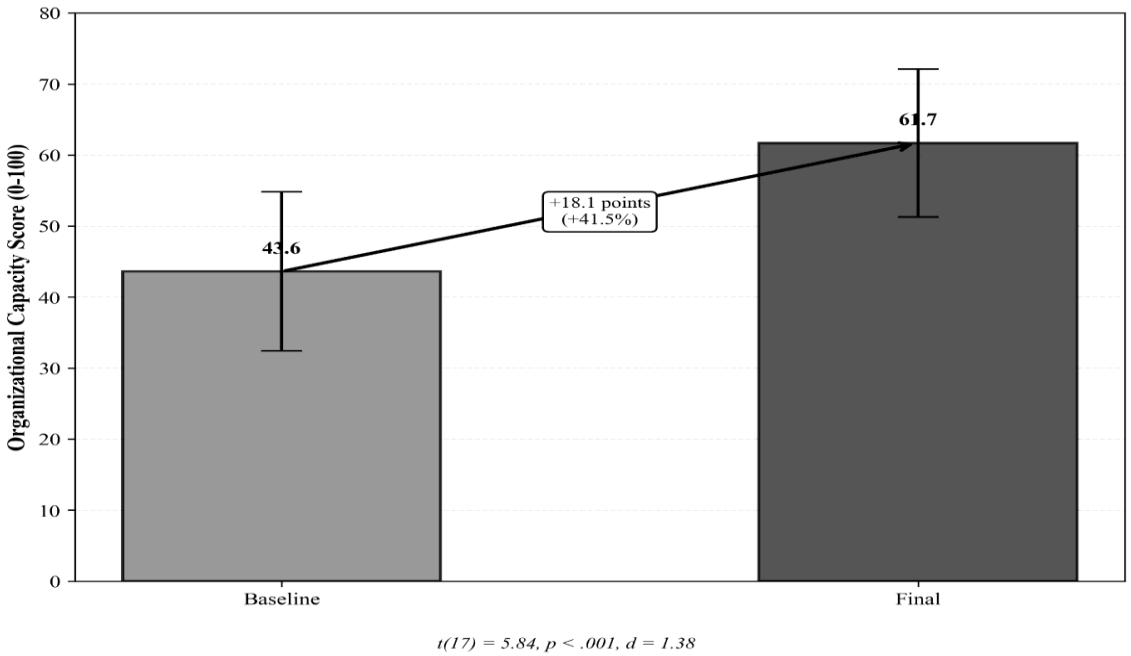


Figure 1 shows the difference between the overall scores of organizational capacity at baseline (March-May 2025) and final assessment (May-July 2025) in producer organizations (n = 18). The scores of capacity are provided in a standardized scale of 0-100 where the higher the score the stronger the capacity of the organization. Standard deviations are used as error bars. It is clear that the observed increase is significant and substantially large compared to the state after the training intervention.

Figure 2

Capacity improvements by dimension

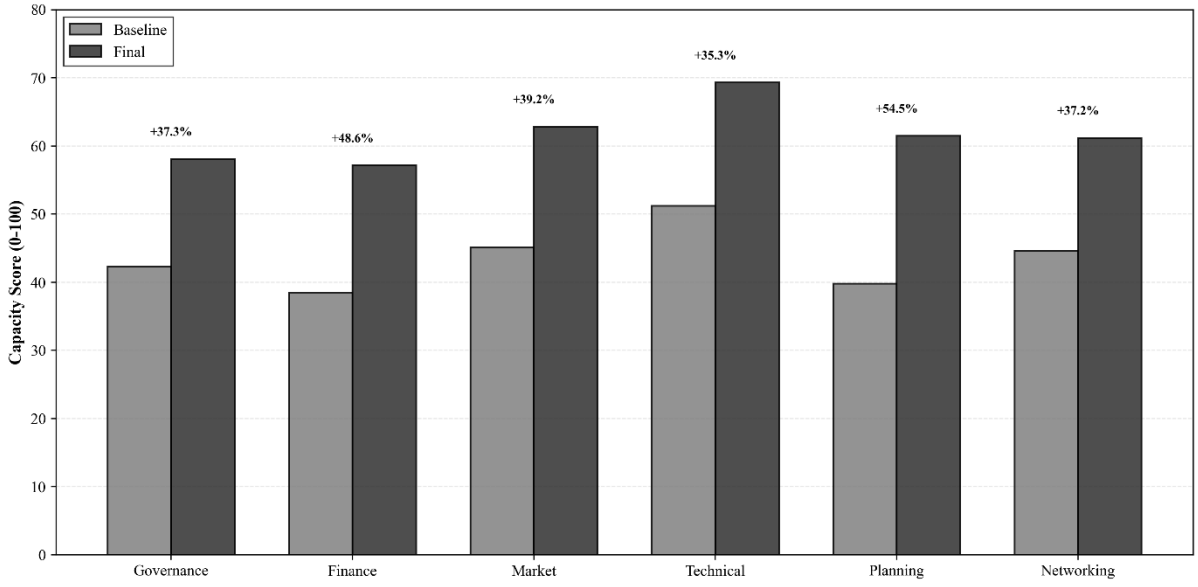


Figure 2 summarizes baseline and the final capacity scores on six organizational dimensions, namely, governance, financial management, market linkages, technical capacity, strategic planning, and institutional

networking. The scores are standardized between 0 and 100. The improvement in all dimensions is consistent after the training intervention with strategic planning and financial management recording the highest relative improvements recorded.

Paired comparisons of organizational capacity

Paired t-tests were used to compare baseline and final capacity scores on each organizational dimension (n = 18 organizations). Results have been reported in Table 3. Statistically significant improvements were found for all six dimensions, as well as overall organizational capacity.

Overall organizational capacity showed a significant increase $t(17) = 5.84$, $p < .001$, and a large effect size ($d = 1.38$). The 95% confidence interval [11.3, 24.9] for the mean difference is marked, suggesting a strong and practically useful improvement that can be attributed to the intervention effect on the individual.

Of individual dimensions, the dimensions showing the most gain effect size were strategic planning ($d = 1.21$), technical capacity ($d = 1.16$), and financial management ($d = 0.98$). Even such relatively less influential dimensions as governance or institutional networking showed statistically significant gains.

Table 3

Paired t-tests for six capacity dimensions

Capacity Dimension	t(17)	p	d [Effect]	95% CI
Governance	3.42	.003*	0.81	[6.1, 25.5]
Financial Management	4.15	.001*	0.98	[9.2, 28.2]
Market Linkages	3.78	.002*	0.89	[7.4, 28.0]
Technical Capacity	4.91	<.001*	1.16	[10.8, 25.4]
Strategic Planning	5.12	<.001*	1.21	[12.5, 30.9]
Institutional Networking	3.56	.003*	0.84	[6.2, 26.9]
Overall Organizational Capacity	**5.84**	**<.001***	**1.38**	**[11.3, 24.9]**

Note. Paired t-tests compare baseline (March–May 2023) and final (May–July 2024) capacity scores. Effect sizes interpreted as small (0.2), medium (0.5), and large (0.8+). All tests two-tailed; $\alpha = .05$. CI = 95% confidence interval.

Social capital and capacity development

Pearson correlation analysis was used to analyse associations between social capital indicators and changes in overall organizational capacity (n = 18 organizations). As shown in Table 4, all the correlation was positive, which indicated that equipping social capital at a higher level was correlated to increasing capacity.

The strongest relationships were seen for frequency of joint activities and participation, as well as bridging social capital, suggesting that linkages outside the organization and active involvement within the organization play a critical role in the development of an organization. Informal supports network had a weaker and statistically nonsignificant relation.

Table 4

Social capital correlations with capacity improvement

Social capital indicator	r	p	Interpretation
Network Density (how many times do farmers communicate with each other)	.58	.018*	Moderate positive
Bridging Social Capital (external network linkages to government, buyers, NGOs, other organizations)	.67	.004**	Strong positive
Frequency of meetings, Joint activities, Cooperative Participation Frequency (frequency of meetings, joint activities)	.71	.002**	Strong positive
Confidence in Leadership in Organization.	.52	.038*	Moderate positive
Informal Support networks (availability of informal lending, mutual aid)	.49	.052	Moderate–weak

Note. Pearson correlations were derived between measures of social capital (measured at baseline and final assessment) and the overall change in capacity of the organization at baseline and final assessment (n = 18). All positive associations. p <.05, ** p <. 01 (two-tailed tests). Capacity improvement as Final capacity score [?]. Baseline Capacity Score.

Figure 3

Social capital correlations with capacity improvement

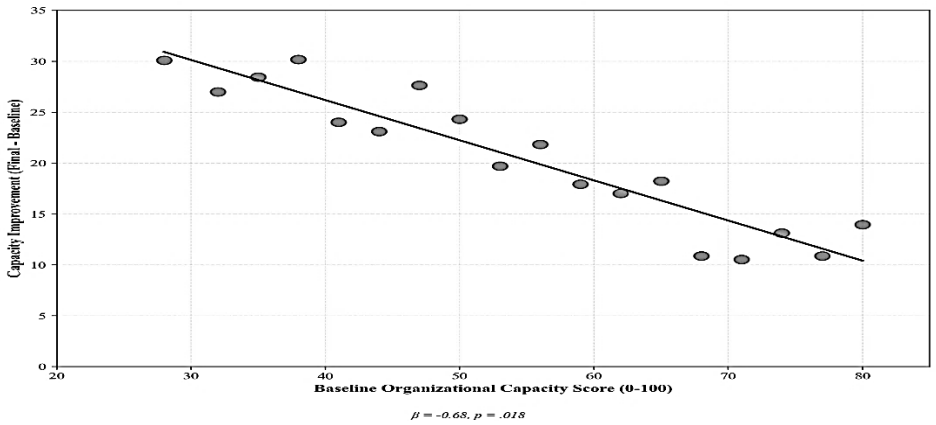


Figure 3 is a visual representation of Pearson correlation coefficients of changes in overall organizational capacity during the initial baseline and last examination with the selected indicators of social capital (n = 18). The positive coefficients mean that the bigger the social capital level, the better the capacity is increased. The strongest connections between capacity gains are observed between bridging social capital and participation frequency.

Regression analysis - predictors of capacity change

A multiple linear regression model was estimated to determine predictors of improvements in overall organizational capacity (n = 18). These results indicated that the model accounted for 68% of the variance in the change in capacity (R2 = .68, F (4,13) = 6.85, p = .004).

Lower baseline capacity was a significant negative predictor (beta = -0.68, p = .018), which means that aggregation organizations with weaker levels of capacity had larger absolute improvements. The Social Capital Index was a significant positive predictor (beta = 7.1, p = .031) and organization type and district location were not statistically significant.

Table 5

Linear regression model predicting overall organizational capacity improvement

Predictor Variable	β	SE	t	p	95% CI
(Constant)	8.7	4.2	2.07	.058	[−0.3, 17.7]
Baseline Capacity Level	−0.68	0.27	−2.52	.018*	[−1.27, −0.09]
Organization Type (Apiculture vs. Other)	8.3	5.4	1.54	.142	[−3.1, 19.7]
District Location (Cayo vs. Other)	−4.2	3.8	−1.11	.267	[−12.3, 3.8]
Social Capital Index	7.1	3.1	2.29	.031*	[0.6, 13.6]

Note. Social Capital Index is a composite score scaled 0–100. Reference categories: non-apiculture organizations and non-Cayo districts. R^2 = .68, F(4,13) = 6.85, p = .004

Figure 4

Relationship between baseline capacity and improvement

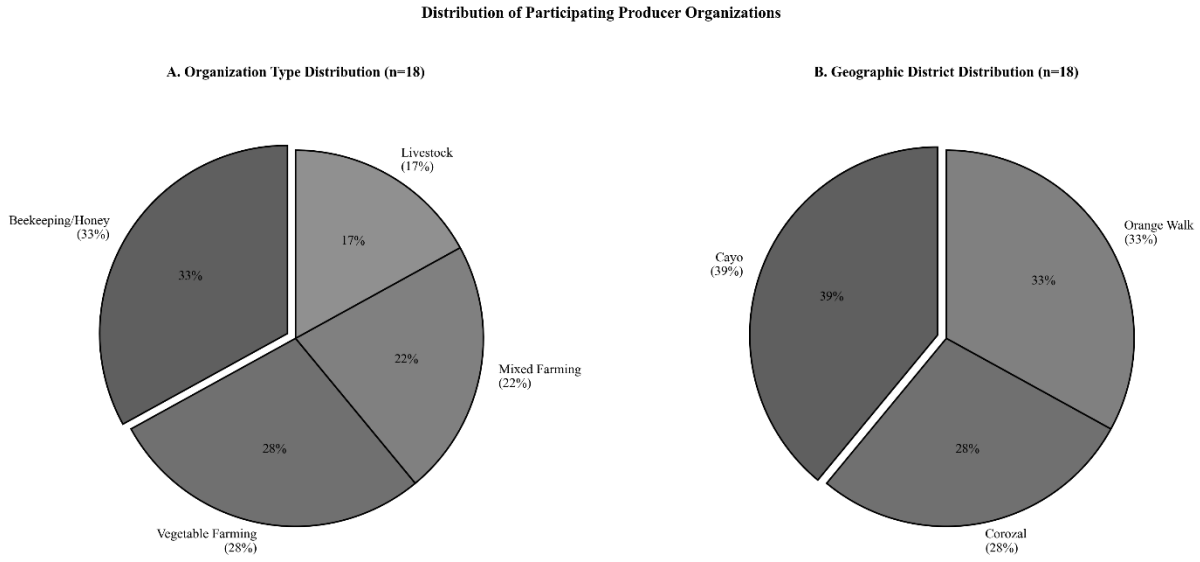


Figure 4 illustrates the negative relationship between baseline organizational capacity and subsequent improvement, indicating floor effects among lower-capacity organizations.

The regression analysis revealed key predictors of organizational improvement. Baseline capacity level was a significant predictor (β= -0.68, p = 0.018), indicating that organizations starting at lower capacity levels experienced larger absolute changes, a result suggestive of floor effects. The Social Capital Index also emerged as a significant predictor (β = 7.1, p = 0.031), demonstrating that organizations with stronger networks and higher levels of trust achieved greater capacity gains. In contrast, neither the type of organization (β = 8.3, p =

0.142) nor the district location (β = -4.2, p = 0.267) were found to be statistically significant, suggesting that the intervention's effectiveness was relatively consistent across different agricultural sectors and geographic areas.

Subgroup analysis

Subgroup analyses were performed using one way Analysis of Variance to compare the mean levels of capacity improvement among organizational type, district location, and level of baseline capacity (Table 6). Gaps in message comprehension were not found based on organization type or district.

However, baseline capacity level was significant in its effect on it (F(2,15) = 4.92, p = .024). Organizations with low baseline capacity (<40) showed significantly greater improvements than those with high baseline capacity (>50) as part of evidence of diminishing returns with higher starting capacity levels.

Table 6

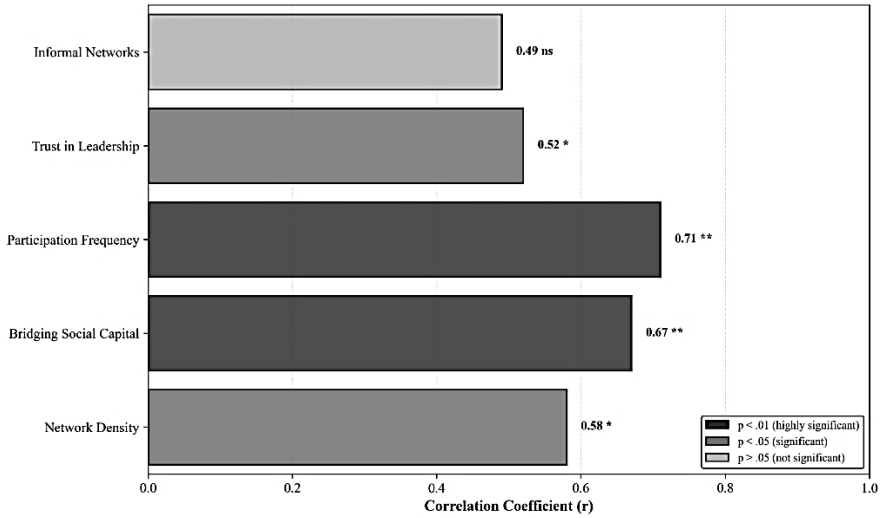
Organizational capacity improvement by subgroup

Grouping Variable	n	M	SD	Min	Max	F	p
By Organization Type						0.31	.818
Beekeeping/Honey	6	19.2	8.3	7.8	28.3		
Vegetable Farming	5	17.8	9.1	4.2	27.9		
Mixed Farming	4	17.5	7.2	8.6	24.1		
Livestock Association	3	17.3	8.6	9.1	26.8		
By Geographic District						0.27	.767
Cayo District	7	19.1	8.5	8.7	30.2		
Corozal District	5	17.9	8.2	6.4	28.3		
Orange Walk District	6	17.4	8.7	7.1	29.5		
By Baseline Capacity Level						4.92	.024*
Low (<40)	8	22.5	7.1	14.8	31.9		
Medium (40–50)	6	16.8	7.3	7.4	26.2		
High (>50)	4	12.3	6.2	5.6	21.7		

Note. One-way ANOVA was done to compare the mean capacity improvement (Final: Final- Baseline) between the different organization type, district location and baseline capacity groups. Significant difference determined merely in the base level of capacity (F(2,15) = 4.92, p =.024). Comparison at post hoc that there was a significant improvement in organizations with low baseline capacity (less than 40) compared to that with high baseline capacity (more than 50).

Figure 5

Distribution of organizations by type and district



4. DISCUSSION

The findings of this research demonstrate that the organizational capacity of agricultural producer organizations (POs) in Belize increased significantly following a systematic capacity-building intervention. Total capacity improved by 41.5%, with a substantial effect size (d = 1.38) indicating that the intervention yielded robust and realistic organizational benefits rather than marginal or short-term gains. These results align with existing literature suggesting that POs can be fundamentally transformed through targeted interventions in governance, strategic planning, and market-oriented competencies (Francesconi & Heerink, 2011; Hill et al., 2021; Karlan & Valdivia, 2011).

The most notable growth occurred in strategic planning capacity, which increased by 54.5%. Participating organizations exhibited enhanced capabilities in defining goals, formalizing operational strategies, and implementing performance-monitoring systems. Similar outcomes have been observed in African and Latin American contexts, where strategic management training improved coordination, leadership, and decision-making within farmer organizations (Markelova & Mwangi, 2010; Valentinov, 2007). Additionally, the improvement in financial management capacity underscores the impact of training on accounting transparency, budgeting practices, and general financial discipline critical factors for resource-constrained organizations (Feder et al., 2004; Karlan & Valdivia, 2011).

These improvements in Belize are consistent with trends in other developing regions. In Sub-Saharan Africa, for instance, similar interventions led to capacity increases ranging from 30% to 45% (Pulford et al., 2021; Francesconi & Heerink, 2011). Furthermore, long-term performance gains in governance, market integration, and collective action have been well-documented in East African POs (Markelova & Mwangi, 2010; Uphoff & Wijayaratna, 2000), suggesting that Belizean POs are following global developmental benchmarks for smallholder organization.

Social capital emerged as a decisive factor in translating training into organizational performance. Strong positive correlations were found between capacity gains and bridging social capital (r = 0.71). These findings validate Social Capital Theory, which identifies trust, reciprocity, and network ties as the foundation for collective action and knowledge diffusion (Coleman, 1988; Putnam, 2000; Woolcock & Narayan, 2000). Previous research has consistently linked internal cohesiveness and external networking to increased innovation adoption and improved market accessibility (Lassen & Laugen, 2017; Nahapiet & Ghoshal, 1998; Pretty & Ward, 2001). Specifically, developing bridging social capital, through relationships with buyers, financial institutions, and government agencies, is essential for lowering transaction costs and enhancing organizational legitimacy (Molinas, 1998; Romero-Castro et al., 2022; Rakopoulos, 2013).

Despite these gains, institutional factors acted as barriers to the full sustainability of the training outcomes. Limited access to formal credit, weak agricultural extension services, and regulatory uncertainty regarding cooperative governance presented significant challenges. These findings are consistent with Institutional Theory, which posits that both formal and informal environments can either facilitate or constrain organizational performance (North, 1990; Scott, 2013). Such obstacles mirror those in other developing nations, where policy inconsistency and limited state capacity often undermine the sustainability of organizational changes (Birkhaeuser et al., 1991; World Bank, 2022).

Theoretically, this research supports an integrated application of the Resource-Based View (RBV), Social Capital Theory, and Institutional Theory. While training reinforced intangible assets, such as managerial skills and governance practices in line with RBV (Barney, 1991), the long-term sustainability of these resources remained contingent upon social capital and institutional support (Korsgaard et al., 2016; Leana & Van Buren, 1999).

Practically, these results imply that capacity-building interventions must adopt a holistic approach that combines technical and managerial training with a focus on institutional connectivity. While organizations starting with lower capacity may see the largest immediate gains, sustaining these benefits requires supportive policies, improved access to finance, and robust extension systems. Without such support, organizational capacity risks stagnation over time. Finally, the use of standardized evaluation tools, such as the Producer Organization Capacity Scorecard (POSC), confirms that organizational improvements can be effectively measured, compared, and replicated across diverse settings (FAO, 2017).

5. CONCLUSIONS

This study demonstrates that structured, participatory training significantly enhances the organizational capacity of agricultural producer groups in Belize. Over a 12-month period, interventions led to substantial gains across multiple dimensions, including strategic planning, financial management, governance, and market linkages. These results underscore that comprehensive training effectively strengthens internal systems and operational readiness.

A key finding is the mediating role of social capital; organizations with cohesive internal networks and high member participation achieved the greatest improvements, confirming that trust and collective action are essential for knowledge adoption. However, institutional constraints, such as limited credit access, weak extension services, and regulatory ambiguity, continue to hinder the full potential of these gains. This highlights that organizational growth is inextricably linked to the broader policy environment.

Moving forward, agricultural policy in Belize should adopt a holistic approach that integrates technical training with institutional support and improved financial access. Prioritizing low-capacity organizations may offer the highest returns for scalability. Ultimately, by aligning structured training with an enabling institutional framework, producer organizations can achieve sustainable market integration and contribute more effectively to the national agricultural development agenda.

Conflicto de intereses / Competing interests:

Los autores declaran que el presente proyecto no representó conflicto de intereses de ninguna parte.

Rol de los autores / Authors Roles:

Carlos Itza: Investigación, curación de datos, validación, análisis formal, escritura – borrador original, escritura – revisión y edición, visualización.

Viviano Ninaquispe: Conceptualización, metodología, supervisión, validación, escritura – revisión y edición, administración del proyecto, recursos.

Fuentes de financiamiento / Funding:

Los autores declaran que el programa de fortalecimiento de capacidades evaluado en esta investigación fue financiado por el Ministerio de Agricultura, Alimentos y Pesca de Belice. Aunque contó con financiamiento externo para su ejecución en 2025, la evaluación de la investigación no recibió fondos específicos; las actividades de análisis fueron realizadas por el propio personal del programa como parte de sus funciones de monitoreo y aprendizaje.

Aspectos éticos / legales; Ethics / legals:

Los autores declaran no haber incurrido en aspectos antiéticos ni haber omitido aspectos legales en la realización de la investigación.

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