



Experiences with systematic triangulation at the Global Environment Facility



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ABSTRACT

Systematic triangulation may address common challenges in evaluation, such as the scarcity or unreliability of data, or the complexities of comparing and cross-checking evidence from diverse disciplines. Used to identify key evaluation findings, its application has proven to be effective in addressing the limitations encountered in country-level evaluation analysis conducted by the Independent Evaluation Office of the Global Environment Facility (GEF). These include the scarcity or unreliability of national statistics on environmental indicators and data series, especially in Least Developed Countries; challenges in evaluating the impacts of GEF projects; and inherent difficulties in defining the GEF portfolio of projects prior to the undertaking of the evaluation. In addition to responding to the need for further developing triangulation protocols, procedures and/or methodologies advocated by some authors, the approach offers a contribution to evaluation practice. This applies particularly to those evaluation units tasked with country-level evaluations in international organizations, facing similar constraints.

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1. Introduction

The scarcity or unreliability of data and the complexities of comparing and cross-checking evidence from diverse disciplines are among the most common challenges evaluators face, particularly – but not exclusively – in evaluations of project and programme support to the environment provided by the international donor community to developing countries. These challenges are also faced in country-level evaluations conducted by the Independent Evaluation Office (hereafter referred to as Office) of the Global Environment Facility (GEF).

The GEF is one of the most important, if not the most important multilateral fund specifically supporting environmental projects and programmes throughout the world. It was set up as a partnership institution in the early 90s to serve as a financial mechanism to the international environmental conventions. It does so providing financial support to enable countries that are signatories to these conventions to abide to their commitments. Support is provided on five main subjects, called ‘GEF focal areas’, which include as diverse environmental sectors as biodiversity, climate change, land degradation, international waters and chemicals, corresponding to a rather diversified set of scientific domains such as ecology, soil science or chemistry, just to name a few.

In 2005, the GEF Council requested the Office to begin conducting evaluations of the GEF portfolio of projects at country level. Since then, country-level evaluations have become a consolidated stream of evaluation work of the Office.¹ The purpose of GEF country-level evaluations is to provide the GEF Council with an assessment of how GEF support is implemented at country level, a report on results from GEF support in all GEF focal areas, and an assessment on how this support is linked to national environmental and sustainable development agendas as well as to the GEF mandate of generating global environmental benefits within its focal areas.

2. Purpose

The way GEF country-level evaluations are conducted, in terms of objectives, main evaluation questions, scope, process, evaluation methodologies and tools, has remained consistent through time in order to facilitate comparison across country portfolios at the end of each GEF replenishment phase.² Another salient feature of GEF country-level evaluations is that the period covered by these

¹ A complete list of countries having undergone CPEs can be found on the Office's website.

² GEF CPE Standard TORs, process description and main evaluation methodologies and tools used in CPEs are available on the Office's web site (<http://www.thegef.org/gef/CPE>).

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evaluations is rather long, often going back to 20 years, i.e. to the start of GEF operations in a given country. This is due to the necessity of having a sufficient number of projects in the portfolio that are completed since long enough time for environmental impact to be observable.

The earlier Country Portfolio Evaluations (CPEs) faced several contextual and methodological limitations, including: (a) scarcity or unreliability of national statistics on environmental indicators and data series, especially in Least Developed Countries (LDCs); (b) unreliability of project performance and results data from the older projects; (c) challenges in evaluating the impacts of GEF projects – many GEF project formulation documents, especially the older ones, do not clearly or appropriately specify the expected impact and sometimes even the outcomes of projects; and (d) inherent difficulties in defining the GEF portfolio of projects prior to conducting the CPE.

Many of these limitations, and especially data scarcity and unreliability, are also faced by those evaluation units of other international organizations tasked with the conduct of country-level evaluations. As for the Office, many of the highlighted initial difficulties have remained, partly because of the very nature of the GEF. Being a global institution based on partnership, project-related information is often located in the management information systems of both international and national GEF partners and Agencies. Such systems do not necessarily communicate with each other. Over the years, several of the Office's evaluations have highlighted weaknesses in the GEF Project Management Information System (PMIS), which is designed to serve as a central information hub for the GEF partnership as a whole. Updating the project portfolio data prior to conducting the evaluation analysis has been and remains a challenge in several evaluations conducted by the Office, including CPEs.

To address those challenges, in 2009 the Office started to adopt more consistently mixed or multiple methods approaches to its CPEs. This involved the gathering of a substantial amount of additional original evaluative evidence through diverse methods, such as case studies, cross-checking of the portfolio under analysis directly with the agencies concerned prior to undertaking the evaluative analysis, quantitative data gatherings from available international databases, online surveys, among others. This contributed to partly address the data challenges. In 2010 the Office went further and identified systematic triangulation as a valid option for addressing the remaining challenges. After an in-depth review of the existing literature on mixed-methods research as well as of triangulation experiences in evaluation practice from the international cooperation sector, the Office designed, tested and adopted a systematic approach to triangulation with the main purpose of strengthening the analysis of data and identifying reasonably solid and reliable evaluation findings. The approach is described in detail in a note aimed at providing guidance and methodological support to internal staff and external consultants involved in the Office's country-level evaluations.³

This article provides a self-assessment of how effective the Office's systematic approach to triangulation has been in identifying key findings in its CPEs. By presenting the case of one international agency's systematic approach to triangulation when undertaking country-level evaluations, the article offers a contribution to evaluation practice, particularly to those evaluation units tasked with country-level evaluations in international organizations, facing similar constraints.

3. Defining triangulation and its main purpose

Triangulation is a powerful research technique that facilitates the cross-verification using more than two sources. In particular, it refers to the application and combination of several research methodologies in the study of the same phenomenon (Bogdan and Biklen, 2006). By combining multiple observers, theories, methods, and empirical data, researchers aim at overcoming the weaknesses, intrinsic biases and the problems that are often found in single method, single-observer and single-theory studies.

In social sciences, where many examples of applied triangulation are found, the concept of triangulation is often used to indicate that more than two methods are used in a study with a view to double-check, or even triple-check, results. The assumption is that a study's finding is more solid if different methods lead to the same result. If only one method is used, there may be a temptation to be over-confident in the strength of the findings. If an investigator uses two methods, the results may contradict each other. By using three methods to get to the answer for one question, two of the three may produce similar answers and therefore provide greater certainty. Alternatively, three clashing answers could be produced, indicating that the question needs to be reframed, methods reconsidered, or both.

Over the years, a number of scholars have attempted to give a precise definition of triangulation and categorize its existing typologies. Jick (1979) broadly defines triangulation as the use of multiple methods – mainly qualitative and quantitative – in studying the same phenomenon for the purpose of increasing study credibility. Cohen and Manion (1985) define triangulation as an “attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint”. According to O'Donoghue and Punch (2003), triangulation is a “method of cross-checking data from multiple sources to search for regularities in the research data”. Altrichter et al. (2008) (pp. 147) explain the usefulness of triangulation, which “gives a more detailed and balanced picture of the situation”.

Denzin (1970) identified four basic types of triangulation: (a) *Methodological triangulation*: involves using more than one method to gather data, such as interviews, observations, questionnaires, focus groups and documents; (b) *Data triangulation*: involves time, space, and persons; (c) *Observer triangulation*: involves multiple researchers in an investigation; and (d) *Theoretical triangulation*: involves using more than one theoretical scheme in the interpretation of the phenomenon under study.

Most articles found in literature deal with data, theories and/or methods triangulation, while observer triangulation is less prominent. Triangulation types and subtypes can be combined depending on interests, research problems and questions (Table 1).

The Office's systematic approach to triangulation has been designed with the specific purpose of identifying key evaluation findings. In most of the existing literature on triangulation – intended as use of multiple sources of qualitative and quantitative information and/or data collection and analysis methods – the main purpose of triangulation is either: (a) the validation of results in a study, or (b) the deepening of the understanding of and insight into such results. Box 1 summarizes a selection of quotes illustrating various authors' conceptualization of triangulation and its related purpose.

There is a rich scientific literature on multidisciplinary and interdisciplinary research that is relevant to triangulation, as it tackles the difficult issue of how to use methods from different scientific domains in a coherent way and how to achieve synthesis or higher-level understanding. This discussion has not been explored for this article, which describes evaluation practice rather than issues raised in the philosophy of science.

³ The CPE triangulation methodological note is available on the Office web site (<http://www.thegef.org/gef/CPE>).

Table 1
Triangulation types and subtypes.

Type of triangulation	Subtypes	Definition	Guiding question	Example
Methodological triangulation	Across-method	An object is studied using at least two different research or data collection methods	Can an object be studied better by using different research methods instead of only one method?	A web-based course can be evaluated by, say, a questionnaire and by a focus-group interview. In addition, expert reviews, log-file analyses, etc. can be carried out.
	Within-method	One set of data is studied using different analysis methods to obtain information about the characteristic features of an object	Are the results of different analysis methods applied to the same set of data comparable?	In the context of a quantitative study, the set of data is studied using different statistical testing procedures: explorative data analyses, procedures for testing hypotheses related to differences and to interrelations, cluster analyses, etc.
Data triangulation	Chronological variation	The object is studied at least on two different occasions	Does the object have the same characteristic features at the different times of measurement?	The acceptance of a teaching method is studied on three different occasions.
	Spatial variation	The object is studied at no fewer than two different locations	Does the object have the same characteristics at the different locations?	A learning method is studied at different locations with comparable conditions.
	Personnel variation	For the study of a social system, the characteristics of interest are studied in different subjects	Do the people in the system of interest have comparable or congruent characteristics or experiences?	To study the didactic quality of a learning arrangement, different groups of learners are included in the study.
Observer triangulation	Data collection by different observers	The data for a subject is collected by different observers	Does an investigation method lead to comparable results when it is used by different observers?	A course is assessed by various people, and the collected data is compared.
Theoretical triangulation	Research with a background of various theories	An object or phenomenon is studied using various theories. Explanation hypotheses with different theoretical approaches are formulated and their validity is tested.	To what extent do the explanatory approaches of different (social) theories for the study of an object agree, to what extent do they differ?	The acceptance of a teaching method is studied using different didactic theories of learning psychology.

Source: ETH, Zurich (2009).

While this article does not intend to dwell on scientific discussions of multi- and inter-disciplinary research, some authors expressing more specific criticisms to triangulation are worth mentioning before further discussing the Office's systematic triangulation approach. Among them, Bryman (2003) indicates that triangulation "is sometimes accused of subscribing to a naive realism that implies that there can be a single definitive account of the social world". Modell (2009) confirms that a key criticism of triangulation is its "treatment of empirical observations as objectively verifiable rather than inherently theory-related". Fielding and Fielding (1986: p. 33) suggest that triangulation does not necessarily reduce bias or increase validity as the methods or theories on which triangulation is based are derived from diverse traditions. Thus, the approach may allow us to develop a fuller, broader or deeper picture of a situation, but will not automatically provide objectivity. They caution that "We should combine theories and methods carefully and purposefully with the intention of adding breadth and depth to our analysis but not for the purpose of pursuing 'objective' truth" (Fielding and Fielding, 1986).

Overall, as seen, authors question triangulation and provide words of caution in the use of triangulation methodologies and approaches. They strongly express the need for the further development of triangulation protocols, procedures and/or methodologies (Oppermann, 2000; Vikström, 2010; Niranjana and Weaver, 2011).

4. Triangulation as a systematic approach for identifying evaluation findings

As discussed in the previous section, many critics see triangulation as ad hoc and requiring solutions for the specific combination that needs to be addressed. These authors see it as impossible to come up with a generalized approach to triangulation, as each possible combination would require its own unique approach. In fact, no standardized approaches, guidelines and/or frameworks for operationalizing triangulation are found in literature. Usually what happens is that researchers and evaluators elaborate on a specific triangulation procedure to serve the particular study or evaluation they are conducting. Furthermore, very few approaches on the process for conducting triangulation in terms of specific steps to be followed can be found in the literature on the subject, with a few exceptions in the fields of social science and health. This discussion points at the need for better descriptions of how to solve triangulation issues faced by evaluation practitioners in the international cooperation sector, to which the Office's experience could contribute. GEF country-level evaluations are conducted in a standardized way for purposes of comparability. This is also the case in those international organizations which evaluation units conduct country-level evaluations. In cases where numerous evaluations are similar in nature, method and process yet different in context (the country) and scope (the evaluandum, i.e. the portfolio) systematic triangulation is an approach worth exploring.

Box 1. Why do others triangulate? Data/results validation or getting insights into results/findings?

"...using data triangulation, provided additional insight into the perceptions of site quality." (Barnes and Vidgen, 2006)

"Triangulation is a comparative strategy for examining data that strengthens qualitative and multi-method research..." (Briller et al., 2008)

"Triangulation of two or more complementary approaches permits us to broaden and deepen our understanding and insights." (Burton and Obel, 2011)

"As such, mixed-methods triangulation can provide the basis upon which different insights upon the same phenomenon can be sensibly combined and thus has the potential to unite aspects of different traditions of economic and social thought." (Downward and Mearman, 2007)

"...it is essential to triangulate the data to address completeness, convergence, and dissonance of key themes." (Farmer et al., 2006)

"...thus utilizing data analysis triangulation, in order to understand phenomenon more fully..." (Leech and Onwuegbuzie, 2007)

"Triangulation involves the careful reviewing of data collected through different methods in order to achieve a more accurate and valid estimate of qualitative results for a particular construct." (Oliver-Hoyo and Allen, 2006)

"...triangulation can seldom be seen as a means of validation, but rather as an alternative to it." (Pflueger, 2012)

"...its primary aim should be to deepen insight and not to achieve formal validation." (Tucci, 2007)

"...although triangulation is far from infallible, it is argued that it helps to gain, view and question knowledge." (Vikström, 2010)

"...mixed methods of inquiry and concurrent triangulation approach is used to corroborate and analyze the data." (Islam, 2010)

"The evolution of social science approaches to triangulation toward a position less concerned with convergent validation and more concerned with using multiple methods to create greater analytic density and conceptual richness..." (Fielding, 2009)

"...method triangulation helped obtain internal validity." (Näslund-Hadley et al., 2009)

"Through data triangulation, the evaluation has verified findings from different sources and methods to increase the credibility and robustness of the analysis." (DANIDA, 2011)

"Rather than using triangulation solely as a technique for validation we employ it in order to enrich the data and to ensure a comprehensive and deeper understanding of the matter." (Klein and Olbrecht, 2011)

"If the findings remain the same under varying environmental conditions, then validity has been established." (Guion et al., 2011)

Box 2. Comparing the Office's triangulation approach to some of the approaches found in literature

SUCCESS framework (USAID, 2010): The Office's triangulation procedure evolves from an initial evaluation matrix with key evaluation questions structured around the three evaluation criteria of relevance, efficiency and effectiveness/results. As for SUCCESS, the Framework (and its components) is the basis for structuring the relevant questions. The identification and cross-checking of evaluation findings in the Office approach is based on three major research areas (Perception, Validation and Documentation) and related sources of information. In the SUCCESS Framework different data sources are derived directly from the components of the program being evaluated.

12-Step approach to triangulation (WHO, 2009): this approach encourages a high level of cooperation and buy-in from multiple institutions and key persons or "stakeholders". This approach follows a 12-step process that involves stakeholders in all its phases, including deciding the priority questions to be answered, identifying and gathering data, guiding the analysis and interpretation, and using the results of the triangulation in making decisions on policies and programs (i.e. inter alia initial consensus building meeting, establishment of a task force, ad hoc consultation). While the Office's procedure also involves participation of and engagement with stakeholders through several interactions at different points in time during the evaluation process, triangulation brainstorming is internal to the team of evaluators, to preserve independence.

EC-Approach for Data Analysis and for Ensuring Data Reliability and Validity of Conclusions (EC, 2010 (Liberia), 2009 (Namibia)): This approach covers the same three major research areas of the Office's procedure (Perception, Validation and Documentation) and is similarly structured around key questions, sources of information and methodology components. However, this approach is not structured around the three evaluation criteria of relevance, efficiency and effectiveness/results.

Triangulated Standards-Based Evaluation Framework (Skinner, 2010): also this framework is structured around three pre-defined research areas (Perception, Validation and Documentation). It differs from the Office's procedure in that it does not detail the specific steps to follow in conducting triangulation.

LSD Triangulation Framework (Layug, 2009): here, triangulation analysis is specific and serves as the overarching framework on how to examine and improve sectoral performance – be it education, health, water, housing, roads; how to deal with related issues and challenges; and identify viable policy reforms. These three components are seen as closely interrelated. The Office's procedure focuses on performance, but also on effectiveness/results and on relevance.

A Toolkit for assessing and building capacities for high quality responses to HIV (International HIV/AIDS Alliance, 2008): Depending on the scope of assessing capacity development, this toolkit offers different ways to triangulate data. It provides specific indicators for capacity development and criteria along pre-defined focus groups (sub-groups) such as "governance and programme management" and "finance, administration and sustainability". The Office's procedure has an initial set of pre-defined indicators, but other indicators are added depending on the country-specific evaluation questions emerged during scoping.

Box 2 compares the Office's systematic triangulation approach applied to country-level evaluations to some of the triangulation approaches found in literature. The main distinction between these and the Office's systematic triangulation approach is the fact that the Office purposively uses triangulation to "identify" key preliminary evaluation findings, as opposed to the two general triangulation purposes of "validating" and "gaining insights in" previously identified findings, which are observed to be most prevalent in the literature.

5. The GEF systematic triangulation procedure

The identification of key preliminary findings through systematic triangulation in the Office's country-level evaluations aims at responding to pre-determined key evaluation questions.

Triangulation of evaluative evidence is conducted by collecting data/information from a number of a different sources and/or applying different evaluation methods and tools to the same key evaluation question.

In the field of evaluation, triangulation specifically refers either directly or indirectly to the cross-checking of the empirical evaluative evidence and data collected – and analyzed through a diverse set of methods – against a set of evaluation questions

Table 2
Most typically used methods and related sources of information.

Evaluation method	Sources of Information
Perceptions	
Individual interviews	<ul style="list-style-type: none"> ●Involved stakeholders ●External key informants
Surveys (including electronic and other surveys)	<ul style="list-style-type: none"> ●Involved stakeholders ●External key informants
Validation	
Group consultations (stakeholder meetings, focus groups, group interviews, other)	<ul style="list-style-type: none"> ●Involved stakeholders ●External key informants
Direct observation	<ul style="list-style-type: none"> ●Field visits ●Involved stakeholders at local level ●Other local level stakeholders
Specific studies (case studies, beneficiaries assessments, impact studies, other)	<ul style="list-style-type: none"> ●Relevant documentation ●Field visits ●Involved stakeholders ●External key informants
Trend analysis (including portfolio analysis, timelines, aggregate results analysis, other)	<ul style="list-style-type: none"> ●National statistics ●Management information systems
Institutional analysis (stakeholder meetings, focus groups, group interviews, other)	<ul style="list-style-type: none"> ●Relevant official documents (i.e. laws, norms and regulations) ●Representatives from the institutions involved ●External informants
Documentation	
Desk review	<ul style="list-style-type: none"> ●Project related documentation ●Relevant policies, strategies and action plans ●National statistics ●Other external documents
Meta-analysis	<ul style="list-style-type: none"> ●Project mid-term and terminal evaluations ●External reviews of terminal evaluations ●Other country, thematic or other relevant evaluations

(Ammenwerth et al., 2003: 239; Hales, 2010: 15; Skinner, 2010). As we have seen earlier, triangulation is applied in an opportunistic or ad hoc way, when there is insufficient reliable quantitative data available to answer key evaluation questions, or when such data are not able to explain in depth the findings that emerged. The procedure elaborated by the Office in its country-level evaluations applies triangulation in a systematic way to the entirety of the qualitative and quantitative information collected. The collected evaluative evidence is categorized into three major research areas: Perceptions, Validation and Documentation,⁴ each of which uses one or more research area specific evaluation methods. Table 2 correlates the most commonly used methods in evaluations to the main sources of information to which they are applied, across each triangulation research area.

The Office conducts triangulation by cross-checking information and analysis resulting from the data collected in these three research areas (Fig. 1).

A detailed evaluation matrix is prepared during the launching phase of all CPEs, usually soon after the scoping mission to the country has been conducted. These matrices basically synthesize the overall evaluation design, which includes all the elements related to the data gathering and analysis plan that is built around the key evaluation questions. Indicators, sources of information and methodology components are identified for each question. Key evaluation questions are grouped by the three main evaluation criteria of effectiveness/results, relevance and efficiency (Table 3).

The evaluation data gathering and analysis phase starts immediately after the country-specific Terms of Reference (TORs) for the CPE, to which the evaluation matrix is annexed, are finalized and published on the Office's website. The collection and analysis of evaluative evidence, including quantitative and qualitative information and data, takes place during this phase, which results in the identification of method-specific findings. These findings

need to be triangulated, i.e. cross-checked with the findings that emerged from other methods related to the same evaluation question, with the aim of identifying the key evaluation finding that responds to the respective key evaluation question. In other words, through following this systematic procedure the analysis moves progressively from method-specific findings to key preliminary evaluation findings through triangulation of the quantitative and qualitative evaluative evidence collected.

The Office's experience in the application of the procedure to nine evaluations to date has shown that for triangulation analysis to be successful, two necessary pre-conditions need to be met: (a) having a well-developed evaluation matrix; and (b) ensuring proper planning and timing for the brainstorming session, which should ideally be conducted within the country once the evaluative evidence gathering and analysis phase is at least 80% complete, i.e. when almost all the method-specific findings have been identified.

Triangulation analysis starts at the end of the evaluation analysis phase. It launches the next phase, which involves the consolidation of evaluative evidence and the identification of key preliminary findings. Consolidation begins with the elaboration of a triangulation analysis matrix. This is a simple derivation of the initial evaluation matrix, with a few differences. The first column on the left has the key evaluation questions structured according to the main evaluation criteria of effectiveness/results, relevance and efficiency. To the right, forming the central body of the matrix, are a number of columns headed according to the evaluation methods used during the evaluative phase. Below each of these headings, the factual information and/or data collected from the respective methodology is organized into rows according to the key question to which it applies. The final column on the right is filled with the key preliminary findings resulting from the triangulation brainstorming exercise. In some cases, minor modifications may be made to this basic format to suit the evaluation study in question. For example, an extra column for follow-up actions in terms of data gathering may be added to the right of the matrix, or a column displaying the indicators to be used for each key question – which

⁴ The distinction between *Perception*, *Validation* and *Documentation* research areas in triangulation analysis for evaluation is taken and further developed from an unpublished internal guidance note of UNDP's Independent Evaluation Office.

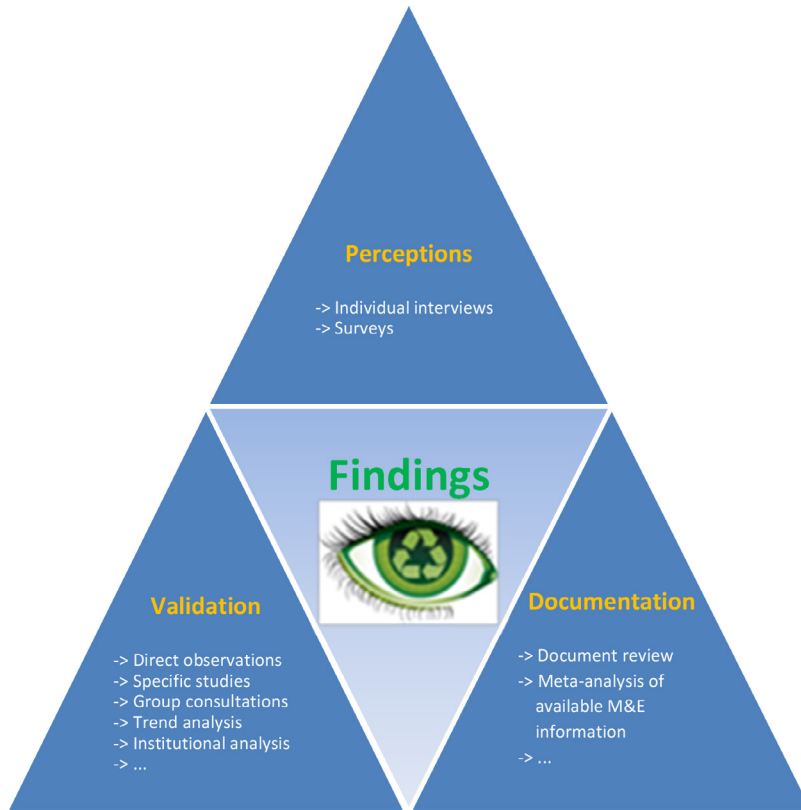


Fig. 1. Triangulation research areas.

are the same contained in the initial evaluation matrix – are inserted to the right of the questions column.

The triangulation analysis matrix (Table 4) is built up and populated with data by the evaluation team during an internal brainstorming session. The progressive building up of the matrix and the process for using the matrix to generate key preliminary findings happens through a series of simple steps.

Steps 1–3 are completed prior to the brainstorming session and draw largely from the original evaluation matrix. In Step 1, all the key evaluation questions from the evaluation matrix are transferred as they are into the first column on the left of the triangulation analysis matrix. In Step 2, the methodological components used in the evaluative phase and their related sources of information for each question, as indicated in the evaluation matrix, are transferred into the adjacent columns. In Step 3, the

Table 3
Outline of a standard CPE Evaluation Matrix.

Key evaluation questions	Indicators	Sources of Information	Methodology
Effectiveness/Results			
KQ1	I1, I2, ...	Sol1, Sol2, Sol3, ...	M1, M2, M3, ...
KQ2	...	...	...
KQ3	...	...	...
...
Relevance			
KQ1	I1, I2, ...	Sol1, Sol2, Sol3, ...	M1, M2, M3, ...
KQ2	...	...	...
KQ3	...	...	...
...
Efficiency			
KQ1	I1, I2, ...	Sol1, Sol2, Sol3, ...	M1, M2, M3, ...
KQ2	...	...	...
KQ3	...	...	...
...

methods to be used to answer each key question, as stipulated in the evaluation matrix, are mapped out in the triangulation analysis matrix.

The evaluation team begins the triangulation brainstorming exercise using the matrix as a guide. While discussing each question in turn, the relevant finding and supporting evidence that has emerged from each method is filled in the previously mapped out cell. Experience has shown that a productive triangulation brainstorming session for CPEs can take up to two full days. During brainstorming, one of the main tasks of the evaluation team is to discuss and agree about the quality and reliability of the data collected and analyzed prior to inputting it into the triangulation matrix.

The results of triangulation brainstorming usually allow the identification of key findings which are confirmed by more than one method. It is then possible to consolidate findings into one preliminary finding for each key question, which is filled in the final column, at the right of the matrix. By cross-checking each other's findings, team members avoid unduly raising the importance of anecdotes in the formulation of findings.

A further result of triangulation brainstorming is that some key questions are only answered by the evidence and data produced by one method, and/or the team determines that the data quality is insufficient to identify a finding. Those questions need further data gathering and analysis. Similarly, other key questions are answered by findings and data that either do not confirm or clearly contradict each other and also require further analysis. In both cases, findings are highlighted in the matrix. The need for further data gathering and analysis is indicated in the final column where the preliminary finding would be found.

The final step in the procedure involves identifying whether (and which) other methods could be used to conduct further information/data gathering and analysis, and to specify any related sources of information that may eventually be available to be used.

Table 4

The Office's triangulation analysis matrix.

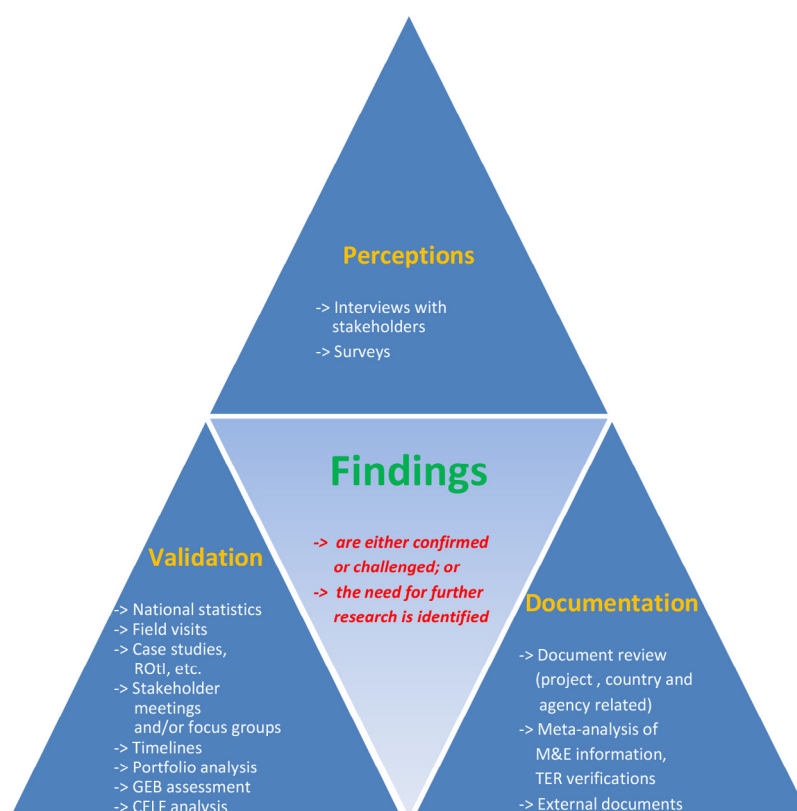
Key evaluation questions	Perceptions		Validation		Documentation		Key preliminary findings
	Method 1	Method 2	Method 3	Method 4	Method 5	Method ...	
Effectiveness/Results							
KQ1							
KQ2							
KQ3							
...							
Relevance							
KQ1							
KQ2							
KQ3							
...							
Efficiency							
KQ1							
KQ2							
KQ3							
...							

The additional data gathering and evaluative analysis that follows as a result of the triangulation brainstorming session aims at: (a) confirming or challenging the key preliminary evaluation findings identified, and (b) identifying the missing key preliminary evaluation findings (Fig. 2). As a result, further steps are planned and undertaken to collect the additional information needed to fill the identified gaps in the analysis. At times, further data are not available after triangulation brainstorming. In such cases the identified gaps are presented at a final stakeholder workshop, where possibilities for obtaining the missing information are solicited.

5.1. The Office's experience with the application of systematic triangulation

Since its introduction and testing during the Turkey CPE in March 2010, the systematic triangulation procedure elaborated by

the Office has been conducted as part of seven other CPEs and recently in the Joint GEF-UNDP Evaluation of the Small Grants Programme (SGP). The Turkey CPE was a particularly method-rich evaluation that included an electronic survey and a significant meta-evaluation effort. It took the team two days to complete the triangulation brainstorming session, which eventually led to the desired outcome of identifying key preliminary findings in response to each of the respective evaluation questions. In 2011, a triangulation brainstorming session was conducted for the OECS Cluster CPE through teleconferencing, with members of the evaluation team connecting with the Office from the US, Canada, Grenada, Antigua and Saint Lucia. Although there were unique challenges in conducting such a session, that second experience also worked out well and led to another successful outcome. Since then, the method has been applied in the Cuba, Brazil, and Sri Lanka CPEs; in the Vanuatu and SPREP Portfolio Evaluation; in the

**Fig. 2.** Triangulation in CPEs and next steps.

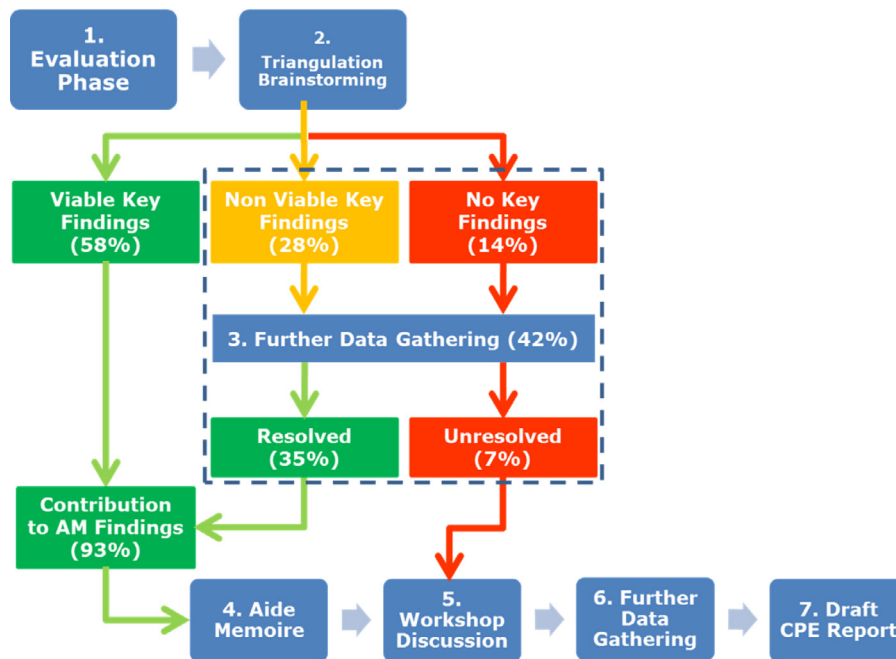


Fig. 3. From triangulation brainstorming to the identification of evaluation findings.

Tanzania and Eritrea CPEs, and lastly in the above-mentioned Joint SGP Evaluation. The Office recently conducted an internal assessment on the effectiveness of its systematic approach to triangulation in identifying key findings for these nine evaluations (Fig. 3). The starting point was the 16 evaluation questions contained in the standard TOR for CPEs (Box 3).

On average, the nine evaluations analyzed included three additional country-specific questions, which were added after scoping based on the issues raised at the initial stakeholder consultation workshop in the country concerned. The average key evaluation questions contained in the triangulation analysis matrix of the nine evaluations in which the procedure has been applied thus far is therefore 19, subdivided in seven questions on results, seven on relevance and five on efficiency.

After the two-days brainstorming triangulation sessions, *viable key findings*, i.e. the findings emerged from and were confirmed by at least one source of evidence from at least two research areas (Perceptions, Validation and Documentation) were generated for 58% of the key evaluation questions. *Non-viable key findings* were also generated for another 28% of the key evaluation questions. For those, despite the fact that it was possible to formulate a key preliminary finding, the sources of evidence on which it was based were considered by the evaluation teams to be either insufficient (in 24% of the cases), contradictory (3%) or both (1%). Insufficient evidence is meant to include cases where the missing evidence was deemed to be central to answering the core of that particular key evaluation question.

For 14% of the key evaluation questions contained in the triangulation matrices no finding could be generated. In those cases the evaluation teams considered that the evidence gathered thus far was either: (a) insufficient to generate some form of key preliminary finding; or (b) the finding was not generated because the evidence was used to complement, support or confirm key findings to other evaluation questions in the matrix.

After the 2-days triangulation brainstorming sessions, the evaluation teams conducted further data gathering and analysis in order to address the information gaps and contradictions identified. In some cases, this has meant gathering and analyzing additional evidence that is peripheral to answer the key evaluation

Box 3. Key evaluation questions in the standard TOR for CPEs

Effectiveness/Results

- 1) Is GEF support effective in producing results at the project level and are these results sustainable?
- 2) Is GEF support effective in producing results at the aggregate level (portfolio and program) by focal area?
- 3) Is GEF support effective in producing results at the country level?
- 4) Is GEF support effective in producing results related to the dissemination of lessons learned in GEF projects and with partners?
- 5) Has GEF support led to progress toward impact over an extended period of time after completion?

Relevance

- 6) Is GEF support relevant to the national sustainable development agenda and environmental priorities?
- 7) Is GEF support relevant to the country's development needs and challenges?
- 8) Is GEF support relevant to national GEF focal area action plans?
- 9) Is GEF support relevant to the objectives linked to the different global environmental benefits in biodiversity, greenhouse gases, international waters, land degradation, and chemicals focal areas?
- 10) Are the GEF and its agencies supporting environmental and sustainable development prioritization, country ownership and decision-making process of the country?

Efficiency

- 11) How much time, effort and financial resources does it take to formulate and implement projects, by type of GEF support modality?
- 12) What are the roles, types of engagement and coordination among different stakeholders in project implementation?
- 13) Are there synergies among GEF agencies in GEF programming and implementation?
- 14) Are there synergies between national institutions for GEF support in programming and implementation?
- 15) Are there synergies between GEF support and other donors' support?
- 16) What role does Monitoring and Evaluation (M&E) play in project adaptive management and overall efficiency?

Source: CPEs Standard Terms of Reference (GEF Independent Evaluation Office, 2012).

question, but complements and/or provides further insights to the viable findings formulated.

The evaluation teams then proceed to draft an Aide Memoire, which is a concise document that summarizes the key preliminary findings and the related supporting evidence. The Aide Memoire is used to present findings at a final stakeholder consultation workshop for discussion and eventually for identification of the remaining information gaps and needs for further data gathering. On average, for the nine evaluations analyzed, 13 key preliminary evaluation findings have been presented in the Aide Memoires in response to the initial, on average, 19 key evaluation questions. This difference is explained by vertical triangulation and consolidation across findings and, in a few cases, the need to gather more information or lines of enquiry at the stakeholder workshop.

From an analysis of the key findings contained in the Aide Memoires, of the 58% *viable key findings* identified during triangulation brainstorming, roughly half formed full findings in the Aide Memoires and the other half made partial contributions. Of the other 42%, composed of *non-viable key findings* (28%) and *no key findings* (14%), further data gathering after triangulation brainstorming successfully addressed information gaps and instances of contradictory evidence in 35% of the cases (Fig. 3). These cases went on to either fully or partially contribute to Aide Memoire findings, while only 7% of cases remained unresolved (4% made an unclear contribution and 3% made no contribution to findings in the Aide Memoires).

In summary, the use of the method allowed the identification of findings that could be included in the Aide Memoires and presented at the final stakeholder consultation workshops for 93% of the initial key evaluation questions. The remaining 7% of unresolved cases were presented at the final stakeholder consultation workshops for further discussion, verification and identification of further sources of evidence.

The Office's systematic triangulation procedure developed for country-level evaluations analysis was also successfully applied in the Joint SGP Evaluation, i.e. an evaluation of a GEF global programme, which requires a rather different evaluation approach as compared with the standardized approach used to evaluate GEF country portfolios. This suggests that the procedure can also be used in evaluations that do not follow standard TORs and approach.

6. Triangulation examples

The examples presented in the following sections include cases of viable findings, information gaps and/or contradictory evidence identified at triangulation brainstorming. Examples also include illustrations of the uptake of findings in the Aide Memoires.

6.1. Questions with a viable finding

Questions with a viable finding are those based on sufficient or strong enough evidence, that are not based on contradictory evidence and that do not identify areas for further research that are central to answering the core of the question. The following example illustrates a case of a viable key finding identified as a result of triangulation brainstorming, in the OECS cluster CPE (Box 4). The finding draws from six separate sources of evidence. There was no contradiction in the evidence supporting the finding and the evaluation team did not point to any areas for further research. Therefore, this finding was considered strong and credible by the evaluation team, and made its way through from triangulation to the Aide Memoire.

Box 4. Extracts from OECS Country Cluster Portfolio Evaluation materials

Key question: *Question 8.* Is GEF support relevant to the OECS countries' national environmental priorities and national GEF focal area strategies and action plans?

Finding after triangulation: "... National environmental priorities are articulated in the National Environmental Management Strategies (NEMS). GEF support, through regional projects, has supported these NEMS. Interviews revealed that States however do not feel that regional projects meet their national needs because the level of funding derived from regional projects for national and local site activities is usually very small. States would prefer to see more investment in site demonstrations rather than in foundational (legislation, policy) interventions. While no evidence was found of countries using their NEMS effectively to provide a roadmap for GEF activities, GEF support has helped the OECS as a sub-region to move the environmental agenda forward. Interviews indicate that there is now better communication between agencies involved in environmental management at the national level and there is potential for generating behavioral change".

Aide Memoire: *Finding 6:* "GEF support has been relevant to OECS countries' national environmental priorities, but regional approaches have diluted relevance for participating countries on efforts that are not a direct output of OECS-country driven initiatives".

6.2. Questions with a non-viable finding due to insufficient evidence

A finding with central evidence missing is deemed to have evidence missing with regard to the core of the question. This can either be because the finding after triangulation is based on too few sources of relevant information or because the evaluation team has highlighted major areas for further research. The missing evidence is assessed with regard to whether or not it is central to answering the question. That is, without the identified further evidence, the finding presented would not be viable or credible enough to be included in the Aide Memoire. In the example from the Cuba CPE reported in Box 5 the evaluation team had an idea about what the answer to the key question might have been and presented it as a preliminary finding. However, the finding was not concrete, it was liable to be altered, and there was very little evidence in support. Therefore, in this case, 'specific examples' were needed to support the main message of the formulated preliminary finding, which were deemed to be central to answering the key question. In fact, the Aide Memoire went on to present numerous examples gathered where GEF support was relevant to the objectives of the conventions and to global environmental benefits.

6.3. Questions with a non-viable finding due to contradictory evidence

Questions with a non-viable finding can also be those where the finding is based on contradictory evidence, i.e. where the information presented from two or more sources of evidence disagree or are divergent. The answer to a question may be composed of a number of pieces of analysis, information and stakeholder insights, which do not necessarily overlap or speak to the same aspect/facet/element of the question. Therefore, it is only when two pieces of information that do speak to the same issue are in direct disagreement that the finding is deemed to be based on contradictory evidence. In such cases, the team calls for further information to be gathered after the triangulation brainstorming.

An example of contradictory evidence leading to further research after triangulation brainstorming comes from the Turkey

Box 5. Extracts from Cuba CPE materials

Key question: *Question b).* Is GEF support to Cuba relevant to the objectives of international and regional environmental conventions in the biodiversity, climate change, international waters, land degradation and chemicals focal areas?

Evidence in the triangulation analysis matrix under the “Stakeholder Consultations” column: “Many have provided examples of relevant GEF projects, including the biosafety ones (during a presentation given at scoping mission in October during the initial stakeholder consultation workshop). There is a need to include specific examples on the importance of each project to the relevant convention”.

Evidence in the triangulation analysis matrix under the “Project Review Protocols” column: “Projects were identified within the relevant international environmental convention. The Cuban government played a strong role in project design”.

Evidence in the triangulation analysis matrix under the “Country Environmental Legal Framework (CELF)” column: “There is a need to check in the CELF document where the links of each project with the relevant international convention are mentioned”.

Finding after triangulation: “Relevance with the conventions (clearly existing for all focal areas).”

Further evidence to be gathered through more stakeholder consultations: “There is a need to include specific examples.”

Aide Memoire: *Finding 5.* “GEF support has been relevant to environmental priorities and strategies, the International Environmental Conventions (CBD, UNFCCC, UNCCD, and Stockholm Convention) and to the GEF mandate and strategies”. The paragraphs that follow the finding statement explain further: “The GEF also helped Cuba in fulfilling obligations vis-à-vis the international conventions, by strengthening national capacities to implement these conventions and contributing to the development of environmental action plans and strategies. Specific examples include: (a) the National Capacity Self-Assessment, in which the country conducted a self-assessment of national capacities for global environmental management in relation to the conventions CBD, UNCCD, and UNFCCC; and (b) the National Implementation Plan for POPs, which contributed to the drafting of a plan for the reduction of POPs.”

Box 6. Extracts from Turkey CPE materials

Key question: *Question 13.* How much time, money and effort does it take to develop and implement a project, by type of GEF support modality?

Finding after triangulation: “Long project cycle, i.e. weak efficiency”.

Key question: *Question 16.* Was the efficiency of the project ever measured or value for money approach used in project design and implementation?

Finding after triangulation: “Cost efficiency of project preparation may be moderate to good”.

Further evidence to be gathered through meta-analysis of project evaluation reports: The triangulation matrix indicated a need to: “Review project Terminal Evaluations, especially for regional projects”.

Aide Memoire: *Finding 8.* “The complexity of the GEF Activity Cycle has not led to barriers to project development in Turkey.” The paragraphs that follow the finding statement explain further: “Some stakeholders in Turkey—mainly related to the three recently Full-Sized Projects (FSPs) on climate change—expressed negative views of the GEF Activity Cycle in relation to previous projects, in terms of long periods taken for processing, associated high transaction costs in terms of financial and human resource inputs, and a lack of clarity and information relating to delays. However, on the whole, and in comparison to other countries Turkey has done remarkably well in getting projects through the project cycle. National FSPs took an average of 1.8 years (only half the time that is needed on average) to move from project entry to implementation and an average of 6.9 years for implementation; that is, they took on average 0.9 years longer than planned (only half the time of the average). The costs of project preparation are estimated at around \$150,000 for FSPs, which is about half the amount officially available under the previous Activity Cycle (see tables in the annex). The relatively short identification and design period kept the momentum high and maintained government commitment/engagement to projects, and eventually contributed to project success”.

CPE (Box 6). In this case, perceptions collected through the online survey and stakeholder interviews indicated to the evaluation team that the project cycle was considered as long and requiring a great deal of effort. The perception concerning the length of project formulation was supported by evaluative information contained in the project review protocols. However, the evidence generated from another key question related to the cost-efficiency of project preparation led the team to reassess the situation.

New evidence generated after triangulation suggested that, in fact, projects in general were relatively cost-efficient and that both preparation and implementation times were significantly shorter than global averages for GEF projects. The apparent contradiction between stakeholders’ perceptions and the project cost-efficiency, and the related comparison between global and Turkey averages allowed the team to refine their understanding of the issue. The team realized that the Turkish stakeholders were more concerned about the complexity of the procedures than the actual duration of the project formulation process and could reflect the finding in the right perspective in the Aide Memoire. The issue was further discussed with stakeholders at the final workshop.

The Turkey example illustrates a case where the findings from two separate key questions ultimately informed each other and

were combined into one finding in the Aide Memoire. In fact, in a number of cases, preliminary findings from two or more key questions have been compared or cross-referenced, which often leads to new or more nuanced preliminary findings.

7. Conclusions

Triangulation offers an opportunity to deal with challenges such as data scarcity or unreliability, commonly encountered in evaluation of environmental programmes. Furthermore, triangulation helps dealing with the multi-disciplinary nature of evaluation – which attempts to answer questions involving multiple areas of knowledge – as opposed to general research – which is often restricted to one discipline or scientific domain in terms of questions asked and methods used.

The approach to systematic triangulation developed by the Office is well suited to evaluate GEF country portfolios, which involve support in different GEF focal areas and face common data challenges. The approach provides a response to those authors questioning triangulation and advocating for the need to further develop triangulation protocols, procedures and/or methodologies. The approach also contributes to evaluation practice, especially in relation to those evaluation units of other international organizations involved in country level evaluations, which

face similar difficulties in data availability as well as in the multidisciplinary nature of their evaluation.

Being systematic, the approach enables discussing different sources of evidence and how to understanding them, ultimately leading to a thorough identification of key evaluation findings. It also ensures the full use and consideration of all the evidence collected. Furthermore, by cross-checking each other's findings, evaluation team members are able to look beyond anecdotal evidence in the identification of evaluation findings.

Although this is not new, the analysis presented confirms the iterative nature of the triangulation process in an evaluation. Throughout the process, data and information gaps are identified and progressively addressed. A wide range of GEF stakeholders participate in the process and provide ongoing and significant contributions.

The most successful applications of triangulation were those where both qualitative information and quantitative data, along with official documentation and other empirical evidence, were analyzed and included in the triangulation matrices in the most verifiable, factual and unbiased way. As seen, this condition was usually only possible when at least 80% of the evaluative data gathering and analysis phase was complete before the triangulation brainstorming session was conducted. Triangulation brainstorming sessions should not be held before that threshold in order to ensure maximum efficacy.

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