Working Paper 2015-82

Using Qualitative Comparative Analysis to Explore Outcome Patterns of Grant Support to Farmer Organisations in Bolivia

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COMPASSS Working Paper 2015-82
Available at http://www.compasss.org/wpseries/Ton2015.pdf
COMPASSS Working Paper Series Managing Editor, Claude Rubinson

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Errors in Table 7 corrected 12-12-2015

ABSTRACT

We used Qualitative Comparative Analysis (QCA) to study the combinations of factors that are consistently related to success or failure of grants given to farmer groups. Using data from a sample of 26 grant beneficiaries, we explored whether baseline characteristics of the organisations related to group sales, organisational scale and organisational strength could predict the intended outcomes of the grant system: improved access to markets for member products, increased organisational capacity, and more income to pay organisational expenses. We explain the calibration process used to assign each organisation to (fuzzy-set) conditions, and the iterative process of QCA to explore the resulting truth-table for plausible causal configurations that may help to target grant funds. We use the ambiguities in the evaluation of success or failure of certain organisations to verify the robustness of the analysis under real-world conditions of measurement error. We detected some single conditions consistently related with success, especially if they were sourcing raw material from members or the spot market, and could triangulate these patterns with logistic regression. The grants to the older, larger and stronger organisations were consistently unsuccessful, because the grant resulted in under-scaled investments in secondary activities that were discontinued after pilot experiences. Finally, we discuss the strengths and weaknesses of QCA as a method for explorative research and causal inference.

1. Introduction

Many development projects want to know how they can improve the effectiveness of their support, but have information on only a limited number of cases to draw conclusions. There is a need for approaches that maximize synergy between qualitative and quantitative research traditions, between the need for sufficient data set observations and sufficiently informative causal-process observations (Brady and Collier, 2004; Brady et al., 2006).

The reality of having to draw causal inferences from a small sample is not uncommon in other areas of science, e.g., political science or management studies, where data sets relate to a limited 'population' of countries or companies. Case-based comparative methods (Byrne and Ragin, 2009) are presented as tools to bridge the qualitative and quantitative divide. Case-based comparative methods use the empirical diversity/heterogeneity of cases in a data set to propose, modify or test theories of causal explanation. Variable-based analytical tools included under this label are Cluster Analysis, Structural modelling and Scatter Plots, which detect causal relations in data sets exploring for correlations between (combinations of) variables and outcomes. Configurational comparative methods (Rihoux and Ragin, 2009), instead, use Boolean algebra to make inferences on causality and detect (configurations of) causal conditions in data sets that are related with outcomes (Thiem et al., 2015).

Qualitative Comparative Analysis, developed by Charles Ragin (1987; 2000; 2008) is a prominent configurational comparative method. QCA is explicitly explorative in nature and geared to detect, and reflect on, the combinations of conditions consistently related to an outcome. QCA is especially useful when we expect multiple causal pathways that are conducive to producing a certain outcome. Instead of one single causal model that fits the data best, QCA explores multiple causal models that exist among comparable cases (Ragin, 1987; Rihoux and Marx, 2013).

Having been developed in political science, QCA has become popular in organisation research (Fiss et al., 2013) and evaluation (Befani, 2013), as it can be applied on small samples sizes. QCA is criticised for being susceptible to changes in parameters and model specifications. Korgslund et al. (2015) argue that by searching for patterns within the data set, the QCA analysis has a marked confirmation bias and may find patterns in random generated data that may mistakenly be interpreted as causal configurations. Different authors (Skaaning, 2011; Thiem, 2013; Lucas and Szatrowski, 2014) point to the sensitivity to different specifications and consistency thresholds used in QCA.

Most papers use simulated data to discuss or check the robustness of QCA solutions. We check the stability and robustness of the QCA solution using observed measurement error in a research that took place in Bolivia between 2010 and 2014 and concerned a small-grant fund that catered to economic farmer organisations. We used QCA to explore whether organisations' start conditions predict success or failure of the grant in order to better target grants in the future and increase the effectiveness of the grant system. The research provided a natural setting in which to check the robustness of QCA results under real-world conditions of measurement error. Two researchers analysed whether grants given to 26 different organisations had been successful or not. Due to different sources of information, they differed in the evaluation of success or failure on some of these cases. We could use the evaluation before and after the reconciliation as real-world measurement error to reflect on the stability of the QCA solutions.

We expected that the effectiveness of the grant would differ for configurations of conditions, for example smaller and economically stronger groups versus larger and economically weaker ones. We detected some single conditions consistently related with success, especially their characteristic of being organisations that source their raw material from members or from spot markets, and could triangulate these with logistic regression. The grants to the best-endowed organisations appeared to have been consistently unsuccessful, likely because the grant amount was limited and caused under-scaled investments in secondary business activities.

The paper proceeds as follows. First, we discuss the method of Qualitative Comparative Analysis in more detail. Second, we describe the context, background and rationale of the FONDOECAS small-grant support fund. We describe the construction of the data set (26 grant beneficiaries), the way that we calibrated the fuzzy-set conditions and the outcomes of the grants. Fourth, we present the results of the QCA analysis and discuss the suggested causal configurations of conditions that could explain/predict success or failure of the grant. We check the stability of the QCA results adapting consistency thresholds, and using the ambiguity in outcome evaluation. Fifth, we triangulate the results of the QCA with those of binary logistic regression. We finish with a discussion on the results and the usefulness of QCA as a method in impact evaluation.

2. Qualitative Comparative Analysis

Qualitative Comparative Analysis (QCA) has been developed by the political scientist Charles Ragin (1987; 2000; 2008). It is used to explore configurations of factors within a data set, that are related to the presence or absence of an outcome condition. Cases share certain attributes, called conditions, and each case is successful or not according to an outcome condition. Conditions can be 'crisp-sets', with the value 1 to denote presence of the condition and 0 to denote absence, or 'fuzzy-sets', with scores between 0 and 1, which denote partial membership of the case in the condition. The data set of observations is a matrix, with the cases in rows and the conditions in columns, similar to the data set used in statistical software.

The conditions used in the QCA analysis are expected to have explanatory power, be it as single conditions or as part of a configuration of conditions. QCA searches for the data set for possible causal relations This process of explorative analysis, looking at the outcomes to derive hypotheses about explanatory models, is called abduction (Reichertz, 2004; Minnameier, 2010) or 'retroduction' (Ragin, 2008; Rihoux and Lobe, 2009).

Abduction is a strategy that seeks satisfactory explanations of observed phenomena that can be adopted as new hypotheses and worthy candidates for further investigation (Douven, 2011; Peirce et al., 1935). By revealing patterns of associations across cases in a data set, QCA generates hypotheses about possible causal relations (Schneider and Wagemann, 2012; Legewie, 2013). QCA is an exploratory tool, and in many respects similar to the iterative use of the technique of cluster analysis in statistics, where cases are grouped according to their similarities in a set of variables. In econometrics, it is similar to the practice of model fitting, looking for possible explanations for observed patterns in data. And, just like model fitting, it bears the risk of data fishing and 'harking' - hypothesis testing after the results are known (Kerr, 1998). Shadish rightfully warns that 'many different models can fit a data set, so our confidence in any given model may be small.' (Shadish et al., 2002). Therefore, QCA results need to be examined critically to prevent spurious causal explanations.

The QCA exploration for causal conditions starts with the data set of observations. This data set has an identifier (e.g., name of the organisation), several conditions and an outcome variable. Several cases may share the same set of conditions. Therefore, QCA creates an overview of all possible combinations of conditions (configurations) and the number of cases that shares the same combination. This matrix is called a 'truth table'. The origin of the truth-table matrix as a device to show all combinations of conditions involved in the causal explanation is ascribed to the 19the century American philosopher and logician Charles Sanders Peirce (Anellis, 2012). Each row of a truth table represents a logically possible combination of conditions. A complete truth table will possess 2^k rows, where k equals the number of conditions. Not all rows in the truth table are necessarily covered by empirical cases. The rows that are not covered are called 'logical remainders'.

The truth table is a 'revealing data-display' (Collier, 2014) that helps us to reflect about explanations for outcomes. One of the key assumptions in the interpretation of truth table rows is that cases with similar conditions behave in a similar manner. When the row is consistently related with the same outcome (presence or absence of success), it is a sufficient causal configuration. Each consistent row in the truth table is considered as a statement of causal sufficiency, called a 'term'.

A QCA term can be written as:

CONDITION1 * condition2 * CONDITION3 * … → Outcome (1)

where, → denotes consistency, * is the Boolean logical operator AND, while UPPERCASE font indicates presence of the condition, while lowercase font indicates absence.

Before searching for the more parsimonious terms with the Quine-McCluskey algorithm, we first need to check for the presence of necessary conditions (Legewie, 2013; Rihoux and Ragin, 2009). Necessary conditions are 'always' present in all cases that share a certain outcome (be it success or failure) and therefore tend to be excluded in the Boolean minimisation as being redundant (Schneider and Wagemann, 2012: 221-225).

While inspection of a truth table is recommended practice (Byrne and Ragin, 2009; Collier, 2014), a much more contested feature of QCA is the use of the minimisations algorithm, which, using Boolean logic, distils causal 'recipes' from each configuration of conditions (rows) in the truth table. Consistency is the key criterion in QCA to decide on the strength of patterns in the data set. Consistency is the degree to which the empirical evidence supports the claim that the relation between conditions and outcome exists (Rihoux and Ragin, 2009: 183). In fuzzy-set QCA, some cases can be partial member of a condition. This implies that the causal relation might not be totally consistent, as the group of cases might have one or more cases that do not share the conditions entirely. To define a causal statement as being 'consistent', most authors recommend to use a consistency score of at least 0.75.The consistency score is computed as the lowest of the membership score of the term in the set of conditions, or the membership score of the term in the set of the outcome (Ragin, 2008; Smithson and Verkuilen, 2006).

The consistency score (C) of a group of n cases is:

$$C = \frac{\sum_1^n \min(membership\ score\ in\ set\ of\ conditions),(membership\ score\ in\ set\ of\ outcome)}{\sum_1^n (membership\ score\ in\ set\ of\ conditions)} \quad (2)$$

As explained above, QCA considers each row with a proper threshold consistency score as a case–as-configuration, the bearer of a set of conditions that are sufficient for the outcome to occur. However, not all conditions and configurations are necessarily relevant for the causal explanation. Some may be trivial or redundant, while others may provide the clue for explaining a causal relation. Using Boolean logic, QCA searches for 'simplest' combinations of conditions that are still consistent with the outcome. This minimisations algorithm used in QCA is the Quine-McCluskey algorithm (McCluskey, 1956). It reduces the complex Boolean expressions of the rows in the truth-table into more parsimonious terms. We can write the resulting causal statements (the QCA solution) as a Boolean expression of these terms.

The QCA solution is written as:

$$\text{Term1} + \text{Term2} + \ldots \rightarrow \text{Outcome} \quad (3)$$

where, → denotes consistency, and + is the Boolean logical operator OR.

Various software packages provide the Quine-McCluskey algorithm (McCluskey, 1956) to do this truth-table minimisation, such as fsQCA 2.5 (Ragin and Davey, 2009), TOSMANA (Cronqvist, 2009), Kirq 2.1.12 (Reichert and Rubinson, 2014), the *fuzzy* command in STATA (Longest and Vaisey, 2008) and QCA for R (Duşa and Thiem, 2014). However, there are fierce debates about the appropriateness (Collier, 2014), validity (Lucas and Szatrowski, 2014) and robustness (Thiem, 2013; Krogslund et al., 2015) of 'automatic' truth table minimisation as a method of causal inference. Slight changes in data, e.g., leaving out one or more of the cases (Lieberson, 2004), the use of different consistency thresholds and varying assumptions about 'logical remainders' have implications for the results of minimisation. Krogslund et al. (2015) replicated the QCA analysis of three prominent studies and showed that their results were not stable. They showed that QCA may feed a preliminary analysis about possible causal configurations but that consistent causal terms derived with QCA minimisation alone cannot be considered strong evidence to prove the existence of these causal factors. Marx (2006), Lucas and Szatrowski (2014) and Krogslund et al. (2015) show with simulation data that the QCA minimisation can easily produce Type I errors: finding causal configurations while these are just random patterns in the data. Skaaning (2011) and Thiem (2013) stresses the need for more extensive robustness checks to accompany a QCA analysis.

Where Thiem and Kroglund et al. have constructive criticism, with a view to improving the procedure of case-based comparative analysis, the critique from Lucas and Szatrowski is more devastating. They attack the dominant positive image of *QCA as a useful case-oriented method for comparative analysis of asymmetrical causal relations*, and reverse this wording into *"QCA is actually a self-contradictory, cell-oriented, non-comparative, non-analytic means to identify asymmetric causal illusions"* (Lucas and Szatrowski, 2014: 66). Their critique is valid when QCA is used mechanically, but we do not agree with their verdict on QCA as a research approach. Most QCA analysts will not accept the results of the QCA solution without a thorough reflection on the process and mechanisms of change. Ragin (2008; Ragin, 2014) and other scholars who developed QCA (Schneider and Wagemann, 2012; Rihoux and Ragin, 2009) have always warned against an uncritical interpretation of the results of QCA. They situate QCA in a cautious process of qualitative analysis, and an iterative process of analysis and interpretation of results in view of refining the understanding of the cases and the potential causal process suggested in the solutions.

The fsQCA-software application (Ragin and Davey, 2009) is partly to blame for uncritical and mechanical use. As results of the Boolean minimisations, fsQCA 2.5 automatically generates three different solutions, which differ according to the inclusion or not of the information in the logical remainder rows of the truth table. The complex solution only uses the rows of the truth table that have empirical cases, the parsimonious and intermediate solutions also include the 'empty' rows (logical remainders). The parsimonious and intermediate solutions differ in the simplifying assumptions used, assumptions about the causal direction of the conditions involved in these logical remainders. Rubinson points to a shortcoming in fsQCA 2.5 which makes that the choice for inclusion or not of a row has to be made by the researcher without direct/explicit reference to the 'names' of the empirical cases that are affected by these decisions. As a result, Rubinson indicates that the software fsQCA lost a key feature, present in the earlier crisp-set version of the software, and necessary for a proper QCA, as emphasised by Ragin

himself (1987: 113). "*To follow the case-oriented approach, then, is to treat any specification of relevant causal conditions as tentative and to use theoretical and substantive knowledge to achieve a proper specification of causal conditions before reducing the truth table*". The new QCA application Kirq (Reichert and Rubinson, 2014) facilitates this necessary reflection on consistent and inconsistent cases in the truth table rows. Researchers can, therefore, better apply their substantive knowledge about the cases to interpret the consistency of a row. For each truth table row and term in the solution, Kirq 2.1.12 gives the identifier of the case that is consistent or inconsistent in the outcome condition.

3. FONDOECAS

We applied QCA on data from an impact evaluation of a Bolivian grant fund. The grant fund FONDOECAS was started in 2006 and by 2010, it had allocated 130 grants to the same number of farmer groups, from a population of 400 possible grantees organisations. In 2010, we started a research project to capture and assess the outcomes of the fund (Ton, 2010a). In 2010, we designed our study in a way that would create a promising context for applying QCA.

FONDOECAS provided a relatively uniform and replicable 'treatment', a grant of USD 10,000 to invest in processing or collective marketing activities. Moreover, we had a group of organisations that, in spite of their specificity, shared distinctive characteristics, all of them being member-based rural organisations with a legal status. The diversity of baseline characteristics of the beneficiaries made it clear that statistical power of any sample, even when doing a census, would be too low to result in quantitative impact estimates with a quasi-experimental design.

The preparation of the impact evaluation coincided with a discussion on the findings of an external evaluation of the pilot phase of the fund (Prudencio, 2010), which suggested that FONDOECAS should focus more on smaller and less-developed organisations, and introduce credit as an additional support service, alongside grants. The suggestion by the external evaluator to focus on small and new organisations was understandably contentious, as the larger and stronger organisations did not want to lose this facility. The idea was also contested by leaders in CIOEC, who preferred to work with organisations that had already proven capable of organising their economic activities, rather than inexperienced newcomers (Pardo, 2010). It was also contrary to the spirit of discussions held during the design phase in 2005/2006 (Ton, 2005), in which the grant was presented as a novel institutional arrangement to resolve specific bottlenecks in relatively strong, well-functioning organisations to access new markets, for example, to help then with the investments needed to comply with the quality requirements in government procurement programmes.

This discussion on the external evaluation influenced our research design. The core question on effectiveness became: For what type of organisations, under what type of conditions, did FONDOECAS result in positive outcomes? The research aimed to generate recommendations that would be useful to the managers of the FONDOECAS small-grant fund, to be worded as follows: "When your objective is to create [intended outcome], based on the available monitoring information, we would suggest that you focus the support [allocation mechanism] on these types of organisations [eligibility criteria] with these characteristics [baseline conditions]." This answer implied the need for an explorative analysis to detect multiple impact pathways, typically the strength of QCA.

4. Conditions used in QCA

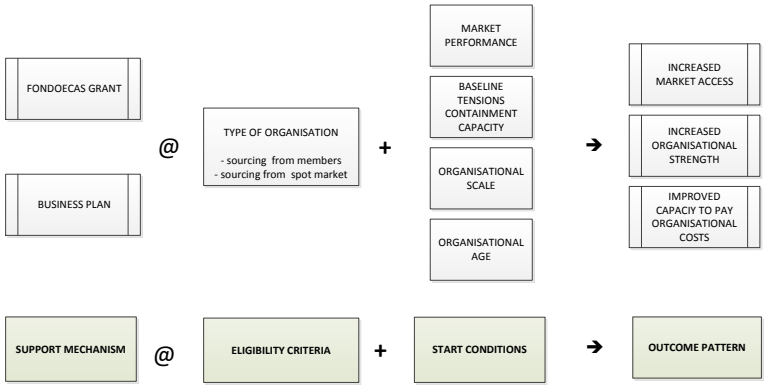
The organisations receiving the grant and the context in which these grants are used are diverse. They work in different sectors, vary in size, in age, in patrimony, baseline turnover, gender composition, geographical location, legal format, etc. The number of conditions used to describe the characteristics of each case is large. For a meaningful analysis of causal pathways, however, we needed to restrict the number of conditions. As explained above, the central feature of QCA is the truth table, which consists of 2^k rows, all possible combinations of conditions. An analysis with two conditions generates four rows. With three variables, this increases to 8 and with six variables it is 64 rows. With only 26 cases, a high number of conditions in the QCA model would lead to a situation in which most rows are unpopulated. Using simulated data sets with random data, Axel Marx (2006; 2010) shows that when the proportion of variables on cases in a crisp set QCA analysis is low, the results of the Boolean minimisation process may

become unstable and trivial solutions are likely to appear. This means that, in crisp set QCA, it is advised, as good practice, to constrain an analysis of 26 cases to five or six conditions only. Fuzzy set QCA is likely to be at least as vulnerable as crisp set QCA. We opted therefore to use only four or five conditions in our analysis.

Based on the documents and discussions around FONDOECAS, we can distil some conditions that are mentioned as possible moderators (see Figure 1). First, there have been discussions about the eligibility of some of the grant recipients, because they had characteristics that deviated from the 'ideal type' economic farmer organisation. Economic farmer organisations are framed by CIOEC as rural membership organisations that sell or process member products. Some beneficiaries, however, do not sell products that they buy from members, but work more as micro-enterprise, processing inputs bought in the market, or from non-members. The effectiveness of the grant can be expected to vary according to this different relation between group and members. Therefore, we distinguished two types: groups that process member products and organisations that process non-member products.

We selected three start conditions for which organisations could be compared at the moment of deciding on the grant proposal, and that could be potential predictors of success. In Chapter 6, we describe our tool to assess the organisational social capital of collective marketing groups, focussing on their capabilities to manage the inherent governance challenges in collective marketing: 'tension containment capacity'. Two other conditions are related to the economic and organisational performance of the organisations at the moment of granting: 'market performance' and 'organisational scale'.

In Figure 1, we present the conceptual model with these constructs using the formula of realist evaluation (Pawson and Tilley 1997). The grant-supported business plan interacts (**@**) with the type of organisation and (**+**) and contextual conditions present at baseline to cause (➔) certain outcome patterns. Our quest is for configurations of conditions that may 'predict' success or failure of the grant. If we find them, FONDOECAS may use them to target the grant to organisations that seem more likely to become a success, adjusting the eligibility criteria of the grant fund. None of the conditions is expected to be necessary or sufficient on its own, but they may be part of a causal configuration of conditions. This type of causal conditions is often called INUS-condition (Mackie, 1965; Mahoney, 2008; Shadish et al., 2002): each condition is insufficient but a non-redundant part of a larger configuration of conditions that is unnecessary but sufficient to cause an outcome.



Source: Author's own elaboration

Figure 0-1. Conditions used in the QCA model

Fuzzy-set calibration

In QCA, each condition takes a value between 0 and 1, describing the (partial) membership of a case in the group of cases that shares a specific condition. Fuzzy-sets make it possible to have cases that are 'nor completely in, nor completely out' of the set-condition (see Table 1). Fuzzy-sets often better represent the reality in the field with some cases that are difficult to classify under a specific condition. In

our model, Market performance, Baseline tension containment capacity and Organisational scale are three constructs that are better represented in fuzzy-sets than in crisp-sets.

Table 1. Verbal description of fuzzy-membership scores

Fuzzy value	The case is….
1	Fully in
0.9	Almost fully in
0.8	Mostly in
0.6	More in than out
0.5	Crossover: neither in nor out
0.4	More out than in
0.2	Mostly out
0.1	Almost fully out
0	Fully out

Source: Schneider and Wagemann (2012: 29)

There are several variables that could represent market performance of an organisation, be it total sales or sales per member. Moreover, group sales, patrimony and membership are informative for an assessment of the scale of an organisation. As explained above, however, we needed a reduced number of conditions for the QCA analysis. To limit the number of conditions in the QCA model, we used a Principal Component Analysis to distil two factors that could proxy for Market performance and Organisational scale. These factors were derived from the four performance variables: group sales, turnover per member, patrimony and membership (see Table 2). We normalised each variable using a natural log transformation. The Principal Component Analysis with Varimax rotation resulted in two factors, which together explained 81% of the variance. The first factor was defined by group sales and group sales per member. The second factor is dominated by patrimony and membership.

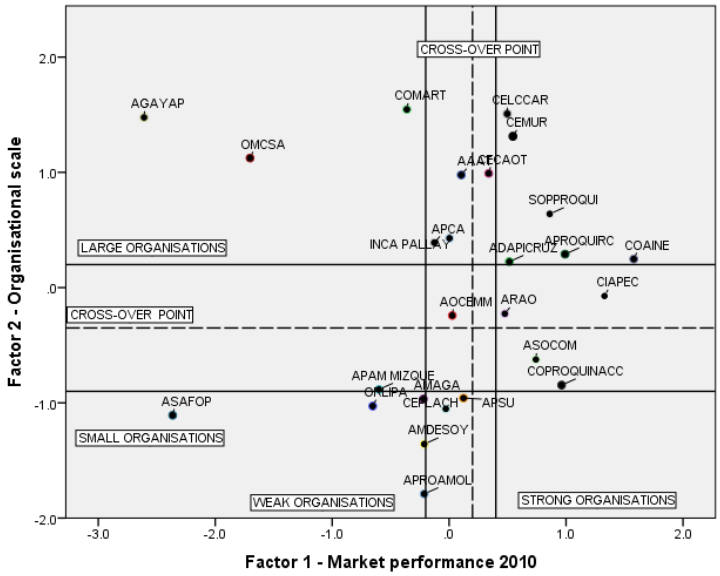
Table 2. Rotated component matrix of Principal Component Analysis on four performance indicators (2010 data)

Component	Factor 1 "Market performance"	Factor 2 "Organisational scale"
Proportion of variance explained	53%	28%
Group sales (Ln)	.930	.289
Turnover per member (Ln)	.990	.004
Patrimony (Ln)	.166	.741
Membership (Ln)	.049	.874

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

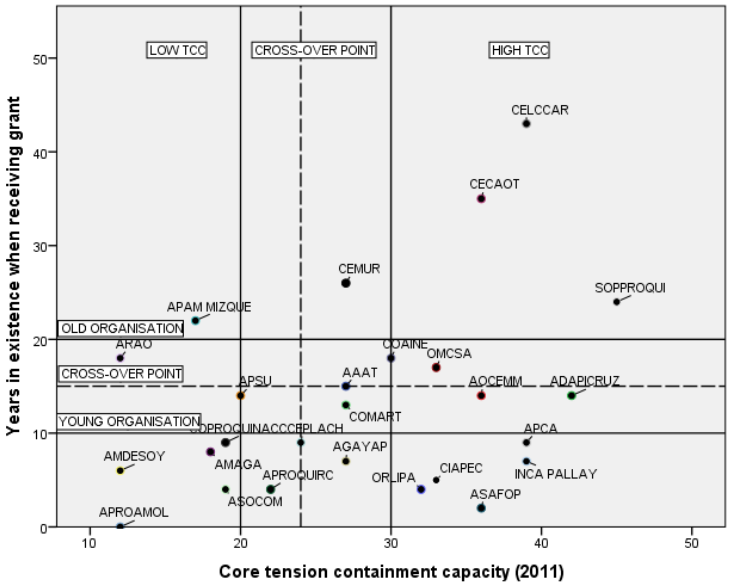
To make the variable suitable for QCA analysis, these principal components need to be transformed into fuzzy sets. The fuzzy-set score of a case represents the membership score of that case in the set. To calibrate the set, we used the 'direct method of calibration', as recommended by Rihoux and Ragin (2009) and provided in the software that is market leader for this analysis, fsQCA 2.5 (Ragin and Davey, 2009). Based on three thresholds, or 'qualitative anchors' (Schneider and Wagemann, 2012), a fuzzy-set variable can be computed with values between 0 and 1, with 0.5 as the cross-over point. The fsQCA 2.5 software applies a logistic function to calculate the continuous fuzzy-set scores between the cross-over point and the threshold cases that are definitely in or definitely out.

The direct method of fuzzy-set calibration (Ragin, 2008) is transparent but explicitly normative. For each set, the organisation that is considered definitely in and out had to be defined based on substantive knowledge and/or existing theory. We used scatter plots to identify the organisations that could function as appropriate qualitative anchors for defining the fuzzy-set scores. These qualitative anchors were selected primarily based on the substantive knowledge of the author on a fair number of organisations in the sample, having worked with many of them during 1999 and 2004 when employed by the national platform of economic farmer organisations CIOEC-Bolivia.



Source: Author's own elaboration

Figure 0-2. Scatter plot for the calibration of the fuzzy sets 'Market performance' and 'Organisational scale'



Source: Author's own elaboration

Figure 0-3. Qualitative anchors used to calibrate the fuzzy set 'Organisations with high baseline tension containment capacity' and 'Old organisations'.

Table 3. Motivation to select cases as qualitative anchors for the calibration of fuzzy-sets

Fuzzy-set condition	Name	Scale score	Fuzzy score	Motivation
Organisations with high baseline tension containment capacities (HIGHTCCBASE)				
- Definitely high (HIGHTCC)	COAINE	30	0.95	COAINE is one of the oldest cooperatives in Bolivia. It manages several coffee processing facilities for pulping and removal of mucilage and parchment. COAINE employs four permanent staff and around 30 persons who work in the drying and parchment centres
- Cross-over	CEPLACH	24	0.50	CEPLACH is a small women's association of dairy processors, legally founded in 2001. It specialises in the production of yoghurt and cheese, when there is a sales opportunity for its products. Its main objective is the generation of part-time employment and complementary cash income for the female worker-members. However, CEPLACH also creates market access for several of the members who supply milk.
- Definitively low (high tcc)	APSU	20	0.05	APSU is a small handicraft organisation located near the border of Chile, specialised in alpaca weavings with a membership that declined from 60 in 2010 to 32 households in 2012. It sells most of its member products in an alliance with the federation COMART, which manages a shop in La Paz.
Strong market performance (STRONGSALES)				
- Definitely strong (STRONGSALES)	CEMUR	0.4	0.95	CEMUR is an association of women's groups organised around capacity building and business development. It manages collective production units to sell the products to their members. In 2010 they had a turnover of US$ 142,857, which means US$952/member.
- Cross-over	APSU	0.2	0.50	APSU is a small handicraft organisation located near the border of Chile, specialised in alpaca weavings. It sells its products in an alliance with the federation COMART, which manages a shop in La Paz. Their sales in 2010 totalled US$18,571, or US$413/member.
- Definitively weak (strongsales)	AMDESOY	-0.2	0.05	AMDESOY started in 2005 and is a women's group that creates products form soy-meal. The member-workers sell the products directly to consumers in Santa Cruz with a system of door-to-door sales. Their annual sales in 2010 were less than US$3,749, which is US$187/member.
Large organisational scale (LARGESCALE)				
- Definitely large (LARGESCALE)	ADAPICRUZ	0.4	0.95	In 2010, the honey processor ADAPICRUZ had 150 members, based in the city of Santa Cruz de la Sierra. They manage a processing unit in Sta Cruz worth around US$140,000.
- Cross-over	ARAO	-0.2	0.50	ARAO, formed in 1983 with legal recognition in 1990, is specialised in the production of carpets, sweaters, shawls and ponchos, and has its own shop in Oruro for distribution. In 2010, ARAO had a membership of 90 members and patrimony of US$92,000
- Definitively small (largescale)	COPROQUINACC	-0.9	0.05	COPROQINACC-T is the smallest of 12 regional organisations that form the national quinoa federation ANAPQUI. It started in 1998 and by 2010, it grouped 60 producers. Only in 2006 did they manage to obtain legal status with the 60 members. They had a patrimony of US$44,000.
Organisational age (OLDAGE)				
- Definitely old (OLDAGE)	APAM MIZQUE	22	0.99	Since 1988, APAM MIZQUE started to produce honey in the area, with help from an NGO. They sell the honey in the consumer market in Cochabamba.
- Cross-over	AAAT	15	0.5	AAAT is a handicraft organisation that uses wool from its 150 members living in a remote area, to produce products for the high-end market. The organisation started in 1992 supported by an NGO. In 2000 they became independent from the NGO but continued to receive support from development cooperation.
- Definitively young (oldage)	CEPLACH	9	0.03	CEPLACH is a small women's association of dairy processors, founded in 2001. It specialises in the production of yoghurt and cheese, whenever there is a sales opportunity for the products. Its main objective is the generation of part-time employment and complementary cash income for the female worker-members.

Figure 2 shows the qualitative anchors used to define the fuzzy-set scores of two conditions. We selected CEMUR as an organisation that was definitely a member of the set of organisations with 'Strong market performance'. We considered APSU as closest to the cross-over point and AMDESOY as the organisations that had to be considered as 'definitely weak'.

On the second condition, 'Large organisational scale', we considered ADAPICRUZ as definitely large, ARAO as the cross-over point and COPROQUINACC as definitely small scale. Table 3 describes the main

characteristics that motivated the selection of these cases as qualitative anchors for calibration of the fuzzy sets.

The construct Baseline tension containment capacity was based on information collected through interviews with board members of the farmer groups. The interviewed board members and the local researchers reviewed the organisational dynamics in each of the organisations in the last few years for ten areas in which agency dilemmas in collective marketing tend to be present (Ton, 2010b). The interviews were summarised using a fixed format, and a 'core tension-containment capacity score' was derived from this information (see Chapter 6 of this thesis). For each agency dilemma, the status of the rules and regulations to resolve the inherent tensions between group and member was assessed on two aspects: the relevance of the issue in the organisations ('the tension comes up / hardly comes up / never comes up') and if the issue was resolved or not (resolved, trying to resolve, no need to resolve). Five of these agency dilemmas proved to be core to most organisations in Bolivia, which resulted in a so-called 'core tensions containment score' as the construct to measure organisation strength.

To select the qualitative anchors for the fuzzy-set condition 'High tension containment capacity', we plotted their respective core tensions containment scores for 2011 (Figure 3). We qualified COAINE as definitely in, CEPLECH as cross-over point and APSU as definitely out of the group of organisations with high baseline tension containment capacities (see Table 3 for more detail). In the same figure, we added the age of the organisation, because this variable is used in some of our QCA analysis as a complementary start condition.

Crisp-set outcomes

To derive the scores of cases in the outcome condition, that is, their 'membership in the group of organisations with a successful outcome of the grant', we used the time-series data and tension containment scores plus the qualitative information about dynamics and processes related to the grant and grant-supported business plan. A case-by-case interpretation of the information was necessary, because the performance indicators between 2008 and 2012 could not be interpreted directly/mechanically to assess success or failure of the grant. Proxy-indicators such as changes in turnover or membership had changed largely in response to dynamics in the traditional business activities of the organisation, whereas the grant only tackled a constraint in a specific business segment, often only one of multiple activities. Therefore, we could not determine the success or failure of a grant by simply subtracting these overall latter indicators of performance from those before the reception of the grant. For example, the contribution of the grant to increased market access was different for large coffee exporters that invested the grant in a pilot roasting machine, as a future complementary activity, than in small dairy plants or honey processors that invested in equipment that improved uniformity and quality of their product, often a mandatory requisite for access to government procurement markets. Therefore, to define if an organisation attained a certain outcome as a result of the grant, we had to infer the effectiveness of the grant through a case-by-case analysis of the processes and dynamics that were set in motion by the grant.

In this interpretative analysis of the change dynamics in each organisation, we applied counterfactual thinking (Vellema et al., 2013). We asked ourselves the question: Would the outcome have been achieved even without the grant?. This classification of success or failure implies interpretation involving normative decisions based on the available information. We classified a case as successful or unsuccessful after reconciling the independent evaluation by the two main researchers, GT, the author of this paper, and LF, the local researcher who had done all 2013 interviews. GT had more knowledge on the performance indicators and the differences between the baseline and end-line interview reports. LF was more knowledgeable on the organisational dynamics, because she had additional information and impressions resulting from the actual interviews. Both quasi-independent judgements were reconciled in a discussion in January 2015. The final, reconciled outcome classification was agreed upon between the two researchers. Table 4 shows the agreement in these evaluations. Agreement between both researchers was 'moderate'. Cohen's kappa scores are 'substantial' for the outcomes enhanced market access and improved organisational capacities, and 'fair' for the increased capacity to pay organisational expenses (Landis and Koch, 1977). . The resulting scores are crisp-sets, where 0 denotes failure of the grant to result in the respective intended outcome and 1 indicates a success. A fuzzy-scale proved unnecessary, because the outcomes for each case after the reconciliation was unambiguous. In Annex 1

of Ton (2015) we describe, for each of the 26 cases, the dynamics in the organisation and the reasons for classifying a case as being successful or unsuccessful in the outcome.

Table 4. Cohen's Kappa scores of agreement in valuations[a] [b]

Outcome	LF original versus reconciled	GT original versus reconciled	LF original versus GT original	Arguments used for reconciliation
Grant enhanced market access	0.75	0.70	0.48	One difference (AAAT) was due to an erroneous interpretation of the use of the investment in the shop. Another was due to considering different time intervals and grant investments (CECAOT). Also, a dairy plant (CEPLACH) appeared to have several milk-producing members who sold to the group but the grant served to build and relocate the place of operation, which negatively affected sales. ORLIPA accessed the local school food programme but appeared to have done so without the products from the grant-supported business plan.
Grant improved organisational capacities	0.83	0.59	0.41	Two cases (CELCCAR, CIAPEC) did not use the grant investment, though they continued with the supported business plan. In two cases the interviewees expressed the importance of the decision-making process around the grant to discuss internal group pressures, even though the grant did not contribute to production.
Grant increased capacity to pay organisational expenses	0.26	0.92	0.22	We noted a difference in interpretation of the question between the two researchers. During reconciliation, it was agreed that the capacity to pay expenses will increase when the level of sales increases due to the grant, even though in most organisations the total amount of expenses or member income did not change.

[a]. Interpretation of Kappa: <0.00=Poor agreement; 0.00–0.20=Slight agreement; 0.21–0.40=Fair agreement; 0.41–0.60= Moderate agreement; 0.61–0.80=Substantial agreement; 0.81–1.00=Almost perfect agreement (Landis and Koch, 1977)
[b]. GT used fuzzy scores for some of the valuations. These were converted to crisp scores before calculating the Cohen's Kappa

The differences in the evaluation of the outcomes by the two researchers (Table 5) provided an opportunity to reflect on the stability of the QCA-solution under real-world conditions of measurement error. Implicitly, this reconciliation implied that one of the researchers had had a 'measurement error' when evaluating the respective organisation. The source of this measurement error differed according to the case, but was mostly due to missing information on the way the grant had been invested or additional, non-recorded information on organisational dynamics. Without this reconciliation process, the QCA would have proceeded with the evaluations of GT only. This makes it possible to assess the robustness of the QCA analysis in function of GT's initial measurement error. Therefore, we used the differences in the authors' evaluation of the outcomes in each organisation ('GT original' versus 'reconciled') to verify the stability of the terms in the QCA solution.

Description of the data set

Table 6 reflects the distribution of the 26 organisations according to the configuration of contextual conditions in which they have their highest membership score. The empty rows reflect the 'limited diversity', which is inherent to most social research: often, not all possible combinations of conditions can be observed in the real world. In QCA, these empty rows are called ' logical remainders'.

Within the sample of grant beneficiaries, there is a group of six organisations that do not share any of the three start conditions. These organisations are relatively small, weak and had limited market performance around the time that they received the grant. Two of them are non-sourcing organisations (row 16), and the other four are classified as sourcing organisations (row 15), though CEPLACH has only partial membership with a fuzzy set score of 0.7. In contrast, seven organisations were strong on all three contextual conditions, one of them non-sourcing (the women's organisation CEMUR), while five of the other six are quinoa- or coffee-bulking organisations.

Table 5. Evaluation of the contributionary role of the grant in three outcome areas

	Positive outcome market access			Positive outcome organisational strengthened			Positive outcome capacity to pay organisational expenses		
	LF original	GT original	Reconciled	LF original	GT original	Reconciled	LF original	GT original	GT + LF Reconciled
AAAT	0	1	0	1	0	1	0	1	1
ADAPICRUZ	1	1	1	1	0	1	0	1	1
AGAYAP	0	0	0	0	0	0	0	0	0
AMAGA	0	0	0	0	1	1	0	1	1
AMDESOY	0	0	0	0	0	0	0	1	1
AOCEMM	1	1	1	1	1	1	1	1	1
APAM MIZQUE	0	0	0	0	0	0	0	0	0
APCA	.	1	1	.	0	0	.	0	0
APROAMOL	0	1	0	1	1	1	0	1	1
APROQUIRC	1	1	1	1	1	1	0	1	1
APSU	0	0	0	0	0	0	0	0	0
ARAO	1	1	1	1	1	1	0	1	1
ASAFOP	0	0	0	1	0	1	0	1	1
ASOCOM	0	0	0	0	0	0	0	0	0
CECAOT	1	0	0	1	0	0	0	0	0
CELCCAR	0	0	0	0	1	0	0	0	0
CEMUR	0	0	0	0	0	0	0	1	1
CEPLACH	1	0	0	0	0	0	1	1	1
CIAPEC	0	0	0	0	1	0	0	0	0
COAINE	0	0	0	0	0	0	0	0	0
COMART	0	0	0	1	1	1	0	1	0
COPROQUINACC	0	0	0	0	0	0	0	0	0
INCA PALLAY	0	0	0	1	1	1	0	0	0
OMCSA	0	0	0	0	0	0	1	1	1
ORLIPA	0	1	0	0	0	0	0	0	0
SOPPROQUI	0	0	0	0	0	0	0	0	0
SUCCES RATE	6/25	8/26	5/26	10/25	9/25	10/26	3/25	13/26	12/26

Table 6. Organisations with consistent membership in each combination of conditions

	Start conditions			Type of org.		
row	HIGH TCC	STRONG SALES	LARGE SCALE	SOURCING	N	Organisations that are member in each row
1	TRUE	TRUE	TRUE	TRUE	6	ADAPICRUZ;CECAOT;CELCCAR;CIAPEC;COAINE;SOPPROQUI
2	TRUE	TRUE	TRUE	FALSE	1	CEMUR
3	TRUE	TRUE	FALSE	TRUE	0	-
4	TRUE	TRUE	FALSE	FALSE	0	-
5	TRUE	FALSE	TRUE	TRUE	6	AAAT;AGAYAP;AOCEMM;APCA;COMART;INCAPALLAY
6	TRUE	FALSE	TRUE	FALSE	1	OMCSA
7	TRUE	FALSE	FALSE	TRUE	1	ORLIPA
8	TRUE	FALSE	FALSE	FALSE	1	ASAFOP
9	FALSE	TRUE	TRUE	TRUE	2	APROQUIRC;ARAO
10	FALSE	TRUE	TRUE	FALSE	0	-
11	FALSE	TRUE	FALSE	TRUE	1	COPROQUINACC
12	FALSE	TRUE	FALSE	FALSE	1	ASOCOM
13	FALSE	FALSE	TRUE	TRUE	0	-
14	FALSE	FALSE	TRUE	FALSE	0	-
15	FALSE	FALSE	FALSE	TRUE	4	APAMMIZQUE;APROAMOL;APSU;CEPLACH
16	FALSE	FALSE	FALSE	FALSE	2	AMAGA;AMDESOY

Source: Original data, analysed using Kirq 2.1.12.
Cases are considered part of the configuration when consistency score of the case in the set >0.5.

Table 7. Data set of observations with membership scores of the cases in the fuzzy-set conditions

		Outcomes			Conditions									
		Market access for member products	Improved organisational capacities	Increased income to pay organisational costs	SOURCING Sourcing member products	HIGHTCC High tension containment capacity (2011)		STRONGSALES Strong marketing performance (2010)		LARGESCALE Large scale (2010)		OLDAGE Organisational age when receiving grant	
No	NAME	crisp set score	crisp set score	crisp set score	fuzzy set score	TCC score	fuzzy set score	PCA Factor 1 score	fuzzy set score	PCA Factor 2 score	fuzzy set score	scale	fuzzy set score
1	AAAT	0	1	1	1	27	0.77	0.1	0.33	0.98	1	15	0.5
2	ADAPICRUZ	1	1	1	1	42	1	0.51	0.99	0.23	0.96	14	0.35
3	AGAYAP	0	0	0	1	27	0.77	-2.61	0	1.48	1	7	0.01
4	AMAGA	0	1	1	0.3	18	0.01	-0.22	0.04	-0.97	0.03	8	0.01
5	AMDESOY	0	0	1	0	12	0	-0.21	0.04	-1.36	0	6	0
6	AOCEMM	1	1	1	1	36	1	0.03	0.21	-0.24	0.64	14	0.35
7	APAM MIZQUE	0	0	0	1	17	0.01	-0.6	0	-0.88	0.05	22	0.99
8	APCA	1	0	0	1	39	1	-0.13	0.08	0.39	0.98	9	0.03
9	APROAMOL	0	1	1	1	12	0	-0.21	0.04	-1.79	0	0	0
10	APROQUIRC	1	1	1	1	22	0.14	0.99	1	0.29	0.97	4	0
11	APSU	0	0	0	1	20	0.05	0.12	0.36	-0.96	0.03	14	0.35
12	ARAO	1	1	1	1	12	0	0.48	0.98	-0.23	0.66	18	0.86
13	ASAFOP	0	1	1	0	36	1	-2.36	0	-1.11	0.02	2	0
14	ASOCOM	0	0	0	0	28	0.86	0.74	1	-0.62	0.18	4	0
15	CECAOT	0	0	0	1	36	1	0.34	0.89	0.99	1	35	1
16	CELCCAR	0	0	0	1	39	1	0.5	0.99	1.51	1	43	1
17	CEMUR	0	0	1	0	27	0.77	0.55	0.99	1.31	1	26	1
18	CEPLACH	0	0	1	0.7	24	0.35	-0.03	0.15	-1.05	0.02	9	0.03
19	CIAPEC	0	0	0	1	33	0.99	1.33	1	-0.07	0.82	5	0
20	COAINE	0	0	0	1	30	0.95	1.58	1	0.25	0.96	18	0.86
21	COMART	0	1	0	1	27	0.77	-0.36	0.01	1.55	1	13	0.23
22	COPROQUINACC	0	0	0	1	19	0.03	0.96	1	-0.85	0.06	9	0.03
23	INCA PALLAY	0	1	0	1	39	1	0	0.19	0.43	0.99	7	0.01
24	OMCSA	0	0	1	0.3	33	0.99	-1.7	0	1.12	1	17	0.77
25	ORLIPA	0	0	0	1	32	0.99	-0.65	0	-1.03	0.02	4	0
26	SOPPROQUI	0	0	0	1	45	1	0.86	1	0.64	1	24	1

The rows in the truth table are generalisations from more than one case. Some organisations have fuzzy-set scores between 0.25 and 0.75, which indicates ambiguity of membership in the row. With slightly changed qualitative anchors, these organisations would have changed membership in a specific truth table row. We will pay special attention to these ambiguous organisations. As Table 7. shows, AMAGA and CEPLACH are ambiguous in sourcing from members; AAAT, ADAPICRUZ, CMUR, CEPLACH and COMART are ambiguous when looking at their tension containment capacities, AAAT and APSU when looking at sales performance, and AOCEMM and ARAO when considering their organisational scale. Annex 1 in Ton (2015) provides more qualitative detail about each of the organisations.

5. Truth table analysis

The data set that resulted after the set calibration of context and outcome conditions (Table 7) is the input for the Qualitative Comparative Analysis. We used of Kirq 2.1.12 (Reichert and Rubinson, 2014) as the preferred computer interface for truth table analysis, as it makes it easier to reflect on the empirical cases. Kirq 2.1.12 lists consistent and inconsistent observations, a feature to help decision making about the inclusion of each row in the QCA minimisation.

The consistency score is computed as the lowest score of the membership of the row in the set of conditions, or the membership of the row in the set of the outcome (Ragin, 2008; Smithson and Verkuilen, 2006). In our case, with a crisp outcome and fuzzy-set conditions, we can easily separate both aspects of consistency. Because the outcome variables are crisp sets, an organisation will always be fully consistent with either the negative or the positive outcome. The proportion of cases that are consistent or inconsistent can thus be computed. Whenever the consistency score is lower than the proportion of consistent cases, this is necessarily the result of the lower consistency of the configuration of conditions. We may use this additional information provided in Kirq when we need to determine if a configuration must or must not be considered as being a 'sufficient explanation' for the outcome, and used as input in the minimisation process. We accept higher inconsistencies of the configuration of conditions than inconsistencies in the outcome. Therefore, where the proportion of cases that shared the same outcome is higher than the consistency score computed by the software, but at least 75%, we included the row in the minimisation process.

The reasons for success may be different from the reasons for failure. Both analyses can give us insights into which factors to take care of when better targeting the scarce resources of the FONDOECAS grant system. QCA explores configurations of conditions that can predict a positive outcome separately from the configuration of conditions that might predict a negative outcome. Based on the computed consistency scores and a reflection on the number of consistent and inconsistent observations, we classify whether a contradictory row can be considered as 'probabilistically sufficient' (Mahoney, 2008) for the positive outcome or for the negative outcome. Often the verdict will be symmetrical, a row is TRUE in one and FALSE in the other. However, contradictory rows may well be considered FALSE for both: they may be inconsistent and therefore insufficient explanations of either the positive outcome or the negative outcome.

In the following, we present truth tables related with the three intended outcome areas of FONDOECAS and reflect on possible explanatory factors that explain why the positive outcome of the grant was present or absent in each of the organisations.

Outcome 1: Increased market access of members

Conditions that predict success

The number of organisations that created market access with the grant-supported business plan is very small. Only five cases are classified as such. When we review the rows in the truth table that contains these successful cases, we see that they all share the conditions of being large-scaled organisations that source from members. The truth table also shows that these conditions are not sufficient for success, as many organisations with a similar configuration of baseline conditions proved unsuccessful (rows 1 and 5 in Table 8).

Table 8. OUTCOME: Grant contributed to market access for members

Row	Start conditions			Type of group				
#	high tcc	strong sales	large scale	sourcing	Consist with success	Suff. for success	Suff. for failure	Observations consistent with successful outcome	Observations consistent with unsuccessful outcome
1	TRUE	TRUE	TRUE	TRUE	0.21	Con (FALSE)	Con (TRUE)	ADAPICRUZ	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI
2	TRUE	TRUE	TRUE	FALSE	0.00	FALSE	TRUE	-	CEMUR
3	TRUE	TRUE	FALSE	TRUE	n/a	Rem	Rem	-	-
4	TRUE	TRUE	FALSE	FALSE	n/a	Rem	Rem	-	-
5	TRUE	FALSE	TRUE	TRUE	0.31	Con (FALSE)	Con (FALSE)	AOCEMM; APCA	AAAT; AGAYAP; COMART; INCAPALLAY
6	TRUE	FALSE	TRUE	FALSE	0.00	FALSE	TRUE	-	OMCSA
7	TRUE	FALSE	FALSE	TRUE	0.22	FALSE	TRUE	-	ORLIPA
8	TRUE	FALSE	FALSE	FALSE	0.00	FALSE	TRUE	-	ASAFOP
9	FALSE	TRUE	TRUE	TRUE	0.78	TRUE	FALSE	APROQUIRC; ARAO	-
10	FALSE	TRUE	TRUE	FALSE	n/a	Rem	Rem	-	-
11	FALSE	TRUE	FALSE	TRUE	0.19	FALSE	TRUE	-	COPROQUINACC
12	FALSE	TRUE	FALSE	FALSE	0.00	FALSE	TRUE	-	ASOCOM
13	FALSE	FALSE	TRUE	TRUE	n/a	Rem	Rem	-	-
14	FALSE	FALSE	TRUE	FALSE	n/a	Rem	Rem	-	-
15	FALSE	FALSE	FALSE	TRUE	0.01	FALSE	TRUE	-	APAMMIZQUE; APROAMOL; APSU; CEPLACH
16	FALSE	FALSE	FALSE	FALSE	0.00	FALSE	TRUE	-	AMAGA; AMDESOY

Source: Original data, analysed with Kirq 2.1.12.
FALSE = inconsistent configuration; TRUE = consistent configuration; Con = contradictory (coded FALSE or TRUE after reflecting the degree of inconsistency); Rem = logical remainder; observations are considered consistent when consistency score of the case is >0.5.

As a next step in the QCA analysis, we checked whether these conditions were necessary conditions (INUS conditions). To qualify as such, all cases with a positive outcome need to be a subset of the set characterised by this necessary condition. The consistency threshold used to qualify as necessary condition needs to be high, at least 0.90 (Legewie, 2013). The QCA analysis shows that this is the case only for sourcing (see Table 9). The condition of large scale is not consistent enough to qualify as necessary condition (consistency score = 0.84). ARAO is ambiguous on the fuzzy-set large organisational scale (fuzzy-set score = 0.66). With a slight change in the fuzzy set qualitative anchors of this fuzzy-set, it could have been classified as having a small scale.

Table 9. QCA analysis of necessary conditions for success in market access of members

Term	Consist	Cov	Obs
SOURCING	1.00	0.25	ADAPICRUZ;AOCEMM;APCA;APROQUIRC;ARAO
LARGESCALE	0.84	0.27	ADAPICRUZ; APCA;APROQUIRC;ARAO

The inconsistent cases in the truth-table rows indicate that there are almost no configurations that can be considered sufficient for a positive outcome. Only one row, with two cases, is consistently related to a positive outcome (APROQUIRC and ARAO, row 9). This group shares all start conditions except high tension containment capacity. With only one truth table row, Boolean minimisation is not possible. The coverage of cases is low and the configuration is, therefore, an unlikely predictor of success.

Conditions that predict failure

We applied a minimum consistency score of 0.75 when deciding on inclusion of the row in the subsequent minimisation to explore for sufficient causes for success. The complex solution that results from the Boolean minimisations of these nine rows results in five terms (Table 10). Four of these terms cover highly consistent groups. Some of these groups have partial overlap in membership.

One group is characterised by having both high tension containment capacities at baseline, with strong sales and being large in scale. It comprises the three coffee exporters and the two largest quinoa exporters. Another group of eight organisations is characterised as being weak considering their tensions containment capacities and being small scale. But there is also another possible group, also with eight

cases, that is characterised as having weak sales and being small scale. Six of the eight organisations overlap in membership and are classified in both groups.

Table 10. Complex solution for failure in generating market access for members

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
HIGHTCCBASE*strongsales*sourcing+	1.00	0.10	0.00	ASAFOP; OMCSA	-
HIGHTCCBASE*LARGESCALE*sourcing+	1.00	0.07	0.00	CEMUR; OMCSA	-
strongsales*largescale+	0.95	0.35	0.06	AMAGA; AMDESOY; APAMMIZQUE; APROAMOL; APSU; CEPLACH; ASAFOP; ORLIPA	-
HIGHTCCBASE*STRONGSALES*LARGESCALE+	0.81	0.29	0.24	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI; CEMUR	ADAPICRUZ
hightccbase*largescale	0.95	0.35	0.10	AMAGA; AMDESOY; APAMMIZQUE; APROAMOL; APSU; CEPLACH; ASOCOM; COPROQUINACC	-
Solution	0.90	0.77			

When we apply the Boolean minimisation of the truth table including the 'empirically empty' logical remainder rows, we reduce these five terms of the complex solution to only three terms in the parsimonious solution (Table 11). One term comprises a group of organisations that have in common that they do not source from members. This is consistent with our earlier finding that being a sourcing organisation is a necessary condition for success. There is another term with organisations that are characterised as being small scale. This points to a plausible explanation, and predictor of success; when market access of members is the goal, it seems wise to hesitate in allocating grants to organisations that are small in scale.

Table 11. Parsimonious solution for failure in generating market access for members

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
sourcing+	1.00	0.27	0.05	AMAGA; AMDESOY; ASAFOP; ASOCOM; CEMUR; OMCSA	-
largescale+	0.93	0.47	0.27	AMAGA; AMDESOY; APAMMIZQUE; APROAMOL; APSU; CEPLACH; ASAFOP; ASOCOM; COPROQUINACC; ORLIPA	-
HIGHTCCBASE*STRONGSALES	0.82	0.30	0.24	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI; CEMUR	ADAPICRUZ
Solution	0.90	0.80			

One term groups the organisations with high tension containment capacities at baseline and strong sales. The result that high tension containment capacities, large scale and strong sales, predict failure of the grant is somewhat counterintuitive: Why would organisations that were already both organisationally strong and good performers be especially unsuccessful in generating positive outcomes with the grant? This made us reflect on the specific situation of this subgroup. The literature shows that many organisations in our sample had a history of working with NGOs that had invested large sums in these organisations (Healy, 2001; Flores et al., 2007; Bebbington, 1996). Would this 'easy money' possibly have led to lower importance being attached to the business plan presented to FONDOECAS?

This reflection induced us to experiment with the inclusion of the age of the organisation as an additional explanatory variable or condition, a modification of our initial conceptual model. The inclusion of OLDAGE as complementary condition in the QCA-model resolved the inconsistent row 1 that involved ADAPICRUZ. The terms and groups in the parsimonious solution change due to the inclusion of this additional condition. With the inclusion of OLDAGE, the non-sourcing organisations disappear as term in the solution; the conditions that were most consistently related to the well-endowed group of organisations change into being old and with high tension containment capacities. The consistency of the solution is high with 0.94, and the coverage is slightly better, but coverage is slightly lower with 0.70 (Table 12). The characteristic of being old seems to be a more consistent condition and a better characterisation of this group of organisations than having strong sales or being large scale.

Table 12. Parsimonious solution for failure in generating market access for members and OLDAGE as additional condition

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
largescale+	0.93	0.47	0.46	AMAGA; AMDESOY; APAMMIZQUE; APROAMOL; APSU; CEPLACH; ASAFP; ASOCOM; COPROQUINACC; ORLIPA	-
OLDAGE*HIGHTCCBASE	0.89	0.30	0.29	CECAOT; CELCCAR; CEMUR; COAINE; SOPPROQUI; OMCSA	-
Solution	0.93	0.76			

Robustness

Applying a higher consistency threshold (0.80 instead of 0.75), leads to the exclusion of truth table row 1 and 7 as sufficient causal configuration for failure. The parsimonious solution would only have two consistent groups (terms). One group is defined by the condition of being non-sourcing organisations, and covers six (27%) of the unsuccessful cases. The other group is characterised by small scale and low tension containment capacities at baseline, and covers eight (35%) of the unsuccessful cases. They partially overlap in membership.

The application of the higher consistency threshold removes the large group of older and stronger organisation from the solution of the initial QCA model. However, the higher consistency threshold does not change the parsimonious solution of the expanded model (with the age condition included), and the term improves in consistency but has a lower coverage (0.35). In this expanded model the older organisations with high tension containment capacities are consistently related with failure of the grant to contribute to market access of members.

Table 13. Ambiguity in evaluation of the grant's contribution to improved market access of members

			Reconciled evaluation		
			Unsuccessful	Successful	Total (original)
GT original evaluation	Unsuccessful	Count	18	0	18
	Successful	Count	3	5	8
	Total (reconciled)	Count	21	5	26

As shown in Table 13, the measurement error in the evaluation of success on the outcome market access of members was relatively high. Three out of eight cases were 'downgraded' during reconciliation from successful to unsuccessful. All cases rated as unsuccessful remained so after reconciliation. The three organisations that changed as a result of the reconciliation are AAAT, APROAMOL and ORLIPA. AAAT and APROAMOL are members of rows that were not included in the truth table minimisation, nor would they have been included in it had they been classified as successful. Row 5 would have remained excluded in the minimisation even if AAAT had been classified as a success. The measurement error related to APROAMOL would have changed the consistency score of row 15 to 0.72. If we leave that row out of the minimisation (applying 0.75 as consistency threshold), the parsimonious solution would still result in a similar grouping of organisations. Neither the reclassification of ORLIPA from unsuccessful to successful does not change the final solution substantially. The parsimonious solution is exactly the same, though with slightly different consistency and coverage. All in all, the QCA analysis on the outcome market access of members proved robust to measurement errors and varying consistency thresholds.

Outcome 2: Improve organisational capacities

Deleted: ¶

Conditions that predict success

Ten out of the 26 organisations registered a positive outcome in this area. Most organisations that were successful, however, are covered by a contradictory truth table row (row 1, 5, 15, 16) with a high proportion of inconsistent cases. The truth table shows only two rows that are possible sufficient causes for a successful outcome (ASAFOP in row 8, APROQUIRC and ARAO in row 9). Interestingly, these two groups differ in all the four baseline conditions. It is, therefore, clear that it is not possible to further reduce the truth table.

Table 14. OUTCOME: Grant contributed to organisational strengthening

	Start conditions			Type of group					
row	high tcc	strong sales	large scale	sourcing	Consist with success	Sufficient for success	Sufficient for failure	Observations consistent with successful outcome	Observations consistent with unsuccessful outcome
1	TRUE	TRUE	TRUE	TRUE	0.28	Con (FALSE)	Con (TRUE)	ADAPICRUZ	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI
2	TRUE	TRUE	TRUE	FALSE	0.01	FALSE	TRUE	-	CEMUR
3	TRUE	TRUE	FALSE	TRUE	n/a	Rem	Rem	-	-
4	TRUE	TRUE	FALSE	FALSE	n/a	Rem	Rem	-	-
5	TRUE	FALSE	TRUE	TRUE	0.57	Con (FALSE)	Con (FALSE)	AAAT; AOCEMM; COMART; INCAPALLAY	AGAYAP; APCA
6	TRUE	FALSE	TRUE	FALSE	0.04	FALSE	TRUE	-	OMCSA
7	TRUE	FALSE	FALSE	TRUE	0.22	FALSE	TRUE	-	ORLIPA
8	TRUE	FALSE	FALSE	FALSE	0.77	TRUE	FALSE	ASAFOP	-
9	FALSE	TRUE	TRUE	TRUE	0.91	TRUE	FALSE	APROQUIRC; ARAO	-
10	FALSE	TRUE	TRUE	FALSE	n/a	Rem	Rem	-	-
11	FALSE	TRUE	FALSE	TRUE	0.23	FALSE	TRUE	-	COPROQUINACC
12	FALSE	TRUE	FALSE	FALSE	0.04	FALSE	TRUE	-	ASOCOM
13	FALSE	FALSE	TRUE	TRUE	n/a	Rem	Rem	-	-
14	FALSE	FALSE	TRUE	FALSE	n/a	Rem	Rem	-	-
15	FALSE	FALSE	FALSE	TRUE	0.36	Con (FALSE)	Con (FALSE)	APROAMOL	APAMMIZQUE; APSU; CEPLACH
16	FALSE	FALSE	FALSE	FALSE	0.36	Con (FALSE)	Con (FALSE)	AMAGA	AMDESOY

Source: Original data, analysed with Kirq 2.1.12.
FALSE = inconsistent configuration; TRUE = consistent configuration; Con = contradictory (coded FALSE or TRUE after reflecting the degree of inconsistency); Rem = logical remainder; observations are considered consistent when consistency score of the case is >0.5.

Conditions that predict failure

In the truth table (Table 14), we see that row 1 has one successful and five unsuccessful cases. Grants to this group of well-endowed organisations proved rather unsuccessful. The proportion of unsuccessful cases is above our threshold of 0.75, but the consistency score is slightly below our threshold of 0.75. When we included row 1, we had five rows that feed the minimisation into the complex solution, which resulted in a solution with four terms. The inclusion of the logical remainder rows in the minimisations did not make much of a difference; the parsimonious solution still has four groups that cover 63% of the unsuccessful cases. The terms in the solutions are very diverse; neither the complex nor the parsimonious solution points to any plausible configuration of conditions related with failure (Table 15 and Table 16). When we excluded row 1 from the minimisation, three of the four groups remained, with a coverage of 26% of the unsuccessful cases.

Table 15. Complex solution after Boolean minimisation of the truth table for failure in organisational strengthening

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
HIGHTCCBASE*LARGESCALE*sourcing+	0.98	0.10	0.04	CEMUR; OMCSA	-
HIGHTCCBASE*strongsales*largescale*SOURCING+	0.78	0.09	0.07	ORLIPA	-
HIGHTCCBASE*STRONGSALES*LARGESCALE+	0.75	0.35	0.29	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI; CEMUR	ADAPICRUZ
hightccbase*STRONGSALES*largescale	0.84	0.15	0.13	ASOCOM; COPROQUINACC	-
Solution	0.87	0.62			

Table 16. Parsimonious solution after Boolean minimisation of the truth table for failure in organisational strengthening.

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
HIGHTCCBASE*largescale*SOURCING+	0.79	0.10	0.07	ORLIPA	-
STRONGSALES*largescale+	0.78	0.16	0.12	ASOCOM; COPROQUINACC	-
LARGESCALE*sourcing+	0.97	0.12	0.06	CEMUR; OMCSA	-
HIGHTCCBASE*STRONGSALES	0.76	0.37	0.29	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI; CEMUR	ADAPICRUZ
Solution	0.80	0.63			

Robustness

For ten organisations, the grant contributed to organisational strengthening. Some ambiguity in this classification of success was present. Table 17 shows that three cases (AAAT, ADAPICRUZ and CECAOT) were upgraded to successful, whereas two cases (CELCCAR, CIAPEC) were downgraded to unsuccessful after the exchange of information and opinions between the two researchers.

When we perform the analysis with the original outcome classifications of GT, thus including measurement error, the results of the QCA alter. All the rows in the truth table become inconsistent as configurations that may predict a successful outcome.

Also, only three rows remain consistent when analysing the conditions related to failure (row 2, 6 and 12). These rows cannot be reduced any further, and only represent three (15% coverage) of the unsuccessful cases. This shows that the QCA analysis is susceptible to measurement errors, especially when the results show many different terms that cover only a limited number of cases. This gives us even more reason to refrain from making strong inferences in the analysis of unsuccessful outcomes.

Table 17. Ambiguity in evaluation of the grant's contribution to organisational strengthening

			Reconciled evaluation		
			Unsuccessful	Successful	Total (original)
GT original evaluation	Unsuccessful	Count	14	3	17
	Successful	Count	2	7	9
	Total (reconciled)	Count	16	10	26

Table 18. OUTCOME: Grant contributed to capacity to pay organisational costs

Start conditions				Type of group				
row	high tcc	strong sales	large scale	sourcing	Consist with success	Suff. for success	Suff. for failure	Observations consistent with successful outcome	Observations consistent with unsuccessful outcome
1	TRUE	TRUE	TRUE	TRUE	0.25	Con (FALSE)	Con (TRUE)	ADAPICRUZ	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI
2	TRUE	TRUE	TRUE	FALSE	0.96	TRUE	FALSE	CEMUR	-
3	TRUE	TRUE	FALSE	TRUE	n/a	Rem	Rem	-	-
4	TRUE	TRUE	FALSE	FALSE	n/a	Rem	Rem	-	-
5	TRUE	FALSE	TRUE	TRUE	0.32	Con FALSE	Con (FALSE)	AAAT; AOCEMM	AGAYAP; APCA; COMART; INCAPALLAY
6	TRUE	FALSE	TRUE	FALSE	1.00	TRUE	FALSE	OMCSA	-
7	TRUE	FALSE	FALSE	TRUE	0.41	FALSE	FALSE	-	ORLIPA
8	TRUE	FALSE	FALSE	FALSE	1.00	TRUE	FALSE	ASAFOP	-
9	FALSE	TRUE	TRUE	TRUE	0.92	TRUE	FALSE	APROQUIRC; ARAO	-
10	FALSE	TRUE	TRUE	FALSE	n/a	Rem	Rem	-	-
11	FALSE	TRUE	FALSE	TRUE	0.31	FALSE	FALSE	-	COPROQUINACC
12	FALSE	TRUE	FALSE	FALSE	0.22	FALSE	TRUE	-	ASOCOM
13	FALSE	FALSE	TRUE	TRUE	n/a	Rem	Rem	-	-
14	FALSE	FALSE	TRUE	FALSE	n/a	Rem	Rem	-	-
15	FALSE	FALSE	FALSE	TRUE	0.55	Con (FALSE)	Con (FALSE)	APROAMOL; CEPLACH	APAMMIZQUE; APSU
16	FALSE	FALSE	FALSE	FALSE	1.00	TRUE	FALSE	AMAGA; AMDESOY	-

Source: Original data, analysed with Kirq 2.1.12.
FALSE = inconsistent configuration; TRUE = consistent configuration; Con = contradictory (coded FALSE or TRUE after reflecting the degree of inconsistency); Rem = logical remainder; observations are considered consistent when consistency score of the case is >0.5.

Condition 3: Increase capacity to pay organisational expenses

Conditions that predict success

Twelve organisations registered a positive outcome on their ability to source income to pay for organisational expenses. The truth table (Table 18) shows that row 2, 6, 8, 9 and 16 are consistently related to a positive outcome, in which the grant had contributed to increased capacity to pay organisational expenses. The complex solution(Table 19) reduces these five rows into three groups that cover 7 out of 12 successful cases, without overlapping members. Five of the successful cases are non-sourcing organisations. The two others (APROQUIRC and ARAO) are large and strong, but with weak tension containment capacities. The parsimonious solution (Table 20) presents more terms than the complex solution. It suggests various alternative ways to reduce the number of conditions in the term, depending on the other prime characteristic attached to ASAFOP, CEMUR and OMCS along with being a non-sourcing organisation.
The sole condition of being a non-sourcing organisation is not enough to explain success in generating income to pay for organisational expenses. However, it is clear that the group of non-sourcing organisations is a group that is likely to be successful in raising the capacity to pay organisational expenses.

Table 19. Complex solution after Boolean minimisation of the truth table for success to increase the capacity to pay organisational costs.

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
strongsales*largescale*sourcing+	1.00	0.24	0.24	AMAGA; AMDESOY; ASAFOP	-
hightccbase*STRONGSALES*LARGESCALE*SOURCING+	0.92	0.15	0.15	APROQUIRC; ARAO	
HIGHTCCBASE*LARGESCALE*sourcing	0.98	0.13	0.12	CEMUR; OMCSA	-
Solution	0.97	0.51			

Table 20. Parsimonious solution after Boolean minimisation of the truth table for success to increase the capacity to pay organisational costs.

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
strongsales*sourcing+	1.00	0.31	0.24	AMAGA; AMDESOY; ASAFOP; OMCSA	-
hightccbase*LARGESCALE+	0.71	0.17	0.15	APROQUIRC; ARAO	
LARGESCALE*sourcing+	0.91	0.15	0.02	CEMUR; OMCSA	-
HIGHTCCBASE*sourcing	0.99	0.23	0.00	ASAFOP; CEMUR; OMCSA	
Solution	0.88	0.53			

Conditions that predict failure

The truth table only has two rows with a consistency score above 0.75. Rows 7, 11 and 12 have only cases with a negative outcome but the configuration of conditions fails to be consistent enough. This is a result of partial membership of these cases (and other cases that have fuzzy set scores between 0 and 1) in one or more of these conditions.

Table 21. QCA analysis of necessary conditions or failure to increase the capacity to pay organisational costs.

Term	Consist	Cov	Obs
SOURCING*	0.93	0.64	AGAYAP; APAMMIZQUE; APCA; APSU; CECAOT; CELCCAR; CIAPEC; COAINE; COMART; COPROQUINACC; INCAPALLAY; ORLIPA; SOPPROQUI

The analysis (Table 21) shows that being a sourcing organisation is a consistent necessary condition for failure. With a consistency score of 0.93, covering 13 out of 14 unsuccessful organisations, this characteristic seems a good predictor of failure to raise the organisation's capacity to pay organisational expenses. There are plausible explanations for this result. Compared to organisations that do not source their products from members, this group faces more agency dilemmas. For example, tensions with members on input price determination or quality control of products supplied to the group are absent in the group of smaller non-sourcing organisations. The grant is generally used to start an additional processing activity, next to bulking of unprocessed member products. The impact of the sales of processed products with this new investment is likely very small compared to the already existing income flows to pay organisational expenses. Thus, we infer that the commitment of the group to use the grant to gain money is higher in organisations that buy inputs on the spot market (similar to micro-enterprises) than in the larger organisations that source from members.

The minimisation of the rows that are related to unsuccessful outcomes will therefore not result in much additional insight. The complex and parsimonious solutions (Table 22 and Table 23)) are identical and show two terms that are identical with the specification of these two truth table rows. ASOCOM has a unique term in the solution, being a non-sourcing organisation with low baseline tension containment capacities, strong sales and small scale. The other term defines a large group of strong and large sourcing organisations that had high tension containment capacities. The large group covers five unsuccessful cases (37% of all unsuccessful cases), and one inconsistent case (ADAPICRUZ). The consistency of the solution is slightly higher than the threshold (0.75), with an overall consistency score of 0.76 that precludes strong inferences.

Table 22. Complex solution after Boolean minimisation of the truth table for failure to increase the capacity to pay organisational costs.

Term	Consist	RawCov	UniqCov	ObsConsist	ObsInconsist
HIGHTCCBASE*STRONGSALES* LARGESCALE*SOURCING+	0.75	0.36	0.36	CECAOT; CELCCAR; CIAPEC; COAINE; SOPPROQUI	ADAPICRUZ
hightccbase*STRONGSALES*largescale	0.78	0.06	0.06	ASOCOM	-
Solution	0.76	0.42			

Robustness

The use of a higher consistency threshold does not alter the results of the QCA analysis of conditions related to success. A higher consistency threshold of 0.80 would make all rows insufficient, precluding any causal analysis of sufficiency.

There was little ambiguity in the evaluation of success in this outcome area, when considering the classification before and after reconciliation (Table 23). Only one case (COMART) changed from successful to unsuccessful after the exchange of information between the two researchers during the reconciliation. This had no influence on the results of the analysis, except slightly different values for consistency and coverage.

Table 23. Ambiguity in evaluation of the grant's contribution to increased capacity to pay organisational expenses

			Reconciled evaluation		
			Unsuccessful	Successful	Total (original)
GT original evaluation	Unsuccessful	Count	13	0	13
	Successful	Count	1	12	13
	Total (reconciled)	Count	14	12	26

6. Why are grants to well-endowed organisations unsuccessful?

Five of the six organisations with high tension containment capacity, strong sales and a large scale, all sourcing member products, failed on all three outcomes. This asks for an explanation of the causal mechanisms that may be involved. The available data is too limited to make strong inferences. Nevertheless, some plausible hypotheses emerges, when we review the grant-related dynamics in this group of organisations (Table 24). All five unsuccessful organisations mention as a reason of failure of the grant-supported business plan that they had invested the grant in under-scales equipment. Also, most of them mentioned the abortion of the grant-supported business plan as a rational business decision, after the pilot experience. For these organisations, the grant investment of USD 10,000 apparently resulted too small in relation to their existing collective marketing activities.

Table 24. Grant dynamics in the well-endowed organisations that proved consistently unsuccessful.

Name	Grant dynamics
CECAOT	CECAOT used their grant, in 2009, to repair an optical quality control unit in their plant, to limit labour costs in the plant. The maximum amount available from FONDOECAS (US$10,000) motivated them to repair the equipment instead of buying a completely new machine (US$40,000). However, the equipment broke down again in 2010, partly due to improper handling. The optic sensor has not been repaired anymore due to the high costs. Instead, CECAOT considered buying a completely new optical sensor, which they did not do however, partly due to the crisis and resulting internal organisational problems in 2011 which resulted from the failure to get a pre-harvest sales contract.
CELCCAR	CELCCAR channelled the FONDOECAS grant to one of its member cooperatives. They experimented with fruit processing on a pilot scale. They mention internal organisational problems and lack of complementary equipment as the major factors that negatively affected the business plan. The capacity of the equipment was considered by the 2013 interviewees to be too low to seriously create market access. An expansion of production capacity is needed to obtain real access to the market.
CIAPEC	CIAPEC wanted to develop a production line for roasted coffee for the national market in La Paz, including expectations for export. It started to experiment with roasting and packaging but the production capacity was lower than expected and they experienced technical problems with the equipment after only one year of operation. They consider the equipment not suitable for processing on an industrial scale.
COAINE	The equipment bought with the grant was far too small for the use that COAINE projected. Additional access to markets has not been created, nor has COAINE visibility in the market been enhanced by the grant. The average yearly turnover of processed coffee was an insignificant amount when compared to the size of the total turnover and size of membership.
SOPROQUI	SOPROQUI wanted to invest in processing and packaging equipment to supply processed quinoa products (quinoa popcorn, quinoa soup) to the market, including the school meal programmes. However, the equipment was never properly delivered and installed and the project never took off. The current board members do consider quinoa processing still as an interesting business opportunity but indicate that other machinery and skilled personnel is needed to start doing so.

Source: For details, see Annex 1 in Ton (2015)

They could stop the new business plan without disintegrating as a group, because they did not depend for their organisational and economic survival on its success. ADAPICRUZ, who shares the characteristics of this group of well-endowed organisations, was successful, but this does not contradict this inference. ADAPICRUZ used a first grant to enter into a new market with a new product, but they needed complementary investments to make the diversified product portfolio commercially viable. Reviewing the grant-related dynamics in the other 20 beneficiary organisations, we see that only the young and small organisation ASOCOM mentioned under-scaled investment as a reason for failure (see Annex 1 in Ton [2015] for details).

7. Triangulating the results of QCA with logistic regression

In spite of the fundamentally different notion of causality implied in regressional-analytical and configuration-comparative methods, detailed in Thiem et al. (2015), and treated in Chapter 1 of this thesis, in our research logistic regression could help to triangulate part of the results of QCA because most of the conditions identified as potential predictors of effectiveness in the QCA resulted to be single conditions, not configurations.

We applied logistic regression to the scale variables that were underlying the fuzzy-sets. We included five variables in our model with a data set of only 26 observations. In Table 25 we present the results with the statistical significance level of the model, according to the Omnibus Test, and we use the Nagelkerke r-squared as the indicator of the capacity of the model to explain the total variance. We only present models for which the Hosmer and Lemeshow test does not reject the null-hypothesis that observed and predicted values have a similar distribution (Meyers et al., 2006). Model 1 suffers from 'quasi-complete separation', a situation in which an explanatory variable perfectly predicts one of the two values for the outcome variable (Rainey, 2014). Grants to non-sourcing organisations will, per definition, always be unsuccessful in improving market access for group members. Quasi-complete separation causes the odd ratio to be infinitely high and the constant infinitely small. To address this problem, we included two alternative models. In Model 2 we omitted the constant from the model and in Model 3 we omitted the sourcing-variable. The Hosner and Lemeshow test indicates there is predictive value in each model. The direction of the odd ratios is stable. Model 1 appears as the best interpretable. It points to the causal necessity of sourcing for success on this objective, and can be read both as 'the condition of being a non-sourcing organisation reduces the chance of the grant to be successful to zero'.

The logistic regressions using the fuzzy-set variables as predictors (Model 4, 5 and 6) yield similar results but with more accentuated odd-ratios. The fuzzy-set condition 'large organisational scale' seems to be a strong predictor of success, and being a non-sourcing organisation a strong predictor of failure. Organisations with a large organisational scale have a likelihood of being successful that is approximately 20 times higher than for organisations that are small scale. In the logistic regression, having high tension containment capacities appears to lower the likelihood of success, and older organisations are likely to be less successful than young organisations. As shown above, QCA detected the combination of both conditions, old age and high tension containment capacity, as a causal configuration consistently related with failure. Overall, the chances that a grant contributes to increased market access for members are very low, which is reflected in the extremely low odd ratio of the constant.

Table 25. Logistic regression for success of grant to increase market access for members with scale variables.

	Scale variable			Fuzzy sets		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Omnibus test	p=.432	p=.029	p=.671	p=.235	p=.068	p=.293
Nagelkerke R-squared	0.273	0.509	0.139	0.369	0.435	0.277
Hosner and Lemeshow test	0.952	0.318	0.741	0.620	0.526	0.574
Correct classification:						
• Overall percentage	77%	81%	77%	85%	81%	85%
• Prediction of success	0%	20%	0%	20%	20%	20%
• Prediction of failure	95%	95%	95%	100%	95%	100%
Odds ratio of predictors:						
• Sourcing organisation	8.66E+23	2.67	--	5.49E+21	0.43	--
• Tension containment capacity	1.02	0.96	1.04	0.14	0.08	0.15
• Market performance	1.63	1.99	2.01	2.62	0.78	2.82
• Organisational scale	1.13	2.16	1.34	23.56	16.93	53.26
• Organisational age	0.94	0.91	0.94	0.23	0.20	0.18
• Constant	0.00	--	0.15	0.00	--	0.05

Note: None of the odds ratio is statistically significantly at the 0.10 level

Table 26. Logistic regression for success of grant on organisational strength and capacity to pay organisational expenses.

	Grant contributed to organisational strengthening (yes=1, no=0)		Grant contributed to capacity to pay org. expenses (yes=1, no=0)	
	Scale variables Model 7	Fuzzy-sets Model 8	Scale variables Model 9	Fuzzy-sets Model 10
Omnibus test	p=.571	p=.521	p=.296	p=.261
Nagelkerke R-squared	0.187	0.203	0.279	0.295
Hosner and Lemeshow test	0.770	0.237	0.394	0.130
Correct classification:				
• Overall percentage	62%	73%	77%	69%
• Prediction of success	40%	50%	58%	58%
• Prediction of failure	75%	88%	93%	79%
Odds ratio of predictors:				
• Sourcing organisation	2.63	1.68	0.11	0.07*
• Tension containment capacity	0.99	0.26	0.97	0.19
• Market performance	0.93	0.37	0.89	0.38
• Organisational scale	1.36	7.05	0.91	4.06
• Organisational age	0.90	0.19	0.98	0.96
• Constant	1.38	0.80	17.94	13.51*

*. Odds ratio is statistically significantly at the 0.10 level

The logistic regressions on the other two intended outcomes of the grant fund, organisational strengthening (Model 7 and 8) and capacity to pay organisational costs (Model 9 and 10) show weaker patterns. The characteristic of being a sourcing or non-sourcing organisations is important as predictors of effectiveness of the grants on these objectives. Being a sourcing organisation seems to predict success of the grant in organisational strengthening, while being a non-sourcing organisation seems to predict success in raising income to pay organisational expenses.

Table 27. Results of the configurational comparative and the regressional-analytic exploration for predictors of success and failure.

OUTCOME AREA	OUTCOME PATTERN DETECTED WITH QCA	OUTCOME PATTERN DETECTED WITH LOGISTIC REGRESSION
Market access for members	• Being a sourcing organisation is a necessary condition for success on this outcome. • Being small scale and being a non-sourcing organisation is consistently related with failure. • Older, stronger and larger organisations with high tension containment capacities at baseline, are consistently unsuccessful on this outcome.	• Being a sourcing organisation seems to increases the likelihood of success; being a non-sourcing organisations seems to lower the likelihood of success. • Organisational scale seems the factor that most increases the likelihood of success.
Increased organisational strength	• No conditions are consistently related with success. • No conditions that are consistently related with failure on this outcome.	• Being a sourcing organisation seem to increase the likelihood of success.
Improved income to pay for organisational expenses	• No conditions are consistently related with success on this outcome. • Being a sourcing organisation is consistently related with failure. • Strong and large organisations with high tension containment capacities at baseline are consistently unsuccessful on this outcome.	• Being a sourcing organisation seems to decreases the likelihood of success.

Table 27 presents the causal inferences derived from both data-analytical approaches. The QCA results show that for a non-sourcing organisation it is impossible to create market access for members. Likewise, the logistic regressions suggest that the likelihood of success for non-sourcing organisations is almost zero. Both data-analytical approaches also detected the importance of organisational scale. Grants to small scale organisations are likely to fail.

The logistic regressions suggest that being a sourcing organisation seems to increase the likelihood of success on the outcome organisational strengthening. For this outcome QCA did not identify any plausible configuration of conditions that could explain effectiveness. QCA identified that being a sourcing organisation was consistently related with failure to increase the capacity to pay for organisational expenses, and, likewise, the logistic regressions suggest that being a sourcing organisation decreases the likelihood of success.

8. Discussion and conclusions

The FONDOECAS grant facility wants to allocate grants to organisations that are most likely to be successful, or less likely to be unsuccessful. We used 26 case studies of grant beneficiaries to explore for baseline conditions that could predict success or failure of the grant, in order to get insights that could help FONDOECAS to improve the targeting of the grants.

The results of the Qualitative Comparative Analysis show that being a sourcing organisation is a necessary condition for success on the outcome of increased market access for members. Having a small organisational scale was consistently related with failure. Also, being an older organisation combined with high tension containment capacities at baseline, was consistently related with an unsuccessful outcome. These results suggests that, when the intention of a grant fund is market access for member farmers, it could increase its effectiveness by targeting the grants to younger organisations that are not too small in scale (in patrimony and/or membership). This is not to be seen as a guarantee for success, but as a strategy to limit the risk of failure. Grants to non-sourcing organisations, however, are more likely to be successful in improving the capacity to pay for organisational expenses. Because some conditions were directly linked with success or failure, and not as part of a configuration, we could triangulate them with logistic regression.

The main difference between the two ways of data-set analysis is in the identification, through QCA, of a pattern of organisations that are older, stronger, larger and with high tension containment capacities but where the grants were, nevertheless, consistently unsuccessful. Revising the history and dynamics in these organisation, we found a plausible causal explanation for this pattern. The small size of the grant

available for the investment and the presence of important other collective marketing activities resulted in most grant supported processing activities not being commercially viable. Therefore, these well-endowed organisations decided to discontinue the new business after the pilot experiences.

We verified the stability of the QCA solutions by applying different consistency thresholds and by repeating the analysis using 'real' measurement error. We show that, overall, the results from the analysis with and without measurement error proved to be similar. The results of the QCA seem also robust to changes in fuzzy-set calibration. The qualitative anchors used for the fuzzy-set calibration resulted in only a small number of organisations with fuzzy-set scores between 0.25 and 0.75. Slightly different qualitative anchors would, therefore, result in a fairly similar truth tables and QCA solutions.

QCA helps to address the explorative question, What works, for whom and under what conditions? However, to do so, it needs always to have additional reasoning on the causal mechanisms that may explain the patterns detected, like, as we used, the technique of process tracing (Collier, 2011; Beach and Pedersen, 2013). We showed that logistic regression can be used to strengthen the validity of causal inferences made with QCA, especially when the QCA solution refers to single conditions with a fair coverage of cases. The Boolean logic in the minimisation of the truth table helps us to think, but does not think in itself (Rihoux and Lobe, 2009). Empirical knowledge on the specificities of each case is needed to interpret the detected data patterns.

Acknowledgements

*The Netherlands' Ministry of Economic Affairs (KB-11-004) supported this research projectwork. The fieldwork was co-funded by the Dutch Interchurch Development Organizations, ICCO, as part of a baseline for an impact evaluation of the innovation grant fund FONDOECAS. Most of the field data was collected by Lithzy Flores, who made a tremendous effort travelling to all those remote places. Oscar Chambi and Richard Arguedas in FONDOECAS, provided additional data and background information. Erwin Bulte, Lan Ge, Barbara Befani and two anonymous reviewers provided useful advice on the data-analytical m*ethods used.

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