The multi-dimensionality of decisions on energetic refurbishment: Results of a qualitative study covering different types of property owners

Dr. Ina Renz
Institute for Housing and Environment (IWU)
Rheinstr. 65
64295 Darmstadt
Germany
i.renz@iwu.de

Ulrike Hacke
Institute for Housing and Environment (IWU)
Rheinstr. 65
64295 Darmstadt
Germany
u.hacke@iwu.de

Keywords

refurbishment, decision-making process, energy efficiency investments, policies and measures, windows of opportunities, qualitative study, barriers, willingness to refurbish, motives

Abstract

In order to achieve European climate targets, there is a strong need to unlock the energy-saving potential lying in the energetic refurbishment of existing buildings. Current research reveals different findings about the relevance of economic and other influencing factors.

This paper describes the key results of a German qualitative study carried out by order of KfW Bankengruppe addressing the question why some property owners decide to refurbish while others don't, with focus on the interplay between different (economic, ecologic, social, personal) arguments.

Based on a sophisticated postal screening in three German cities using a set of a priori defined criteria, 32 private property owners (landlords and owner-occupiers with differing criteria-based characteristics) have been interviewed.

Comparing the arguments of owners who realised refurbishment activities with those who did not, the qualitative content analysis identifies twelve categories of influencing factors. Although those that refurbish and those that decide against refurbishment consider similar aspects, both assess at least some of these aspects differently. Generally, it was found that every decision on refurbishment has two stages – each with specific barriers that are considered and balanced against possible benefits. In stage 1 there are six reasons for refurbishment which lead to an in-depth evaluation in stage 2 constituting the condition for actual (different) refurbishment activities. Otherwise barriers on the first stage discourage property owners from refurbishment activities.

The identified interdependences between a wide range of decision-making factors and barriers suggest that approaches to promote energetic refurbishment of homes should ideally address several financial and non-financial aspects.

Introduction

In order to promote the energy transition towards climate protection and sustainable energy supply, the European Union committed itself to ambitious objectives in energy policy. In Directive 2012/27EU increasing energy efficiency in the existing building stock was fixed as one important pillar showing huge potential for energy savings. According to directive 2010/31EU all new buildings should correspond to low energy performance buildings and with respect to existing buildings national plans have to be developed in order to increase the number of low energy buildings. In December 2014 the German Federal Government adopted the Climate Protection Plan 2020 which aims – regarding the building sector – at a (nearly) climate-neutral building stock by 2050. One major target is to double the energetic modernisation rate of buildings to 2 % per year[1]. In order to support the implementation of these aims, different national policy instruments have been further elaborated within the Action Programme for Climate Protection 2020 and the Climate

1. For more information see website of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety: http://www.bmub.bund.de/themen/klima-energie/energieeffizienz/kurzinfo/ (last access: January 2017).

Protection Plan 2050[2]. Such measures comprise national laws and regulations aiming to reinforce the application of renewable energies (Renewable Energy Sources Act) or regulate efficiency requirements in the building sector (Energy Saving Ordinance), the extension of energy consulting programmes and different funding programmes for efficiency investments (e.g. incentives for energetic refurbishment, replacement of heating systems and expansion of renewables, energy-efficient construction of buildings).

One of the most comprehensive funding systems consists of the KfW-funding programmes for energy-efficient construction and refurbishment which are financed by the German Federal Government's CO_2 Building Refurbishment Programme with a volume of €2 billion annually by 2018.[3] The prominent role of KfW programmes is also shown by the fact that 80 % of residential buildings with funding for thermal insulation measures between 2005 and 2009 have been funded by KfW (Diefenbach et al. 2013: 9[4])[5].

However, the currently still low rate of building refurbishment in Germany (see Simons 2012: 42)[6] leads to the assumption that not only financial, but predominantly non-financial arguments influence decisions on energetic refurbishment. However, the specific and comprehensive decision-making processes of building owners have been hardly investigated in scientific studies so far.

There are a few studies that aim at identifying single determinants of the realisation of energetic refurbishment focusing on socio-structural or building-related characteristics (Beillan 2011[7], Cirman et al. 2011[8], Diefenbach et al. 2010[9]), that take into account the influence of lifestyles (Gröger et al. 2011[10]) or specific individual motives and obstacles (Jahnke/Verhoog 2012[11], Jarnehammar et al. 2009[12], Matschoss et al. 2013[13], Saner et al. 2012[14]). A further research strand focuses on the willingness to pay for energetic building refurbishment by means of discrete choice tasks (Achtnicht/Madlener 2012[15]). However, all these studies do not consider influencing factors in their entirety. Although some qualitative research studies focus on the specific decision-making situation they show divergent findings about the relevance of economic and other influencing factors (e.g. attitudes, expectations, fears). This is mainly due to their different methodological designs (e.g. narrow/selective target groups) or little differentiated analyses (Stieß et al. 2009[16], Albrecht et al. 2010[17], Gossen/Nischan 2014[18]).

Consequently, existing studies reveal little knowledge about the interplay between the comprehensive individual influencing factors that are relevant for property owners *who do* refurbishments *and* those *who do not*, and these studies do not account for comprehensive barriers and motives.

This is where the present study starts addressing the question why some property owners decide to refurbish while others do not with a focus on the interplay between economic, ecologic, social and personal arguments. Following a qualitative research design, the study aims to capture the comprehensive decision making process covering all arguments that are relevant from the point of view of 32 private property owners that have been interviewed about their personal decision processes. It shows the motives and barriers as well as considerations between decision-making factors which serve as a basis for further development of instruments for increasing the rate of building refurbishment.

2. See website of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety: http://www.bmub.bund.de/themen/klima-energie/klimaschutz/klima-klimaschutz-download/artikel/klimaschutzplan-2050/?tx_ttnews%5BbackPid%5D=3915 (last access: January 2017).

3. See website of the Federal Ministry for Economic Affairs and Energy: https://www.bmwi.de/DE/Themen/ Energie/Energiewende-im-Gebaeudebereich/kfw-programme.html (last access: January 2017).

4. Diefenbach, Nikolaus et al. (2013): Monitoring der KfW-Programme „Energieeffizient Sanieren" und „Energieeffizient Bauen" 2012: http://www.iwu.de/fileadmin/user_upload/dateien/energie/KfW_Monitoringbericht_fuer_2012.pdf (last access: January 2017).

5. Diefenbach, Nikolaus et al. (2013, corrected version 2014): Gutachten Monitoring der KfW-Programme „Energieeffizient Sanieren" und „Energieeffizient Bauen" 2012. Online-Publikation: http://www.iwu.de/ fileadmin/user_upload/dateien/energie/KfW_Monitoringbericht_fuer_2012.pdf (last access: 17.12.2015).

6. Simons, Harald (2012): Energetische Sanierung von Ein- und Zweifamilienhäusern. Energetischer Zustand, Sanierungsfortschritte und politische Instrumente. Berlin: http://www.bausparkassen.de/fileadmin/user_upload/ pdf_service/empirica_Energetische_Sanierung.pdf (last access: January 2017).

7. Beillan, Véronique et al. (2011): Barriers and drivers to energy-efficient renovation in the residential sector. Empirical findings from five European countries, in Conference Proceedings of the eceee Summer Study 2011, 1083-1093: http://proceedings.eceee.org/visabstrakt.php?event=1&doc=5-072-11 (last access: January 2017).

8. Cirman, Andreja et al. (2011): What determines building renovation decisions? The case of Slovenia. Enhcr Conference 5–8 July 2011, Toulouse.

9. Diefenbach, Nikolaus et al. (2010): Datenbasis Gebäudebestand. Datenerhebung zur energetischen Qualität und zu den Modernisierungstrends im deutschen Wohngebäudebestand. Institut Wohnen und Umwelt: http://datenbasis.iwu.de/dl/Endbericht_Datenbasis.pdf (last access: January 2017).

10. Gröger, Maria et al. (2011): Lifestyles and Their Impact on Energy-Related Investment Decisions. In: Low Carbon Economy, 2, 107–114.

11. Jahnke, Katy; Verhoog, Mart (2012): Gebäudemodernisierung. Maßnahmen, Motivationen und Hemmnisse. Trendreport Energie 3: co2online: http://www.co2online.de/service/publikationen/trendreport-energie/ modernisierung-motivation-und-hemmnisse/ (last access: January 2017).

12. Jarnehammar, Anna et al. (2009): Barriers and possibilities for a more energy efficient construction sector. Secure Project: http://www.academia.edu/18416089/Barriers_and_possibilities_for_a_more_energy_efficient_construction_sector (last access: January 2017).

13. Matschoss, Kaisa et al. (2013): Energy renovations of EU multifamily buildings: Do current policies target the real problem? In: Conference Proceedings of the ECEEE Summer Study 2013, 1485-1496: http://proceedings.eceee.org/visabstrakt.php?event=3&doc=5B-235-13 (last access: January 2017).

14. Saner et al. (2012): Why some Homeowners energetically renovate and others do not - The Case of Herisau (AR). NSSI Working paper 47. ETH Zürich.

15. Achtnicht, Martin; Madlener, Reinhard (2012): Factors Influencing German House Owners' Preferences on Energy Retrofits. Aachen. FCN Working Paper 4/2012: https://www.eonerc.rwth-aachen.de/global/ show_document.asp?id=aaaaaaaaaagvvua (last access: January 2017).

16. Stieß, Immanuel et al. (2009): Making the home consumer less – putting energy efficiency on the refurbishment agenda. In: Conference Proceedings of the eceee Summer Study 2009, 1821–1828: http://www.eceee.org/ library/conference_proceedings/eceee_Summer_Studies/2009/Panel_8/8.256/paper (last access: January 2017).

17. Albrecht, Tanja et al. (2010): Zum Sanieren motivieren: Eigenheimbesitzer zielgerichtet für eine energetische Sanierung gewinnen. Projektverbund ENEF-Haus: http://www.enef-haus.de/fileadmin/ENEFH/redaktion/PDF/ Zum_Sanieren_Motivieren.pdf (last access: January 2017).

18. Gossen, Maike; Nischan, Carolin (2014): Regionale Differenzen in der Wahrnehmung von energetischen Sanierungen. Ergebnisse einer qualitativen Befragung von privaten GebäudeeigentümerInnen zu energetischer Sanierung in zwei unterschiedlichen Regionen. Gebäude-Energiewende, Arbeitspapier 1. Berlin: http://www.projekte.iw.undko.de/data/gebEner/user_upload/Dateien/GEW_AP1_Ergebnisbericht_Interviews_final_141126.pdf (last access: January 2017).

Design of the study

The study followed a qualitative research approach. 32 private property owners were asked for participation in semi-structured interviews. To reveal all factors affecting their decision, the interviewees were taken through a detailed reconstruction of their decision situations and all relevant steps in their decision making process. This approach ensures that respondents are not restricted to single topics, but can mention every thought and argument that was important from their point of view.

TARGET GROUPS AND SELECTION OF RESPONDENTS

In order to elaborate barriers and motives related to energetic refurbishment measures one important requirement consisted in addressing property owners *who did* refurbishment *and* owners *who did not*. Furthermore the study aimed at differences between different types of property owners (e.g. landlords, owner-occupiers) with different socio-demographic characteristics. Last but not least, it was important to restrict the target group to respondents who are owners of buildings with a general need of renovation. In this regard the study concentrated on buildings that have been constructed before the first German Thermal Insulation Ordinance (construction date before 1979).

All these requirements made it necessary to apply a sophisticated approach to selecting respondents in order to address an unbiased pool of property owners.

The study applied a two-level approach following the principle of criteria-based contrasting:

On the first level three German cities have been selected according to socio-spatial characteristics (housing market characteristics, fluctuation, population structure) contrasting especially growing and shrinking cities of comparable size.

On the second level, respondents have been selected according to the typology of property owners. That was realised based on a screening conducted by means of an address inquiry ("Adressmittlungsverfahren") in cooperation with the local administration of the 3 cities. This specific procedure is most suitable for ensuring data privacy.

The screening questionnaire contained all relevant criteria for respondent selection (e.g. realised/rejected refurbishment activities, kind of ownership and building use, socio-demographic information, building characteristics). Furthermore respondents were asked for their consent to take part in the face to face interviews – and in this case – to fill in contact information.

In total, the three cities sent screening questionnaires to 714 property owners. Thereof 180 questionnaires returned to Institute for Housing and Environment (IWU) (25 %) and 71 property owners gave their consent to participate in the semi-structured interviews. Thereof 32 property owners have been selected based on the information given in the screening questionnaire (contrasting principle; see below).

PREPARATION AND CONDUCTION OF SEMI-STRUCTURED INTERVIEWS

The semi-structured interviews have been conducted by means of interview guidelines that ensure to ask all relevant main topics and to collect comparable information, but at the same time assure that the respondent is not restricted in his opinions and is able to raise specific themes that are relevant from the respondents' point of view. The guidelines covered the following main topics:

1. Introduction: information about the aim of the study, the procedure/way of interview conduction and the use of data and anonymity, ask for consent to record the conversation.
2. Initial situation – occasion and decision-making background: personal background, building characteristics, further objective and subjective contexts, triggers for considerations about refurbishment actions, targets with the property (e.g. retirement security, heritage for children), personal attitudes.
3. Stages of decision making process: important stages and steps of decision-making (e.g. previous knowledge, information gathering and processing, consulting, negotiation processes, specific planning, perception and role of funding).
4. Weighing of influencing factors – difficulties/concerns and advantages: uncertainties, perception of risks and barriers; benefits; consideration of information (and their sources) and attitudes; main motivations/barriers; consolidation of specific topics mentioned before.
5. Conclusive perceptions – satisfaction with refurbishment activities and final overall assessment: summarising aspects about experiences and satisfaction with realised activities, overcoming barriers; prospective activities/further planning, potential for improvements; further important topics from view of respondent.

Table 1. Characteristics of the selected cities.

	Heidelberg	Fürth (Bavaria)	Herne
Inhabitants[1]	148,415	116,640	154,887
Growing/shrinking[2]	strongly growing	growing	shrinking
Rent level[3]	high (level 5)	medium (level 3)	low (level 2)
Unemployment rate[4]	5,1 %	6,1 %	12,6 %
Energy-efficiency rent index	available	not available	available

Sources: [1] Federal Statistical Office, as at 2011 (based on the Census 2011); [2] Interactive map of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) to growing and shrinking cities and municipalities (as at 2012): http://www.bbsr.bund.de/BBSR/DE/Raumbeobachtung/InteraktiveAnwendungen/WachsendSchrumpfend/ wachsend_schrumpfend_node.html; [3] Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB); Rent levels divided into level 1 (most favourable rents) to level 6 (most expensive rents) as at 2012; [4] Federal Agency for Employment, as at October 2015.

The interview guidelines have been slightly adapted according to different owner types (e.g. owner occupants and private landlords) based on the previous knowledge based on existing studies and based on the screening.

The interviews have been mainly conducted face-to-face and had a duration between 40 minutes and 1 ½ hours.

INTERVIEW ANALYSIS

The analysis of the interviews followed the approach of qualitative content analysis (Gläser/Laudel 2006[19]) and was realised with the help of the software MAXQDA 11 based on the completely transcribed interviews. The analysis comprises 3 steps:

1. Extraction: all relevant text passages have been allocated to a priori defined code system; code-memos ensured code definitions and allocation rules.
2. Processing: systematization and differentiation of the categories based on the assigned passages. In this step, passages have been moved to sub-categories.
3. Evaluation/Analysis: analysis of the assigned passages with comparisons of owner types.

The extraction was realised by several persons and each interview has been extracted by at least two persons. The results have been compared with help of the MAXQDA teamwork function. In doing so, inter-coder-reliability is ensured. The a priori defined code system comprised seven main codes (in some cases with several sub-codes): decision-making background, knowledge/perception/attitudes, actors/information sources, considerations/relevant influencing factors, experiences during implementation, funding instruments, conclusions. The evaluation was realised by means of several MAXQDA retrieval functions which allow visualising passages of selected codes for different text groups (e.g. owner types).

Description of the survey sample

Figures 1–4 provide an overview on the typology of the surveyed property owners.

As planned, half of the respondents are owners of single- or two-family houses; the other half owns a multi-family house. Approximately 2/3 of respondents are owner-occupiers with seven persons of them letting one or several flats in their building and 1/3 of respondents are private landlords (see Figure 1). These relations basically correspond to the sample of persons who gave their consent to participate in the interviews.

The distinction of property owners who did energetic refurbishment measures and who did not was another important point for analysing arguments for and against the implementation of energetic refurbishment measures. This distinction was based on the screening question about (un-)realised measures. Persons who were willing to take part in the interviews, but stated in the screening that they did not (yet) think about implementing refurbishment measures[20] (n = 9) or stated that *all* measures have been implemented by a previous property owner (n = 2) or did not answer the question (n = 3) have not been selected as respondents.

As the screening showed that the property owners not always corresponded to ideal-typical types of doing or not doing refurbishment measures, the following 4 types of refurbishment status have been distinguished:

1. **Persons who realised refurbishment measures.** This group realised extensive measures (during the approximately previous 5 years). All persons did insulation measures of the building envelope and most of them additionally renewed the heating system and the windows. In some cases solar thermal or photovoltaic systems have been installed.
2. **Persons who did not realise refurbishment measures**. This group represents the opposite of the above-mentioned type. All of the interviewees seriously have been thinking about insulation measures, but finally decided against it. The replacement of the heating systems and/or of some windows was realised either by the previous property owner or many years ago.
3. **Persons who tend to realise refurbishment measures**. This group represents one of two so-called "mixed types" and have at least renewed the windows and the heating system or are about to plan these measures. However, they are sceptical toward insulation measures.
4. **Persons who tend to not realise refurbishment measures.** This group carried out renewals of windows or the heating system on a small scale only (e.g. single windows). Technical installations or insulation measures are not an issue for them.

As shown in Figure 2, half of the respondents represent persons who realised refurbishment measures on a large scale. The remaining half contains property owners who did not realise refurbishment or who belong to the mixed types. As insulation measures are of major importance with respect to refurbishment activities, persons of group 2, 3 and 4 (persons not realising refurbishment and persons who belong to mixed types) have been considered as one group during analysis and have been compared to the first group (realising refurbishment including insulation measures). This is also considered as appropriate approach, because mixed types are much more sceptical toward insulation measures than persons belonging to the first group.

When selecting the respondents, it was also important to have different types of household in the interview sample: people at or close to retirement age as well as families with children and childless couples or singles (see Figure 3).

Furthermore, different building age classes are represented in the sample of respondents (Figure 4). Especially single- and two-family-houses have a certain spread related to their year of construction, of which two third (n = 10) have been constructed between the 1930s and 1960s. The majority of multi-family houses have been constructed before 1919. Among them there are half-timbered houses from the 17th to 19th century. In total, ten buildings are partly under monumental protection.

19. Gläser, Jochen; Laudel, Grit (2006): Experteninterviews und qualitative Inhaltsanalyse. Wiesbaden: VS Verlag für Sozialwissenschaften.

20. The respondents should have dealt extensively with the topic during the previous 5 years.

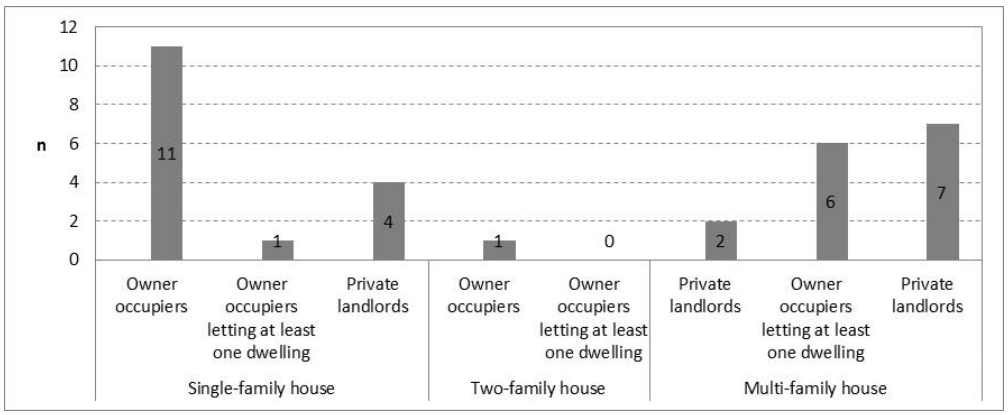

Figure 1. Number of respondents related to type of building use and building type.

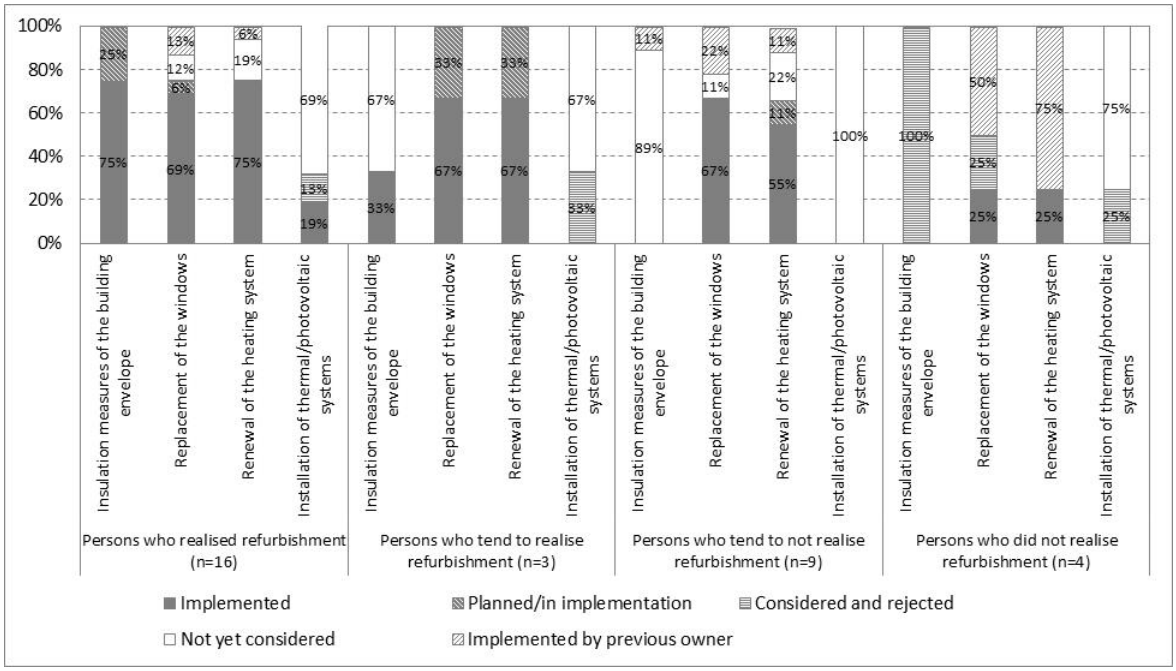

Figure 2. Respondents related to type of refurbishment status and implemented measures.

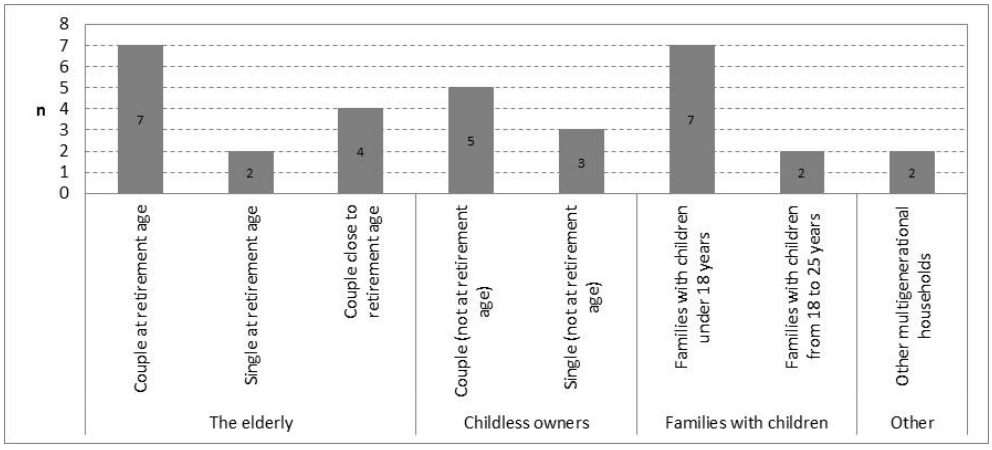

Figure 3. Number of respondents related to type of household.

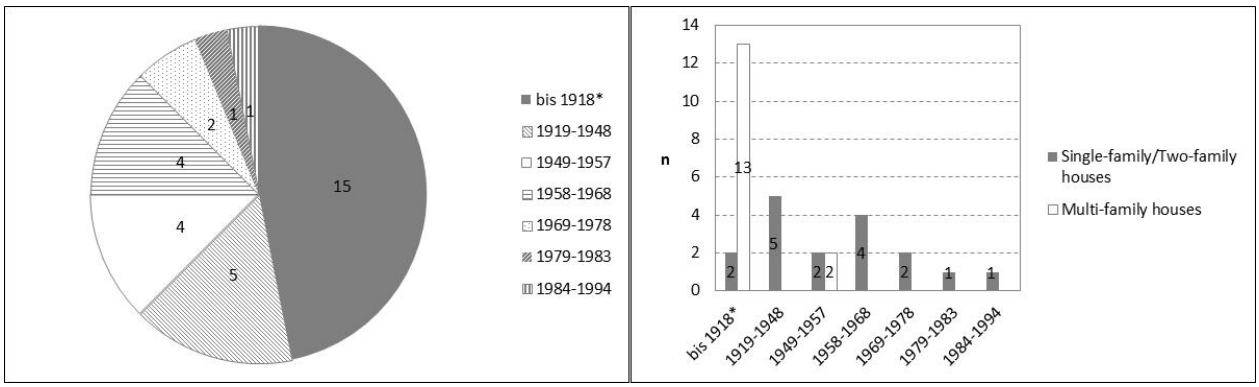

Figure 4. Respondents related to building age class and building type.

Main results of the interviews

The interviews show that every decision on energetic refurbishment measures is different and unique. However, the main findings can be summarised in 4 propositions describing decision making processes.

1. DECISIONS ON REFURBISHMENT DEPEND ON THE INDIVIDUAL BACKGROUNDS OF OWNERS

The individual backgrounds of property owners and circumstances related to their buildings are important point for the fact whether and in which way the owner deals with decisions about energetic refurbishment measures. The contexts are also crucial for the fact which different influencing factors are considered for decision-making and in which way they are assessed and valued.

Individual backgrounds consist of the personal living situation/socio-economic characteristics such as age and household size or family structure of the property owners as well as their financial situation (capital resources or access to leverage). This is strongly related with perceptions of the building condition (energy performance) and urgency of maintenance actions and with the individual goals that are associated with the building in the long term (retirement security, to be out of debt at retirement age, value retention or appreciation, etc.).

One important situation to mention is the use perspective of the building in the long-term related to use purpose and clarity of use purpose. For example owner occupiers who realised refurbishment measures report on the intention to live in the building for a long time or even into old age or they are sure that the building remains family-owned. Private landlords who did refurbishment focus on the return to be generated. If there is no concrete long-term use or purpose, property owners (owner-occupiers and private landlords) do not realise refurbishment on a large scale which then is related to doubts in the profitability of measures or the perception of a good condition of the building. Consequently, decisions on possible measures are transferred to the future.

Furthermore, the date of acquisition of ownership is also important for the decision on refurbishment. A property acquisition dating back not longer than 5 years opens a favourable opportunity window for an energetic retrofit. This is shown by five out of six owners having acquired their homes no longer than 5 years ago who realised refurbishment measures on a large scale.

Last but not least, decisions on refurbishment depend on further individual background conditions such as mechanical and technical skills, previous experiences and existing knowledge, impressions from the environment (especially houses of neighbours with/without successive refurbishment), subjective norms, attitudes and needs.

2. DECISION PROCESSES ARE MULTI-DIMENSIONAL: MANY FACTORS INFLUENCE THE DECISION MAKING PROCESS, BUT NOT EACH FACTOR IS RELEVANT IN EACH SITUATION OR FOR EACH OWNER

The interviews reveal a great range of arguments and influencing factors that are relevant for refurbishment decisions. Depending on their individual backgrounds (as described above), property owners differ strongly in weighing and assessing single factors. Therefore influencing factors work as dimensions that can have an impact in both directions – they can be an argument in favour of an efficiency measure or against it.

The analysis showed a total of twelve topics – some of them with further differentiations. Among these factors, economic considerations play a very prominent role for all types of owners and were mentioned in all 32 interviews, followed by ecological considerations (31 interviews) and the need for repairs/ permanent maintenance (also 31 interviews). Most of the respondents also take into account the living comfort in their homes (of their own or their tenants in case of private landlords), views from professional third parties (architects, property managers, chimney sweepers, energy consultants) and non-professional third parties (family, friends, neighbours, colleagues) about planned measures (and their profitability in the long-term) or the energy performance of buildings that are communicated at owners. Some owners even delegate decisions to professional third parties whose opinions then take great effect on the decision. In this respect the trust in information and sources of those third parties is of major relevance. The same is true for technical crews, manufacturers and craftsman or executing companies. The spectrum ranges from unquestionable confidence to open distrust. Generally, confidence in experiences and information from professionals such as energy consultants, chimney sweepers, architects or from familiar persons (colleagues, friends, neighbours) is much more higher than in firms or manufacturers especially if they are not known from further experience. Considerations about the perceived practicability of measures related to their ease of implementa-

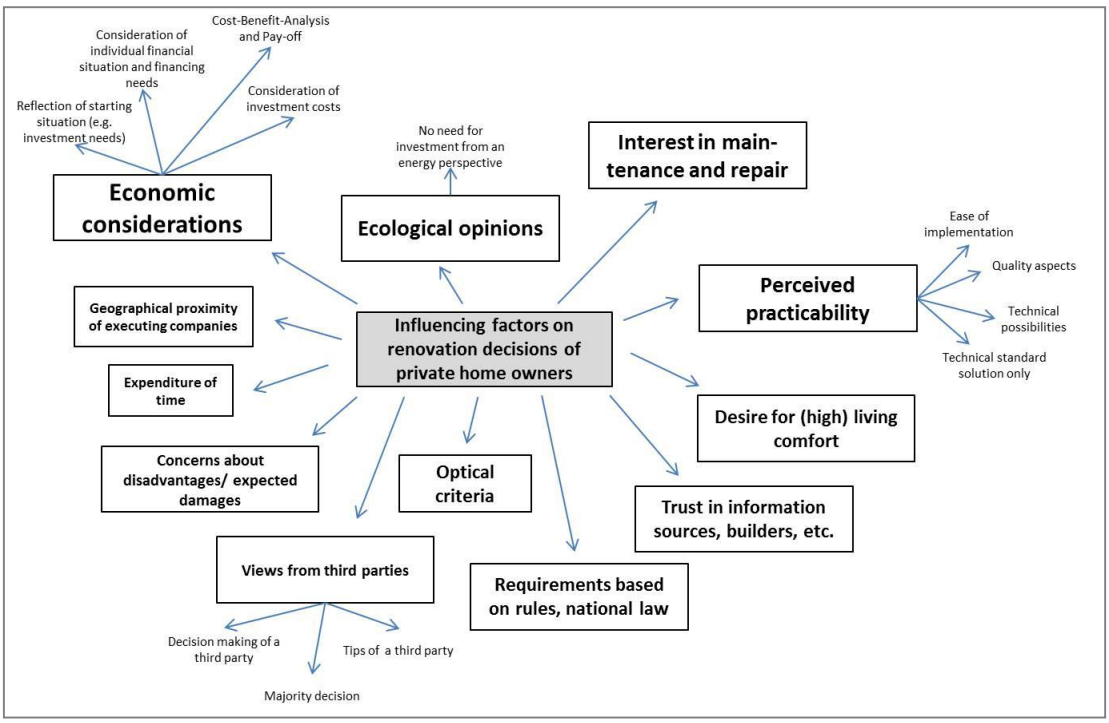

Figure 5. Factors influencing refurbishment decisions of private property owners.

tion, quality aspects or technical solutions is of similar priority for the decision process. Requirements based on rules and laws (e.g. monument protection, requirements for funding), optical criteria (simple expectations up to decided desires as the preservation of the architectural charm of the building) and the estimated time expenditure are further subjects taken into account by about half of the respondents. A less frequent, but important argument consists of concerns about disadvantages or expected damages in case of refurbishment activities whereas the geographical proximity of executing companies is rather insignificant.

All these factors do not work in isolation, but several factors are weighed against each other which shows the multi-dimensionality of decision making. This means that even an initial situation apparently clearly requiring action such as an urgent need of repair does not dictate the decision taken, because different owners make different decisions. However, those who refurbish and those that decide against it take into account roughly the same factors, but arrive at different results. This is because those that do not refurbish repeatedly assess some of those aspects or specific features more negatively than those that do refurbish (as described below).

Slight differences between owner types appear related to the use type of the building. Owner occupiers are more willing to make large investments in energy performance if these deliver higher comfort, whereas private landlords are more interested only in promoting property letting and see this not greatly related to energy performance. Consequently, economic aspects of energetic retrofit and long-term letting potential of buildings/dwellings are more crucial for private landlords, including considerations of split incentive effects, according to which tenant, and not the landlord, benefits from improvements financially or in terms of comfort.

3. EACH DECISION ON REFURBISHMENT HAS TWO STAGES AND USUALLY NEEDS A SPECIFIC REASON FOR IT. AT EACH STAGE THERE ARE SPECIFIC BARRIERS FOR THE REALISATION OF REFURBISHMENTS

Despite the individual and heterogeneous decision-making factors found in the interviews, the study identifies a decision making structure which consists of 2 stages (see Figure 6). At the first stage, property owners who refurbished reported of a specific reason as a basis for an in-depth analysis of the subject at stage 2. The extent of refurbishment then varies depending on the arguments considered at stage 2 and ranges from occasional individual measures (e.g. roof insulation) to a complete and comprehensive refurbishment of an entire building. If there are no specific reasons, property owners do not further consider refurbishment and/or specific barriers discourage property owners from refurbishment activities. Consequently, they do not implement refurbishment measures.

The most common initial reasons which lead to further analysis at stage 2 are the *need for repairs* (owner-occupiers and landlords) and the wish to improve the *living comfort* which was found particularly for owner-occupiers that before refurbishment perceived a lack of comfort such as chilly and draughty rooms or impractical windows. Further reasons cover evaluating environmental protection, influence from third parties, savings in energy costs and legal requirements. In case of *valuing environmental protection* as starting point of a detailed analysis of the subject, property owners put the ecological idea in the heart of further consideration. For those owners, it is important to contribute to climate protection and to reduce waste of energy. That is why they are striving for the energetic optimisation of their building and try to take appropriate opportunities (mostly found for owner-occupiers). The *influence from third parties* is different for owner-occupiers and private landlords. In the case of landlords the initiative is strongly de-

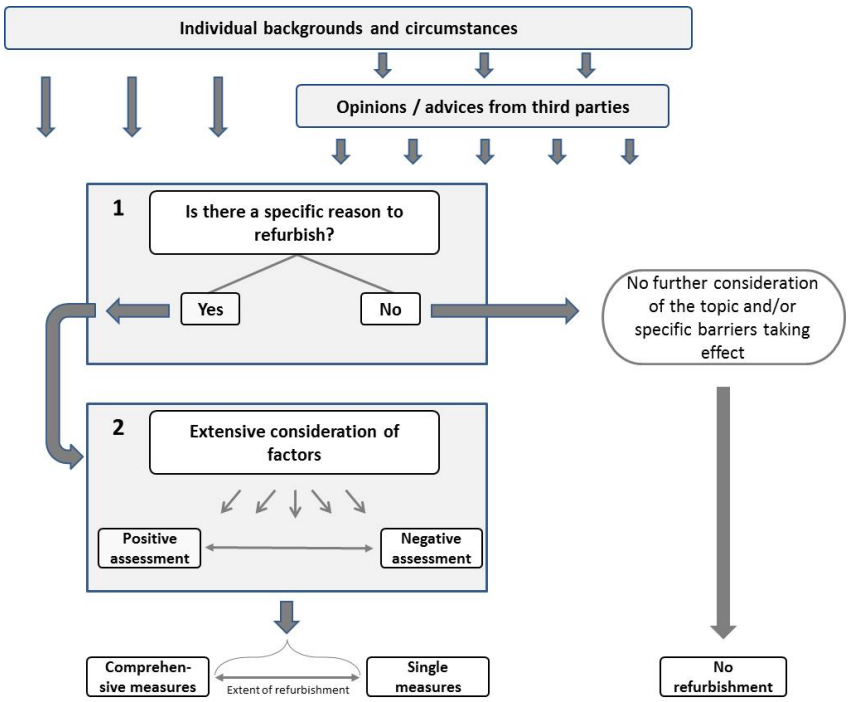

Figure 6. Structure of decision making.

pendent on third parties (e.g. complaints by tenants, hints from professionals like chimney sweepers). They mainly follow the hints of third parties within their own economic considerations and tend to less expensive measures, whereas ecological considerations do not play a major role. In contrast, owner occupiers show a greater initiative. They make use of existing contacts to craftsmen or exercising companies they regard as suitable and trustworthy serving as starting point for information or special offers. They even accept higher costs in favour of engaging trustworthy craftsmen or firms. Some owner occupiers focus on the *saving potential* through the implementation of refurbishment activities. They predominantly consider costs for investment and follow-up and predominantly come to the conclusion that savings in energy costs are achievable with reasonable investment costs. They implement very different measures ranging from insulation of the whole building to successive single measures (partly carried out on their own). One private landlord reported on *legal requirements* as reason for refurbishment actions not only in following the requirements, but furthermore in serving as "food for thought" which results in the implementation of comprehensive energetic measures.

If none of the above-mentioned reasons apply, property owners generally do not refurbish their building. That's why the perception that there is *no need to refurbish* and especially no need for energetic modernisation serve as prior barrier to carrying out refurbishment. In this case, *financial constraints* – for example high investment costs, uncertain and unpredictable profitability of measures, too low savings potential, or the currently poor financial situation of owners – prove to be a further major obstacle. In addition to that, the study identifies three more obstacles consisting in the *fear of drawbacks* which are predominantly associated with insulation measures such as damp/mould, fire risk or vermin, in *environmental concerns* referring to insulation materials such as hazardous waste and other issues around waste disposal or their negative energy footprint if material production is taken into account. Last but not least, some *national legal regulations* with respect to monument protection or to compensation for electricity fed into the grid as well as the Energy Saving Ordinance (which led an owner to purchase a building which does not underlie this ordinance) are mentioned as further barriers.

Focussing on the closer analysis at stage 2, the study identifies a complex set of interacting decision-making factors and arguments. The following figure illustrates five major lines of argumentations with the core arguments weighed against each other.

The three solid lines in the figure represent the lines of argumentation that are relevant for owner-occupiers and private landlords with the first two lines leading to the implementation of less comprehensive energetic measures.

In the first line, owners weigh the ecological benefit resulting from a measure against the impact on the appearance of the building. They frequently come to the result that the appearance is negatively affected by insulation activities or replacement of windows. Even if they recognize the energetic benefit of such measure, the optical appearance is more important for them.

In the second line of argumentation the high investment costs are balanced against the possibilities of funding for energetic retrofit and their ecological benefit. Owners frequently acknowledge the opportunities for funding, but report that making use of funding programs requires very comprehensive measures which leads to higher investment costs as originally planned (thinking of less comprehensive measures that don't receive funding). They often decide to implement less comprehensive measures without funding that they also perceive as energy-efficient.

In contrast, within the third line of argumentation, the investment costs are considered as warrantable and/or support-

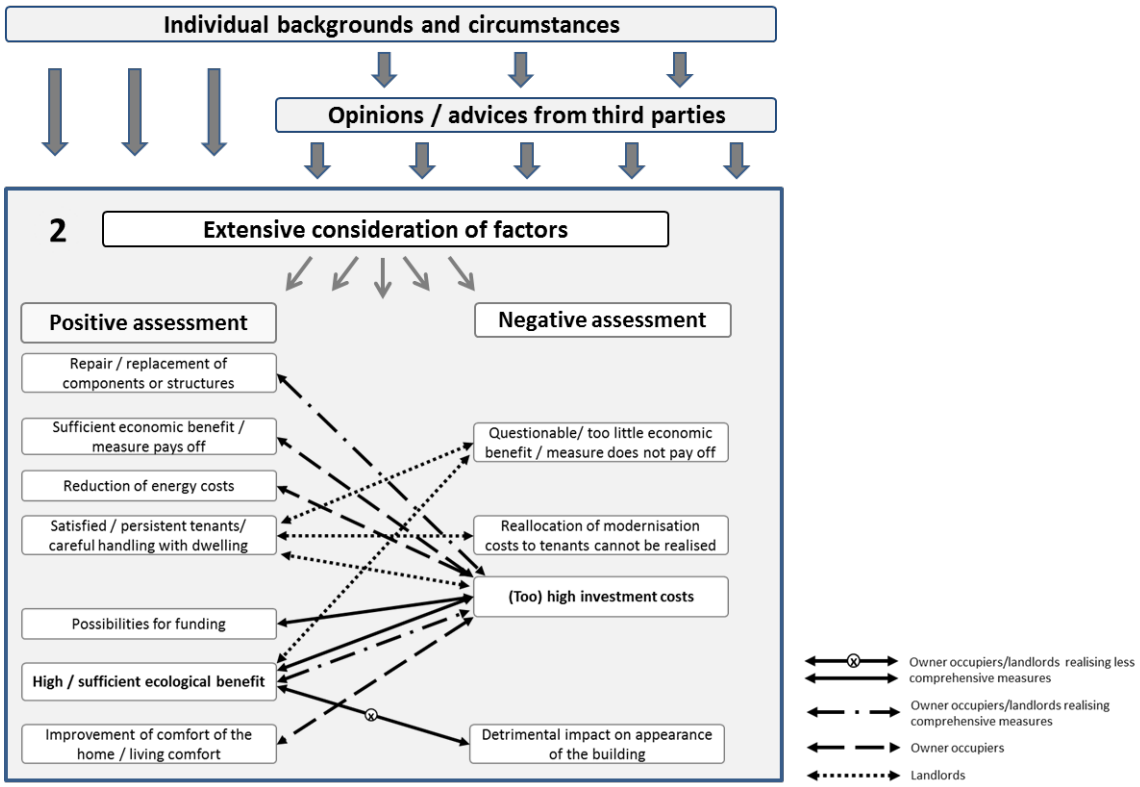

Figure 7. Lines of argumentations at stage 2.

able related to the ecologic benefit and related to the fact that implementing measures is favourable for the maintenance of the building. This line of argumentation is the basis for the implementation of mostly comprehensive refurbishment including facade insulation measures.

The core arguments from the perspective of owner-occupiers (dashed lines) are the high investment costs which are balanced against a possible increase of living comfort, the potential for saving energy costs and the long-term economic benefit. The decision to implement more or less comprehensive measures depends on the importance and assessment of those possible advantages compared with high investment costs. In some cases owner occupiers conclude that they can raise their living comfort without specific energetic measures and in this case implement single activities or replacement of structures without raising energy efficiency substantially.

Private landlords (dotted lines) focus on several economic aspects which they assess as obstacle to carry out comprehensive measures. Similar to the previous lines of argumentation they assess investment costs as (too) high, but are additionally questioning whether energetic measures really pay-off in the long-term even if they are estimated helpful to optimize energy efficiency. This is related to the perception that it is not realistic to reallocate a part of the modernisation costs to the tenants[21], because if doing so, tenants would probably move out and it would be more difficult to relet the dwelling. However, implementing energetic measures (without reallocation of costs) could imply more satisfied tenants who would take care of the dwelling which would be an argument in favour of refurbishment. This argumentation shows that split-incentive effects strongly impact landlords' decision making.

It is important to mention that in addition to these arguments many property owners consider further barriers and motives showing that decision-making even is more complex in reality. Those arguments are optionally considered and do not follow a clear structure. Generally, all barriers at the first decision stage could also apply at stage 2. Further frequent arguments against the implementation of measures consist in an energetic benefit that is considered too small, in sufficient high living comfort, inadequate constructional / technical possibilities and a lack of confidence in craftsmen, materials or measures.[22] On the contrary, other owners come to a positive perception of these arguments that in these cases take positive effect on the decision process. Generally, arguments for and arguments against energetic refurbishment each reinforce themselves. However, one argument against the implementation of measures can be decisive if it cannot be balanced against one or several arguments in favour of energetic refurbishment. As mentioned above, the assessment of factors at both stages is influenced by the individual background of the property owners and by hints and opinions from third parties.

21. The German Code of Federal Regulations (§ 559 BGB) allows landlords to reallocate the investment costs for modernisation activities (e.g. energetic refurbishment) to their tenants. So landlords may demand a supplement of 11 % of the modernisation costs to the net rent.

22. Interestingly, barriers related to time expenditures have been very rarely found in the interviews. In most cases, time expenditures are accepted or evaluated as normal.

4. SUPPORT WITH OVERCOMING BARRIERS IS POSSIBLE

The findings show that there are many and heterogeneous relevant decision-making factors which suggest that support with overcoming barriers ideally should address several aspects. From the findings can be concluded that the creation of a greater awareness for possible reasons for refurbishment would lead more property owners to the second stage of decision making which then – as shown – results in the realisation of refurbishment measures (on different scales). Therefore and for the detailed assessment of factors at stage 2 the dissemination of unbiased information and the creation of good (practice) examples is a central issue and should be targeted:

- Opportunities for energy advice services and information campaigns should be increased; for this purpose independent professionals who appear to be trustworthy to the owners should be in charge.
- Opinions from independent third parties can highlight reasons for investing in refurbishment and help with evaluations such as: Are the measures useful? Is there potential for lucrative savings? Are measures profitable in the long-term? Will measures function without problems?
- Energy advice and information should be (almost) free of charge.
- Those owners who volunteer to be a "showpiece" – once their planned refurbishment has been completed successfully – could receive extra funding.
- Neighbourhood development schemes offer the potential for closer collaboration between local authorities and consumer advisors to build networks (also for practice examples).

Besides that, economic aspects could also be optimised:

- Owners often carry out refurbishment on their own and are not aware that the KfW reimburses costs of materials.
- Higher levels of funding would be helpful.
- A more flexible funding system where not only very comprehensive measures receive funding would be helpful; successive measures could also receive funding.

In general, it appears to be most promising if a bundle of measures is offered which is able to address the different factors preventing property owners from energetic refurbishment. Such bundles can be targeted to the different types of owners taking up the issues that have been described in the owner-specific lines of argumentation. However, the argumentations have shown that measures addressing investment costs and funding, transparency about reduction of energy costs, ecological benefit and impact on the appearance of buildings would be helpful for both types of owners.

Conclusions

The study reveals deeper insights in decision-making processes of different types of property owners to implement or not to implement energetic refurbishment. Comparing arguments of owners who realised refurbishment activities with those who did not, the qualitative content analysis identifies twelve categories of influencing factors. Although owners that refurbish and those who reject refurbishment consider similar aspects, both assess at least some of those aspects differently and therefore come to different conclusions in the decision process. There have been not found major systematic differences between the decision-making of owner-occupiers and private landlords. However landlords focus on economic issues whereas owner-occupiers emphasise the living comfort.

The findings show that decision-making is a complex multi-dimensional process where different factors are taken into account. In doing so, the individual backgrounds of owners and opinions of third parties determine which of the twelve influencing factors are considered and how they are assessed. Although different owners consider different aspects, it was found that every decision on refurbishment has two stages – each which specific barriers that are considered and balanced against possible benefits.

There are six initial reasons for refurbishment (need for repairs, wish to improve living comfort, influence of third parties, savings in energy costs, valuing environmental protection, legal requirements) leading home owners to an in-depth analysis at stage 2 constituting the condition for different refurbishment activities. If none of these reasons apply, barriers at the first decision stage discourage property owners from refurbishment activities (no need to refurbish, financial constraints, fear of drawbacks, environmental concerns, nationally applicable legal regulations).

At the second stage of decision-making five lines of argumentation including the core arguments that are weighed against each other could be identified. Most of them revolve around (too) high investment costs as major barrier which is balanced against the perceived ecological benefit. Both arguments are reinforced and/or balanced by further factors.

The identified interplay between a wide range of decision-making factors and barriers suggest that approaches to promote energetic refurbishment of homes should ideally address several financial and non-financial aspects such as the increase of objective information strategies, networks and good practice examples which could create a greater awareness for possible reasons for refurbishment and could contribute to the assessment of arguments.

Although the study revealed valuable insights in the interference on decision-making factors based on a sophisticated recruiting strategy, more research is needed to quantify interrelations and trade-offs between decision-making factors. This knowledge could then feed in the development of concrete instruments that contribute to raise the rate of energetic refurbishment. IWU currently is preparing such a follow-up study.

Acknowledgements

This work is based on a study carried out by order of the KfW Bankengruppe. The authors gratefully acknowledge the methodological freedom given by KfW to conduct a study which is not restricted to KfW funded home owners and so allowed to achieve a broader scope of the study results and also thank their students supporting transcription work and especially the home owners taking part in the interviews.