

PRACTICAL AND ETHICAL ISSUES OF POST-DISASTER RESEARCH

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ABSTRACT

Disaster response after a natural disaster is especially challenging when a great number of victims is involved, like in highly dense urban areas. Especially low-income groups become internally displaced and are in need of design innovations that offer short-term and long-term relief. However, design research for post-disaster shelter and settlement, can present specific practical and ethical challenges. The purpose of this paper is to discuss these issues for the development of a support-tool. Besides, conclusions are drawn for a suitable research methodology. The discussed issues are related to the development of a knowledge-based support-tool for self-built processes as a strategy for post-disaster recovery. It is a tool to teach survivors how to build their own hurricane or flood resistant shelter. Especially in the case of recurring disasters, the use of self-built processes provides an opportunity for humanitarian organisations to create a sustainable recovery process and prevent relief cost in the future. Preparing experiments is challenging because of the unpredictability of disaster occurrence but needed to convince humanitarian organisations of the functioning of the new support tool. A literature review, case study comparison and expert consultation enable preparing for experiments. A suitable research framework is found in the Design Research Methodology. Based on the ethical and practical considerations, the paper suggests for design research to for all research activity how to balance the critical need for research in and after the disaster, with the ethical responsibility to protect the vulnerable survivors serving as research participants in experiments.

Keywords: sustainable innovation design, design research, post-disaster recovery, shelter and settlement, internally displaced people, low-income groups, self-built housing strategy, research methodology

1. INTRODUCTION

This paper discusses the practical and ethical challenges encountered whilst defining a research methodology for the development of a support-tool for disaster recovery. The support-tool is developed for recovery from a flooding or a hurricane in a high density urban. Floods and hurricanes mostly occur in tropical environments where they disproportional affect vulnerable or marginalised people [1–5]. In those cases, the mainly low-income groups become internally displaced [5,6]. In 2014 17.5 million people were displaced by disasters related to weather hazards [5]. In this research the way the building professional could contribute to the lives of internally displaced people (IDP) in post-disaster situations is explored.

This type of research seems to ask for investigation into post-disaster situations and for experiments in practice. However, while defining the research methodology, the need to discuss various practical and ethical issues became apparent. It is for example considered unethical to test new products with people that are victims of disasters. Is it for example acceptable to monitor people in need without directly contributing in providing a solution? And how can research experiments be prepared for an unscheduled disaster? The knowledge gained may well highlight possibilities to formulate, adjust or change a post-disaster research process. Based on the practical and ethical considerations, at the end of this paper, a methodology is defined for the design of the support-tool.

1.1 Potential of Self-Recovery

The support-tool will be part of the doctoral research of the writer of this paper. The aim is to develop and test a knowledge-based support-tool for self-build processes for post-disaster recovery. Currently, there are not enough knowledge and good example in practice available. Here, the relevance of this research is explained.

The number of natural disasters reported is steadily increasing [7–9]. It is estimated that every day there is a disaster somewhere [10,11]. The main increase is of hydro-meteorological disasters [7,12]. Hurricane of flood resistant structures need to be developed that withstand unscheduled natural forces and prevent the event from becoming a disaster. In the chaos of destroyed housing after a disaster, a lot of building materials can be salvaged. This material could be used to improvise a shelter, in particular in the case of recurring disasters, such as floods and hurricanes. Material can be reused for the creation of a shelter with a long technical lifespan (5-50 years) in a minimum of time and without heavy equipment or power tools, which are usually not available in an emergency situation [13]. For the self-reliance of the community being able to build and maintain their own dwellings is preferred over the constant need of external expertise. Therefore, teaching survivors how to build more sustainable flood or hurricane resistant structures, with the material that can be found, could make a difference. It is an opportunity for the humanitarian sector to enable the inhabitants to become more self-reliant in terms of constructing their own shelter, and therefore prevent relief cost in the future. Enabling inhabitants to achieve durable housing solutions, increases their self-reliance and their preparedness for future disasters and that way decreases vulnerability [5,14].

Internationally, the success aspects of self-built housing are often overlooked [15,16]. Nevertheless, there is a great economical and participatory potential in self-building as a solution for resilient city development [17,18]. Self-build processes should be seen as more of an opportunity rather than as a threat.

Self-builders therefore need to understand the structural risks while constructing. Together with an understanding of the building process; this will increase their ability to independently construct. On the long-term this could increase their self-reliance. Knowledge about hurricane and flood resistant structures is already widely available. However, a way to transfer this knowledge and enable an understanding of the structural risks and building process is not available yet as a support-tool in the humanitarian sector [19].

Using the potential of self-building requires some guidance and quality assessment in order to lead to a more resilient city. There is a necessity, task

and responsibility for the building professional to give this guidance and develop smarter solutions. The practical and ethical issues encountered during the development of this knowledge-based support-tool for self-building are discussed in this paper.

2. PRACTICAL AND ETHICAL ISSUES

Doing research in a chaotic disaster situation is highly problematic. Most of the research dilemmas encountered in disaster situations have both a practical and ethical aspect.

First it is important to elaborate what is understood by ethics in relation to disasters. Humanitarian organisations and researchers have a responsibility to undertake research striving to make contributions that will alleviate current and potential future suffering of disaster survivors [20]. Ethics is the study of codes of conduct and moral judgements concerning what is right and wrong [21]. Ethics differ around the world and form the foundation for societies and cultures and influence political, social and economic decision making [22–24]. As society becomes more global and intertwined, ethics become more complex as well [22]. Because of the unpredictable nature of disasters the humanitarian organisations try to rely universal truths of what is right and wrong [22,25,26].

The changing disaster context leads to three types of ethical dilemmas in humanitarian relief [21]. The first is choices between options with conflicting merits and costs [21]. The second is moral subjectivity on how to act when values of survivors clash with those of humanitarian organisations [21]. And the third is moral conflicts with the hierarchy of moral obligations[21]. These dilemmas are here discussed in the light of design research for post-disaster recovery. The discussion provides more questions than answers. Here are the questions that are discussed in the following paragraph.

How to balance the critical need for research with the ethical responsibility to protect the vulnerable survivors and research participants when experimenting? How can post-disaster research be planned and experiments be prepared without knowing where the disaster will occur? In what way can research participants be selected? And can partners be found that are needed to execute experiments? How should donor money be spent?

2.1 Research with Vulnerable Survivors

Otherwise healthy people, when subjected to disaster, become more vulnerable [22,27]. Vulnerability can be defined as a human characteristic,

in the case that people might have the decision making capacity but there is a lack of power and resource to make truly voluntary decisions [27,28]. Factors such as gender, age, disability, health status and other contextual life stressors affect vulnerability and shape people's ability to cope and survive a disaster [1,27,29]. The level of development of a country also affects disaster vulnerability. Geale states in "The ethics of disaster management" that those groups that are already vulnerable, e.g. children, women and impoverished groups become more susceptible to exploitation and abuse [22]. Those groups need extra protection after disasters [30]. In general it is considered unethical to do experiments with vulnerable groups.

So, is it ethical to test with self-built solutions involving low-income groups of victims of a natural disaster? Since it is research it is always a possibility that the experiment does not have positive results for the people. Is it acceptable that an experiment like this fails? And whose responsibility is it if the support-tool appears not to have positive results? If for example an aid solution fails, who is liable and who will give guarantees? In addition, there is a difference between not improving the situation and even making it worse for them. What are the exact risks? A risk analysis could be helpful while setting up experiments. As defined by Geale, it is fundamental that the benefits for the participants outweigh the physical, emotional and social risks [22]. It is mandatory to consider the potential effect of the research on participants [22]. The accuracy of prediction of human behaviour in disasters that way influences test results [31]. It should be questioned which vulnerable populations are able to make capacitated and voluntary decisions [32].

Due to the vulnerability of affected populations and the chaos in disaster situations, research should be limited to research that cannot be conducted under non-disaster conditions [20].

There is a wide-ranging agreement that disaster research is needed [22,33]. Geale and Rosenstein state that, the researcher needs to balance the critical need for research with the ethical obligation of respect of the interest of the research participants, especially in situations where participants are under the exceptional stresses found in a disaster [22]. Knowing that, how can vulnerable survivors be protected in the planning of post-disaster research?

2.2 Planning Post-Disaster Research

Given the choice between an experimental support-tool and their current support practice, a working method that has been tried and tested would always be preferred by humanitarian organisations above experiments. Therefore new innovations should be first developed and tested in a carefully

selected and simulated situation of a disaster situation before humanitarian organisations would apply them. In general simulating a disaster situation would be the best option. But is it possible to regimen a disaster situation and have reliable tests? Before preparing a simulation at least a good understanding of the influencing factors on the success of the support-tool is needed. Various iterative simulations can than provide more insight in the functioning of the support-tool. This way most tests are done with less vulnerable groups [13]. A final showcase of the support-tool, developed for this doctoral research, would be ideally planned after two years of preparation and simulation. Selecting the final a case study situation is an important dilemma.

First of all, it is hard to say which type of natural disaster will occur, and when or where it will occur. The great variety of natural disasters makes it complex to prepare experiments. Besides that, the context differs not only by the type of disaster but also by the political, economic, social and cultural circumstances. Therefore defining a clear scope, but leaving possibilities open, increases the chance of finding a suitable test situation. According to Cisin and Clarck the challenge of disaster research is the lack of time [34]. They name among others; the lack of time between occurrence of the disaster and field research, the lack of time to develop research instruments, the lack of time to even decide which event is worth studying. Because of the unpredictability not every step can be planned in advance and not every step will have a successful outcome. As judged by the standpoint of 'good research' this might lead to inferior products [34].

There is always a possibility that no disaster will occur at all within the research period that suits the preparation. Also, it is possible that a disaster occurs too early in the research period. What way to anticipate in the research planning on these two scenarios? It might not be feasible to test in a real life disaster situation within a fixed period. But imagine a solution is found to incorporate these two scenarios in the planning another question arises. How can research participants be selected just after the disaster occurred?

2.3 Target Group

There is an ethical aspect of selecting a case study where a natural disaster is likely to occur. As there is an intention to assist, there is a responsibility of carefully selecting a target group. Who to assist? And since a reference group is necessary to compare the results the support-tool with, the question is also; who not to assist? And what is the reference group provided with? And is what they are provided with also acceptable considering the difficult situation they are in?

But how should a group be selected for the experiment by the researcher? Randomly or on their ability to survive the experiment and lead to positive research results? It is doubtful that the researcher should be the one to decide. Most disaster research could be defended by stating that more people are helped with the results of the research that could be harmed in experiments [27]. Each person is obliged to consider the greater good rather than their own self-interest [22]. On the other hand it is a question of social justice that argues that every person should have the same amount of liberty [27]. If a group is selected to assist, are they willing to participate in research and do they have a choice? The existence of liberty to make voluntary choices of research participants in post-disaster situations could be questioned. So who has the power to decide that a certain group should be part of an experiment? Collaboration with parties that are experienced in making those decisions is desired to discuss ethical issues.

2.4 Research Collaboration

Because research collaborations appear to be crucial it is necessary to have insight in the stakeholders within post-disaster recovery. That way possibilities for collaboration can be explored.

Although self-building appears to be a solution for recovery, testing this has its downside. In this case using self-building as a strategy could be misinterpreted by humanitarian organisations as not assisting at all, since no material but only knowledge is given. The question could be misunderstood as where not to help, instead of where to help?

Since this research concerns an experimental support-tool, involvement of humanitarian organisations until the final test phase is needed. It could be of big influence on the research results if a humanitarian organisation withdraws their collaborations on the last moments because of ethical doubts. This might cause the experiments not to be executed. Partners that are convinced of the potential of the support-tool are crucial in order to execute experiments in real life situations. Therefore, it might be dangerous for the research to depend on external collaborations. Especially when these parties have to make decisions, on the lives of people, under extreme stress. However, humanitarian organisations are experienced in making such decisions. By collaborating the ethical responsibility is checked not only by the researcher but also by field experts. On the other hand universities ask for a clearly defined research plan. Universities need to be willing to make the experiment result dependent on the collaboration with humanitarian organizations.

Besides that, in the humanitarian sector it is not quite clear who the customer is. It could be the donor (the one who pays), the humanitarian sector (the one who purchases a shelter), or even the beneficiary [13]. Remarkably, in the shelter industry the consumer is not involved in the supply chain at all, which is, for example, comparable to the building industry but different in other industries such as product development [13].

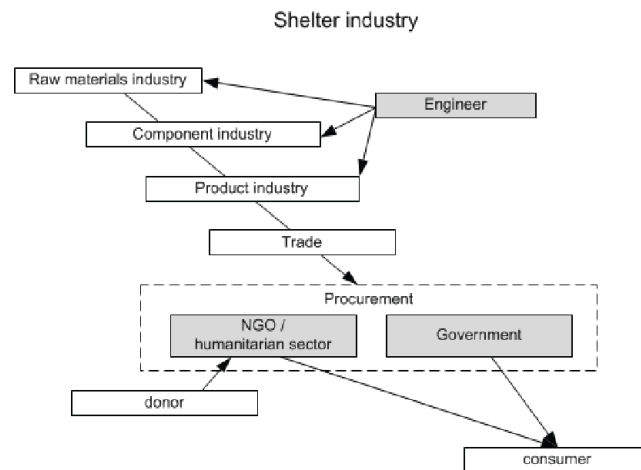


Figure 1: Shelter industry [13]

Although practitioners and researchers do their best to improve the disaster situation, they are not always by power to make decisions. Local governments in some cases make decisions which could obstruct the research process [10]. Therefore, collaboration with the local government and the local population is needed. Both should be willing to cooperate. But how can local partners be contacted for an unscheduled event? The described difficulties concerning collaboration on post-disaster research among others, cause a lack of shelter innovation.

2.5 Shelter Innovation

De Haas et al, describe why (shelter) innovation in the humanitarian sector is scarce [13]. In general humanitarian organisations like to be involved in innovation research. They believe open source information sharing will enable them to help the customer even better. By sharing knowledge with the private sector and academia, new products can be fine-tuned [13]. However,

sharing knowledge also has its downside. Money and time invested in the development of an innovative product could allow other developers to benefit. This makes the shelter industry a complex sector to invest in when you compare it for example with the building industry [13]. This is one of the reasons that sharing experience and ideas between practitioners, donor governments, academics and the private sector is at best periodical and at worst ad hoc [33].

Initiatives have been developed to overcome this downside. One example are developments to improve humanitarian shelter solutions through enhanced technical research and innovation for and together with the IFRC, the Dutch Red Cross, UNHCR and MSF mainly executed by the Eindhoven University of Technology (TU/e) [13]. Besides that, an EU funded 4 year collaborative innovation project S(P)EEDKITS is currently on-going. Here academia, humanitarian sector and industry work together in the development of disaster relief items and therefore learning from each others systems procedures and principles. The developed shelter solutions are also demonstrated in field disaster situations.

The shelter industry prefers to test everything before field application. Humanitarian aid organisations prefer a tool that is proven to work situation independent, location independent, disaster/war independent, customer independent and should fit the term “one-size fits all”[13]. This way they try to protect disaster survivors. Therefore, humanitarian organisations will often start limiting their risk by removing new features and innovations [13]. Execution of experiments in practice is clearly essential. And collaboration with humanitarian organisations is one of the conditions to make innovations into a success. However, humanitarian organisations have to deal with conditions on how to spend their money. This prevents them from financing collaborations on innovation.

Emergency based humanitarian organisations have reason to fail combining emergency relief with long-term recovery activities. The humanitarian sector largely depends on donor resources and the help of the affected population [13]. Most of the money is allocated or earmarked, leaving more for emergency needs and less for permanent approaches, even when the situation asks for permanent solutions[10]. The donor and governments do not prioritize long-term shelter needs [33]. Direct relief is mostly preferred, even though survivors would enjoy more benefits with long-term solutions [13]. What is justice? Should money be invested for long-term improvements if this affects the availability of direct help? The optimal functioning of innovation within the shelter sector is troubled by the demand driven, and not people centred, character of the sector [33].

The allocation of money mostly implies an obligation to help a specific defined amount of people as promised to the donor. Consequently, the amount of money available per survivor is fixed [13]. To satisfy donors, costs per person have to be minimal and therefore it is possible that shelters are selected that have a lifetime of only 3 months instead of 12 months or more, just to serve the promised amount of people [13]. Although these tents are meant to last only for the first 3 months, they are likely to be used for years [13,35].

The allocated money also prevents investment in process or product innovation. This is one of the reasons why shelter innovation in the humanitarian sector is scarce [13]. There is a lack of emphasis on formal learning within the shelter industry [33]. Besides that, the lack of innovation is partly caused by the people purchasing aid solutions in the name of the humanitarian organisations, having a lack of knowledge on the innovative new products that are available [13,33].

Next to that, funding could be distributed on various manners. One way is according to economic impact. This means that the relatively rich, which suffered greater loss in material, would benefit more than those who suffered less material loss [36]. This would contribute to restoring the situation before the disaster. Another way is distributing funding according to actual need. In this case aid is distributed according to those without support [22], the mainly poor population. The question is what is fairness and what is justice in situations like these?

A major research gap is describing how the media-driven, supply-driven humanitarian sector could change in order to be more responsive to the needs of the disaster-affected population while garnering sufficient resources beyond the media timeline for disasters [10]. If all the previous discussed issues are covered experiments can be prepared. This also involves some considerations.

Suppose that, by the time any kind of experiments can take place, the developed support-tool shows clear potential to contribute to the lives of the target group. It would then be ideal to monitor a control group before the disaster occurs to exclude as many factors as possible. The support-tool ideally should function independently from variables such as education level, income, culture or politics. For this part of the research a quasi-experimental

design is needed. As Campbell explains because it is appropriate to provide answers to Research Questions [37]. Quarantelli elaborates on the separate roles of laboratory and field studies [38]. The aim of using the quasi-experiments is to define key-components for real-life experiments with less

vulnerable groups. Quasi experiments could be used to exclude as many influencing factors as possible to measure purely the influence of the support-tool. These quasi-experiments allow focusing the research, by only studying a selection of aspects, and excluding other variables, and comparing different actors using the tool in simulated situations [37]. Quasi-experiments are also needed to prevent a shortage of test situations for the final experiments to be analysed and compared.

Observations or events are not only influenced by what can be seen but also by underlying patterns, structures and mental models. These can include cultural aspects such as beliefs, values and assumptions [39]. A taboo such as that women should not work in construction, or a superstition such that ghost live in niches in buildings as is believed in for example Haiti could influence test results. The way the support-tool is observed and used might be affected by underlying assumptions and trouble drawing conclusions.

In order to see if the support-tool really has a positive effect a similar group should be monitored at the same time and under the same circumstances. In a post-disaster situation this is hard to guarantee. Especially in a highly dense urban context, in a chaotic situation it is hard to find a similar group. Next to that, at very short notice two groups need to be selected. In an ideal research set-up, the other group would not be helped at all or on the same support-tool as normal. Not helping a group would be practically impossible. After a disaster many organisations arrive and it would not be ethical or possible to forbid helping.

One of the goals of this case study research is to enable participants to learn how to build. This means enabling an understanding of constructive risks and the construction process. It is crucial to evaluate the learning process. This could be done by comparing the ability to build before providing knowledge and after. Since it is difficult to measure before the disaster, because of insecurity of where the disaster will exactly occur, another strategy should be applied. The learning process could for example be provided to a group with minimal knowledge on constructive risks and the building process. In most cases this would be young adults or women.

Since various aid organisations arrive after a disaster, it is almost impossible to have a reference group that is not being assisted at all. So, if one group is provided with the new support-tool and the other group with the standard aid procedure this could be compared. For comparison monitoring the process of both groups is needed. But how can the researcher only be observing the recovery process of the disaster victims and not influence or help at all? This would be a hard job. Using cameras could be an option, although this might

harm the privacy of the disaster survivors. Besides that, using cameras creates dependence on electricity and they are in danger of getting stolen.

In addition, the two test situations should not influence each other. If the two groups are in the same city there is always a possibility of external influence. To minimise the influence, quasi-experiments done beforehand could serve to isolate as many variables as possible. Collaboration with a humanitarian organisation that uses the new and the old strategy in parallel would practically and ethically be the most convenient and realistic.

Another aspect of the preparation of the experiments is the role of the actors involved in the experiments, the researcher and or the building professional. The close involvement of the researcher as knowledge provider in the experiments might influence the test results and make them less reliable. Therefore it would be better if an independent building professional would provide the knowledge. But also in this case there is a danger of close collaboration with this professional that could make test results less reliable. The question is, if this should be a local building professional, a professional of a humanitarian organisation or some other.

Besides that, data collection is often complicated as there is intense time and resources pressure and often security concerns [10]. Triangulation of sources is sometimes used afterwards to complete the data needed. However, care is needed in interpreting data from different sources and material that might not have been obtained through direct fieldwork [10]. Consistency across case studies that make the results of the disaster research comparable might be an unachievable ideal. In a real life context, such as a humanitarian disaster, having control over the events and identification of the variables ahead of time is unrealistic [10].

Taking into account the limited time for the research, it will only be feasible to do one semi-final test. The support-tool might appear to be successful or it might not be. The question remaining will be what can be concluded based on only one single real life test case.

3. METHODOLOGY DESIGN

The previous discussion on; protection vulnerable survivors and research participants, finding a way to plan and prepare experiments together with stakeholders, all together provide input to design a methodology. What makes disaster research unique are not the methods but the circumstances in which methods are employed [40]. These disaster circumstances affect human behaviour and that way special methodological problems originate [41]. Here,

a type of research and methodology are defined for the development of the support-tool. Although the discussion of issues makes clear that more shelter innovation is needed, it does not seem realistic to find a methodology that will simply overcome all the identified research issues.

The main goal of this research is developing a suitable support-tools in practice for post-disaster recovery. Currently, there is not yet enough empirical information on self-building in order to draw conclusions for post-disaster recovery [42]. Moreover, reality and theory do not always correspond. In order to provide evidence that the developed support-tool works in reality it therefore is crucial to execute tests in practice. The type of study is therefore exploring empirical research [43]. This distinguishes the goals to clarify, predict and prescribe[43,44].

For the overall objective it is necessary to uncover prevalent trends in thought and opinion about self-building in post-disaster situations. The appropriate type of research is therefore qualitative because it is to gain an understanding of underlying reasons and motivations of self-builders by means of an open research question [42]. For qualitative empirical research certain types of research methods are required.

For qualitative research the outcomes and conclusions need to be plausible and the procedure transparent [42]. Empirical research requests case study research and iterative design experiments [43]. Iterative steps will lead from an initial support-tool to quasi-experiments to a semi-final support-tool. The results of one iteration are used for the following iteration.

In addition, the support-tool will be designed based on findings in practice. In this case the development of a technical support- tool is therefore a research through design. Research trough design needs a special kind of research framework.

The framework should support design research and development of a support-tool in practice. Methodological issues have been investigated broadly, however, only few of them are applicable for design research related to housing. Most design research engages in a multitude of methods. The authors of Spatial Agency even advises to strive for a combination of methods, which leaves design researchers with the complexity of making individual research outcomes comparable [45]. Furthermore, design research tends to fail in answering to the initial set of research questions due to the lack of connection with the reality. The research framework should enable comparison of the research to other related studies by means of a systematic documentation of the research process. [46] Transparency and the ability of supporting design

research in practice are therefore important characteristics that a research framework should offer.

A suitable research framework is found in the Design Research Methodology (DRM) of Blessing and Chakrabarti [46]. DRM provides a research framework that is not only transparent but incorporates an iterative process in steps with various feedback opportunities. DRM provides a framework for design research that allows the needed variety of research approaches and methods [46]. DRM enables transparency of the research process and a solid line of argumentation by providing guidelines for systematic planning of the research [46]. Design research becomes comparable on the different research stages and on the research approach [46]. This framework also encourages reflections on the applied approach [46]. These characteristics mean that DRM is found to be the appropriate framework for this research.

DRM consists of four stages; Research Clarification, Descriptive study I, Prescriptive study, Descriptive Study II [46]. Every stage is supported with its own methods, which match the desired outcomes of the stage. The different research methods, as defined in research strategies, can be linked to the stages of DRM (Figure 2). Transparency, flexibility in methods, comparability and the suitability for design research in practice make DRM into a suitable research framework for this research.

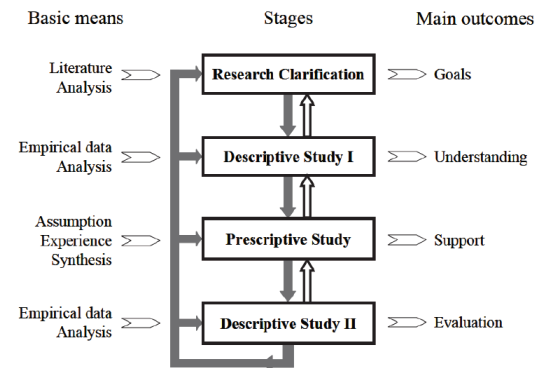


Figure 2: Support-tool research framework [46]

3.3 Research Strategy

The DRM could be used various ways. For this research we have chosen to use the fourth option, leading from two review-based studies to two comprehensive studies (Figure 3). Methodological triangulation will be used, combining a variety of research methods to give an answer to the research question. The discussion on practical and ethical issues forms the basis for the selection of methods for each research stage.

Research Clarification	Descriptive Study I	Prescriptive Study	Descriptive Study II
1. Review-based	→ Comprehensive		
2. Review-based	→ Comprehensive	→ Initial	
3. Review-based	→ Review-based	→ Comprehensive	→ Initial
4. Review-based	→ Review-based	→ Review-based Initial/ Comprehensive	→ Comprehensive
5. Review-based	→ Comprehensive	→ Comprehensive	→ Initial
6. Review-based	→ Review-based	→ Comprehensive	→ Comprehensive
7. Review-based	→ Comprehensive	→ Comprehensive	→ Comprehensive

Figure 3: Types of design research project [46]

A review-based literature review is the main part of the Research Clarification and is needed to identify the problem and the corresponding aims. The problem and aims are related to why, what and how. The Research Clarification is to find additional evidence or indications that support the assumptions made in order to formulate a realistic and worthwhile research goal [46]. A literature study is needed to investigate the discrepancy between literature and observations in order to investigate contradictory evidence. Next to that, it enables a learning process on the phenomenon, as it is a topic derived from the needs in a certain situation. Theoretical triangulation will be used, regarding the topic from different specialisms such as social theory, management theory and design theory.

The research starts with a descriptive literature review exploring the state-of-the-art knowledge on self-building tools for post-disaster situations. The focus will be on support-tools that use transference of knowledge to increase understanding of structural risks and the building process. Next to it, possible support-tools are compared and a group of support-tools are selected for further investigation. The state-of-the-art knowledge on the influencing factors

related to this support-tool is reviewed. This way the criteria for successful outcomes become clear, and the way influencing factors can be measured.

After finalising a literature review, a survey will be held under experts, who work with self-builders or in post-disaster situations. Based on their feedback a research method will be selected to evaluate the findings in the literature.

For the Descriptive Study I, a review-based case study research is executed by means of a case study analysis, distilling best practices from an analysis of case studies in literature, and later on in practice, to test external validity. The selected examples in practice are executed with the grounded theory, ensuring no influencing factors are missed that might not have been considered in the literature. By selecting cases on a-select basis the variables not regarded are negligible. Nevertheless, a check on the representativeness of the response method is needed.

Consequently, for the Prescriptive Study, the influencing factors are comprehensively tested in a defined situation with quasi-experiments as described before. For these experiments collaboration with humanitarian organisations is sought. The quasi-experiments are executed in simulated conditions first in the Netherlands and later in a developing country. Research participants are selected with minimal building knowledge, most probably women or low-educated. Based on the previous phases a method will be selected to measure the effect of the implementation of the knowledge-based support-tool for self-recovery. In this research the support-tool is used as a moderator variable. This is a qualitative or quantitative variable able to affect the strength of the relation between an independent and a dependent variable and/ or the direction between those [47]. Both direct and indirect observations will be analysed and related with support of a conceptual framework.

Finally, for the Descriptive Study II, the results of quasi-experiments are the basis for the iterative design process where the hypothesis, support-tool, is tested. This is done by comprehensive experiments in a developed case study on heuristic basis, action research.

It is expected that the tool can be tested no more than two times and only in one specific context. This implies that it is only possible to prove it functions in this context and it can only be made plausible to function in a similar context. Besides that, due to the four-year research period no long-term effects, like the increase of self-reliance of households, can be measured. Further research will be necessary in order to prove its generic functioning. Based on the discussion of practical and ethical issues in post-disaster research some general conclusions can be drawn.

4. CONCLUSIONS

The main goal of this paper is to discuss the practical and ethical issues in post-disaster research related to the development of one specific support-tool. These considerations form the basis to define a research type and methodology for the development of a support-tool. All disaster research activity should be balanced with the ethical responsibility to protect vulnerable disaster survivors. Only vulnerable groups that are still able to make voluntary decisions should take part in research. They should not be selected only by the researcher but in close collaboration with an experienced humanitarian organisation. Finding collaboration with a humanitarian organisation that is willing and able to invest in long-term shelter solutions, and which is convinced of the potential of self-recovery, is essential for field experiments. The risk is that the necessity of collaboration makes the research dependent on external parties. Preparing experiments and finding local collaboration is difficult because of the unpredictable character of disasters. Preparation and development of the support-tool can be enabled by literature research, case study comparison and consultation of field and academic experts. Afterwards by means of quasi-experiments, in which less vulnerable groups collaborate, an increased understanding of influencing variables of the support-tool can be realised. Unfortunately, it is not realistic to incorporate a final-test in a disaster situation within a limited four-year research period, because of the unpredictable occurrence of disasters. A suitable framework for this design research is found in the DRM in which all methods can be combined and made transparent for comparison with other research.

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