QUALTIATIVE COMPARATIVE ANALYSIS PROCEDURES

We considered six conditions in our analysis. A consistency cutoff of 0.8 was used, while also considering PRI values of pathways. While no specific cutoff was used for PRI, pathways with large gaps between raw consistency and PRI values were removed. Through subset/superset analysis, conditions were then removed in order to achieve more parsimonious solutions.
The truth table for the analysis is provided below in Table 2.

Simplifying Assumptions

Part of QCA relies on making Boolean minimization, drawing from relevant theoretical and substantive knowledge in order to resolve counterfactuals. In order to achieve parsimony in the solutions created, we have drawn on 'easy counterfactuals' to reduce complexity (Ragin and Sonnett 2005). While often neglected, simplifying assumptions constitute an important step in the QCA process. For the outcome, we have included a discussion of assumptions made, drawing on theoretical and case knowledge used to inform these decisions. A summary of simplifying assumptions for all conditions are presented in Table 1 below.

TABLE 1: SUMMARY OF SIMPLIFYING ASSUMPTIONS FOR RESILIENCE AND SUSTAINABILITY

	Resilience	**Sustainability**
Planning Coordination	Present	Present
Planning Participation	Present	Present
Design Coordination	Present	Present
Design Participation	Present	Present
Construction Participation	Present	Present
Construction Training	Present	Present

TABLE 2: RESILIENCE AND SUSTAINABILITY TRUTH TABLE

Case	Community	PlanCoord	PlanPart	DesCoord	DesPart	ConstPart	ConstTrain	Resilience	Sustain	Combined
1	Okoy	0.78	0.70	0.67	0.67	0.17	1.00	0.59	0.70	0.59
2	Maricaban	0.68	0.00	0.33	0.00	0.50	0.50	0.36	0.60	0.36
3	Poblacion	0.44	0.00	0.00	0.00	0.50	0.00	0.46	0.22	0.22
4	Sungko	0.11	1.00	0.00	0.00	0.35	0.00	0.47	0.45	0.45
5	Sillon	0.44	0.00	0.33	0.00	0.50	0.00	0.35	0.37	0.35
6	Kangkaibe	1.00	0.00	0.33	0.00	0.50	0.50	0.39	0.67	0.39
7	Tagpuro	0.44	0.00	0.33	0.00	0.50	0.00	0.40	0.21	0.21
8	Pago	0.46	0.00	0.33	0.00	0.50	0.50	0.29	0.37	0.29
9	New Kawayan (101)	0.22	1.00	0.00	0.00	0.85	0.84	0.69	0.73	0.69
10	Bagacay (93)	0.78	0.00	0.33	0.00	0.17	1.00	0.43	0.69	0.43
11	San Agustin	0.22	0.00	0.33	0.00	0.34	0.34	0.39	0.27	0.27
12	San Jose (83C)	0.78	1.00	0.33	0.67	0.50	0.50	0.68	0.85	0.68
13	Magallanes (52)	1.00	1.00	1.00	0.67	1.00	0.50	0.42	0.45	0.42
14	San Jose (85)	0.57	1.00	0.00	0.00	0.67	1.00	0.42	0.65	0.42
15	Hiabangan	0.68	1.00	0.00	0.00	0.50	0.84	0.72	0.75	0.72
16	Sagkahan (62)	1.00	1.00	1.00	0.67	0.50	0.67	0.73	0.88	0.73
17	Sulangan	0.78	0.70	1.00	0.67	1.00	1.00	0.58	0.59	0.58
18	Cogon	0.56	0.00	0.33	0.00	0.50	0.00	0.50	0.42	0.42
19	Cantahay	0.67	0.00	0.00	0.33	0.85	1.00	0.30	0.38	0.30

Resilience

As a preliminary step, we first investigate the necessity and coverage of individual conditions on resilience. The results of this initial analysis are shown in Table 1 below. The presence of all conditions is expected to lead to resilience. We expect that the presence of each individual condition will result in more efficient project management processes and resilience.

TABLE 1: NECESSITY AND SUFFICIENCY OF RESILIENCE OUTCOME

Condition	Necessity	Coverage
Planning Coordination	0.883446	0.699714
Construction Participation	0.836466	0.740158
Construction Training	0.729754	0.659066
Planning Participation	0.577806	0.631796
Design Coordination	0.571089	0.789969
Design Participation	0.351351	0.878129

Assumptions:

- Planning Coordination (present)
- Planning Participation (present)
- Design Coordination (present)
- Design Participation (present)
- Construction Participation (present)
- Construction Training (present)

Preliminary Intermediate Solution

Pathway	Raw Coverage	Unique Coverage	Consistency	Cases
consttrain*constpart*planpart	0.412214	0.194111	0.863014	New Kawayan (101), San Jose (85), Sulangan
consttrain*despart*descoord*planpart*plancoord	0.282443	0.064340	0.911972	Okoy, Sagkahan (62), Sulangan

solution coverage: 0.476554
solution consistency: 0.865347

Subset/Superset Analysis

In order to potentially reduce the complexity of the solution obtained, we next investigate each of the pathways obtained in the initial intermediate solution to determine if there are simpler pathways which maintain the same level of consistency, but potentially greater coverage. The two pathways from the resilience solution are listed below. Combinations of conditions are listed for all subsets higher than the original pathway, if such subsets exist. If such a subset does not exist, then up to five subsets greater than the consistency cutoff value of 0.8, are listed.

Pathway 1: consttrain*constpart*planpart

Subset	Consistency	Coverage
consttrain*constpart*planpart	0.863014	0.412214

Pathway 2: consttrain*despart*descoord*planpart*plancoord

Subset	Consistency	Coverage
consttrain*despart*planpart	0.916943	0.300981
consttrain*despart*planpart*plancoord	0.916943	0.300981
consttrain*despart	0.916168	0.333697
consttrain*despart*plancoord	0.916168	0.333697
consttrain*despart*descoord	0.911972	0.282443
consttrain*despart*descoord*planpart	0.911972	0.282443

consttrain*despart*descoord*plancoord	0.911972	0.282443
consttrain*despart*descoord*planpart*plancoord	0.911972	0.282443
consttrain*descoord*plancoord	0.910913	0.446020

From the subset/superset analysis as well as the earlier necessity and sufficiency analysis, we can remove design participation and maintain the same level of consistency. We thus remove this condition from the analysis.

Final Intermediate Solution

Pathway	Raw Coverage	Unique Coverage	Consistency	Cases
consttrain*constpart*planpart	0.412214	0.194111	0.863014	New Kawayan (101), San Jose (85), Sulangan
consttrain*descoord*planpart*plancoord	0.282443	0.064340	0.902439	Okoy, Sagkahan (62), Sulangan

solution coverage: 0.476554
solution consistency: 0.865347
From the revised analysis, three cases fall into the first pathway and three fall into the second, with one of these cases overlapping.

Sustainability

As a preliminary step, we first investigate the necessity and coverage of individual conditions. The results of this initial analysis are shown in Table 1 below. The presence of all conditions is expected to lead to sustainability.

TABLE 1: NECESSITY AND SUFFICIENCY OF SUSTAINABILITY OUTCOME

Condition	Necessity	Coverage
Planning Coordination	0.890482	0.785283
Construction Participation	0.765156	0.753854
Construction Training	0.755867	0.760079
Planning Participation	0.590450	0.718849
Design Coordination	0.525098	0.808735
Design Participation	0.330020	0.918367

Assumptions:

- Planning Coordination (present)
- Planning Participation (present)
- Design Coordination (present)
- Design Participation (present)
- Construction Participation (present)
- Construction Training (present)

Preliminary Intermediate Solution

Pathway	Raw Coverage	Unique Coverage	Consistency	Cases
consttrain*~constpart*plancoord	0.498537	0.288780	0.951583	Okoy, Bagacay (93)
consttrain*constpart*planpart	0.399024	0.189268	0.93379	New Kawayan (101), San Jose (85), Sulangan

solution coverage: 0.687805
solution consistency: 0.927362

Subset/Superset Analysis

In order to potentially reduce the complexity of the solution obtained, we next investigate each of the pathways obtained in the initial intermediate solution to determine if there are simpler pathways which maintain the same level of consistency, but potentially greater coverage. The two pathways from the sustainability solution are listed below. Combinations of conditions are listed for all subsets higher than the original pathway, if such subsets exist. If such a subset does not exist, then up to five subsets greater than the consistency cutoff value of 0.8, are listed.

Pathway 1: consttrain*~constpart*plancoord

Subset	Consistency	Coverage
consttrain*~constpart*plancoord	0.951583	0.498537
consttrain*~constpart	0.916519	0.503415

Pathway 2: consttrain*constpart*planpart

Subset	Consistency	Coverage
consttrain*constpart*planpart	0.93379	0.399024

Despite similar consistency and coverage of the both combinations of conditions in pathway 1, the presence of planning coordination provides strong explanatory power for the cases. We could also remove both conditions during the design phase, design coordination and design participation, however analysis after removing these conditions does not have an impact on the final pathways. As a result, there is no need to revise the initial pathways determined.

Combined Resilience and Sustainability

In order to analyze the combined outcome of resilience and sustainability, we assign the minimum value of the two individual outcomes. Practically, the lower value limits the presence of the combined outcome. For example, in case 1, the community of Okoy had a resilience set value of 0.59 and a sustainability set value of 0.70, thus the 0.59 becomes the combined set value. Across all of the cases examined, there were no cases where resilience was present without the presence of sustainability – in particular, six cases exhibited the combined outcome.

As a preliminary step, we again first investigate the necessity and coverage of individual conditions. The results of this initial analysis are shown in Table 1 below. The presence of all conditions is expected to lead to sustainability.

TABLE 1: NECESSITY AND SUFFICIENCY OF COMBINED RESILIENCE AND SUSTAINABILITY OUTCOME

Condition	Necessity	Coverage
Planning Coordination	0.893587	0.656762
Construction Participation	0.833064	0.684046
Construction Training	0.778191	0.652184
Planning Participation	0.620299	0.629399
Design Coordination	0.593717	0.762107
Design Participation	0.378627	0.878129

Assumptions:

- Planning Coordination (present)
- Planning Participation (present)
- Design Coordination (present)
- Design Participation (present)
- Construction Participation (present)
- Construction Training (present)

Intermediate Solution

Pathway	Raw Coverage	Unique Coverage	Consistency	Cases
consttrain*constpart*planpart	0.412214	0.194111	0.863014	New Kawayan (101), San Jose (85), Sulangan
consttrain*despart*descoord*planpart*plancoord	0.282443	0.064340	0.911972	Okoy, Sagkahan (62), Sulangan

solution coverage: 0.514723
solution consistency: 0.865347

Subset/Superset Analysis

In order to potentially reduce the complexity of the solution obtained, we next investigate each of the pathways obtained in the initial intermediate solution to determine if there are simpler pathways which maintain the same level of consistency, but potentially greater coverage. The two pathways from the combined solution are listed below. Combinations of conditions are listed for all subsets higher than the original pathway, if such subsets exist. If such a subset does not exist, then up to five subsets greater than the consistency cutoff value of 0.8, are listed.

Pathway 1: consttrain*constpart*planpart

Subset	Consistency	Coverage
consttrain*constpart*planpart	0.863014	0.44523

Pathway 2: consttrain*despart*descoord*planpart*plancoord

Subset	Consistency	Coverage
consttrain*despart*planpart	0.916943	0.325088
consttrain*despart*planpart*plancoord	0.916943	0.325088
consttrain*despart	0.916168	0.360424
consttrain*despart*plancoord	0.916168	0.360424
consttrain*despart*descoord	0.911972	0.305065
consttrain*despart*descoord*planpart	0.911972	0.305065
consttrain*despart*descoord*plancoord	0.911972	0.305065
consttrain*despart*descoord*planpart*plancoord	0.911972	0.305065
consttrain*descoord*plancoord	0.910913	0.481743

Similar to the standalone resilience outcomes, our analysis reveals that design participation can be removed as it does not appear in more parsimonious pathways.

Final Intermediate Solution

Pathway	Raw Coverage	Unique Coverage	Consistency	Cases
consttrain*constpart*planpart	0.445230	0.209658	0.863014	New Kawayan (101), San Jose (85), Sulangan
consttrain*descoord*planpart*plancoord	0.305065	0.069494	0.902439	Okoy, Sagkahan, Sulangan

solution coverage: 0.514723
solution consistency: 0.865347