A quasi-experimental method for testing rural design support within a DRM framework

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Abstract

Purpose – The purpose of this paper is to describe the quasi-experiment setting to test the formulated design support (developed in the author's PhD research) within a design research methodology (DRM) framework. This support intends to help designers to consciously engage rural families within a development aid scenario and increase their self-reliance towards their built environment (housing).
Design/methodology/approach – This paper elaborates on the setting in which the design support was tested within a quasi-experiment. The literature section describes the challenges in design research and why the DRM is suitable for this type of empirical research.
Findings – Findings of the paper include a workable setting to organise and evaluate the impact of a design support within a DRM framework on a vulnerable rural community.
Research limitations/implications – The main limitation of the research lies in the study population. Due to financial and time constraints, only four teams could participate in the experiment conducted in rural Kenya.
Social implications – Further research will need to prove that the support works in comparable situations on the African continent.
Originality/value – The quasi-experiment setting within a DRM framework could benefit researchers in comparable empirical investigations.

Keywords Quasi-experiment, Sustainable development, Sub-Sahara Africa, Applied design research, Design support evaluation, Inhabitant self-reliance

Paper type Research paper

1. Introduction

The author's overall research is situated on Mt Elgon, rural Kenya. As the communities at this location have various income levels and living standards, struggling to achieve an acceptable quality of life (Skevington *et al.*, 2004), it proves an exemplary situation for comparable developing societies on the continent. Based on previously performed research (literature review, local surveys, etc.) and subsequent publications (Smits, 2014, 2017), the overall problem statement underpins that the self-reliance of the majority of rural impoverished inhabitants is decreasing due to the externally introduced building materials and technologies.

The survey results show that most inhabitants still build traditional housing by themselves although they state that traditional housing is not desirable. Rural inhabitants on Mt Elgon wish for a better and more modern habitation' however, they lack the resources, tools and knowledge to build an improved one without professional – external – support. Moreover, currently involved professionals (designers, engineers, aid workers, etc.) insufficiently include inhabitants in developing processes. Existing inhabitant capacities[1] are neither analysed nor incorporated

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in the decision-making. As a result, professionals fail to transfer the applied knowledge in articulating building solutions.

As an effect, inhabitants cannot maintain realized housing, they cannot build new housing without external professional support (financial, organisational, etc.) and consequently lower their level of self-reliance in relation to their built environment. Therefore, professionals require design support that would need to addresses the following three main success criteria to sustain and increase inhabitant self-reliance towards their built environment:

(1) increasing the level of inhabitant participation in establishing their built environment;

(2) increase the level of including inhabitant capacities in decision-making concerning their built environment; and

(3) effective knowledge transfer between professional and inhabitants.

Existing design tools fail to address all three criteria in one tool; furthermore, there is currently no methodology to assess rural inhabitant capacities in relation to their built environment. Therefore, the author previously described a concept support tool[2] enabling professionals to advise impoverished rural communities how they can build and improve houses by themselves. However, to test the impact and overall effectiveness of the design support is equally important. Due to the specificity of the design support and the context in which it is being tested, there are no direct applicable experiments designs available. Therefore, the aim for this paper is to design a framework for the experiment in which the support tool can be tested and evaluated.

Consequently, the next section describes the identified methodology (design research methodology (DRM)) and the subsequent framework; Section 3 succinctly introduces the articulated support followed by the section describing the quasi-experiment framework in which the support was tested. Section 5 describes how the support was tested within a quasi-experiment, followed by the section explaining how the impact was measured.

The last section of the paper projects the conclusions, indicating how the formulated quasi-experiment design will provide researchers working in comparable empirical research with a suitable framework. The framework and the experiment design are unique in their design and application (in a vulnerable context); moreover, offer an applicable framework for the increasing demand from humanitarian organisations. Positioning the results in an applied context is highly complicated (variables) and requires a separate publication to elaborate in length. However, the implications of the results have been included in the conclusions of this paper.

2. Methodology and framework

The author's research is an empirical investigation of the explanation, prediction and prescription (Weggeman, 2001) of how current design and building methodologies applied by professionals affect rural inhabitant's self-reliance in relation to their built environment, aiming at developing a functioning design support tool for professionals wanting to design and realise houses in the Mt Elgon area. In comparison to other methodologies, this research focusses on implementing, measuring and altering the methodology in practice, describing suitable support, providing clear insights in its functioning and making improvements to it.

Design research is a rapidly growing research domain (Joost *et al.*, 2016) and specifically, the role of design research and how it constitutes to articulating solutions in practice. Many investigate the importance of performing design research (Birkhofer, 2011; de Vries *et al.*, 2013; Rampino, 2012) or advocate the implementation of the design research in practice (Crouch and Pearce, 2013; Laurel, 2003; Rampino, 2012). Only few research works have studied the practical implications of design research within the context of structuring and writing a dissertation (Durdella, 2018). Moreover, current methodologies lack a description of a fundamental framework in which various methods can be deployed according to the

investigated phenomenon in practice. Furthermore, they are often industry specific in their approach and application, which might not work in other fields of design.

With architecture engaging in a variety of spatial, social and contextual issues (Awan *et al.*, 2013), researchers in this field are left with the complexity of making the myriad of individual research outcomes comparable. According to Blessing and Chakrabarti (2009), the current design research gives rise to three main issues:

(1) the lack of overview of existing research;

(2) the lack of use of results in practice; and

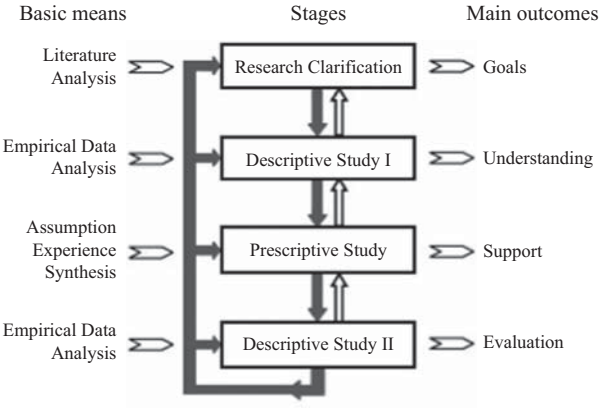
(3) the lack of scientific rigour.

In their DRM, Blessing and Chakrabarti (2009) developed a framework specifically for the design industry. In their opinion, there were calls for DRM (Cross *et al.*, 1992; Fulcher and Hills, 1996; Reich, 1995); however, the status of design research into its own methodology is poor (Blessing and Chakrabarti, 2009). The formulated process supports the researcher in developing his design research step by step. This framework specifically aims at validating design methodology research by defining goals clearly, describing success criteria, developing strategies, measuring results in practice and measuring and proving success criteria in clear steps.

The DRM depicts a layout that permits the combination of different architectural research methodologies in one framework: how the problem addressed *in situ* can be evaluated (Mt Elgon, Kenya), how the solution (success) can be articulated by developing a functioning support tool and how the impact of the support can be evaluated. The main goal of the DRM is to describe a suitable support tool or in case of (partial) failure, providing clear insights for possible continuation of the research in the consecutive DRM stages or the research followed up by others.

In Figure 1, the cycle of the DRM framework is shown. Every phase of the design research can be based on deploying mixed methods. The research clarification (RC) uses literature review, expert interviews and case studies (Mt Elgon) to prove the lack in practice of inhabitant's self-reliance in relation to their built environment. This helps to identify the research problem, goals and criteria. In the Descriptive Study 1, literature review and survey research (Fowler, 2013) identifies the measurable success criteria that potentially improve inhabitant self-reliance towards their built environment.

In the Prescriptive Study 1 (PS1), the success criteria are articulated in an applicable design support. This phase also describes an evaluation model for the impact of the support and how the support was tested within a quasi-experiment setting *in situ*, which is the part



Source: Blessing and Chakrabarti (2009)

Figure 1.
DRM framework

elaborated in this paper. In the last phase, Descriptive Study 2 (DS2) of the basic DRM framework, the impact of the support is evaluated and adjustments to the support described. The PS1 phase is the part of the author's overall research described in this paper, excluding the development of the support tool. Below, a brief overview of the support is given followed by the description of the quasi-experiments' setup.

3. The design support guidance

The support was written for architects and engineers who aim at helping Kenyan rural impoverished inhabitants to establish self-reliance in their housing. This first version of the support was developed for local testing in Kenya; however, it is intended to be expanded to fit wider application on the continent. The support was written based on the literature review and expert interviews. This section describes the chapters of the book and mixed methods used in the support; how the support collects data; and how users evaluate its effectiveness in the field.

As the support is applicable to vulnerable inhabitants and communities (culturally, socially and financially), the first chapter of the support describes how to appropriately introduce oneself to the community, explaining desirable behaviour (taking pictures, use of language, etc.), suitable clothing (many rural communities have a traditional and conservative way of dressing) and sensitive way of working with inhabitants and their community members (position of man, woman, adult and child). The second chapter describes a semi-structured interview with individual family members about their daily routine. It enables the practitioner[3] to better understand individual weekly schedules and daily life. More importantly, it helps to prepare and plan the activities to come (following the rest of the book).

The third chapter describes a play session with individual family members to unravel their hopes and dreams. As those most likely differ substantially from those of the professional; it helps to comprehend the family's expectation from the project. The fourth chapter describes the general inventory (floor plans, sections, facades, etc.) of the existing house(s) and compound of the family. In the fifth chapter, individual family members are observed through one day of the week. In this way, the professional gets insight into where, how and with whom certain activities in and around the house are taking place.

The sixth chapter provides with an in-depth contextual analysis describing the inventory of housing typology in the area, basic geology and infrastructure. This analysis helps the professional to map available building materials and building methodologies. The seventh chapter helps the professional to prepare a structured interview to research the inhabitant's capacities. This capacity analysis (together with the chapters on inhabitant involvement and knowledge transfer) is one of the most crucial methods developed within the authors' PhD research. The method instructs how to evaluate available skills, finance, materials, tools and help from community members. Using the outcomes, the professional is able to develop three alternative housing solutions within the eighth chapter, which are based on the inhabitants' existing housing situation, daily use, dreams, preferences and their capacities. After discussing the most suitable solutions with the family, the chapter results in a final design.

With many resources (materials, tool and labour) provided by the community, the ninth chapter helps to plan the building activities and include the identified materials, tools and labour. The last chapter of the support helps the professional to evaluate inhabitant skill levels per building activity, plan teaching/training activities and evaluate effective knowledge transfer to the inhabitants.

4. Quasi-experiment framework

Testing the support is an empirical investigation in how it influences the decision-making of both professional and inhabitant in improving the inhabitants' self-reliance within their

built environment. A complex set of variables (professional, inhabitants and context) and limited resources do not allow a random assignment (Keppel and Wickens, 2004). Here, the differences in financial capacities or family size could potentially make the research outcomes bias. To limit the variables in testing the developed support, the experiment is framed within a quasi-experiment (Bailey, 2008).

The experiments' population size had to be restrained to the available resources, but also had to be large enough to prove a potential impact of the support and the potential societal benefit (Scher *et al.*, 2015). For this reason, the total population size was set on four groups, consisting of one control group. Case group A has a positive impact and group B+C have a negative impact, there is sufficient evidence that the support does not have the desired effect. Without the third group, the results might become inconclusive (group A positive and group B negative). Cases group A+B have a positive impact and group C has a negative impact, however minimal, there is sufficient evidence for a positive trend. The control group D does not only help comparing outcomes with the groups that use the support, but also provides valuable information on the problems of the entire studied population (within Famia, community investigated on Mt Elgon).

The size of the individual teams was set by the support: the team has changing roles in which one team member is active as actor while the other observes and evaluated his team member. The team's sampling was mainly based on financial constraints and convenience (Jager *et al.*, 2017). It did not seem possible to find architects willing to pay for their own expenses while participating in the experiment. Covering expenses of the eight professionals was not possible and therefore an alternative had to be sought. Every year many students are involved in development aid; however, the added value for the supported communities can be questioned (Holdsworth and Quinn, 2010). Building engineering students were more than willing to participate in the experiment and pay for their expenses. They also contribute to one of the largest global groups of volunteers. However, they could not work according to the support without supervision. Therefore, the support has additional chapters for students and includes a working methodology combining one professional and one student.

The architects applied via a call that was set out in November 2016. The call was randomized and resulted in four architects originating from different countries: the Netherlands, Greece, Kenya and Kosovo. The architect selection procedure had two criteria: applicants need to hold an MSc in Architecture and need to be available during the entire experiment period. Selection of the architects was based on a heterogeneous convenience sampling (Jager *et al.*, 2017), every applicant meeting the criteria was automatically selected.

The students applied via an internship call published on the virtual network of the Avans University of Applied Sciences and posters spread over both locations of the faculty. The student selecting procedure had three criteria: students needed to be third-year building engineer students and have finished the entire first-year curriculum. Selection of the students was based on a homogeneous convenience sampling (Jager *et al.*, 2017), every applicant meeting the criteria was automatically selected.

After completing the selection for the experiment, the team composition was randomly sampled (Creswell, 2013). One jar consisted of small notes with the names of the architect and another jar with those of the students. The author was blindfolded and picked one note from each jar. In four rounds, the teams were randomly picked.

Due to the prior case studies and surveys, the quasi-experiment was situated on Mt Elgon. The survey evaluated the housing situation of 200 households within four different communities. Two selection criteria guided the choice of the community: inhabitants had to own the land they lived on and their current houses had to be built by locals (without external help). Results showed that in one community (red marker), the government owned

the land. In another community (orange marker), an inhabitant collective owned the land and was heavily restrained in physical additions or changes to their housing situation. Most of the Chepchoina (green marker) inhabitants rented their house and did not own local land. The community members Famia (blue marker) owned their land and their houses were built by locals (or by inhabitants themselves); therefore, it was selected.

To find interested families in April 2017, a poster call was put on various locations in the Famia community (blue marker). People were asked to meet the following requirements:

- legally owning a piece of land;
- have family members available between August and January 2018 to help with construction;
- family members should be communicative in English;
- having and willing to contribute funds or materials for the building; and
- the plot should be within ten-minute motorbike ride from Andersen Medical Centre.

As families who applied had complex and differing capacity variables within a quasi-experiment setting, the assignment was nonrandomized. Therefore, four comparable families were sought. After two months, 14 families applied for the project. They were then visited by a local social worker who repeated the project requirements and participants' responsibilities. One family (application no. 13) withdrew from the project, as they expected to receive a fully funded house to be built by the organisation. Multiple criteria were set for the families registering for the project; however, these criteria were not influencing the final selection. The criteria were: distance habitation teams, available budget, condition of the existing house, availability of materials, labour and time. The first selection round used a score system (0–10) for each criterion, based on the individual scores, seven families with the highest score were chosen.

While evaluating the selected applications, it appeared that some of the families already had a half built house, had an unclear family situation or had too few family members. These issues were so fundamental in realizing a new housing or they made too much difference in between the families that a new selection procedure was made. Again including all families and setting different criteria, prioritised by if the: family has already begun building a new house, availability of the family members, level of English, size of the plot, having children and budget. These criteria made sure that the family had the land to build a house on, basic financial means for small parts (tools, materials or labour) and a minimum level of English for basic communication between the team and the community members. Out of the 13 applications, 4 families were selected which had the most comparable scores. It must be stated that although the families are similar there are still substantial differences and, therefore, the experiment follows a non-equivalent group design (Kong *et al.*, 2016; Moenaert and Caeldries, 1996; Wener, 1989).

The criteria of budget, amount of children and size of the plot have a considerable effect on the research outcomes (Figure 2). They defined how much financial means the family had, determining their expectations for the type of materials, size of the house and used building method for their new housing.

Assigning the families to the teams was also random sampling (Creswell, 2013). One jar consisted of small notes with the numbers of the teams and another jar with those of the families. The author was blindfolded and picked one note from each jar. In four rounds, the four families were linked to their team.

According to the code of ethics (Scientific Integrity Committee, 2012) of the Delft University of Technology, a separate research application was written together with partner institute Jomo Kenyatta University of Agriculture and Technology. The quasi-experiment

was evaluated and approved by both institutes and later on by the National Commission for Science, Technology and Innovation (NACOSTI) in Kenya. The next section will describe the practicalities of executing the quasi-experiment on Mt Elgon.

5. Executing quasi-experiments

Executing a field experiment in a vulnerable context required many additional conditions to protect the family, community, team members and the quality of the gathered data. This section describes the following elements: governmental consent, community consent, family consent; media/financial/cancellation and team member consent/housing/office space/context introduction/nondisclosure agreement and communication.

According to the NACOSTI (2017) research permit legislation, the County Commissioner and Education Department were needed to approve the experiment. Therefore, upon their arrival both offices based in Kitale were visited to get the necessary official approval. The most important local level of approval came from the Areal Chiefs (Transnzoia), Community Board and Village Elder (Chepchoina). At this meeting the author was asked to explain the purpose of the experiment, the content of the support, potential participation of community members and the overall conditions to the research. The meeting was closed with the approval for the experiment to take place in Famia and a short welcoming ceremony for the research team to the community. Over the course of the project, three community meetings for were held in Famia. In these meetings inhabitants could ask any questions or address any remarks they had, concerning the experiment. During these meetings, there was always a local social worker and village elder present to guide the meeting.

Offering vulnerable families help raises many expectations and potential problems. To protect the family from making any decisions solely based on the external help, one of the most important processes in the quasi-experiment was the inhabitant informed consent (Mohler *et al.*, 2010). During the first week, the author, assistant Researcher (Beata Duda) and Community Worker (Geoffrey Ngeywo) visited all families to informally introduce themselves and to hand out the consent form to the family (see Appendix 1). It included the following information: identification of the researcher, sponsoring institution, purpose of the study, identification of the benefits for participating, level and type of participant involvement, notation of risks to the participant, guarantee of confidentiality to the participant, assurance that the participant can withdraw at any time and provided the details of persons to contact if questions arise (Sarantakos, 2005). Moreover, the consent had a threefold varied description of the conditions to consolidate the inhabitants' understanding of the conditions and making sure they could comprehend what they were signing. Together (researchers, family members and social worker) they read the entire document and then family members were able to address any questions, remarks or

Criteria \ Family no.	1	2	3	4	5	7	8	10	11	13
(1) Construction has begun	1	1	1	1	1	0	1	0	1	1
(2) Availability	1	1	0.5	1	1	–	1	–	0.75	0
(3) Level of English	1	0	0.5	1	1	–	1	–	1	–
(4) Size of the plot	0.75	–	0.25	1	0.25	–	1	–	0.75	–
(5) Having children	0.5	–	0	1	1	–	1	–	1	–
(6) Budget (income and savings)	1	–	–	1	0.5	–	0.25	–	0.25	–
Final score	5.25	–	–	6	4.75	–	5.25	–	4.75	–

Figure 2.
Criteria and relative score per family: 0 failed criterion, 0.5 only partially met criterion and 1 fully meeting criterion

translations they might have had. The same procedure was followed for the audio/video consent (Appendix 2) to explain the procedures for recording and sharing data. The families were then left with the contract and audio/video consent for a couple of days to discuss them. When they were ready they contacted the author via the provided details and the zero measurement[4], an in-depth interviews (Muskat *et al.*, 2012) were planned. In the next section the impact measurement is further explained.

After notifying participants about the acceptance of the experiments, multiple (Skype) meetings were held to go through all the conditions of the experiment. After two meetings, all participating team members were asked to read the contract and consent form. Afterwards they had the opportunity to ask questions or give suggestions to the contract. Subsequently, some of the projects conditions were changed in favour of the participants (originally all additional costs (visa, insurance, etc.) were to be financed by the participants themselves). The experiment described individual accommodation for every team, to reduce the risk of sharing information between each other. However, the group as a whole found the costs too high and separate accommodation as socially undesirable. Therefore, additional costs were covered by the author and a nondisclosure agreement was set up in which the teams agreed not to disclose any information between each other or to any third parties.

The teams were allowed to share everyday issues via social media and with each other; however, anything directly related to the experiment (research, design, decision-making, etc.) was prohibited. Due to the tremendous amount of preparation time, all teams required an office space through the first three months of the project. Although in the first weeks, there were some logistic issues every team got their own working space. Due to the high altitude and sensitive social/cultural context, the first week of the project was planned for context adjustment. Language courses (Swahili), desirable behaviour and dos and don'ts were addressed. Being a part of an impoverished community means that the teams had to be very conscious in what they say and do while being in the community (Liamputtong, 2006). During multiple sessions, the group discussed how to behave in a given scenario (community members asking for money, smoking and alcohol consumption in the community, etc.). At the end of the paper, an overview of considerations is given that occurred during the experiment and could help the effectiveness of similar future endeavours.

6. Impact measurement and implications of outcomes

To measure the outcomes of the tested support in a quasi-experiment setting, the framework targets the families involved in the research, as the overall aim being to improve inhabitant's self-reliance towards their built environment. The most direct outcome of the experiment could be evaluated two to five years after its completion. Here, the factual maintenance, extension or reproduction of the house could be physically observed and easily made comprehensible (survey, interview or observation). However, the timeframe of the overall research is limited (PhD timeframe) and, therefore, a measurement directly after the project was necessary. To make the impact visible, a baseline measurement (Rubin and Babbie, 2009) was set up before the teams started to test the support. The measurable variables identified in the RC and DS1 phase intended to expose multiple issues concerning the inhabitants' self-reliance in relation to the existing and desired housing. It included the following barriers to self-reliant housing:

- Housing size: many families prefer an expensive way of building often resulting in smaller housing, which cannot house the entire family and increases the inhabitant's reliance on renting housing.
- Rent and landownership: In relation to variable 1, many families are forced to rent a house and land (Chepchoina) as they cannot afford to build an improved house, which increases the inhabitant's financial reliance; no income = no habitation.

- Availability, locality and costs-building materials: traditional houses were built from free/cheap materials that were locally available, desired materials are expensive and not locally available. Building with them increases the inhabitant's financial reliance.
- Self-build and hired labour: family and community traditionally build their houses (without financial compensation) themselves. As the desired materials are more complicated to work with, families and communities need to hire skilled labour, which increases the inhabitant's financial reliance.
- Building knowledge: if the inhabitants do not have the required building knowledge, it increases their reliance to skilled labour.
- Maintenance and permanence: an often-heard complaint is the level of maintenance; the perception on modern housing[5] is that it does not require maintenance. However, it does, which increases the inhabitant's reliance to skilled labour.
- Help and alternative solutions: the traditional building evolved over centuries while modernity has shown inhabitants a giant leap in housing quality and durability. As a result, almost the entire community desires a comparable style of "modern" housing. However, their financial capacities do not meet the needed requirements. This variable identifies the need of "external help" in finding alternative solutions according to the inhabitant's capacities.
- Capacity acceptance: when looking at the financial means, inhabitants still prefer a housing solution that does not suit their capacities. An important additional variable pinpoints that if the inhabitant gained a better understanding of their actual capacities and related building solutions (more realistic desires towards their housing), then they are more likely to accept "cheaper" alternatives.

To better understand inhabitant's motives concerning the variables, a structured in-depth interview was formulated (Appendix 3). This form for conducting interviews ensured that all measurable variables data are collected (Creswell, 2013) and in depth to allow the inhabitant to provide with additional and detailed motives (Guion *et al.*, 2001). In the baseline interviews, inhabitants received questions about their current and desired habitation (Appendix 4). In the post-experiment (impact) interview, inhabitants got the same questions about current (new) and past habitation (Appendix 4). In both interview cycles, a social worker and the observer were present. Moreover, the inhabitants in both cycles received separate consent forms stating privacy issues and how the collected data would be used. The full outcomes of both the baseline and impact interviews are extensive and will therefore be described in detail in a consecutive paper by the author.

7. Conclusions

DRM proved to be a suitable model to evaluate existing problem *in situ*, analyse existing approaches, articulate a plausible support and successfully test the support in a quasi-experiment setup executed on Mt Elgon. The described procedures enabled the identification of families needing help in their housing and provided a setting in which they could safely participate in articulating improved housing. The procedures also successfully identified the participating practitioners and random sampling provided with an objective composition of the teams. Due to the extensive ethical approvals and setup of the experiment, there was a high level of awareness and involvement of both the local communities and government. Therefore, this paper provides valuable information under which circumstances design support can be tested and its impact in a vulnerable rural context could be evaluated. Providing researchers working in the field of empirical research with a workable setup to test applied support *in situ*, hopefully empowering practitioners

intending to help rural inhabitants to sustain their self-reliance towards their housing preliminary outcomes confirm that there is a positive impact on the inhabitant's self-reliance. However, due to the complexity of variables, the extensive data collection and transcripts, the outcomes of both interview cycles will be elaborated in a consecutive paper. This paper successfully described a quasi-experiment setup to test the design support within a DRM framework. The setup is specifically developed for the context of Mt Elgon; however, applying the setup in different contexts imposes substantial changes. Below, the main implications for application in comparable contexts are given:

- Vulnerable inhabitant's social, cultural and financial capacities are context specific and might differ strongly with other communities.
- The described process procedures are specific for Kenya and might require different steps in properly engaging the government and community.
- Although nondisclosure agreements were signed, participants struggled not to breach contract. The experiment setting should ensure the participants' discretion in future endeavours.
- Conducting this type of quasi-experiment over a period of five months requires a strong social group (moral support), which contradicts the conditions for discretion. The combination of participants into teams was very positive. However, this was primarily due to agreeable grouping and may have led to different outcomes; if the participants were grouped differently, the outcomes of the experiment could have been altered substantially. It is advised to use a personality assessment in pairing participants into teams (preferably under expert supervision).

Notes

1. Capacities: all resources, knowledge and skills inhabitants have.
2. The support: the methodology developed within the author's PhD research which entails: a book and multiple digital files (to be published after consecutive experiments and adjustments within the author's postdoctoral research).
3. The practitioner: students and professionals working in the built environment.
4. Baseline measurement: measurement of identified variables at the beginning of the study, which is used to compare to later measurement for impact evaluation.
5. Modern housing: inhabitant perspective on improved housing in comparison to vernacular housing tradition.

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Appendix 1

Rural Housing Project Consent Form

Research investigator: […]

Thank you for agreeing to participate in the Rural Housing Project. In the period 08-2017 till 01-2018 you will host two foreign engineers to help you construct a new dwelling. Their accommodation, travel, food and drinks are all taken care of by the project organization. We would however like to ask you to help them with arranging lunch. By participating in the project you agree, that you are responsible to supply the project with all needed materials, tools, labour and such. The two engineers will only design, advise and help built the house. They will not offer financial aid during the project (includes aid for materials, tools, labour, food, drinks or any comparable form of aid).

The project aims to design and built an improved house compared to the existing house. As available materials, tools and labour will articulate the new house offered to you. This will limit the possibilities in offering a new dwelling by the engineers; therefore the expectations should be adjusted to these limitations. In case the house is not finished by the end of the project, the project organization will facilitate finishing the house before 06-2018. In case the building failed (collapsed, leaking or such) before 01-2018 the project organization will facilitate to repair or rebuilt a comparable house based on the materials and costs of original design of the new house. In case the building starts to leak or has any other malfunctions after 01-2018 all responsibility lie with you as owners. There are no possibilities for financial compensation or reimbursements during or after the project. Below an overview of the above mentioned conditions:

- Owners are committing for the whole duration of the project: 08-2017 till 01-2018
- Owners do not have to offer any form of accommodation, food or drinks to the visiting engineers
- Owners are requested to help the visiting engineers to find lunch within the community (engineers will pay themselves for the lunch)
- Owners are responsible to supply the project with all needed materials, tools, labour and such.
- The visiting engineers and project organization will not cover any form of additional aid on top of advice and labour offered.
- As materials and tools are limited to what you as owners and/or community can afford/offer, you should adjust you expectations accordingly
- In case the house is not finished by the end of the project (01-2018) the project organization will facilitate to finish the house. Again based on the materials, tools and labour offered by the family.

- In case the building failed (collapsed, leaking or such) before 01-2018 the project organization will facilitate to repair or rebuilt a comparable house based on the materials and costs of original design of the new house
- In case the building starts to leak or has any other malfunctions after 01-2018 all responsibility lie with you as owners
- There are no possibilities for financial compensation or reimbursements during or after the project.

Ethical procedures for academic research undertaken from Dutch institutions require that participants explicitly agree how the information gathered within the project will be used. This part of the consent form is necessary for us to ensure that you understand how we intend to record the project and with it your involvement. Moreover, that you agree how this information (of your participation) will be stored, shared, published and by whom. We record the project in three different ways. Firstly, a documentary team will film you, your family, other relatives and community members. Secondly, a camera will be placed close to your house. This camera will make one picture every minute during the working hours of the day and over the total project time. Thirdly, the engineers have a camera to document everything connected to the project (the house, how you live, which items you own, your daily activities and such).

The documentary team will collect all the data to make a film. In this film we want to show how the process f the project went and what the outcomes our. Below we will offer a separate consent where you can mark if you allow us to use your names in the film.

Collecting and storing the other information, will be performed by the engineers and handed over to the leading researcher ([…]). The engineers will be able to access the data till the end of the research (01-2018) after that all data will only be accessible by the leading researcher. This information will be used in publishing of the manuscript of mr. […] and in connected articles. Below we will offer a separate consent where you can mark if you allow us to use your names in publications or if you prefer us to anonymize the information. Below an overview of the above mentioned conditions:

The project is recorded in three different ways:

1. A documentary team will film you, your family, other relatives and community members.
2. A camera will be placed close to your house, which will make one picture every minute during the working hours of the day and over the total project time. This to generate an overview of the total process.
3. The engineers have a camera to document everything connected to the project (the house, how you live, which items you own, your daily activities and such).

These are recorded, edited and shared by:

- Raw footage documentary: documentary team, and leading researcher.
- Storage documentary data: only accessible by leading researcher after 01-2018.
- Finished documentary film shared: international audience.
- Raw footage of the total process: Engineers and leading researcher Finished data.
- Storage footage total process data: only accessible by leading researcher after 01-2018.
- Finished sequence films shared: international audience.
- Raw footage of engineers: engineers and leading researcher.
- Storage raw footage of engineers data: only accessible by leading researcher after 01-2018
- Selection of pictures and films shared: international audience for articles.

In the following section we explain which health and safety issues might occur. The family members are responsible for their own health and safety during the construction of the house. This means that they need to take the appropriate measures to work safely and healthy. However, in case a family member or community member gets injured during building activities, the project organization has an insurance to cover the expenses. Any sicknesses not related to the project will need to be covered by the family members themselves. Below an overview of the above mentioned conditions:

- Family members are primarily responsible for their own health and safety during the construction of the house.
- Family members means will need to take the appropriate measures to work safely and healthy during the construction of the house.
- In case a family member or community member gets injured during building activities, the project organization has an insurance to cover the expenses.
- Any sicknesses not related to the project will need to be covered by the family members themselves.

To make sure you fully understand the conditions you are agreeing to we would like to explain your responsibility and our responsibility as organization. By signing this form I as owner of the house confirm that:

1. I am voluntarily taking part in this project. However, I am committing myself for the full length of the project 08-2017 till 01-2018.
2. I do not have to offer any form of accommodation, food or drinks to the visiting engineers.
3. I have to help the visiting engineers to find lunch within the community (engineers will pay themselves for the lunch).

4. I am responsible to supply the project with all needed materials, tools, labour and such.
5. The visiting engineers and project organization will not cover any form of additional aid on top of advice and labour offered.
6. I adjust my expectations accordingly, to my available; funds, materials and tools.
7. In case the house is not finished by the end of the project (01-2018) the project organization will facilitate to finish the house (again based on the materials, tools and labour offered by my family).
8. In case the building fails (collapsed, leaking or such) before 01-2018 the project organization will facilitate to repair or rebuilt a comparable house based on the materials and costs of original design of the new house.
9. In case the building starts to leak or has any other malfunctions after 01-2018 all responsibility lie with me as owner.
10. That there are no possibilities for financial compensation or reimbursements during or after the project. A documentary team will film you, your family, other relatives and community members.
11. A documentary team to film my family, relatives, other community members and me.
12. A camera will be placed close to my house, which will make one picture every minute during the working hours of the day and over the total project time.
13. The engineers have a camera to document everything connected to the project (the house, how you live, which items you own, your daily activities and such).
14. Raw footage documentary will be made by: documentary team, and leading researcher.
15. Storage documentary data will be only accessible by: leading researcher after 01-2018.
16. Finished documentary film will be shared to an international audience.
17. Raw footage of the total process: Engineers and leading researcher Finished data.
18. Storage footage total process data will be only accessible by: leading researcher after 01- 2018.
19. Finished sequence films will be shared to an international audience.
20. Raw footage taken by engineers will be accessible by: engineers and leading researcher.
21. Storage raw footage of engineers data will be only accessible by: leading researcher after 01-2018.
22. Selection of pictures and films will be shared to an international audience for articles.
23. I am primarily responsible for my own health and safety during the construction of the house.
24. I will take the appropriate measures for me my family and community members to work safely and healthy during the construction of the house.
25. In case a family member or community member gets injured during building activities, the project organization has an insurance to cover the expenses.

26. Any sicknesses not related to the project I will need to cover by myself.
27. I don't expect to receive any benefit or payment for my participation besides the realization of a new house.
28. I have been able to ask any questions I might have, and I understand that I am free to contact the researcher with any questions I may have in the future.

Please read the following statements and cross through what does not apply to you.

In the event of publishing pictures or movies of me, my family, relatives or community members, I prefer/do not prefer you to use my and their names.

In the event of publishing pictures or movies of me, my family, relatives or community members, I allow/do not allow using my and their names.

In the event of publishing written results of the research in the manuscript or subsequent articles, I allow/do not allow you to use my and their names.

I wish/wish not to receive the outcomes of this research.

Family Approval
Name: Signature:
Surname:

Main Researcher Approval
Name: […] Signature: Mail: […]

If you have any further questions or concerns about this project, please feel free to contact the leading researcher

Appendix 2

Research investigator: […]

Ethical procedures for academic research undertaken by Dutch institutions require that participants explicitly agree how the information gathered within the project will be used. This part of the consent form is necessary for us to ensure that you understand how we intend to record the project and with it your involvement. Moreover, that you agree how this information (of your participation) will be stored, shared, published and by whom. We record the project in three different ways. Firstly, a documentary team will film you, your family, other relatives and community members. Secondly, a camera will be placed close to your house. This camera will make one picture every minute during the working hours of the day and over the total project time. Thirdly, the engineers have a camera to document everything connected to the project (the house, how you live, which items you own, your daily activities and such).

The documentary team will collect all the data to make a documentary. In this film we want to show how the process of the project went and what the outcomes are. Below we will offer a separate consent where you can mark if you allow us to use your names in the film. Collecting and storing the other information, will be performed by the engineers and handed over to the leading researcher ([…] The engineers will be able to access the data until the end of the research period (01-2018) after that all data will only be accessible by the leading researcher. This information will be used in publishing of the manuscript of mr. […] and in connected articles. Below we will offer a separate consent where you can mark if you allow us to use your names in publications or if you prefer us to anonymize the information. The overview of the above mentioned conditions is as follows:

The project is recorded in three different ways:

1. A documentary team will film you, your family, other relatives and community members.
2. A camera will be placed close to your house, which will make one picture every minute during the working hours of the day and over the total project time. The reason is to generate an overview of the total process.
3. The engineers have a camera to document everything connected to the project (the house, how you live, which items you own, your daily activities and such).

These are recorded, edited and shared by:

- Raw footage documentary, by: documentary team, and leading researcher.
- Storage documentary data, by: only accessible by leading researcher after 01-2018.
- **Finished documentary film will be screened to international audience**
- Raw footage of the total process, by: Engineers and leading researcher.
- Storage footage total process data: only accessible by leading researcher after 01-2018.
- **Finished documentary film will be screened to international audience**
- Raw footage of engineers, by: engineers and leading researcher.
- Storage raw footage of engineers data: only accessible by leading researcher after 01-2018.
- Selection of pictures and films shared: international audience for articles.

To make sure you fully understand the conditions you are agreeing to we would like to explain your responsibility and our responsibility as organization. By signing this form I as owner of the house confirm that:

1. Allow a documentary team to film my family, relatives, other community members and me.
2. A camera will be placed close to my house, which will make one picture every minute during the working hours of the day and over the total project time.
3. The engineers have a camera to document everything connected to the project (the house, how you live, which items you own, your daily activities and such).
4. Raw footage documentary will be made by: documentary team, and leading researcher.
5. Storage documentary data will be only accessible by: leading researcher after 01-2018.
6. Finished documentary film will be shared to an international audience.
7. Raw footage of the total process: Engineers and leading researcher Finished data
8. Storage footage total process data will be only accessible by: leading researcher after 01-2018.
9. Finished sequence films will be shared to an international audience.
10. Raw footage taken by engineers will be accessible by: engineers and leading researcher.
11. Storage raw footage of engineers data will be only accessible by: leading researcher after 01-2018.
12. Selection of pictures and films will be shared to an international audience for articles.

Please read the following statements and cross through what does not apply to you.

I allow/do not allow you to screen a documentary containing audio-visual material of my family, relatives and community members, to an international audience.

In the event of publishing pictures or movies of me, my family, relatives or community members, I agree/do not agree for you to use my and their names.

I allow/do not allow you to screen sequences of the building process containing visual material of my family, relatives and community members, to an international audience.

In the event of publishing pictures or movies of me, my family, relatives or community members, I allow/do not allow using my and their names.

In the event of publishing written results of the research in the manuscript or subsequent articles, I allow/do not allow you to use my and their names.

I wish/wish not to receive the outcomes of this research

Family Approval

Name: Signature:

Surname:

Main Researcher Approval

Name: […] Signature:

Mail: […]

If you have any further questions or concerns about this project, please feel free to contact the leading researcher

Appendix 3

Interview Questionnaire

August 2017

Client:	Mount Elgon Trust of Kenya
Partner Applicant:	Stichting Elimu Mount Elgon.
Location:	Chepchoina, at the slopes of Mount Elgon in Western Kenya Catchment area approximately 5 km around the projects.
Researcher:	[…] The department of Architecture, Chair of Methods and Analysis Faculty of Architecture and the Built Environment, Delft University of Technology

RESEARCH INFORMATION

Central Research Question:

What is the current self-reliance level of family's towards their housing situation? What is the desired level of the self-reliance of the family towards their housing situation?

Objective: Assess and evaluate existing level of self-reliance regarding the housing situation of the family in relation to their community.

Aim: To determine the self-reliance level of the family in relation to their community within their housing situation. It will be used as a baseline measurement for the *Rural Housing Studio Support Tool*, in order to compare the self-reliance level before and after application of the support tool.

QUESTIONNAIRE

INTRODUCTION:

You have previously signed a document about the recordings that will be made during the project and how they will be handled (privacy). By signing the audio/video consent form you have agreed that I as leading researcher, the engineer and his student are allowed to make audio/video recordings. In order to confirm authenticity of this questionnaire I would like to make a **video recording**. Do you have any objections for me recording this interview so that I am able to write out the interview later? Do you have any questions before we begin?

- START VIDEO RECORDING - - - - - - - - - - - - - - - - - -

As independent researcher I am an going to conduct an interview with you to get to know your views on your housing situation. You are family.....living in the village of Chepchoina and for the purpose of our research you have been given number .....

This interview is voluntary, will take approximately 1,5 to 2 hours and can be stopped by you at all time. If you have any questions or uncertainties you are welcome to address them during the interview. I have written the questions down and printed them to be precise, I am sorry this might feel impersonal but is essential to take the same interview with the other families.

Your family has applied for the rural housing studio project, which will help you to build a new house for your family. By signing the contract you have committed your family to the project and are you able to abandon the project at all time. This project is a part of my research at the Delft University of Technology in The Netherlands, that aims at helping poor rural families to build houses, which would increase the level of family's self-reliance (independence). Although we are helping you to construct a new house, we intend to make you independent from external labour and help (NGO's). In this way you will be able to maintain, extend or replicate your house by yourself. To do so I have written a book to instruct the engineer and the student to advise you how to build a house by yourself. The outcomes of this research will directly influence your living situation, however will not directly influence the community. This interview is meant to understand how did you build your house, to what extend did you do it yourself, with the help of the community or with hired labour. We are curious if you will be more self-reliant with regard to your housing situation after the team leaves.

Do you understand the procedure? Do you have any questions about the procedure?

THE QUESTIONS

Questions about current house:

1. Do you own the house you live in?
   If yes:
   a. how is it financed?/did you need a loan, did you have savings

If no:

b. how is it financed?rental?

2. Does your house consists of one building or more?
3. What is/are the sizes of buildings? (meters or fet)
4. How many rooms does the house have?
5. Is the house large enough for the whole family?

If yes:

a. can you explain why?

If no:

b. can you explain why not?

6. Do you own the plot?
7. What materials did you use to build the house? (please list material per phase: foundations, floor, walls, roof, finishes)
8. In case the family has iron sheets:
   a. How does the iron sheet roof behave when it rains?
   b. What is the temperature inside during the midday under the iron sheet roof?
   c. How much did the iron sheet roof cost?
   d. Was it expensive?

      If yes

      Are there cheaper alternatives for roof material?

      If yes:

      i) Which are they?
      ii) How do they behave when it rains?
      iii) How do they behave in full sun?
9. Why did you choose the iron sheets?
10. Are those materials locally available (walking distance or by using your own mean of transport)?

    If yes:

    a. Did you have to pay for the materials or are there other ways of collecting/ acquire these materials

    If not:

    b. Did you bring materials yourself or did you hire somebody to do that for you?

    If both:

    c. Please answer a+b
11. Are those materials local natural resources (e.g. mud or straw)or manufactured (e.g. cement, iron sheet)?
12. Are those materials expensive or cheap, please answer using the following scale?

    1-very cheap, 2 - cheap, 3- affordable, 4- expensive, 5- very expensive
13. Did you build your house yourself? (Please explain per construction phase: foundations, floor, walls, roof, finishes)?

    If yes:

    a. Did you have help?

    b. From who?

c. What did they help you with?
d. Was it small or substantial help?
e. Were the community members able to help you with it? (did they have the necessary skills?)
f. Did the community members help you with it?
    i. In which parts did they assist?
    ii. Were these skilled or unskilled tasks
g. Did they do it for free or were they compensated?
    If compensated:
    i. In what form were they compensated? (did you help them in return, did you provide the with meals, did you pay them?)
If no:
h. Did you hire labour?
i. Were the workers for all or some of the work?
j. Why did you hire labour?
If lack of knowledge was the problem:
    i. Would you have built the house yourself if you would have known how to do it?

14. To what extend do you have the knowledge to build in this way (with this method)?
15. How and when were you trained to build this way?
16. Could you extend or duplicate the house by yourself?
17. Did you help any other community member constructing their house?
    If yes:
    a. Did you helped the people that helped you?
    b. What did you help with, what did you do?
18. Are you satisfied with your current house?
    If yes:
    a. What do you like about the house?
    b. What makes your house special?
    If no:
    c. What don't you like about the house?
        i. Why don't you like it?
        ii. What could you change to make it more likeable?
19. What does your house have in common with other houses in the community?
20. Did your house already need repairs?
21. What did you need to repair?
22. How frequently do you need to repair the house?
    a. Which component(s) need a lot of repair?
    b. What type of things/components of the house do you repair yourself?
    c. What type of things/components of the house can't you repair yourself?
23. Do you know how to repair your house? (walls, floor, roof)
    If yes:
    a. Do you repair your house yourself?
    b. Could you still afford the repairs if you your income got smaller?

If not:

c. Do you need to hire somebody to do it for you?
d. Can you afford that?
e. Do you do that [hire somebody to repair your house]?
f. Could you afford it if you would lose your income?

24. How much did the whole house cost?
25. Would you have preferred to build your house differently?
26. What would you have done differently?
27. Why didn't you build your house like that?

If the answer insufficient fund (or similar)

a. What is the cause of such high price (e.g. materials, method)?

28. Did you have knowledge how to build all the elements of this house yourself?

If yes: explain why you didn't build this house yes
If no: is there anybody in the community that could teach you that for free? Or is it so complicated you need to hire skilled labour to do it for you?

29. Would you prefer to build a house that you have sufficient building knowledge of?
30. Would you prefer to build the house by yourself (and your community) or to hire labour?

If by yourself:

a. Do you think that you would need the knowledge/help of the engineer and the student?
b. For which aspects would you need the knowledge and help of the engineer and the student?

If hire:

c. Would have enough money to buy materials and hire labour?

31. Would you consider alternative materials that are cheaper, but have similar characteristics as your preferred materials?
32. Would you consider building method that is closer to your building knowledge?
33. Would you be interested to learn how to build with the materials/methods yourself?

If yes:

a. Why?

Questions about the desired house:

34. Which parts/elements of the current house would you like to use in the new house?
35. Out of what materials would you like to build your house from? (specify; foundation/floors/walls/roof: mud, brick, concrete, wood, steel sheet, etc.)

a. Why; explain your arguments
b. Why?

36. Do you have the knowledge how to build all the elements of this house yourself?

    If yes: explain why you didn't build this house yet
    If no:
    To what extend do you have the knowledge to build in this way?

    Do you think you would be able to learn all those skills within next 3 months?

    Is there anybody in the community that could teach you that for free?

    Or is it so complicated you need to hire skilled labour to do it for you?

37. Could you extend or duplicate the house by yourself?

38. Would you prefer to build the house by yourself (and your community) or to hire labour?

    If by yourself:
    Do you think that you would need the knowledge help of the team?

    If hire

a. Would have enough money to buy materials and hire labour?

39. What materials would you like to build the house from? (please list material of: foundations, floor, walls, roof, finishes)

    In case the family chose iron sheets:

    e. How does the iron sheet roof behave when it rains?
    f. What is the temperature inside during the midday under the iron sheet roof?
    g. How much does the iron sheet roof cost?
    h. Is it expensive?
       If yes
       Are there cheaper alternatives for roof material?
       If yes:
       iv) Which are they?
       v) How do they behave when it rains?
       vi) How do they behave in full sun?

a. Why do you choose the iron sheets?

40. Are those materials locally available (walking distance or using your own mean of transport)?

    If yes:

a. Would you have to pay for the materials or are there other ways of collecting/ acquire these materials?

    If not:

b. Would you bring materials yourself or would you hire somebody to do that for you?

    If both:

c. Please answer a+b

41. Are those materials expensive or cheap, please answer using the following scale?
    1-very cheap, 2 - cheap, 3- affordable, 4- expensive, 5- very expensive
42. Would you be able to finance this type of house?
    If yes:
    a. How? (From your savings, By taking a lone?)

43. Would you want to build this house yourself?
    If yes:
    a. Could the community members help you with it? (would they have the necessary skills)
    b. Would the community members help you with it?
    c. Would the friends, family and community members that helped you before help you again?
    d. Would they do it for free or would they be compensated?
        If yes: -
        If no:
        i. In what form (would you help them in return, would you provide the with meals) would you pay them?
    If no:
    e. Would you need to hire for one or some of the jobs?
    f. Would you need to help them as much they helped you?
44. Would this house need a lot of repairing?
    If yes:
    a. Why?
    b. Do you know how to improve the situation?
    If no:
    c. What do you need to know to improve?
    d. Is this important for wanting the new house?
45. How frequently would you need to repair the house?
46. Would you consider materials/methods that are cheaper, but have same characteristics (durability) as your preferred materials and methods have?
47. Would you want to know how to build/maintain the house yourself?
    If yes:
    a. Would you repair your house yourself?
    b. Could you afford the repairs if you would lose your income?
    If not:
    c. Would you need to hire somebody to do it for you?
    d. Could you afford that?
    e. Could you afford it if you would lose your income?
48. Would you want to learn how to build/repair your desired house?
    If yes:
    a. Would you be willing to help construct/repair a house for one of the community members in order to learn?
    b. Would you be willing to help construct/repair a public building (school/hospital/etc.) in order to learn?
49. Do you think that you will need help from an NGO after the project is finished?

General information:

50. Please state the names of parent(s)
51. Ages of parent(s)
52. Occupation of parent(s)
53. Pleas state the amount of children
54. Please state the name of children
55. What are ages of the children?
56. What is the occupation of children (please specify: education or work)?
57. Are there any other family members e.g. cousins, living with you?
    If yes:
    a. Please state who they are and their names
58. Do you have an income?
59. How much is your shared income?
60. Is this stable, or does fluctuates?
    a. If the income fluctuates:
    b. Does it fluctuate seasonally or occasionally?
61. If there are fluctuations how often and how much difference do they make?
62. Do you own a mean of transport? (bicycle, motorbike, donkeys)
    If yes:
    a. What type of transport do you own?
63. Do you have a shamba?
64. Do you own this land?
65. Does it generate income?

- STOP AUDIO RECORDING - - - - - - - - - - - - - - - - - -

Questionnaire Consent Form

Research investigator: [...]

We don't anticipate that there are any risks associated with your participation, but you have the right to stop the questionnaire or withdraw from the research at any time.
Thank you for agreeing to be questionnaireed as part of the above research project. Ethical procedures for academic research undertaken from Dutch institutions require that the questionnaireed explicitly agree to being questionnaireed and how the information contained in their questionnaire will be used. This consent form is necessary for us to ensure that you understand the purpose of your involvement and that you agree to the conditions of your participation. Please therefore read the information below and then sign this form to certify that you approve the following:

- The questionnaire will be recorded and a transcript will beproduced.
- You will be sent the transcript and given the opportunity to correct any factual errors.
- The transcript of the questionnaire will be analysed by [...] as research investigator.

- Access to the questionnaire transcript will be limited to […] and academic colleagues and researchers with whom he might collaborate as part of the research process.
- Any summary questionnaire content, or direct quotations from the questionnaire, that are made available through academic publication or other academic outlets will be anonymized so that you cannot be identified, and care will be taken to ensure that other information in the questionnaire that could identify yourself is not revealed.
- The actual recording will be kept for valorisation purpose only.
- Any variation of the conditions above will only occur with your further explicit approval.

Agreeing to this form I confirm that;

1. I am voluntarily taking part in this project. I understand that I don't have to take part, and I can stop the questionnaire at any time;
2. The transcribed questionnaire or extracts from it may be used as described above;
3. I have read the Information sheet;
4. I don't expect to receive any benefit or payment for my participation;
5. I can request a copy of the transcript of my questionnaire and may make edits I feel necessary to ensure the effectiveness of any agreement made about confidentiality;
6. I have been able to ask any questions I might have, and I understand that I am free to contact the researcher with any questions I may have in the future.

If you have any further questions or concerns about this study, please contact:

Name of researcher: […]

E-mail: […]

Phone number: […]

Appendix 4

Interview Questionnaire

August 2017

Client:	Mount Elgon Trust of Kenya
Partner Applicant:	Stichting Elimu Mount Elgon.
Location:	Chepchoina, at the slopes of Mount Elgon in Western Kenya Catchment area approximately 5 km around the projects.
Researcher:	[…] The department of Architecture, Chair of Methods and Analysis Faculty of Architecture and the Built Environment, Delft University of Technology

RESEARCH INFORMATION

Central Research Question:

What is the current self-reliance level of family's towards their housing situation? What is the desired level of the self-reliance of the family towards their housing situation?

Objective: Assess and evaluate existing level of self-reliance regarding the housing situation of the family in relation to their community

Aim: To determine the self-reliance level of the family in relation to their community within their housing situation. It will be used as a baseline measurement for the *Rural Housing Studio Support Tool*, in order to compare the self-reliance level before and after application of the support tool.

QUESTIONNAIRE

INTRODUCTION:

You have previously signed a document about the recordings that will be made during the project and how they will be handled (privacy). By signing the audio/video consent form you have agreed that I as leading researcher, the engineer and his student are allowed to make audio/video recordings. In order to confirm authenticity of this questionnaire I would like to make a **video recording**. Do you have any objections for me recording this interview so that I am able to write out the interview later? Do you have any questions before we begin?

- START VIDEO RECORDING - - - - - - - - - - - - - - - - - -

As independent researcher I am an going to conduct an interview with you to get to know your views on your housing situation. You are family.....living in the village of Chepchoina and for the purpose of our research you have been given number .....

This interview is voluntary, will take approximately 1,5 to 2 hours and can be stopped by you at all time. If you have any questions or uncertainties you are welcome to address them during the interview. I have written the questions down and printed them to be precise, I am sorry this might feel impersonal but is essential to take the same interview with the other families.

Your family has applied for the rural housing studio project, which will help you to build a new house for your family. By signing the contract you have committed your family to the project and are you able to abandon the project at all time. This project is a part of my research at the Delft University of Technology in The Netherlands, that aims at helping poor rural families to build houses, which would increase the level of family's self-reliance (independence). Although we are helping you to construct a new house, we intend to make you independent from external labour and help (NGO's). In this way you will be able to maintain, extend or replicate your house by yourself. To do so I have written a book to instruct the engineer and the student to advise you how to build a house by yourself. The outcomes of this research will directly influence your living situation, however will not directly influence the community. This interview is meant to understand how did you build your house, to what extend did you do it yourself, with the help of the community or with hired labour. We are curious if you will be more self-reliant with regard to your housing situation after the team leaves.

Do you understand the procedure? Do you have any questions about the procedure?

THE QUESTIONS

Questions about current house:

66. Do you own the house you live in?
    If yes:
    a. how is it financed?/did you need a loan, did you have savings
    If no:
    b. how is it financed?rental?

67. Does your house consists of one building or more?
68. What is/are the sizes of buildings? (meters or fet)
69. How many rooms does the house have?
70. Is the house large enough for the whole family?
    If yes:
        a. can you explain why?
    If no:
        b. can you explain why not?
71. Do you own the plot?
72. What materials did you use to build the house? (please list material per phase: foundations, floor, walls, roof, finishes)
73. In case the family has iron sheets:
        a. How does the iron sheet roof behave when it rains?
        b. What is the temperature inside during the midday under the iron sheet roof?
        c. How much did the iron sheet roof cost?
        d. Was it expensive?
            If yes
            Are there cheaper alternatives for roof material?
            If yes:
                i) Which are they?
                ii) How do they behave when it rains?
                iii) How do they behave in full sun?
74. Why did you choose the iron sheets?
75. Are those materials locally available (walking distance or by using your own mean of transport)?
    If yes:
    a. Did you have to pay for the materials or are there other ways of collecting/ acquire these materials
    If not:
    b. Did you bring materials yourself or did you hire somebody to do that for you?
    If both:
    c. Please answer a+b
76. Are those materials local natural resources (e.g. mud or straw)or manufactured (e.g. cement, iron sheet)?
77. Are those materials expensive or cheap, please answer using the following scale?
    1-very cheap, 2 - cheap, 3- affordable, 4- expensive, 5- very expensive
78. Did you build your house yourself? (Please explain per construction phase: foundations, floor, walls, roof, finishes)?
    If yes:
    a. Did you have help?
    b. From who?
    c. What did they help you with?
    d. Was it small or substantial help?

e. Were the community members able to help you with it? (did they have the necessary skills?)
f. Did the community members help you with it?
i. In which parts did they assist?
ii. Were these skilled or unskilled tasks
g. Did they do it for free or were they compensated?
If compensated:
i. In what form were they compensated? (did you help them in return, did you provide the with meals, did you pay them?)
If no:
h. Did you hire labour?
i. Were the workers for all or some of the work?
j. Why did you hire labour?
If lack of knowledge was the problem:
i. Would you have built the house yourself if you would have known how to do it?

79. To what extend do you have the knowledge to build in this way (with this method)?
80. How and when were you trained to build this way?
81. Could you extend or duplicate the house by yourself?
82. Did you help any other community member constructing their house?
If yes:
a. Did you helped the people that helped you?
b. What did you help with, what did you do?
83. Are you satisfied with your current house?
If yes:
a. What do you like about the house?
b. What makes your house special?
If no:
c. What don't you like about the house?
i. Why don't you like it?
ii. What could you change to make it more likeable?
84. What does your house have in common with other houses in the community?
85. Did your house already need repairs?
86. What did you need to repair?
87. How frequently do you need to repair the house?
a. Which component(s) need a lot of repair?
b. What type of things/components of the house do you repair yourself?
c. What type of things/components of the house can't you repair yourself?
88. Do you know how to repair your house? (walls, floor, roof)
If yes:
a. Do you repair your house yourself?
b. Could you still afford the repairs if you your income got smaller?
If not:
c. Do you need to hire somebody to do it for you?
d. Can you afford that?

e. Do you do that [hire somebody to repair your house]?
f. Could you afford it if you would lose your income?

89. How much did the whole house cost?
90. Would you have preferred to build your house differently?
91. What would you have done differently?
92. Why didn't you build your house like that?
    If the answer insufficient fund (or similar)
    a. What is the cause of such high price (e.g. materials, method)?
93. Did you have knowledge how to build all the elements of this house yourself?
    If yes: explain why you didn't build this house yes
    If no: is there anybody in the community that could teach you that for free? Or is it so complicated you need to hire skilled labour to do it for you?
94. Would you prefer to build a house that you have sufficient building knowledge of?
95. Would you prefer to build the house by yourself (and your community) or to hire labour?

If by yourself:

a. Do you think that you would need the knowledge/help of the engineer and the student?
b. For which aspects would you need the knowledge and help of the engineer and the student?

If hire:

c. Would have enough money to buy materials and hire labour?

96. Would you consider alternative materials that are cheaper, but have similar characteristics as your preferred materials?
97. Would you consider building method that is closer to your building knowledge?
98. Would you be interested to learn how to build with the materials/methods yourself?
    If yes:
    a. Why?

Questions about the desired house:

99. Which parts/elements of the current house would you like to use in the new house?
100. Out of what materials would you like to build your house from? (specify; foundation/floors/walls/roof: mud, brick, concrete, wood, steel sheet, etc.)
    a. Why; explain your arguments
    b. Why?
101. Do you have the knowledge how to build all the elements of this house yourself?
    If yes: explain why you didn't build this house yet
    If no:
    To what extend do you have the knowledge to build in this way?

Do you think you would be able to learn all those skills within next 3 months?

Is there anybody in the community that could teach you that for free?

Or is it so complicated you need to hire skilled labour to do it for you?

102. Could you extend or duplicate the house by yourself?

103. Would you prefer to build the house by yourself (and your community) or to hire labour?

If by yourself:
Do you think that you would need the knowledge help of the team?

If hire

a. Would have enough money to buy materials and hire labour?

104. What materials would you like to build the house from? (please list material of: foundations, floor, walls, roof, finishes)

In case the family chose iron sheets:

e. How does the iron sheet roof behave when it rains?
f. What is the temperature inside during the midday under the iron sheet roof?
g. How much does the iron sheet roof cost?
h. Is it expensive?
If yes
Are there cheaper alternatives for roof material?
If yes:
iv) Which are they?
v) How do they behave when it rains?
vi) How do they behave in full sun?

a. Why do you choose the iron sheets?

105. Are those materials locally available (walking distance or using your own mean of transport)?

If yes:

a. Would you have to pay for the materials or are there other ways of collecting/ acquire these materials?

If not:

b. Would you bring materials yourself or would you hire somebody to do that for you?

If both:

c. Please answer a+b

106. Are those materials expensive or cheap, please answer using the following scale?

1-very cheap, 2 - cheap, 3- affordable, 4- expensive, 5- very expensive

107. Would you be able to finance this type of house?
    If yes:
    a. How? (From your savings, By taking a lone?)
108. Would you want to build this house yourself?
    If yes:
    a. Could the community members help you with it? (would they have the necessary skills)
    b. Would the community members help you with it?
    c. Would the friends, family and community members that helped you before help you again?
    d. Would they do it for free or would they be compensated?
        If yes: -
        If no:
        i. In what form (would you help them in return, would you provide the with meals) would you pay them?
    If no:
    e. Would you need to hire for one or some of the jobs?
    f. Would you need to help them as much they helped you?
109. Would this house need a lot of repairing?
    If yes:
    a. Why?
    b. Do you know how to improve the situation?
    If no:
    c. What do you need to know to improve?
    d. Is this important for wanting the new house?
110. How frequently would you need to repair the house?
111. Would you consider materials/methods that are cheaper, but have same characteristics (durability) as your preferred materials and methods have?
112. Would you want to know how to build/maintain the house yourself?
    If yes:
    a. Would you repair your house yourself?
    b. Could you afford the repairs if you would lose your income?
    If not:
    c. Would you need to hire somebody to do it for you?
    d. Could you afford that?
    e. Could you afford it if you would lose your income?
113. Would you want to learn how to build/repair your desired house?
    If yes:
    a. Would you be willing to help construct/repair a house for one of the community members in order to learn?
    b. Would you be willing to help construct/repair a public building (school/hospital/etc.) in order to learn?
114. Do you think that you will need help from an NGO after the project is finished?

General information:

115. Please state the names of parent(s)
116. Ages of parent(s)
117. Occupation of parent(s)
118. Pleas state the amount of children
119. Please state the name of children
120. What are ages of the children?
121. What is the occupation of children (please specify: education or work)?
122. Are there any other family members e.g. cousins, living with you?
    If yes:
    a. Please state who they are and their names
123. Do you have an income?
124. How much is your shared income?
125. Is this stable, or does fluctuates?
    a. If the income fluctuates:
    b. Does it fluctuate seasonally or occasionally?
126. If there are fluctuations how often and how much difference do they make?
127. Do you own a mean of transport? (bicycle, motorbike, donkeys)
    If yes:
    a. What type of transport do you own?
128. Do you have a shamba?
129. Do you own this land?
130. Does it generate income?

- STOP AUDIO RECORDING - - - - - - - - - - - - - - - - - -

Questionnaire Consent Form

Research investigator: [...]

We don't anticipate that there are any risks associated with your participation, but you have the right to stop the questionnaire or withdraw from the research at any time.

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- You will be sent the transcript and given the opportunity to correct any factual errors.

- The transcript of the questionnaire will be analysed by [...] as research investigator.
- Access to the questionnaire transcript will be limited to [...] and academic colleagues and researchers with whom he might collaborate as part of the research process.
- Any summary questionnaire content, or direct quotations from the questionnaire, that are made available through academic publication or other academic outlets will be anonymized so that you cannot be identified, and care will be taken to ensure that other information in the questionnaire that could identify yourself is not revealed.
- The actual recording will be kept for valorisation purpose only.
- Any variation of the conditions above will only occur with your further explicit approval.

Agreeing to this form I confirm that;

7. I am voluntarily taking part in this project. I understand that I don't have to take part, and I can stop the questionnaire at any time;
8. The transcribed questionnaire or extracts from it may be used as described above;
9. I have read the Information sheet;
10. I don't expect to receive any benefit or payment for my participation;
11. I can request a copy of the transcript of my questionnaire and may make edits I feel necessary to ensure the effectiveness of any agreement made about confidentiality;
12. I have been able to ask any questions I might have, and I understand that I am free to contact the researcher with any questions I may have in the future.

If you have any further questions or concerns about this study, please contact:

Name of researcher: [...]

E-mail: [...]

Phone number: [...]

Corresponding author
Michaël Willem Maria Smits can be contacted at: m.w.m.smits@tudelft.nl