Supplementary Material: Explaining Success and Failure in the Commons: The configural nature of Ostrom's Institutional Design Principles

Contents

1 Coding Comparison and Coding Reliability

1.1 The coding process

It is difficult to ascertain the specific differences in coding approach between different individuals and groups. However, several scholars have asserted the necessity of explicit rules of coding for both intercoder agreement and replicability (Stemler, 2001; MacQueen, McLellan, Kay, & Milstein, 1998). Especially when dealing with secondary data sources, it is also important to identify the ”work-process knowledge” (e.g. the coding schema) (Medjedović & Witzel, 2008). While access to coding schemas is often difficult, either because they are complicated or because no formal schema is often followed, the coding presented relies on the design principles' definitions as articulated in Table 3 by Cox et al. (Cox, Arnold, & Tomás, 2010, p.45)

With the exception of five case studies reported in Spanish, which were coded by two bilingual coders, we utilized three separate coders per case study, whereas the same cases were coded by two coders per case in (Cox et al., 2010). While it is not established that more coders implies a higher validity, as long as there are at least two different coders per text (Krippendorff & Bock, 2009), the difference in the number of coders may account for some of the differences in results.

In order to define a design principle as present or absent, coders looked for explicit evidence within the original author's own statements and utilized this approach to mitigate any differences between coders during the coding process as well. While these points of methodological approach were similar between the two studies, challenges associated with the use of secondary data and potentially different interpretations of coding schema (success and design principles) leads to the deterioration of the useful data set, especially between two unrelated groups of researchers.

In an effort to increase efficacy and replicability, we used a codebook creation process that was iteratively modified prior to and during the coding process. The initial codes for each variable category were based on the used definition of success, and the modified design principles (1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7, 8) as defined on Table 3 by (Cox et al., 2010, p.45). These variables were then augmented with additional support variables selected from the original CPR variables developed by Ostrom et al. (Ostrom, Schlager, Tang, & Anderson, 1987). A total of fifty-seven variables were used in our coding schema, which were divided into categories for Success and each of the eleven expanded design principle categories (the full codebook will be published and made available through the SES Library at Arizona State University and as a CBIE working paper). The codebook was iteratively tested, discussed and clarified by the entire research team and utilized throughout the coding process. Cases were coded individually by sets of three coders per text and then discussed by each group of three coders in order to come to a group decision on the final code to be used for each variable. If there were disagreements or disputes between coders, each coder cited explicit evidence from the text in support of their argument. If the group of three coders for the case could not come to an agreement, the question was brought to the attention of the entire team and then resolved. If there was insufficient explicit evidence in support of a code or coming to a unanimous decision on the final code was impossible, the variable was coded as ”Missing In Case (-1 MIC)” and left null.

1.2 Coding Reliability Testing

The aim of recoding was to replicate the findings with a different set of coders applying "different but functionally equivalent measuring instruments" (Krippendorff, 2012, p.271). It was also an attempt to reduce the number of missing values in order to assess design principle co-occurrence. This represents an important empirical process which, if confirmatory, not only verifies the study findings of the initial team but also demonstrates the craftsmanship and overarching applicability of Ostrom's design principles as a CIS analytical tool.

Coding is an essential element of classical content analysis because it converts qualitative data, which is susceptible to individual interpretation, biases, and distortions, into datasets that are supportive of more transparent analyses and can be replicated by other scholars (Krippendorff, 2012). Testing intercoder agreement verifies the replicability of coding results and requires another set of statistical tools that can vary depending on the number of coders and the coding values. Although there are various intercoder reliability statistics to check for coder agreement, each method has its drawbacks, which is why it is important to select the one most appropriate to the dataset and to utilize more than one intercoder reliability technique. However, many studies do not perform intercoder reliability ratings, choose an inappropriate technique for their analysis, and/or fail to report details about their study parameters (coders utilized, intercoder ratings chosen, rating results, etc.) (Feng, 2014). This analysis represents an attempt to break the mold in order to facilitate a more comparative cross-study analysis.

1.2.1 Research Design

We were able to successfully recode 69 of the cases used in the analysis by Cox et al. (Cox et al., 2010). Each of the cases was analyzed in order to assess the presence (=1) or absence (= 0) of a specific design principle, as well as the overall case success. Additionally, a value of negative one (-1) was assigned if the text contained ambiguous or conflicting information with regard to a design principle, or if information on the design principle was not reported. The actual coding results provided by Cox et al. (Cox, personal communication) included "1/-1" coding values indicating the presence and absence of design principles, and a value of "0" if the text was ambiguous or conflicting regarding the existence of specific design principle. Cox et al. also coded missing values as "blank" cells in cases where the design principles were not reported. Due to the discrepancies in coding values between the different coding groups, the Cox coding values were modified to match the CBIE codes, i.e., all minus one (-1) values were replaced with zeros (0), and the zero (0) and blank values were substituted with minus ones (-1) (see Table A1).

1.2.2 Results

Table A2 outlines the results of the intercoder reliability test scores for the 69 case studies by coding variable for both teams. The second column ("Missing Values Included") reflects the intercoder ratings for all code values, including missing values. Missing values were excluded from the

Table A1: Comparison of coding values utilized

	Original	CBIE	Comparable
Present	1	1	1
Absent	-1	0	0
Ambiguous/conflicting	0	-1	-1
Not reported	Blank	-1	-1

Note: Original = code values utilized by Cox, et al.; CBIE = recoding values used; Comparable = adjusted coding values for Cox, et al. used for testing coding reliability.

calculations that led to the intercoder ratings reported in the third column (”Missing Values Not Included”). The fourth column reflects the actual number of missing values by variable by team.

Table A2: Coding Reliability Testing Results

	Missing Values Included			**Missing Values Not Included**			
Coding variables	alpha	kappa	%agree	alpha	kappa	%agree	Missing Values
Success	0.709	0.707	85.50%	0.709	0.707	85.50%	None
1A: Clearly defined social boundaries	0.316	0.311	63.80%	0.556	0.552	80.00%	Cox: 12 CBIE: 2
1B: Clearly defined biophysical boundaries	-0.128	-0.137	39.10%	0.048	0.034	75.00%	Cox: 33 CBIE: 0
2A: Congruence between local conditions and resource extraction	0.176	0.17	46.40%	0.705	0.699	89.30%	Cox: 41 CBIE: 7
2B: Investment / Extraction proportionality	-0.046	-0.053	34.80%	0.4	0.378	71.40%	Cox: 51 CBIE: 18
3: Collective choice arrangements	0.275	0.270	53.60%	0.549	0.543	77.50%	Cox: 26 CBIE: 9
4A: Monitoring	0.402	0.397	66.70%	0.438	0.433	75.90%	Cox: 13 CBIE: 7
4B: Monitoring the monitors	0.215	0.209	50.70%	0.508	0.499	82.10%	Cox: 37 CBIE: 16
5: Graduated sanctions	0.383	0.378	59.40%	0.844	0.841	92.60%	Cox: 37 CBIE: 21
6: Conflict-resolution mechanisms	0.476	0.472	68.10%	0.753	0.749	91.90%	Cox: 32 CBIE: 13
7: Rights to organize	0.374	0.369	65.20%	0.570	0.565	84.40%	Cox: 24 CBIE: 7
8: Nestedness	0.175	0.169	50.70%	0.138	0.126	68.40%	Cox: 24 CBIE: 16
Average values	0.277	0.272	57.00%	0.518	0.511	81.17%	

Note: alpha = Krippendorff?s alpha (nominal values); kappa = Fleiss? kappa; %agree = simple percent agreement.

Values for Krippendorff’s alpha and Fleiss’ kappa range between 0 and 1, with 1 demonstrating perfect agreement between coders and 0 indicating agreement that is consistent with chance, i.e., the absence of reliability. Negative alpha values signify coder agreement that is below chance (Krippendorff, 2008).

Krippendorff (Krippendorff, 2012) recommends drawing study conclusions only from coded variables with reliabilities above 0.800, although variables with reported reliabilities in the range of 0.667 to 0.800 could be used to draw tentative conclusions. Landis and Koch (Landis & Koch, 1977) outlined a set of values that mark different agreement levels based on the value of Fleiss' kappa: < 0.00 Poor; 0.00-0.20 slight; 0.21-0.40 fair, 0.41-0.60 moderate, 0.61-0.80 substantial, and 0.81-1.00 almost perfect. Generally, researchers consider kappa values of > 0.80 as evidence of high reliability, and values in the range of 0.70 to 0.79 are deemed acceptable. However these standards "ad hoc and still evolving" (Bernard & Ryan, 2009).

Simple percent agreement tends to overestimate intercoder reliability because it does not account for chance agreement, which is why it is not recommended as the sole measure of intercoder reliability (Hruschka 2004, Feng 2014). However, it is appropriate to utilize this technique in conjunction with other mea(Hruschka et al., 2004) sures if the variables analyzed are nominal (Feng, 2014). The desired range of value for simple percent agreement is $\geq 85\%$ (MacQueen, McLellan-Lemal, Bartholow, & Milstein, 2008). Here we use the simple percent agreement values in conjunction with other intercoder reliability metrics to assess the robustness of our findings.

It should also be noted that although both coding groups analyzed the same cases for the same variables, the coding did not occur under standard test-test conditions in which each coder applied the same coding instructions to the same unit of analysis.

Table A2 also illustrates the effect that missing values have on intercoder agreement. The variable "Success" was the only variable without missing values which returned acceptable intercoder agreement scores of above 0.7 for all three reliability metrics. In contrast, acceptable intercoder reliability scores for some of the design principles could only be reached after excluding the missing values. This is in part due to the fact that the CBIE team's coding was purposely designed to minimize missing values in order to facilitate the identification of design principle co-occurrence, whereas the Cox et al. team's goal was to assess and refine the individual design principles.

After all missing variables were excluded from the calculation, intercoder testing values returned acceptable/substantial agreement for design principle 5 (above 0.80 alpha and kappa scores); the values for design principles 2A and 6 were in the tentative conclusion/substantial range (above 0.70 alpha and kappa scores); and moderate kappa scores (between 0.50 and 0.57) were reached for design principles 1A, 3, 4B, and 7. All other design principles scored around or below 0.40 indicating coder agreement that was little better than chance. Certainly, the high number of missing values account for part of the intercoder disagreement and concomitant low reliability scores. For example, design principle 2B and 2A were coded as missing/ambiguous/unclear 51 and 41 times, respectively, by the Cox team. However, even after excluding the missing values, intercoder agreement remains low. This likely can be attributed to different team coding strategies, with the Cox team likely applying a more conservative interpretation of the design principles vis--vis the CBIE team, which was trying to determine co-occurrence of design principles.

The marginal intercoder reliability ratings presented in this paper highlight the challenge of attempting to pull theoretical concepts out of ethnographic studies that were in large part never written to address any of the sought-after CIS conditions. The ratings also illuminate the inherent ambiguity in the design principles, which were drafted as overarching values applicable to a variety of CISs. We argue that it is precisely these coding disparities that necessitate testing for intercoder agreement. The purpose of presenting this intercoder reliability assessment is not to challenge the validity of the Cox et al. study findings, nor is it to assert that the institutional analysis of complex social-ecological systems based on Ostrom's design principles precludes interrater reliability testing. Instead, we encourage the inclusion and reporting of intercoder agreement ratings for every CIS analysis. The challenges we faced in our project serve only to highlight the current weaknesses in the institutional analysis process which, we argue, are not insurmountable. We believe they can be overcome by collaboration and the joint development of a unified coding system and structure that facilitates a more consolidated analysis and interpretation of CIS variables across case studies and academic institutions. Intercoder agreement testing is a crucial instrument to assess the reliability, replicability, and ultimately the trustworthiness of study findings. As such, it represents an important tool that should always be included in the analyst's toolkit.

2 Qualitative Comparative Analysis (QCA)

QCA relies on Boolean algebra for cross-case comparisons to reduce causal complexity into a minimal set of conditions necessary for an outcome (Ragin, 1987). QCA establishes conditions of necessity and sufficiency. A condition is necessary if it must be present for a certain outcome to occur. A condition is sufficient if, by itself, it can produce a certain outcome (Ragin, 1987). A condition is both necessary and sufficient if it is the only cause to the outcome. If various conditions can produce the outcome by themselves, these are sufficient, but not necessary causes. Finally, if a cause only appears in a subset of combinations that produce the outcome, then this causal condition is neither necessary nor sufficient.

Consistency measures the degree to which a relation of necessity or sufficiency between a causal condition (or combination of conditions) and an outcome is met within a given data set (Ragin, 2006). Consistency values range from 0 to 1 where 0 indicates no consistency and 1 indicates perfect consistency. Coverage provides a measure of empirical relevance. Coverage is computed by gauging the size of the overlap of two sets relative to the size of the larger set (Ragin, 2008), with values again ranging between 0 and 1.

Reliability measures how confident we can be in the results provided by the QCA analysis that take into account only the complete cases. To calculate the reliability scores present in table A3 we proceeded as follows:

1. We performed QCA on the 27 complete cases (DP)
2. We performed QCA one on the dataset assuming missing data = absent (DP-) (i.e. effectively setting all missing values to 0)
3. We performed QCA on the dataset assuming missing data = present (DP+) (i.e. effectively setting all missing values to 1).

   The QCA performed on DP- and DP+ represent the boundaries of the analysis, or, in our words, the boundary values of the QCA metrics and the validity of the different solution sets. If a specific set was not reported as a solution in one of the QCA performed, we implied that coverage and consistency = 0.

4. Finally, we define reliability of coverage R(Cov), reliability of consistency R(Cons) and solution reliability R(Sol) as follows:

   (a) reliability of coverage as 1 − standard deviation of coverage scores of the three QCA analysis. Since coverage ranges from 0 to 1, our reliability metric also exhibited this range: $R(Cov) = 1 - std(cov_{DP}, cov_{DP-}, cov_{DP+})$.

   (b) reliability of consistency as 1 − standard deviation of consistency scores of the three QCA analysis. Since consistency ranges from 0 to 1, our reliability metric also exhibited this range: $R(Cons) = 1 - std(cons_{DP}, cons_{DP-}, consDP+)$

   (c) solution reliability as the number of times a specific set was reported in the solution set: $R(Sol) = N_{set}/3$ where 3 is the number of QCA analysis performed (DP, DP- and DP+).

2.1 QCA Solution Sets Tables

Table A3: QCA minimized solution for all cases and per activity. Solution Set are for Success and Not Success

Set Leading To	System Type	Minimized Solution Set		Complete		Missing = 0		Missing = 1		Reliability		
		Principle Present	Principle Absent	Cons	Cov	Cons	Cov	Cons	Cov	Cons	Cov	Sol
SUCCESS	All	1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 8		1	0.684	1	0.333	n.a.	n.a.	0.529	0.721	0.667
		1A, 1B, 2B, 3, 4A, 4B, 6, 7, 8	2A	1	0.105	n.a.	n.a.	n.a.	n.a.	0.529	0.951	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,	8	1	0.158	1	0.179	n.a.	n.a.	0.529	0.92	0.667
		1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7, 8		1	0.526	1	0.256	n.a.	n.a.	0.529	0.785	0.667
		1A, 1B, 2A, 2B, 3, 4A, 6, 7,	4B, 5	n.a.	n.a.	1	0.051	n.a.	n.a.	0.529	0.976	0.333
		1A, 1B, 2A, 4A, 4B,	2B, 3, 5, 6, 8	n.a.	n.a.	1	0.051	n.a.	n.a.	0.529	0.976	0.333
		1A, 1B, 2A, 2B, 7,	3, 4B, 5, 6, 8	n.a.	n.a.	1	0.051	n.a.	n.a.	0.529	0.976	0.333
		1A, 1B, 2A, 3, 6, 8	4A, 4B, 5, 7	n.a.	n.a.	1	0.051	n.a.	n.a.	0.529	0.976	0.333
		1A, 1B, 2B, 3, 4A, 4B, 5, 6, 7, 8		n.a.	n.a.	1	0.256	n.a.	n.a.	0.529	0.879	0.333
		1B, 3, 6, 8	1A, 2A, 2B, 4A, 4B, 5, 7	n.a.	n.a.	1	0.026	n.a.	n.a.	0.529	0.988	0.333
		1A, 1B, 4A, 7,	2A, 2B, 3, 4B, 5, 6, 8	n.a.	n.a.	1	0.026	n.a.	n.a.	0.529	0.988	0.333
		1A, 1B, 2A, 3, 7, 8	2B, 4A, 4B, 5, 6	n.a.	n.a.	1	0.026	n.a.	n.a.	0.529	0.988	0.333
		1A, 1B, 2A, 3, 4A, 5, 7, 8	2B, 4B, 6	n.a.	n.a.	1	0.026	n.a.	n.a.	0.529	0.988	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 6, 7, 8		n.a.	n.a.	1	0.308	n.a.	n.a.	0.529	0.855	0.333
		1A, 1B, 2A, 2B, 3, 4A, 6, 7, 8	5	n.a.	n.a.	1	0.103	n.a.	n.a.	0.529	0.951	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,	4A	n.a.	n.a.	n.a.	n.a.	1	0.051	0.529	0.976	0.333
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 8	3	n.a.	n.a.	n.a.	n.a.	1	0.077	0.529	0.964	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,	8	n.a.	n.a.	n.a.	n.a.	1	0.103	0.529	0.951	0.333
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 8	7	n.a.	n.a.	n.a.	n.a.	1	0.103	0.529	0.951	0.333
		2A, 2B, 3, 4A, 4B, 5, 6, 7, 8	1A	n.a.	n.a.	n.a.	n.a.	1	0.051	0.529	0.976	0.333
		1A, 1B, 2B, 3, 4A, 4B, 6, 7, 8	2A, 5	n.a.	n.a.	n.a.	n.a.	1	0.026	0.529	0.988	0.333
		1A, 1B, 2A, 2B, 4A, 4B, 5, 7,	3, 6, 8	n.a.	n.a.	n.a.	n.a.	1	0.026	0.529	0.988	0.333
SUCCESS	Irrigation	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7,		1	0.9	1	0.929	1	0.643	1	0.871	1
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 7, 8		1	0.8	1	0.857	1	0.643	1	0.91	1
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	1	0.571	0.529	0.731	0.333
		1A, 1B, 2A, 3, 6, 8	4A, 4B, 5, 7	n.a.	n.a.	n.a.	n.a.	1	0.143	0.529	0.933	0.333
SUCCESS	Fishery	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7, 8		1	1	n.a.	n.a.	1	0.909	0.529	0.549	0.667
		1A, 1B, 2A, 2B, 3, 4A, 6, 7,	4B, 5	n.a.	n.a.	1	0.182	n.a.	n.a.	0.529	0.914	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7,		n.a.	n.a.	1	0.182	n.a.	n.a.	0.529	0.914	0.333
		1A, 1B, 2A, 2B, 7,	3, 4B, 5, 6, 8	n.a.	n.a.	1	0.182	n.a.	n.a.	0.529	0.914	0.333
		1B, 3, 6, 8	1A, 2A, 2B, 4A, 4B, 5, 7	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		1A, 1B, 4A, 7,	2A, 2B, 3, 4B, 5, 6, 8	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		1A, 1B, 2A, 3, 7, 8	2B, 4A, 4B, 5, 6,	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		1A, 1B, 2A, 3, 4A, 5, 7, 8	2B, 4B, 6	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 6, 7, 8		n.a.	n.a.	1	0.182	n.a.	n.a.	0.529	0.914	0.333
		1A, 1B, 2A, 2B, 3, 4A, 6, 7, 8	5	n.a.	n.a.	1	0.182	n.a.	n.a.	0.529	0.914	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 8		n.a.	n.a.	n.a.	n.a.	1	0.909	0.529	0.571	0.333
SUCCESS	Forestry	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7,		1	0.9	n.a.	n.a.	1	0.929	0.529	0.569	0.667
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 7, 8		1	0.8	1	0.214	1	0.857	1	0.709	1
		1A, 1B, 2A, 4A, 4B,	2B, 3, 5, 6, 8,	n.a.	n.a.	1	0.143	n.a.	n.a.	0.529	0.933	0.333
		1A, 1B, 2B, 3, 4A, 4B, 6, 7, 8	2A	n.a.	n.a.	1	0.143	n.a.	n.a.	0.529	0.933	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,	8	n.a.	n.a.	1	0.286	n.a.	n.a.	0.529	0.865	0.333
		1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7, 8		n.a.	n.a.	1	0.143	n.a.	n.a.	0.529	0.933	0.333
			1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7, 8	n.a.	n.a.	1	0.071	n.a.	n.a.	0.529	0.967	0.333

cont. QCA minimized solution for all cases and per activity. Solution Set are for Success and Not Success

Set Leading To	System Type	Minimized Solution Set		Complete		Missing = 0		Missing = 1		Reliability		
		Principle Present	Principle Absent	Cons	Cov	Cons	Cov	Cons	Cov	Cons	Cov	Sol
NOT SUCCESS	All	7,	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 8	1	0.5	n.a.	n.a.	n.a.	n.a.	0.529	0.764	0.333
		1B, 4A, 8	1A, 2A, 2B, 3, 4B, 5, 6, 7,	1	0.125	n.a.	n.a.	n.a.	n.a.	0.529	0.941	0.333
		1B, 3, 4A, 6, 8	1A, 2A, 2B, 4B, 5, 7,	1	0.125	n.a.	n.a.	1	0.033	0.529	0.947	0.667
		1A, 1B,	2A, 2B, 3, 4A, 4B, 5, 6, 7, 8	1	0.125	1	0.033	1	0.033	1	0.957	1
		1A, 1B, 3, 6, 7,	2A, 2B, 4A, 4B, 5, 8	1	0.125	n.a.	n.a.	n.a.	n.a.	0.529	0.941	0.333
		4A, 4B, 7,	1A, 1B, 2A, 2B, 3, 5, 6, 8	n.a.	n.a.	1	0.033	n.a.	n.a.	0.529	0.984	0.333
		1B, 4A, 4B,	1A, 2A, 2B, 3, 5, 6, 7, 8	n.a.	n.a.	1	0.033	n.a.	n.a.	0.529	0.984	0.333
		1A, 1B, 6, 8	2A, 2B, 3, 4A, 4B, 5, 7,	n.a.	n.a.	1	0.033	n.a.	n.a.	0.529	0.984	0.333
		1A, 1B, 3, 4B, 7, 8	2A, 2B, 4A, 5, 6,	n.a.	n.a.	1	0.033	n.a.	n.a.	0.529	0.984	0.333
		1A, 1B, 3, 4A, 4B, 7,	2A, 2B, 5, 6, 8	n.a.	n.a.	1	0.033	n.a.	n.a.	0.529	0.984	0.333
		1A, 1B, 3, 4A, 4B, 5, 6,	2A, 2B, 7, 8	n.a.	n.a.	1	0.033	n.a.	n.a.	0.529	0.984	0.333
			1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 8	n.a.	n.a.	0.857	0.2	n.a.	n.a.	0.596	0.906	0.333
		5, 6, 8	1A, 2A, 2B, 3, 4A, 4B, 7,	n.a.	n.a.	1	0.067	n.a.	n.a.	0.529	0.968	0.333
		1B, 8	1A, 2A, 2B, 3, 4B, 5, 6, 7,	n.a.	n.a.	1	0.1	n.a.	n.a.	0.529	0.953	0.333
		1B, 3, 6, 8	1A, 2A, 2B, 4B, 5, 7,	n.a.	n.a.	0.5	0.033	n.a.	n.a.	0.764	0.984	0.333
		1B, 2A, 3, 4A, 4B, 6, 7, 8	2B, 5,	n.a.	n.a.	1	0.067	n.a.	n.a.	0.529	0.968	0.333
		1A, 1B, 3, 7,	2A, 2B, 4A, 4B, 5, 8	n.a.	n.a.	1	0.133	n.a.	n.a.	0.529	0.937	0.333
		1A, 1B, 3, 4A, 8	2A, 2B, 4B, 5, 6,	n.a.	n.a.	1	0.067	n.a.	n.a.	0.529	0.968	0.333
		1A, 1B, 3, 4A, 4B, 5, 6, 7, 8	2A,	n.a.	n.a.	0.5	0.033	n.a.	n.a.	0.764	0.984	0.333
		1A, 1B, 2B, 3, 4A, 4B, 6, 7, 8		n.a.	n.a.	0.125	0.067	n.a.	n.a.	0.941	0.968	0.333
		7,	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 8	n.a.	n.a.	n.a.	n.a.	1	0.133	0.529	0.937	0.333
		4A, 4B, 7, 8	1A, 1B, 2A, 2B, 3, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		3, 4A, 4B, 5, 6, 7,	1A, 1B, 2A, 2B,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 3, 4B, 5, 6, 7, 8	1A, 1B, 2A, 4A,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1B, 2B, 4A, 4B,	1A, 2A, 3, 5, 6, 7, 8	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 3, 4A, 4B, 5, 6, 8	2A, 2B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2B, 3, 4A, 4B, 8	2A, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4B, 6, 7,	2B, 4A, 5,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4A, 7, 8	2B, 4B, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 5, 6, 8	1A, 2A, 3, 4A, 4B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1B, 4A, 8	1A, 2A, 2B, 3, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 7, 8	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.1	0.529	0.953	0.333
		1A, 1B, 3, 6, 7,	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 4A, 4B, 6, 7, 8	2A, 5,	n.a.	n.a.	n.a.	n.a.	0.5	0.033	0.764	0.984	0.333
		1B, 2A, 2B, 3, 4A, 4B, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.107	0.1	0.95	0.953	0.333
		1A, 1B, 2B, 3, 4B, 5, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.133	0.133	0.937	0.937	0.333
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 8		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6,		n.a.	n.a.	n.a.	n.a.	0.065	0.067	0.969	0.968	0.333
NOT SUCCESS	Irrigation	1B, 3, 4A, 6, 8	1A, 2A, 2B, 4B, 5, 7,	1	0.167	1	0.1	n.a.	n.a.	0.529	0.931	0.667
		1A, 1B,	2A, 2B, 3, 4A, 4B, 5, 6, 7, 8	1	0.167	1	0.1	1	0.033	1	0.945	1
		1B, 2A, 3, 4A, 4B, 6, 7, 8	1A, 2B, 5,	n.a.	n.a.	1	0.1	n.a.	n.a.	0.529	0.953	0.333
		1A, 1B, 3, 4A, 7, 8	2A, 2B, 4B, 5, 6,	n.a.	n.a.	1	0.1	n.a.	n.a.	0.529	0.953	0.333
		1A, 1B, 2B, 3, 4A, 4B, 6, 7, 8	5,	n.a.	n.a.	0.5	0.2	n.a.	n.a.	0.764	0.906	0.333
		7,	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 8	n.a.	n.a.	n.a.	n.a.	1	0.133	0.529	0.937	0.333
		4A, 4B, 7, 8	1A, 1B, 2A, 2B, 3, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		3, 4A, 4B, 5, 6, 7,	1A, 1B, 2A, 2B,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 3, 4B, 5, 6, 7, 8	1A, 1B, 2A, 4A,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1B, 3, 4A, 6, 8	1A, 2A, 2B, 4B, 5, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1B, 2B, 4A, 4B,	1A, 2A, 3, 5, 6, 7, 8	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 3, 4A, 4B, 5, 6, 8	2A, 2B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2B, 3, 4A, 4B, 8	2A, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4B, 6, 7,	2B, 4A, 5,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4A, 7, 8	2B, 4B, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 5, 6, 8	1A, 2A, 3, 4A, 4B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1B, 4A, 8	1A, 2A, 2B, 3, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 7, 8	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.1	0.529	0.953	0.333
		1A, 1B, 3, 6, 7,	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 4A, 4B, 6, 7, 8	2A, 5,	n.a.	n.a.	n.a.	n.a.	0.5	0.033	0.764	0.984	0.333
		1B, 2A, 2B, 3, 4A, 4B, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.107	0.1	0.95	0.953	0.333
		1A, 1B, 2B, 3, 4B, 5, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.133	0.133	0.937	0.937	0.333
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 8		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6,		n.a.	n.a.	n.a.	n.a.	0.065	0.067	0.969	0.968	0.333

cont. QCA minimized solution for all cases and per activity. Solution Set are for Success and Not Success

Set Leading To	System Type	Minimized Solution Set		Complete		Missing = 0		Missing = 1			Reliability	
		Principle Present	Principle Absent	Cons	Cov	Cons	Cov	Cons	Cov	Cons	Cov	Sol
NOT SUCCESS	Fishery	1B, 4A, 8	1A, 2A, 2B, 3, 4B, 5, 6, 7,	1	1	n.a.	n.a.	n.a.	n.a.	0.529	0.529	0.333
			1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 7, 8	n.a.	n.a.	1	0.222	n.a.	n.a.	0.529	0.895	0.333
		4A, 4B, 7,	1A, 1B, 2A, 2B, 3, 5, 6, 8	n.a.	n.a.	1	0.111	n.a.	n.a.	0.529	0.948	0.333
		1A, 1B, 6, 8	2A, 2B, 3, 4A, 4B, 5, 7,	n.a.	n.a.	1	0.111	n.a.	n.a.	0.529	0.948	0.333
		1A, 1B, 3, 4B, 7, 8	2A, 2B, 4A, 5, 6,	n.a.	n.a.	1	0.111	n.a.	n.a.	0.529	0.948	0.333
		1A, 1B, 3, 4A, 8	2A, 2B, 4B, 5, 6, 7,	n.a.	n.a.	1	0.111	n.a.	n.a.	0.529	0.948	0.333
		1A, 1B, 3, 4A, 4B, 5, 6,	2A, 2B, 7, 8	n.a.	n.a.	1	0.111	n.a.	n.a.	0.529	0.948	0.333
		1B, 8	1A, 2A, 2B, 3, 4B, 5, 6, 7,	n.a.	n.a.	1	0.222	n.a.	n.a.	0.529	0.895	0.333
		7,	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 8	n.a.	n.a.	n.a.	n.a.	1	0.133	0.529	0.937	0.333
		4A, 4B, 7, 8	1A, 1B, 2A, 2B, 3, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		3, 4A, 4B, 5, 6, 7,	1A, 1B, 2A, 2B,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 3, 4B, 5, 6, 7, 8	1A, 1B, 2A, 4A,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1B, 3, 4A, 6, 8	1A, 2A, 2B, 4B, 5, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1B, 2B, 4A, 4B,	1A, 2A, 3, 5, 6, 7, 8	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B,	2A, 2B, 3, 4A, 4B, 5, 6, 7, 8	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 3, 4A, 4B, 5, 6, 8	2A, 2B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2B, 3, 4A, 4B, 8	2A, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4B, 6, 7,	2B, 4A, 5,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4A, 7, 8	2B, 4B, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 5, 6, 8	1A, 2A, 3, 4A, 4B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1B, 4A, 8	1A, 2A, 2B, 3, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 7, 8	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.1	0.529	0.953	0.333
		1A, 1B, 3, 6, 7,	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 4A, 4B, 6, 7, 8	2A, 5,	n.a.	n.a.	n.a.	n.a.	0.5	0.033	0.764	0.984	0.333
		1B, 2A, 2B, 3, 4A, 4B, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.107	0.1	0.95	0.953	0.333
		1A, 1B, 2B, 3, 4B, 5, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.133	0.133	0.937	0.937	0.333
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 8		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6,		n.a.	n.a.	n.a.	n.a.	0.065	0.067	0.969	0.968	0.333
NOT SUCCESS	Forestry	1A, 1B, 3, 6, 7,	2A, 2B, 4A, 4B, 5, 8	1	1	n.a.	n.a.	n.a.	n.a.	0.529	0.529	0.333
		1B, 4A, 8	1A, 2A, 2B, 3, 4B, 5, 6, 7,	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		1B, 4A, 4B,	1A, 2A, 2B, 3, 5, 6, 7, 8	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		1A, 1B, 3, 4A, 4B, 7,	2A, 2B, 5, 6, 8	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		1A, 1B, 2A, 3, 4A, 4B, 6, 7,	2B, 5,	n.a.	n.a.	1	0.091	n.a.	n.a.	0.529	0.957	0.333
		5, 6, 8	1A, 2A, 2B, 3, 4A, 4B, 7,	n.a.	n.a.	1	0.182	n.a.	n.a.	0.529	0.914	0.333
		1A, 1B, 3, 7,	2A, 2B, 4A, 4B, 5, 8	n.a.	n.a.	1	0.364	n.a.	n.a.	0.529	0.828	0.333
		1A, 1B, 3, 4A, 4B, 5, 6, 7, 8	2A,	n.a.	n.a.	0.5	0.091	n.a.	n.a.	0.764	0.957	0.333
		7,	1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6, 8	n.a.	n.a.	n.a.	n.a.	1	0.133	0.529	0.937	0.333
		4A, 4B, 7, 8	1A, 1B, 2A, 2B, 3, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		3, 4A, 4B, 5, 6, 7,	1A, 1B, 2A, 2B,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 3, 4B, 5, 6, 7, 8	1A, 1B, 2A, 4A,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1B, 3, 4A, 6, 8	1A, 2A, 2B, 4B, 5, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1B, 2B, 4A, 4B,	1A, 2A, 3, 5, 6, 7, 8	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B,	2A, 2B, 3, 4A, 4B, 5, 6, 7, 8	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 3, 4A, 4B, 5, 6, 8	2A, 2B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2B, 3, 4A, 4B, 8	2A, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4B, 6, 7,	2B, 4A, 5,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		1A, 1B, 2A, 3, 4A, 7, 8	2B, 4B, 5, 6,	n.a.	n.a.	n.a.	n.a.	1	0.033	0.529	0.984	0.333
		2B, 5, 6, 8	1A, 2A, 3, 4A, 4B, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1B, 4A, 8	1A, 2A, 2B, 3, 5, 6, 7,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 7, 8	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.1	0.529	0.953	0.333
		1A, 1B, 3, 6, 7,	2A, 2B, 4A, 4B, 5,	n.a.	n.a.	n.a.	n.a.	1	0.067	0.529	0.968	0.333
		1A, 1B, 3, 4A, 4B, 6, 7, 8	2A, 5,	n.a.	n.a.	n.a.	n.a.	0.5	0.033	0.764	0.984	0.333
		1B, 2A, 2B, 3, 4A, 4B, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.107	0.1	0.95	0.953	0.333
		1A, 1B, 2B, 3, 4B, 5, 6, 7, 8		n.a.	n.a.	n.a.	n.a.	0.133	0.133	0.937	0.937	0.333
		1A, 1B, 2A, 2B, 4A, 4B, 5, 6, 8		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4B, 5, 6, 7,		n.a.	n.a.	n.a.	n.a.	0.033	0.033	0.984	0.984	0.333
		1A, 1B, 2A, 2B, 3, 4A, 4B, 5, 6,		n.a.	n.a.	n.a.	n.a.	0.065	0.067	0.969	0.968	0.333

Note: Presence = principle needs to be present in the solution set. Absence = principle need to be absent in the solution set. n.a. = not available (as set is not considered a solution). Cons = consistency, Cov = Coverage. All solution set variables are linked via multiplication (sensu as in QCA).

2.2 Truth Tables

Table A4: Truth table, all cases

QCA Type	**Design Principles**											**Success**	**n**	**Consistency**
	1A	1B	2A	2B	3	4A	4B	5	6	7	8			
Complete	1	1	1	1	1	1	1	1	1	1	1	1	9	1
	1	1	1	1	0	1	1	1	1	0	1	1	2	1
	1	1	1	1	1	1	1	1	1	1	0	1	2	1
	0	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	0	1	1	1	1	0	1	1	1	1	1	1
	1	1	0	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	0	1	1	1	1	0	1	1	1
	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	0	1	0	0	0	1	0	0	0	0	1	0	1	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	0	0	1	0	0	0	1	1	0	0	1	0
Missing = 0	1	1	1	1	1	1	1	1	1	1	1	1	9	1
	1	1	1	1	1	1	1	1	1	1	0	1	6	1
	1	1	1	1	1	1	1	0	1	1	1	1	3	1
	1	1	1	1	0	1	1	1	1	0	1	1	2	1
	0	1	0	0	1	0	0	0	1	0	1	1	1	1
	0	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	0	0	0	1	0	0	0	1	0	1	1	1
	1	1	0	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	0	0	1	1	0	0	0	0	1	1	1
	1	1	1	0	0	1	1	0	0	1	0	1	1	1
	1	1	1	0	1	0	0	0	0	1	1	1	1	1
	1	1	1	0	1	0	0	0	1	0	1	1	1	1
	1	1	1	0	1	1	0	1	0	1	1	1	1	1
	1	1	1	1	0	0	0	0	0	1	0	1	1	1
	1	1	1	1	0	1	0	0	0	1	0	1	1	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	0	0	0	1	0	1	1	1	1
	1	1	1	1	1	0	1	1	1	1	0	1	1	1
	1	1	1	1	1	1	0	0	1	1	0	1	1	1
	1	1	1	1	1	1	0	0	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	0	0	0	0	0	0	0	0	0	0	0	0	3	0.333
	1	1	0	0	1	0	0	0	0	1	0	0	3	0
	1	1	0	1	1	1	1	0	1	1	1	0	3	0.333
	0	1	0	0	0	1	0	0	0	0	1	0	2	0

Note: n = number of cases matching a specific configuration, Consistency = sufficiency consistency score. 0 = absent/not successful, 1= present/successful.

cont. Truth table, all cases

QCA Type	**Design Principles**											**Success**	**n**	**Consistency**
	1A	1B	2A	2B	3	4A	4B	5	6	7	8			
Missing=0	0	0	0	0	0	0	0	1	1	0	1	0	1	0
	0	0	0	0	0	1	1	0	0	1	0	0	1	0
	0	1	0	0	0	0	0	0	0	0	1	0	1	0
	0	1	0	0	0	0	0	1	1	0	1	0	1	0
	0	1	0	0	0	1	1	0	0	0	0	0	1	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	0	1	1	0	1	1	1	0	1	1	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	0	0	0	0	0	0	1	0	1	0	1	0
	1	1	0	0	1	0	0	0	1	1	0	0	1	0
	1	1	0	0	1	0	1	0	0	1	1	0	1	0
	1	1	0	0	1	1	0	0	0	0	1	0	1	0
	1	1	0	0	1	1	0	0	0	1	1	0	1	0
	1	1	0	0	1	1	1	0	0	1	0	0	1	0
	1	1	0	0	1	1	1	1	1	0	0	0	1	0
	1	1	0	0	1	1	1	1	1	1	1	0	1	0
	1	1	1	0	1	1	1	0	1	1	1	0	1	0
Missing = 1	1	1	1	1	1	1	1	1	1	1	0	1	3	1
	1	1	1	1	0	1	1	1	1	0	1	1	2	1
	1	1	1	1	1	1	1	1	1	0	1	1	2	1
	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	0	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	0	1	1	1	1	0	1	1	1	1	1	1
	1	1	1	1	0	1	1	1	0	1	0	1	1	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	0	1	1	1	1	0	1	1	1
	1	1	1	1	1	0	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	0	25	0.96
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	1	1	0	1	1	1	1	1	1	1	1	0	3	0.333
	1	1	0	0	1	0	0	0	0	1	1	0	2	0
	0	0	0	0	0	1	1	0	0	1	1	0	1	0
	0	0	0	0	1	1	1	1	1	1	1	0	1	0
	0	0	0	1	0	0	0	1	1	0	1	0	1	0
	0	0	0	1	1	0	1	1	1	1	1	0	1	0
	0	1	0	0	0	1	0	0	0	0	1	0	1	0
	0	1	0	0	0	1	1	0	0	0	1	0	1	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	0	1	0	1	0	0	0	1	1	0	1	0	1	0
	0	1	0	1	0	1	1	0	0	0	0	0	1	0
	0	1	1	1	1	1	1	0	1	1	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	0	0	1	0	0	0	1	1	0	0	1	0
	1	1	0	0	1	0	0	0	1	1	1	0	1	0
	1	1	0	0	1	1	1	0	1	1	1	0	1	0
	1	1	0	0	1	1	1	1	1	0	1	0	1	0
	1	1	0	1	1	0	1	1	1	1	1	0	1	0
	1	1	0	1	1	1	1	0	0	0	1	0	1	0
	1	1	1	0	1	0	1	0	1	1	1	0	1	0
	1	1	1	0	1	1	0	0	0	1	1	0	1	0
	1	1	1	1	1	1	1	0	1	1	1	0	1	0
	1	1	1	1	1	1	1	1	1	0	0	0	1	0

Note: n = number of cases matching a specific configuration, Consistency = sufficiency consistency score. 0 = absent/not successful, 1= present/successful.

Table A5: Truth table, Irrigation cases

QCA Type	**Design Principles**											**Success**	**n**	**Consistency**
	1A	1B	2A	2B	3	4A	4B	5	6	7	8			
Complete	1	1	1	1	1	1	1	1	1	1	1	1	7	1
	1	1	1	1	1	1	1	1	1	1	0	1	2	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
Missing = 0	1	1	1	1	1	1	1	1	1	1	1	1	11	1
	1	1	1	1	1	1	1	1	1	1	0	1	2	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	1	1	0	1	1	1	1	1	1	1	1	0	2	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	0	1	1	1	1	1	1	0	1	1	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	1	0	1	1	0	0	0	1	1	0	1	0
Missing = 1	1	1	1	1	1	1	1	1	1	1	1	1	7	1
	1	1	1	1	1	1	1	0	1	1	1	1	2	1
	1	1	1	1	1	1	1	1	1	1	0	1	2	1
	1	1	1	0	1	0	0	0	1	0	1	1	1	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	0	0	0	1	0	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	1	1	0	1	1	1	1	0	1	1	1	0	2	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	0	1	1	0	1	1	1	0	1	1	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	0	0	1	1	0	0	0	1	1	0	1	0

Note: n = number of cases matching a specific configuration, Consistency = sufficiency consistency score. 0 = absent/not successful, 1= present/successful.

Table A6: Truth table, Fishery cases

QCA Type	**Design Principles**											**Success**	**n**	**Consistency**
	1A	1B	2A	2B	3	4A	4B	5	6	7	8			
Complete	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	0	1	0	0	0	1	0	0	0	0	1	0	1	0
Missing = 0	0	1	0	0	1	0	0	0	1	0	1	1	1	1
	1	1	0	0	0	1	0	0	0	1	0	1	1	1
	1	1	1	0	1	0	0	0	0	1	1	1	1	1
	1	1	1	0	1	1	0	1	0	1	1	1	1	1
	1	1	1	1	0	0	0	0	0	1	0	1	1	1
	1	1	1	1	0	1	0	0	0	1	0	1	1	1
	1	1	1	1	1	1	0	0	1	1	0	1	1	1
	1	1	1	1	1	1	0	0	1	1	1	1	1	1
	1	1	1	1	1	1	1	0	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	0	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	1	1	0	0	1	0	0	1	0
	0	1	0	0	0	0	0	0	0	0	1	0	1	0
	0	1	0	0	0	1	0	0	0	0	1	0	1	0
	1	1	0	0	0	0	0	0	1	0	1	0	1	0
	1	1	0	0	1	0	1	0	0	1	1	0	1	0
	1	1	0	0	1	1	0	0	0	0	1	0	1	0
	1	1	0	0	1	1	1	1	1	0	0	0	1	0
Missing = 1	1	1	1	1	1	1	1	1	1	1	1	1	9	1
	1	1	1	1	1	0	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	0	0	0	0	0	1	1	0	0	1	1	0	1	0
	0	0	0	0	1	1	1	1	1	1	1	0	1	0
	0	0	0	1	1	0	1	1	1	1	1	0	1	0
	0	1	0	0	0	1	0	0	0	0	1	0	1	0
	1	1	0	0	1	1	1	1	1	0	1	0	1	0
	1	1	0	1	1	0	1	1	1	1	1	0	1	0
	1	1	0	1	1	1	1	0	0	0	1	0	1	0
	1	1	1	0	1	0	1	0	1	1	1	0	1	0
	1	1	1	1	1	1	1	1	1	0	0	0	1	0

Note: n = number of cases matching a specific configuration, Consistency = sufficiency consistency score. 0 = absent/not successful, 1= present/successful.

Table A7: Truth table, Forestry cases

QCA Type	Design Principles											Success	n	Consistency
	1A	1B	2A	2B	3	4A	4B	5	6	7	8			
Complete	1	1	1	1	1	1	1	1	1	1	1	1	7	1
	1	1	1	1	1	1	1	1	1	1	0	1	2	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
Missing = 0	1	1	1	1	1	1	1	1	1	1	0	1	3	1
	1	1	1	1	0	1	1	1	1	0	1	1	2	1
	0	0	0	0	0	0	0	0	0	0	0	1	1	1
	0	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	0	1	1	1	1	0	1	1	1	1	1	1
	1	1	0	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	0	0	1	1	0	0	0	0	1	1	1
	1	1	1	0	0	1	1	0	0	1	0	1	1	1
	1	1	1	1	1	0	1	1	1	1	0	1	1	1
	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	0	0	1	0	0	0	0	1	0	0	3	0
	0	0	0	0	0	0	0	1	1	0	1	0	1	0
	0	1	0	0	0	0	0	1	1	0	1	0	1	0
	0	1	0	0	0	1	0	0	0	0	1	0	1	0
	0	1	0	0	0	1	1	0	0	0	0	0	1	0
	1	1	0	0	1	0	0	0	1	1	0	0	1	0
	1	1	0	0	1	1	1	0	0	1	0	0	1	0
	1	1	0	0	1	1	1	1	1	1	1	0	1	0
	1	1	1	0	1	1	1	0	1	1	1	0	1	0
Missing = 1	1	1	1	1	1	1	1	1	1	1	1	1	11	1
	1	1	1	1	1	1	1	1	1	1	0	1	2	1
	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	1	1	0	1	1	1	1	1	1	1	1	0	2	0
	0	1	0	0	1	1	0	0	1	0	1	0	1	0
	0	1	1	1	1	1	1	0	1	1	1	0	1	0
	1	1	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	1	0	1	1	0	0	0	1	1	0	1	0

Note: n = number of cases matching a specific configuration, Consistency = sufficiency consistency score. 0 = absent/not successful, 1= present/successful.

Table A8: Fraction of times a principle is present in consistent solution leading to success and to not-success in all QCA performed (complete, missing = 0 and missing = 1)

		All Activities		Irrigation		Fishery		Forestry	
QCA Data	DP	Not-Success	Success	Not-Success	Success	Not-Success	Success	Not-Success	Success
Complete	1A	0.4	0.889	0.333	1	0	1	0.333	1
	1B	0.8	1	0.667	1	1	1	0.667	1
	2A	0	0.778	0	1	0	1	0	1
	2B	0	1	0	1	0	1	0	1
	3	0.4	0.778	0.333	0.667	0	1	0.333	0.667
	4A	0.4	0.889	0.333	1	1	1	0.333	1
	4B	0	1	0	1	0	1	0	1
	5	0	0.889	0	1	0	1	0	1
	6	0.4	1	0.333	1	0	1	0.333	1
	7	0.4	0.778	0.333	1	0	1	0.333	1
	8	0.4	0.778	0.333	0.667	1	1	0.333	0.667
Missing = 0	1A	0.545	0.905	0.5	1	0.5	0.909	0.556	0.818
	1B	0.818	1	0.833	1	0.75	1	0.889	0.909
	2A	0.091	0.857	0.333	1	0	0.818	0.111	0.727
	2B	0.045	0.667	0.333	1	0	0.636	0	0.727
	3	0.545	0.667	0.667	0.667	0.375	0.727	0.556	0.636
	4A	0.545	0.714	0.667	1	0.5	0.727	0.556	0.818
	4B	0.409	0.524	0.333	1	0.375	0.273	0.444	0.909
	5	0.182	0.429	0.167	1	0.125	0.273	0.333	0.636
	6	0.455	0.667	0.5	1	0.25	0.545	0.556	0.727
	7	0.5	0.714	0.667	1	0.25	0.909	0.556	0.636
	8	0.591	0.619	0.667	0.667	0.625	0.545	0.556	0.545
Missing = 1	1A	0.56	0.8	0.5	1	0.556	1	0.5	1
	1B	0.8	0.9	0.833	1	0.667	1	0.833	1
	2A	0.24	0.9	0.167	1	0.222	1	0.333	1
	2B	0.44	1	0.167	0.833	0.444	1	0.333	1
	3	0.68	0.7	0.667	0.833	0.778	1	0.667	0.667
	4A	0.6	0.8	0.667	0.667	0.667	0.667	0.667	1
	4B	0.6	1	0.333	0.667	0.889	1	0.333	1
	5	0.36	0.9	0	0.5	0.556	1	0.167	1
	6	0.64	0.9	0.5	1	0.667	1	0.5	1
	7	0.6	0.8	0.667	0.667	0.556	0.667	0.667	1
	8	0.8	0.7	0.667	0.833	0.889	1	0.667	0.667

Note: n = number of cases matching a specific configuration, Consistency = sufficiency consistency score. 0 = absent/not successful, 1= present/successful.

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