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Case study strategies for designers: Teaching integrative data evaluation

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ABSTRACT: Teaching research methodology and conducting architectural research for years has revealed to the author of this paper that there is noticeable lack of globally established depictions of methods in design research, also called evidence-based design or practice-based research. Partially this is caused by the fact that research carried out by architects and other designers is a somewhat new phenomenon, when compared to many other disciplines, partially by the wide range of subject matters and paradigms in architectural and environmental research. The lack of defined methodology applies particularly to case studies, although those are most commonly employed by designers. In professional jargon, however, the term case study itself seems to refer to anything from a simple 'precedent study' to a 'project description,' sometimes used even as a synonym for an 'example.' Hence, this paper sheds light into the pros and cons of both quantitative and qualitative paradigm from a transdisciplinary perspective, including ontological and epistemological premises of case studies. Special attention is paid to the characteristics of embedded case studies and holistic case studies in terms of their data collection and analysis methods, including conventional surveys, interviews, fieldwork, participatory design, and post occupancy evaluations, but also such novel strategies as memory sketching and thick descriptions. These strategies are, then, examined from the perspective of integrative data evaluation with theoretical sampling, triangulation, pattern-matching logic, and analytical generalization. In other words, the focus is on deep understanding of a case within its complex context, in order to provide means of holistic interpretations of empirical inquiries in real-life contexts. The objective and future contribution of the proposition is to promote the value of research as the basis of design excellence among students and professional practitioners alike, with the mastery of case study method informing their design decisions.

1 INTRODUCTION

As case studies, when conducted properly, can be among the most valuable research strategies in many design disciplines, this paper focuses on the many facets of the case study research method as well as the best practices of evaluating, analyzing, and interpreting data coming out of the process. We investigate these procedures from an inter- and/or transdisciplinary perspective by applying the principles of integrative data evaluation, or the 'Four Pillars and the Roof', like Pauwels and Matthyssens call it. This is one of the significant ways in both ensuring the reliability of a case study and educating the proper means of conducting case studies.

According to Scholz and Tietje, most skepticism about case studies is caused by nontransparent knowledge integration, especially in case studies with multiple methods of qualitative data generation. They argue that this is why "integrative evaluation – an evaluation that integrates viewpoints from such diverse disciplines as ecology, economics, and sociology – is crucial component of case studies" (Scholz & Tietje 2002). For this process, they suggest a synthesis of knowledge integration that can be divided into four categories: integration of disciplines, systems, interests, and modes of thought. Correspondingly, in any design research case study, triangulation between methods, not just between sources of data and evidence, is crucial. It also allows great potential for creativity regarding the research design, with opportunities to develop novel data collection and analysis methodologies.

An additional reason for skepticism about case studies is, no doubt, the conventional call for scientific objectivity. In the context of multiple case study research in international business and the 'architecture' of such research design, Pauwels and Matthyssens discuss the ontological and epistemological premises of qualitative research "that departs from a time- and human-free objective reality towards a more context-bound intersubjective reality […], in which the social world is to be understood from the point of view of the individuals who are directly in-

volved in the events that are investigated" (Pauwels & Matthyssens 2004). They go on arguing that "Multiple case study research aims at closing the gap between the objective of the study and the object of the study. In this respect, we explicitly aim at capturing the subjectivity that is embedded in the object" (Ibid). In evidence based design, this can be seen as an invaluable approach in interpreting the interrelationship between the built environment and its users, from the perspective of the latter.

However, Pauwels and Matthyssens also point out the significance of reducing the researcher's impact on the validation and evaluation process. For this, they suggest the aforementioned principles of 'Four Pillars and a Roof' – an appealing simile for architects. Pillar 1, theoretical sampling, is based on selecting both typical and atypical cases, as opposing to a number of analogous cases. In this process, the analyses of atypical cases produce contrasting results, though for predictable reasons, and create theory-driven variance and divergence of data. Pillar 2, triangulation, is naturally one of the basic 'pillars' in any research project. For Pauwels and Matthyssens, it serves two purposes: it reduces random errors and increases internal validity of a study. Pillar 3, pattern-matching logic, is based on the fundamental scientific pattern model according to which, for instance, events can be explained in relation to sub-elements so that together they constitute a unified system. Pillar 4, then, deals with analytical generalization by testing the validity of research outcome and/or theory development against extant theories. Finally, the roof encompasses validation by juxtaposition and iteration of the pillars that support it, which we examine below.

2 FOUR PILLARS AND A ROOF

2.1 *Theoretical sampling*

In his 'classic' publication with regard to the topic of this paper, titled *Case Study Research: Design and Methods*, Robert K. Yin covers the issue of theoretical sampling extensively, pointing out that replication logic is different from sampling logic. In short, this means that in multiple-case studies in particular the former is analogous to multiple experiments, as opposing to random sampling (Yin 2013), which is further discussed below in the context of pattern-making logic. This kind of analysis process often is performed in two or more rounds in order to validate the outcome. In the first round, the goal is typically production of theory-driven data in order to build theoretical foundation on the divergence of evidence. In the next stage or stages, the abstracted process may require more practical considerations based on typical and/or atypical cases (Pauwels & Matthyssens 2004); in design research, this often means normative theory development with focus on a distinct design problem and its solutions.

The process is somewhat similar to the cross-case analyses Yin describes, though it is important to note that 'the more cases, the better' attitude does not itself provide validity. The cross-analyses can be literal replications producing similar results from multiple cases or units of analysis that are chosen as part of the analytic strategy – if the results are similar, they support the initial theoretical stance, if contrasting, they reject it. Theoretical replications, in turn, produce contrasting results for predictable reasons, thereby testing the theoretical framework, often contrasting it with rival explanations (Yin 2014). Even a two-case study can, hence, serve as the basis of theoretical sampling, while in a single-case study it can be provided by variety of units of analysis in one setting which strengthens the internal validity of an emerging theory. In multiple-case studies, with at least two cases, cross-case synthesis is naturally an essential means of analysis both in terms of theoretical sampling and evaluating research outcome.

In addition to pattern matching, Yin lists four other analytic techniques: explanation building, time-series analysis, logic models, and cross-case synthesis. The three first ones are, in fact, specific types of pattern matching, while the last can be regarded as the 'roof' of Pauwels and Matthyssens. Cross-case comparisons are naturally possible only in multiple-case studies, whether those are performed separately by independent researchers or are part of a larger study by one investigator or a research team. As the goal is to generalize the research outcome, the above-discussed replication logic is the central part of analyses in this method. Explanation building, time-series analyses, and logic models, in turn, can be applied to both single- and multiple-case studies. For Yin, "[t]o 'explain' a phenomenon is to stipulate a presumed set of causal links about it, or 'how' and 'why' something happened" (Yin 2013). That is, obviously, relevant in explanatory case studies and usually involves creation of a narrative explaining the causalities, whereas in exploratory case studies it is primarily a process to generate hypotheses, not to analyze evidence.

However, the aim of this iterative process is not just to find patterns that support the hypotheses, but to test them against rival explanations. In time-series analyses, one also looks for patterns between observed phenomena that are usually empirical, though by tracing changes over a certain period of time; or the so-called time data points. One could, for instance, conduct a single-case study of a certain neighborhood and observe how changes in building code impact changes in the built environment and property values before and after each data point. Finally, logic models allow one to analyze evidence by

"matching empirically observed events to theoretically predicted events", as Yin (2013) puts it.

2.2 *Triangulation*

Like theoretical sampling, triangulation should take place throughout the case study process: from the research design, through data collection, to its analysis and evaluation. The simple reason is to maximize the strengths of included data gathering strategies, whether multiple sources of evidence, measurements, methods, references, cases, or units of analysis, and the kind, while minimizing the weaknesses of each. This process convincingly confirms findings and reduces random errors which increases the internal validity of a case study. Originally triangulation is a navigation strategy with which you can determine your position by the relative fixed locations and distances of two points, such as a landmark or a star, and that is what triangulation does in research as well; in other words, it determines the position of an investigator in relation to various measurements, methods, levels of analysis, or other 'points'.

Triangulation is usually associated with research as a means of avoiding bias or other undesirable impact in the substantiation of empirical phenomena through multiple sources and methods of data collection to improve the convergent validity of a study. Convergent validity is a common concept in sociology, psychology, and other behavioral sciences, including environmental psychology, as part of constructing validity of a study by confirming that the two measures of constructs that are theoretically related (e.g., by the theoretical sampling above) actually are related in reality as well. In the *Encyclopedia of Case Study Research*, Julie Wolfram Cox and John Hassard describe triangulation as a way of "developing a more effective method for the capturing and fixing of social phenomena in order to realize a more accurate analysis and explanation" (Mills & Durepos & Wiebe 2010).

According to Norman Denzin, there are four types of triangulation: (1) data triangulation, as the term implies, deals with corroborating data collected in different times from different sources; (2) investigator triangulation necessitates that different investigators collect data independently on the same phenomenon and compare the results; (3) methodological triangulation entails data collected by different methods, meaning that it requires a multiple method research design; while (4) in theory triangulation different theories are used to interpret the data (Denzin 1978). This kind of meta-triangulation can, then, include various subtypes, such as quantitative and qualitative data played against each other in order to examine various interrelationships within a setting.

However, as the said approach to triangulation is largely based on positivist paradigm according to which singular reality can be understood objectively, it has faced criticism within the postmodern theoretical framework that questions the dualistic subject-object distinction. Hence, Wolfram Cox and Hassard give a few examples of studies in which "new forms of triangulation can be used to analyze supposedly contradictory information and to show how positivist and interpretivist research may be mutually informative" and "can be understood as strategies of convergence and divergence" (Ibid), whether the data comes from quantitative or qualitative research or both. By convergence they refer to findings that provide a study with reliability and/or validity, while divergence allows its theoretical elaboration. Moreover, they point out that reflexive awareness includes sensitivity toward the relationship between the investigator and the investigation.

Accordingly, one should also look at dilemmas, inclusions, and exclusions within the research strategies which Wolfram Cox and Hassard call "associated impossibilities". Particularly interesting is their description on how convergence can be found through "holographic typical cases" as a representation of layers of variables or data that helps you to see the whole picture. Without going into the details of this strategy, it is sufficient to note that the metaphor of holograph denotes a three-dimensional, virtual image which is only a re-presentation of reality; thereby it re-counts the above-mentioned impossibilities. This is to say that the kind of triangulation, characterized by the involvement of investigators and participants as well as classifications derived not merely from literature reviews, multidimensional scaling, and other conventional tactics, but also qualitative strategies (e.g., metaphors) and other means beyond the status quo, aims to find partial views or new angles and perspectives. In this respect, it is important to bear in mind that in the subjectivist/ constructivist paradigm the investigator is only a tentative interpreter of a particular context with multiple realities.

There are innumerable ways to achieve triangulation in design research case studies and this also is an area in which there still is plenty of potential for creativity. Besides the multiple data collection techniques – varying from conventional observations, interviews, surveys, mapping, sorting, and such, to more novel means, like memory sketching and role playing – the analysis, evaluation, and interpretation, too, can include triangulations of less conformist nature. For instance, interviews or role playing can be followed by posing the initial tasks to a new group of people (for the purposes of theory sampling, preferably people with contrasting views), or conducting open-ended interviews with the same people on a particular new topic; in other words, the first round would be for theoretical sampling,

whereas the next provides qualitative evidence for triangulation. Or, as another example, one can return to the field for feedback to check with the previous informants whether they agree with the interpretations, which would be a significant act in qualitative research.

Also, visual communication with both the informants and, subsequently the audience, is critical, which can take such forms as correlational charts, syntax diagrams, composite and/or gamma maps, concept matrixes, and the kind, or even story boards, Japanese *manga* cartoons or *anime* videos (Sarvimäki 2013), as visual interpretations of the phenomena in built environment.

2.3 *Pattern-matching logic*

According to Yin, pattern-matching logic is one of the most desirable techniques for case study analyses. In short, a pattern model explains events or settings in terms of related elements and subsystems so that together they constitute a unified system; in other words, this 'pillar' is linked to logical argumentation in which interrelated 'building blocks' form a conceptual system (see Groat & Wang 2013). As Pauwels and Matthyssens point out, however, this well-known analytical *strategy* has a limited number of established analytical *techniques*.

To overcome this shortcoming, they applied the Inferential Pattern Coding (IPC) of Miles and Huberman (Miles & Huberman 1994) in their study "The Architecture of Multiple Case Study Research in International Business". The research design included both literal and theoretical replications, as well as the following four analytic steps: (1) Pattern coding was based on the list of guiding constructs derived from the initial research questions. The coded patterns, constantly upgraded as the study went on, formed abstracted chains of events and attached meanings, which were visualized in a matrix of interrelated patterns of a particular case. (2) In the next step, the causal relationships that begun to emerge by integrating relevant patterns from different units of analysis were highlighted and further triangulated by the existing literature. Non-causal patterns were, by no means, disregarded either because they supported the delineation of interrelated causal patterns. (3) Through this iterative process of cross-case comparisons, a causal meta-pattern logic was constructed across all 12 cases, which led to an intermediate model of four cases. Although not all causal patterns were identified in all cases, even the contradictory patterns were potential material for cross-case analyses; in Yin's terminology, the rival explanations, or Wolfram Cox and Hassard's impossibilities. (4) Finally, Pauwels and Matthyssens grouped the dominating patterns found in step 3 in seven groups of non-overlapping process propositions that "accommodated both a causal pattern as well as non-causal yet conditioning patterns" (Pauwels & Matthyssens 2004).

Relevant to design research, Yin sheds more light into this process of pattern matching. He points out that while similarities between empirical and predicted patterns can help in strengthening the internal validity of a case study, especially in explanatory studies, in descriptive studies, too, "pattern matching is still relevant, as long as the predicted pattern of important descriptive conditions was defined prior to data collection" (Yin 2013). He also discusses the nonequivalent dependent variables derived from quasi-experimental research designs and warns us about certain threats to the validity of this logic, regarding single-case studies in particular. In those, it is crucial to identify a subset of the initial dependent variables and, using the same data, to show how the patterns could be different in different circumstances: "In essence, your goal is to identify all reasonable threats to validity and to conduct repeated comparisons, showing how such threats cannot account for the dual patterns" (Ibid), he says. In addition to rival theoretical propositions overall, articulated in operational terms (e.g., what are the mutually exclusive variables as opposing to inclusive variables of your initial position), literal replication can successfully match a proposition of a single-case study with evidence supporting the initial hypothesis, whereas similar cross-case results confirm it even more assertively. Likewise, theoretical replication can confirm the pattern-matching logic for rival explanations across multiple cases in which predictable, different results support your initial position.

One of my doctorate supervisees, with Yin as the prime reference in preparing and conducting her case studies, applied the idea of a matrix, at first, in developing the research question and, then, using it as pattern-matching model for the interpretations. This was an embedded multiple-case study, in which she combined quantitative and qualitative data to answer the initial topic of inquiry whether the impact of a house on its users is actually the same as the architect claims or wishes. The research design included such quantitative strategies as performance analyses, census information of the neighborhoods, correlational questionnaires among the occupants, historical analysis of the settings, and visual scrutiny of pre- and post-occupancy floor plans, supplemented by qualitative data from critical analyses of these buildings, participant observations in the target houses, open-ended interviews among the occupants (e.g., why they had modified the house design) as well as with the architects; as two comparison groups, the investigator had analogous developer-designed 'cookie-cutter houses' and user-designed-and-built homes (i.e., the atypical cases). In a significant role of knowledge generation was the POE with an open-ended survey with which the research-

er was seeking to understand the occupants' own perception of their real-life setting.

Based on a literature review which focused on reveling why and how the disconnect between the user and the architect may have taken place, this doctorate candidate formulated her theoretical framework in a matrix with three horizontal lines of houses designed by a developer (D), an architect (A), or the user (U), whereas each had two vertical classifications of generic design (G) or that for a specific user (S). This created six categories: DG (developer generic), DS (developer specific), AG (architect-designed generic), AS (architect-designed for a specific client), UG (user-designed generic), and US (user-designed for him/herself). As UG is the least common category, the investigator acquired the role of a 'user-designer' in her design research for a flexible family home, in which design solutions were justified by the patterns found in the five other categories; this established the analytical generalizations for an ideal user-designed generic house (UG) by pattern-matching logic (Trimble 2014).

2.4 *Analytical generalization*

When an investigator has generated a pattern model that consists of related events and subsystems, which explains the workings (and usually causal relationships) of an unified system, s/he should ask oneself whether these relationships are generalizable beyond the setting of the case study, or settings of a multiple-case study. There are two options: statistical or analytical generalization, of which only the latter works in qualitative research. In the above example of an embedded case study, statistically generalizable census records and some other quantitative data (e.g., median house values, floor areas, number and cost of alterations, etc.) was part of the collected evidence, but in order to answer how does a house design effect the inhabitants, and how to interpret the outcome by comparing developer-designed, architect-designed and user-designed-and-built houses, qualitative findings were of most importance in the validation process. Hence, the investigator tested the research outcome and the evolving theory against the existing theoretical framework on the topic through analytical generalization. This is naturally crucial in multiple-case studies, in which generalizability is the goal, allowing the juxtaposition of an emerging theory and the extant literature, including competing theories.

Pauwels and Matthyssens applied the so-called Degrees of Freedom Analysis (DFA), developed to serve qualitative research, as the means for analytical generalization by validating their "process theory of international market withdrawal […] against two established process theories of organisational and strategic change" (Pauwels & Matthyssens 2004). Although this study on international business, at the first glance, appears quite distant from design research, their method of using DFA in analytical generalization is useful for us, too. Overall, it was based on listing parameters (e.g., motive of initiation) and related questions (e.g., Which stimuli cause a decision process to start or not to start? How and by whom is the decision process initiated? Where is the decision process initiated?), and comparing their emergent explanatory theory to the two theoretical benchmarks.

In design research, just to think about the aforementioned topic of inquiry, the DFA questions could include such parameters as the reasons to buy a particular house/ plot, to hire the chosen architect, to not hire a professional designer, to make changes after occupying the house, etc., while the related questions would be: Why and by whom was the decision made? What were the other options? Which mechanisms prevented choosing the ideal options?, and so on among the myriad of possibilities.

Yin, too, addresses the difference between statistical and analytical generalizations by stating that "in doing case study research, your goal will be to expand and generalize theories (analytic generalization) and not to extrapolate probabilities (statistical generalizations)" (Yin 2013). This distinction cannot be over-emphasized, since the characteristics and benefits of case studies are in-depth explanations, descriptions, explorations, even predictions of a setting by using data derived from multiple sources and methods which defines causal links, develops or tests a theory, and/or generalizes to theory. Subsequently, the ultimate objective is to integrate all this in a meaningful way.

2.5 *Validation by juxtaposition*

The four methodological pillars discussed above are essential 'structural' elements in the 'architecture' of multiple-case studies, but without balancing them – or providing lateral forcing, to use structural engineers' vocabulary – the construction would collapse. The 'roof' is what connects the pillars, and while doing so it also stabilizes the whole construct of the research it spans. This validation of data is an ongoing and deliberate process in which the investigator examines and creates possible explanations of both validity and invalidity from the perspective of various sources. The creation of invalidity is similar to the rival theories mentioned above. In other words, juxtaposing data by analyzing, interpreting and validating findings and extant theories, the emergent theory might upgrade, complement, or correct an extant theoretical stance. This, consecutively, provides opportunities for further theoretical sampling. In this process, the goal is not only to search for information that supports the hypothesis, but, most im-

portantly, that which does not support it. Pauwels and Matthyssens, referring to Kvale (1989) go as far as stating that "[t]he researcher plays the devil's advocate by critically assessing the possible impact of sources of misfit or invalidity" and that "juxtaposition and iteration are two highly complementary validation strategies both aiming at the identification of possible sources of invalidity" (Pauwels & Matthyssens 2004).

Somewhat similarly, Yin categorizes the test for judging case study research design in four subtactics: (1) In constructing validity, the aim is to identify operational definitions and measures of the study, which takes place particularly in the data collection phase, and is concluded in composing a research report. (2) Ensuring internal validity is a process in which the investigator seeks to establish causal relationships in explanatory or causal case studies; this does not apply to descriptive of exploratory studies, as those focus on thick descriptions of one setting, not cause-effect analyses. The internal validation process occurs almost exclusively within the data collection and analysis stage, although it of course must be planned in the research design. (3) External validity also is considered in this context, as it deals with the generalizability of the research outcome; by using theoretical approach in single-case studies, and replication logic in multiple-case studies. (4) Reliability, then, is ensured by a rigorous case study protocol and database, for which space does not allow discussion here (for more, see Yin 2013).

One example of an embedded single-case study employing the 'four pillars and a roof' I was involved with as a supervisor investigated a relatively broad topic looking at Chinese geomancy (*fengshui*), environmental psychology, and biophilic design. In this instance, too, the topic of inquiry was the user's perception of a house and her own setting, though the primary objective was the architect-client relationship and communication during the design process; in other words, this was a pre-occupancy evaluation focusing on the impending user. In addition to a very comprehensive literature review on these three separate schools of thought with examples of their design principles (pillar 1), the thesis went on identifying differences and similarities of these principles (pillar 2), pattern models underlying the logic of all three (pillar 3), and then tested the conclusions against extant phenomenological views on the perception of place (pillar 4). The 'roof' was a design project on a real site for a real family (though hypothetical as client) testing and validating the research results attained by the four 'pillars'. Thus, this design research case study highlighted feedback from the client and the impact of that on the design. The goal was to validate the research results and design solutions based on – or perhaps better with this metaphor, resting on – the theoretical framework by juxtaposing them with the extant theories on *fengshui*, environmental psychology, and biophilic design, as well as general theories on architecture and perception (Hudson 2013). In terms of evidence, the challenges were considerable in not only crossing many disciplinary and cultural boundaries, but also in integrative data evaluation deriving from these diverse fields.

In short, integrative data evaluation in design research case studies, like in any research project, amounts to deliberate, ongoing checks of validity or invalidity through concurrence of data and findings, both existing and emerging theories, case selection, data collection, definition of terms, and other internal and external reference points. These principles are reminiscent of Scholz and Tietje's integrative evaluation with emphasis on multiple sources of data and evidence, of the case study doctrines laid out by Yin, as well as of the 'four pillars and the roof' discussed above. As pointed out by Pauwels and Matthyssens:

> The omission of one of these pillars has a baleful influence in the methodological quality of the study and causes the roof – the ongoing validation process – to collapse. Yet, these pillars are only qualifiers: relying upon them is necessary though not sufficient. Each of the pillars should be operationalised and interwoven in a way that best fits the research questions and gives an optimal answer to the operational challenges of the study (Pauwels & Matthyssens 2004).

3 CONCLUSION

In closing, it is my wish that bringing together the aforementioned interdisciplinary views on case studies helps in defining this methodology in architecture and related disciplines, to the extent those could be discussed in the limited framework of this paper, Accordingly, it appears that the curricula in architecture and other design schools could apply much more rigorous interdisciplinary approach with regard to the education of research methods in order to ensure genuine integrative data evaluation in general. This might be stating the obvious, but it does deserve attention because, like in any academic field, design research education is based on determining one's position based on extant 'fixed points', in a similar way than triangulation does in navigation.

Yet, although the case study methodologies discussed above do demonstrate new approaches to design research, one definite challenge in teaching design research methods, as well as in conducting case studies, is over-emphasis on established methodology (as rules to follow) and under-emphasis on the role of creativity and intuition in research. Hence, an

appropriate ending is Scholz and Tietje's statement with which I fully agree: "It should be mentioned that, as in architecture, developing projects in the field of the environmental sciences is an art […] in many such cases, the artistic design is a determining factor for success" (Scholz & Tietje 2002).

References

Groat, Linda, and David Wang. *Architectural Research Methods*. New York, NY, USA: John Wiley & Sons, 2002 (first edition), 2013 (second edition).

Denzin, N. (1978) *The research act: A theoretical introduction to sociological methods*. New York: McGraw Hill.

Hudson, Katelyn. "Holistic Dwelling: Integrating Biophilic Design, Environmental Psychology, and Feng Shui." (DArch Thesis) University of Hawaii at Manoa, School of Architecture, May 2013.

Kvale, S. "To validate is to question", in S. Kvale (ed.), *Issues of Validity in Qualitative Research*. Lund, Sweden: Studentlitteratur, 73-92, 1989.

Miles, M.B. and A.M. Huberman. *Qualitative Data Analysis*. Thousand Oaks, CA: Sage, 1994.

Mills, Albert J., Gabrielle Durepos, and Eiden Wiebe (eds.). *Encyclopedia of Case Study Research*. Thousand Oaks: Sage, 2010.

Pauwels, P., and P. Matthyssens. "The Architecture of Multiple Case Study Research in International Business." *Handbook of Qualitative Research Methods for International Business*. Rebecca Marschan-Piekkari and Catherine Welch (eds.). Cheltenham, UK/ Northampton, MA, USA: Edward Elgar, 2004, 125-143.

Sarvimäki, Marja. "A Case Study on Case Studies." *The Visibility of Research: Proceedings of the 2013 ARCC Spring Research Conference*. Chris Jarrett, Kyoung-Hee Kim, and Nick Senske (eds.). Charlotte: University of North Carolina at Charlotte, 2013, 338-342. http://arccweb.org/conferences/proceedings/ARCC2013_UNCC%20Conference%20Proceedings.pdf

Scholz, Roland W., and Olaf Tietje. *Embedded case study methods: Integrating quantitative and qualitative knowledge*. Thousand Oaks, CA, USA: Sage Publications, 2002.

Trimble, Willa. "The Architect and the User: Investigating Designer and User Practices and Structures in Hawaii." (DArch thesis) University of Hawaii at Manoa, School of Archi

Yin, Robert K. *Case Study Research: Design and Methods.* Thousand Oaks, CA: Sage, 2013 (fifth edition).tecture, May 2014.