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Building resilience in urban settlements

The 2018 global population of 7.65bn is predicted to reach 9.7bn in 2050. Urban growth is accelerated as more people survive to reproductive age, fertility rates change and migration rates intensify. Climate change is varying existing weather patterns, some of which are life threatening and socially, environmentally and economically devastating. These trends have far-reaching implications for future generations.

We need effective planning and governance to deliver transition across all levels, scales and types of development from building to city scale, ensuring infrastructure can support growing populations, changing land uses and new technologies. With adaptation of existing areas to accommodate more people, and as land uses undergo change, we need to consider optimum levels of sustainable development that includes, at the building level, different types and degrees of new development, adaptation and adaptive reuse. Taking action now is embodied in the concept of building resilience to future events. Resilience implies capacity to respond to both chronic stresses or acute shocks, which can be social, economic and environmental, or combinations thereof.

Our cities will grow, faster than ever, yet typically only 1–2 per cent is added annually to the total stock of buildings; hence resilient retrofit, resilient adaptation and resilient adaptive reuse are terms we must define, develop and embrace. Resilience, and how it is manifested, varies from location to location, and we need to share our ideas, approaches and practices to inform others.

This special edition of the IJBPA examines resilience and adaptation in respect of four aspects; pathways to resilience, risks in decision making and managing risk through building rating tools, adapting existing buildings and housing quality.

Pathways to resilience

The dynamic relationship between the built environment and biosphere can be conceptualised from a social-ecological systems approach (Folke et al., 2016); in that context, resilience may be defined in terms of the capacity of such systems to absorb, adapt and transform in the face of external disturbance while maintaining core system structure and function. But are the pathways to achieving urban resilience universal? In their study of the Perceptions and pathways of resilience in Addis Ababa – acknowledging both the importance of the rapidly urbanising African continent to our perception of resilience and adaptation and the frequent overlooking of this part of the world in built environment research – Baron and Cherenet offer clear evidence for the existence of locally distinctive perceptions of and pathways to urban resilience. They point out that only through adjusting our understanding of resilience to the local context can the design and implementation of urban resilience strategies be successful.

Risks management: rating tools and decision making

Building rating tools were developed to increase sustainability and resilience and to reduce and manage risk; however, the results are at best patchy in terms of uptake and acceptance. In their paper titled “Sustainability ratings in residential development: a worthwhile endeavour?” Warren-Myers et al. examine new housing markets in Australia. The study investigates consumer motivation and experience post-purchase of sustainable housing in a certified development. The findings show the rating systems do not have the anticipated influence.
With consumers having low awareness of sustainability and lack of trust in the ratings, stakeholders need to revisit the assumptions on which current rating tool models are based.

In “Advancing real estate decision making: understanding known, unknown and unknowable risks”, Higgins and Perera take a broader view on risk in real estate risk management. They claim existing literature is focussed on holistic risk management techniques and the unforeseen, rare and extreme events associated with resilience issues and acute shock can challenge existing decision-making strategies. They posit that by taking a downside risk approach examining known, unknown and unknowable risks; a new blueprint for effective real estate risk management can be adopted, which is far more suited to a changing global environment.

Adapting existing buildings
Drilling down to the building scale, three papers in this issue examine adaptability and adaptation from quite different but complementary perspectives. Aigwi et al. consider the efficacy of adaptive reuse for the redevelopment of historical buildings in New Zealand, not simply as a money saving scheme to repurpose underutilised buildings as an alternative to knock down and rebuild, but as a strategy for regenerating a major provincial town centre facing problems of inner-city shrinkage. The authors found that a majority of stakeholders involved with town centre regeneration in the historic city of Whanganui supported this approach. Huuhka and Saarimaa take a cross-disciplinary approach at the crossroads of human geography, building stock research and adaptability research to understand how the lack of variation in dwelling size affects residential segregation. Their premise is that “when dwellings fail to respond to residents’ needs, housing will suffer from segregation and buildings will possibly be demolished ahead of their time”. Drawing on an analysis of Finnish mass housing built in the 1960s and 1970s, the authors discuss how mass housing layouts can be adapted to meet changing occupant needs.

Housing quality
In the paper, “The importance of user memory in understanding housing quality” by Sadikoglu Asan and Ozsoy, housing quality is examined in a novel way. Spatial quality is a multi-dimensional concept that encompasses objective and subjective features and reflects individual needs, values and satisfaction in relation to the conditions of a building and its surroundings. The authors assert much existing housing no longer meets spatial needs; although rather than demolition, improvement strategies and programmes to improve spatial quality are needed. However, a house is also a space containing compressed time and memories. Memory relates to personal experience and the events and objects that surround humans throughout their lives. Therefore, user memory is a tool that can provide valuable information to understand problems of housing quality and facilitate the development of a quality improvement strategy. Their research examines Turkish housing stock to test this hypothesis; finding a strong relationship between perceived housing quality and memories.

Conclusion
The online introduction to this journal points to “rapid technological developments, a changing climate and more extreme weather, coupled with developing societal demands” as among the key trends underpinning the dynamic challenges of maintaining, conserving, refurbishing, adapting and ultimately sustaining our buildings. The selection of articles published in this special issue reflects the journal’s interdisciplinary, practical and problem-solving focus to that end. From global programmes such as 100 Resilient Cities to local debates among the built environment professions and research community, the notion of urban resilience has become a structuring framework for a plethora of initiatives around
built environment sustainability. As the guest editors for this issue we hope the papers published herein will contribute to this process.

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Perceptions and pathways of resilience in Addis Ababa

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Abstract

Purpose – Resilience has recently attracted widespread interest in the field of urban planning and theory. However, the research that has been conducted on urban resilience in Africa has major theoretical and methodological gaps. This can lead to problems when designing and implementing resilience strategies there. Understanding African perspectives can be a way of tackling these. The paper aims to discuss these issues.

Design/methodology/approach – Using the example of Addis Ababa, Ethiopia, this paper analyses expert interviews based on a grounded theory approach. The goal is to explore locally specific perceptions of and pathways to urban resilience. By comparing these findings to those reported in the existing literature, differences and overlaps are identified.

Findings – This study provides evidence for the existence of locally specific perceptions of and pathways to urban resilience. Furthermore, it identifies urban development pathways such as complete urban makeover (tabula rasa) and complete negation of change (resistance).

Research limitations/implications – Because this study uses Addis Ababa as a singular case and expert interviews as method, it rather represents an initial attempt at exploring a new research field than claiming generalisability. Its quality and significance lie in its discursive approach and theory formation.

Practical implications – This exemplary study from Ethiopia demonstrates that a regionally specific understanding of urban resilience is valuable for the design and implementation of urban resilience strategies.

Originality/value – This study offers unique insights into urban resilience from an African perspective and into the manifestation of urban resilience in Addis Ababa.

Keywords Qualitative research, Ethiopia, Urban resilience, Expert interviews, Provincializing

Paper type Research paper

1. Introduction

Understanding urban resilience is important to achieve social-ecological sustainability and make-wise urban management decisions (e.g. Wu and Wu, 2013; Tierney, 2014). This paper adopts the standpoint of general, social-ecological resilience, which can be defined as the capacity of “any and all parts of a system to absorb all kinds of shocks” (Folke et al., 2010, p. 2) while retaining the same basic function and identity. The extant literature speaks of certain pathways to resilience (Meerow et al., 2016): persistence, transition and transformation, which will be discussed further in this paper. The question that motivates this paper is whether such definitions are universal?

There is still little convergence on the wide range of definitions of and theories about urban resilience (Meerow et al., 2016). When reviewing mainstream urban resilience literature (e.g. Holling, 1973; Folke et al., 2008; Newman et al., 2009), it becomes clear that it is based predominantly on western experiences and locations, while there are significant knowledge gaps in resilience conceptions, actors and environments in non-western countries. This may result in major design and implementation challenges particularly in

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the case of Africa, as Watson (2014) demonstrates. Drawing on the example of Ethiopia’s
capital Addis Ababa, this paper bridges existing knowledge gaps by exploring local
perceptions of as well as perceived pathways to urban resilience. In doing so, the authors
aim to produce new knowledge and to identify areas for future, in-depth research.

With these goals in mind, this paper will first identify the conceptions of urban resilience
that exist in Addis Ababa’s urban expert community and then investigate the pathways to
urban resilience in Addis Ababa perceived by these experts. The study employs
semistructured expert interviews as well as a Glaser and Strauss’ (1967) grounded theory
(GT) approach to produce valuable insights into this under-researched area.

2. Background

Ethiopia’s capital Addis Ababa is not just Africa’s political centre but also one of its fastest
growing cities. According to UN-HABITAT (2017), the city increased from 1.3m in 1979 to
nearly 4m in 2017 due to rapid population growth and rural-urban migration. Surprisingly,
the historical neighbourhoods of the city have suffered little loss of functionality and
identity in this process of urban expansion and densification albeit their physical
deterioration (Yitbarek, 2012). For the authors of this paper, this observation suggests a
strong general urban resilience within the historical neighbourhoods of Addis Ababa, which
is the starting point of this study. Before discussing the study in detail, the authors will
provide a brief overview of the research context and the relevance of this study.

2.1 Addis Ababa’s historic centre

Addis Ababa was founded by Empress Taitu and Emperor Menelik II in 1886 at the foot
of Mt. Entoto (Ghiorgis, 2012). As Ghiorgis (2012) notes, the new capital of the Ethiopian
empire resembled the hierarchy of the royal court, with members settling on hills around
the palace according to their status, each, in turn, surrounded by their servants and
soldiers. Mud paths connect each of these neighbourhoods with the others and with the
palace (Ghiorgis, 2012). Despite the very complex political and planning history that
followed, this basic urban structure still exists: for example, the organic road system still
connects important nodes and is not based on a grid system (Ghiorgis, 2012). Today,
major roads are lined with commercial towers, administrational buildings and shopping
malls, behind which a dense carpet of low-rise mud buildings and alleys fills the
remaining urban space (Baumeister and Knebel, 2009). This spatial proximity creates
a sharing of resources (Baumeister and Knebel, 2009) and very pronounced social cohesion
(Yitbarek, 2012). Baumeister and Knebel (2009) call this un-planned, yet fruitful,
togetherness the “indigenous urban tissue of Addis Ababa” (p. 56).

2.2 Relevance of study

Despite this unique spatial and social “mixture” (Baumeister and Knebel, 2009, p. 57), African
cities have been largely overlooked by global urban theorists (Chenal, 2014; Parnell and
Robinson, 2018) due to lack of data, lack of funding and various epistemological
assumptions (Parnell and Robinson, 2018). This applies to urban resilience literature, in
particular, for which the authors were not able to find critical research. Existing urban
settlements in Africa are often demolished in pursuit of a shinier future to the expense of
urban memory and the urban poor (Watson, 2014). The reasons for this deletion are
substandard living conditions (UN-HABITAT, 2017) but also, if not mainly, what Adichie
(2010) calls the “Danger of a Single Story”, that is, the hegemony of western knowledge over
African knowledge. Mirroring this hegemony, Addis Ababa City Administration
(AASZDPPO, 2013) has vowed to demolish all inner-city neighbourhoods within the next
15 years to build an inhabitable and representative capital. According to the 2014 master
the intended physical transformation entails a complete makeover of the inner city as well as the expansion of the edges of the city into arable farmland. To illustrate the intensity of this spatial transformation, see Figure 1. The social, ecological and economic impacts of this transformation have been the subject of fierce debate and have triggered (cf. e.g. Yitbarek, 2012; UN-HABITAT 2017) political unrest.

On the one hand, this study seeks to create relevant knowledge about an Addis Ababa that is on the brink of total destruction. Its qualities need to be described and understood to make them usable for a sustainable urban development, otherwise there will be a total loss of urban identity and urban memory. It will be necessary for Ethiopia to understand the resilience principles that are guiding decision makers within its institutions, as urban resilience depends critically on social and institutional behaviour (Tierney, 2014). On the other hand, this study is interested in reflecting mainstream urban resilience theory against a non-western context to identify sensible areas for future research.

3. Literature review: resilience concepts guiding this research

Without the concept of resilience, sustainability goals cannot be achieved in cities because sustainability alone lacks the change factor (Folke et al., 2002). By understanding social-ecological systems (SES) such as cities as complex and adaptive systems, resilience can incorporate the change factor (Folke et al., 2002). Therefore, by integrating the principles of resilience into planning and urban practice, sustainable urban development can be reached. Folke et al. (2002) offer a strikingly clear-cut definition of resilience: “[...] resilient social-ecological systems are able to absorb larger shocks without changing in fundamental ways. When massive transformation is inevitable, resilient systems contain the components needed for renewal and reorganisation. In other words, they can cope, adapt, or reorganise without sacrificing the provision of [basic] services” (p. 438). As Meerow et al. (2016) demonstrate in their review paper, authors contributing research to urban resilience theory frequently employ a wide variety of keywords but fail to
elucidate their meaning, giving rise to confusion and miscommunication. Hence, the authors of this paper will clarify their stance on equilibrium and adaptability as well as review the mechanisms of change that will create the background against which the data from Addis Ababa can be compared.

The authors of this paper understand cities as SES and acknowledge their complexity, adaptiveness and ability to learn (Du Plessis, 2008). Furthermore, this paper rejects the engineering perspective on resilience, first described by Holling (1996), which states that cities should, or even could, go back to their former state after shock or stress. It is reasonable to say that Ethiopian cities will never return to their prior state in the face of current urbanisation trends. Hence, a non-equilibrium conventionalization called social-ecological resilience (Meerow et al., 2016) is adopted in this paper. It is also necessary to outline the authors’ position on interpreting adaptability. Harald Kegler (2014) describes two extreme standpoints on adaptability: adaptability to a certain part of the system to a certain scenario (specific resilience) and adaptability of the entire system to any kind of stresses or shocks (general resilience). Since this paper is interested in a specific city, but not specific scenario, the authors of this paper refer to adaptiveness on a general scale. This also means that resilience will not be measured by the speed of recovery (Meerow et al., 2016).

Meerow et al. (2016) identify three different “Pathways to Resilience”, i.e. mechanisms of system change as follows: persistence, transition and transformation. Persistence refers to the engineering-resilience approach and its desire to preserve or go back to the original state. Maintenance of status quo, resistance and robustness are keywords in this mechanism (Meerow et al., 2016). According to Kegler (2014), Persistence can be considered a non-resilient pathway as it builds up tension between status quo resulting in greater chance of catastrophe. Transition refers to incremental adaptation targeting the preservation of the system’s identity and functionality (Meerow et al., 2016). According to Kegler (2014), it also entails learning from the past in order to improve and prosper. Transition is strategic and pro-active (Kegler, 2014). Transformation is more fundamental and might entail the rebuilding of functionality and identity (Meerow et al., 2016). That might actually be desirable, if the former status quo was not healthy for its actors (Kegler, 2014). Furthermore, Kegler (2014) describes two additional system change mechanisms, adaptation and mitigation. Adaptation describes a reactive and cyclic mechanism while mitigation is pro-active and aimed at reducing the negative effects of transformation (Kegler, 2014). Knowing these pathways is important, because this paper aims to see whether they are generally applicable or not.

This research goal pertains to the authors’ standpoint of challenging the normativity of mainstream urban resilience knowledge: Are its definitions and strategies universal? When reviewing mainstream urban resilience literature, it is clear that theory and implementation strategies are based predominantly on western experiences and locations (cf. e.g. Holling, 1973; Folke et al., 2008; Kegler, 2014). To the knowledge of the authors, there is no critical urban literature that explores Ethiopian perceptions of resilience. When urban resilience in Ethiopia is addressed in publications, it is understood by local and foreign institutions in the engineering-resilience sense, i.e., as tool to mitigate climate change and other stresses (cf. e.g. Pauleit et al., 2015; OECD, 2014; The World Bank, 2015). The current master plan for Addis Ababa (AASZDPPO, 2013) inadvertently substantiates this finding by failing to reflect on the goal of sustainable urban development, and its guiding national development agenda (National Planning Commission, 2016) mentions climate resilient cities without further explaining what, how and why. While creating climate resilience in Ethiopia is important, its implementation will most likely suffer if existing perceptions and practices within the urban expert community of Ethiopia are not reflected.

Considering the current struggles in implementing sustainable development in Sub-Saharan African countries (Parnell and Robinson, 2018) such as Ethiopia, the appropriateness of
western standards and technologies should at least be questioned (De Laet and Mol, 2000); if
deprecated unsuitable, such standards should be replaced by more appropriate ones to create more
sustainable development solutions.

4. Method
To achieve this goal, the authors of this paper choose a qualitative and inductive research
design. Due to the under-documented Ethiopian research context (Baron and Donath,
2016) and the existing hegemony of western knowledge in the African context
(Adichie, 2010; Watson, 2014; Parnell and Robinson, 2018), an explorative and theory-
generating approach is sensible. This approach entails the exploration of new knowledge
and the identification of areas for future research (Mason, 2002). The method selected by
the team is an expert interview study because, on the one hand, as Mason (2002, p. 66)
underlines, the data are “not feasibly […] available in any other form”. On the other hand,
an expert interview can generate highly relevant knowledge because these specific
informants are very powerful, and as Bogner et al. (2009, p. 7) emphasise, can “actually put
their interpretations into practice”.

For theoretical knowledge to be produced, however, Bogner and Menz (2009) emphasise
that it is essential to understand the expert statements as interpretative knowledge. Mason
(2002) explains this constraint: while expert statements are not hard facts, the
interpretations they represent are highly relevant as they affect the actions of people who
are powerful enough to impact the area of their expertise – in this case, Addis Ababa’s
urban development.

4.1 Data collection and analysis
The entire interview process is understood as iterative and inductive, generating theory
along the principles of the GT (Glaser and Strauss, 1967). To illustrate the research process,
the authors show an overview of the individual steps in Figure 2, which are explained in
detail below.

4.1.1 Sampling. A total of 12 Ethiopian urban experts are carefully selected for
interviewing. Their professions can be divided into four actor groups, as displayed in Table AI.
The experts are selected according to theoretical sampling (Glaser and Strauss, 1967). This
means that they are purposefully selected to highlight different positions within a discourse
indicated, for example, by their profession, age and gender (Mason, 2002). At the end of the
interviewing process, the original sample size of ten is increased to 12 to expand internal
validity (Mason, 2002) and to reach “theoretical saturation” (Glaser and Strauss, 1967, p. 61f),
which means that no further theory development can be reached. The sample size of this study
corresponds with what Guest et al. (2006) find in their study on data saturation: the majority of themes within a discourse appear at a sample size between 6 and 12 interviews. However, even if a sample size is theoretically saturated, it does not automatically create representativeness. Hence, the study at hand can only be an initial exploration of the topic; a study with a representative sample can generate greater generalisability and provide insights into marginalised perspectives (Guest et al., 2006).

4.1.2 Interviewing. In total, 12 interviews with urban experts from Ethiopia are conducted by the first author between October 2017 and January 2018. The average length of the interviews is 40:53. An interview guide is carefully designed for the interview that avoids pre-conceived theoretical constructions (Glaser and Strauss, 1967) such as general urban resilience based on a preliminary theoretical review. This guide is semi-structured to ensure that the main topics are covered, and space is left for the interviewees’ narratives (Bogner and Menz, 2009). The wording and structure of this initial guide is improved through a focus group discussion and a test interview. This initial guide is reviewed after three and after ten interviews to accommodate relevant but unexpected aspects (Glaser and Strauss, 1967). To create transparency, the guide is sent to the interviewees in advance. To acquire approval for analysis, the transcripts are sent to the interviewees in advance. All interviews are conducted in English[1]. Table AII provides an overview of the interviews.

4.1.3 Analysis. Interview recordings are transcribed verbatim, paraphrased and coded (Meuser and Nagel, 2009) in an inductive manner with the help of the programme atlas.ti (Version 8.1.2 - 517). This means that codes are developed based on the interview text (Glaser and Strauss, 1967) to increase sensitivity to the context. The GT is developed in three basic steps (Meuser and Nagel, 2009): first, the paraphrases are assigned with one or more codes the wording of which is as close to the paraphrases as possible. Then, by thematic comparison (Meuser and Nagel, 2009), the codes are aggregated, and their relationships established, but there is no theorising at this stage. As displayed in Figure 2, these two steps constantly influence each other, as do sampling and interviewing. In the third and last step – sociological conceptualisation – “the commonly shared knowledge of experts is condensed and categorisations formulated” (Meuser and Nagel, 2009, p. 36). The result is a hierarchy of codes, concepts and categorisations with which the researchers are able to identify typical perceptions of resilience within the Ethiopian urban expert community (see Table I).

5. Findings
In this section, the authors focus on two sub-themes of resilience within the urban expert community in Addis Ababa, Ethiopia: the conceptions of urban resilience that are developed through an etymological analysis, and perceived pathways to resilience.

5.1 Speaking of resilience in Amharic
In the interview, the experts are asked whether they know any term in an Ethiopian language that will translate into coping capacity, the common language transcription for resilience chosen for this research. The interviewees report of five different ways of saying “coping capacity”, all in Amharic, the predominant language in Addis Ababa, or not, as the case may be.

5.1.1 Reliability/resilience እንጉራንጆ እቻም ( jämaalqwa:qwa:m a:k’m). Expert 03 (23 October 2017) explains that “coping capacity is ‘jæmæqwa:qwa:m a:k’m’. It means to “cope with” and “to resist a certain impact”. Deconstructing this Amharic translation (Abyssinica Dictionary, 2018), “a:k’m” means power or capacity while “maalqwa:qwa:m” translates as “resistance”. Together with the possessive prefix “jæ”, the literal translation of “jæmaalqwa:qwa:m a:k’m” is “the capacity to resist”.
5.1.2 Continuity Քաղաք (k‘æt’ajənaet). The two experts that mention “k‘æt’ajənaet” translate it as: “to sustain something” (Expert 03, 23 October 2017) and “to continue something” (Expert 04, 26 October 2017), respectively. When deconstructed, “k‘æt’ajənaet” proves to be an adverbial construction that refers to the adjective “k‘æt” meaning “continuous” (Abyssinica Dictionary, 2018). Today, it is officially used to mean “sustainable” in the context of sustainable development in Ethiopia.

5.1.3 Durable/tolerant Ḩǐ{j (tfai). Expert 06 (30 October 2017) defines “tfai” to mean “a person who can resist […] a person that is able to absorb shocks”. However, it is a term that “only refers to humans” (Abyssinica Dictionary, 2018). In a later e-mail, the expert elaborates: “tfai is the ability to accommodate different life challenges. It is like adjusting without creating a big deal. Sometimes, we use the term for products that last long [with little or no care]” (Expert 06, e-mail, 22 January 2018).

5.1.4 Unyielding ያለው ከርሃ (jamaːjbaːgær). According to Expert 02 (21 October 2017), “jamaːjbaːgær” is a very old term, but it is increasingly used to mean resilient. It means to be resistant, to withstand or to endure changes (Abyssinica Dictionary, 2018). Expert 01 (20 October 2017) stresses that the term has a strong bias towards resistance and acknowledges: “I do not think being resilient is being strong enough to withstand changes. It is going back a certain distance and then to come back to your true status” (Abyssinica Dictionary, 2018).

5.1.5 There is no proper term for coping capacity in Amharic. This category summarises all the experts (n = 4) that find that there is no proper term for coping capacity in Amharic.
Instead, they report a principal scepticism towards everything modern: “This culture is very suspicious of change” (Expert 02, 21 October 2017). This results in a conflict between seeing the need to change for the sake of development and wanting to remain unchanged: “It is more of a fatigue, you know. A fatigue. On the one hand, you want to change and on the other hand, you want to stay like you are. It’s tension. It’s a big tension” (Expert 04, 26 October 2017).

5.2 Perceived pathways of resilience

The second sub-theme that this paper focuses on is how the experts perceive pathways to urban resilience, i.e., the mechanisms of change in Addis Ababa. From the GT analysis, the authors are able to identify the following five perceived pathways: tabula rasa, learning, adaptation, mitigation and resistance. In the following subsections, each categorisation is described by an introductory summary followed by explorations of the interview data. However, the authors will begin by addressing the question of change first to create a background against which the five pathways to resilience perceived by the Ethiopian urban experts can be discussed.

5.2.1 Change and transformation. According to the urban sociologist Elias Yitbarek, change refers to the transition from one state to another (Yitbarek, 2012). However, in order to understand change, it is necessary to understand the original state from which to depart. Looking for this state in the interview data, the authors can refer to numerous descriptions of what is considered to be Addis Ababa’s traditional urban identity. Positive descriptions include architectural heritage, different communal societies that create social safety nets, the importance of open spaces and their sharing, a mixture of functions, social classes, and housing typologies. The interviewees also report of walkability, a strong sense of place as well as social cohesiveness, and a sense of safety deriving from these aspects. The interviewees also refer to several shortcomings: all agree that something needs to be done about the physical deterioration of the city, the lack of infrastructure, as well as insecure land tenure. Certain negative aspects of this traditional urban identity and space are only mentioned by female interviewees, namely, the high risk of falling victim to violence for women and children (Expert 11, 5 January 2018) as well as an unequal sharing of open spaces (Expert 06, 30 October 2017). This is what the interviewees refer to as “old Addis” or “traditional neighbourhoods”.

5.2.2 Tabula rasa. In this interview study, tabula rasa stands for a pathway to resilience – or a mechanism of change – that affirms change to the extreme: the goal is complete renewal, as the present system is judged as undesirable. It is pro-active and strategic. In terms of speed, scale and impact, this pathway is not only fast and large-scale but also targets the complete makeover of the city’s urban identity. Thus, there is no time and no need to understand history or the status quo of the city.

For the actors of this strategy, the government, and private real estate companies, the aim of this transformation is to create a modern society assuming that a modern city generates a modern society, as interviewee 09 (6 November 2017) explains: tabula rasa will “reconfigure [our society] both, in class and thinking”. Accordingly, tabula rasa includes the complete removal of existing urban structures such as buildings, infrastructure and social networks, as well as replacing them with something new. “The destructive nature is necessary for [societal] renewal to set in because [this renewal] has to start from scratch” (Expert 09, 6 November 2017). The result of tabula rasa is great pressure on all planners and architects to develop plans. The effect of that pressure is that there is hardly any time to research and discuss designs: “Because the speed of […] development and image improvement is so fast […] construction projects get started and you analyse them [meanwhile]” (Expert 05, 27 October 2017). All of the experts interviewed see tabula rasa in
conflict with the existing urban society[2]. There is almost no involvement of residents in tabula rasa. The opponents of tabula rasa emphasise its negative effect on social cohesion, crime and traffic amongst other issues. Furthermore, the motive is questioned: “I do not think that it makes sense. [This investor] wants to promote [...] the image of Addis Ababa and Ethiopia [by building] one of the tallest hotels in the world. [...] Would YOU think that building a sixty-floor hotel makes Ethiopia great all of a sudden? No! As long as the farmer out there is still walking around barefoot […], it is not” (Expert 07, 31 October 2017).

5.2.3 Learning. The perceived pathway of learning describes the idea that resilience can only be achieved if existing knowledge and experience are reflected. It contains codes such as memory, exchange of knowledge and embracing change. Learning accepts change and uses it actively as well as strategically to improve the city. This is achieved through learning from the past, adapting to the present, and planning for the future.

“Addis Ababa is a real-time laboratory. It’s a place where the present meets the past and is affecting the future” reports Expert 01 (20 October 2017). The reported actors of learning are researchers, planners and architects. They are not only interested in heritage and social cohesion, but also strongly advocate for a better discourse among all stakeholders, including residents and the government. Expert 05 (27 October 2017), an architect, explains: “The discourse we had amongst ourselves was not enough. So, I felt like there should be a platform for architects, planners, leaders, and people involved in the construction industry”. Expert 04 (26 October 2017) explains the goal of learning: “One must understand what is here – the tangible things – and then build on that”. In doing so, compromises between plans and reality are achieved. Hence, the speed of transformation through the mechanism of system change learning is slower than through tabula rasa, yet expected to be more sustainable. When asked about what she thinks about resilience and sustainability, one expert suggests that “we should educate our people, help them know the value of things […] and involve them in urban development […]” (Expert 10, 6 November 2017). The scale of that strategy is still large as the goal of creating a contemporary Addis Ababa persists. Proponents of learning amongst the interviewees critique the current planning approach that is based on tabula rasa: “The [current] planning approach […] does not really consider the assets that we have as a city […]” (Expert 10, 6 November 2017). Expert 05 (27 October 2017) criticises those who do not seem to be interested in learning, i.e. the government and real estate developers: “If you do not have the proper documents and knowledge of the area, you make mistakes. […] It is visible in most of the re-developed areas in Addis Ababa” (Expert 05, 27 October 2017).

5.2.4 Adaptation. The categorisation adaptation describes a reaction to changing conditions brought on from the outside (e.g. climate change, the government or the west) or from the inside (e.g. residents, local companies or neighbourhood associations). It neither affirms nor negates change. Instead, it is reactive and non-strategic. Adaptation includes codes such as gradual, voluntary, adaptive and flexible.

The experts report of two scales of adaptation in Addis Ababa. The first one includes small-scale, everyday practices of adapting to change. For example, interviewee 05 (27 October 2017) describes how Addis Ababa’s residents deal with changes in urban space: “We, the locals, adapted the area to our needs. We improvise a lot here. […] This is a jazzy life”. This quote also implies acceptance of what is within the scope of one’s power. The status quo is accepted and is left alone to affect the future without interference. The second scale of adaptation is larger; it refers to the neighbourhood scale and the means by which it achieves change: the processes of gradual upgrading of individual houses. Interviewee 07 (31 October 2017) describes it as follows: “I think before we started this ‘tabula rasa’, we had this principle – not by design but by tradition: […] For instance, in a neighbourhood [some of the children grow up to get] good jobs or go abroad. They send some money home. And then, without destroying the entire neighbourhood, the parents improve their houses.
You slowly see those transformations and it does not annoy anybody. It does not take away the rights of anybody. [...] And then, your neighbour feels okay [...]". Hence, the speed and impact of adaptation is gradual and incremental, respectively. The actors in this pathway of resilience are local residents. The government is perceived to be absent in adaptation and is viewed as a cause of stress (see Section 5.2.2 (Tabula rasa)).

5.2.5 Mitigation. This pathway of resilience describes the efforts made to reduce the stress on[3] caused by change. It is a reaction to changes that are made to on Addis Ababa by external forces (e.g. the government, investors, modernity or climate change). At the same time, mitigation involves an element of planning and learning from the past in, which distinguishes it from adaptation.

Concretely speaking, almost all interviewees speak about coping mechanisms that Addis Ababa’s urban society has developed to buffer stresses and shocks in the absence of a social welfare state. These are organised by the communities themselves. Examples include the voluntary burial association known as ከዲር (addır), and the traditional group savings association እጋባ (əqub). Some of the interviewees see these traditional associations in decline. Expert 02 (21 October 2017), on the other hand, perceives them to be in the process of adapting to new conditions: “They used to be concerned with [...] death. Now, they are also concerned with life. [...] They take care of security, maintain buildings, and the neighbourhood”. The actors in this strategy are local residents. The government is perceived to be absent in mitigating shocks and stresses.

5.2.6 Resistance. The last reported pathway to resilience is one that negates change. Here, the status quo is valued over any unforeseeable consequences of change.

Many interviewees stress that there is a tension between the perceived requirements of modernity and Addis Ababa’s existing urban identity (see Section 5.2.1). The interviewees see Ethiopia’s society as traditional and persistent. As Expert 02 explains (21 October 2017): “This culture is very suspicious of change”. Three quarters of the experts express great affection towards the traditional way of life in Addis Ababa and mourn its destruction through tabula rasa.

Under this impression, several experts mention resistance as typical mechanism against system change in Addis Ababa. At the same time, they understand that this pathway creates a tension that makes any other pathway harder: “On the one hand, you want to change and on the other hand, you want to stay as you are. It’s a big tension” (Expert 05, 27 October 2017). This resistance is interpreted by Expert 05 as fatigue (Expert 05, 27 October 2017). This attitude towards change makes urban planning a challenge in Addis Ababa, as he points out: “Anything that [the city government] tries to do clashes with this fatigue” (Expert 05, 27 October 2017).

6. Discussion
The qualitative analysis of interviews with 12 Ethiopian urban experts reveals that they perceive and understand urban resilience. The authors are able to identify five nuanced conceptualisations of urban resilience based on an etymological analysis and five pathways to resilience as perceived by the interviewees. At first sight, these conceptions and pathways could be assigned to the definitions and pathways to urban resilience, as identified by international literature. However, as a more detailed comparison below shows, there are some significant differences that should be acknowledged by decision makers when designing and implementing an urban resilience strategy in Addis Ababa. In this section of the paper, the two sub-themes – conceptualizations and perceived pathways – are associated with each other and with existing resilience theory. This allows the authors to identify gaps in current urban resilience theory to make suggestions on how to improve resilience strategies in Ethiopia and to identify future research areas.
6.1 Resistance instead of resilience: conceptions of resilience

The findings of this paper suggest that the reported conceptions of urban resilience demonstrate a considerable element of resistance, or what Meerow et al. (2016) call persistence. This can be illustrated by four out of five conceptions. Reliability (cf. Section 5.1.1), unyielding (cf. Section 5.1.4) as well as “There is no proper term for coping capacity in Amharic” (cf. Section 5.1.5) emphasise resistance to changes or challenges. The Amharic term for reliability, jæmæqwɑːqwaːm ɑːkim, can be deconstructed to actually mean resistance rather than adaptation to change (see Section 4.1.1). Several experts emphasise that the Ethiopian culture is very conservative and suspicious of any type of change. This is reflected not only in the overwhelming presence of resistance to change in the conceptions of resilience but also in the perceived pathway to resilience resistance (cf. Section 5.2.6); an assessment that is confirmed by several Ethiopian urban researchers (Ghiorgis, 2012; Yitbarek, 2012; Cherenet, 2015).

However, it is clear that there is a shared awareness among all experts that this resistance can no longer be upheld in the face of population pressure, dilapidated housing, the lack of infrastructure, as well as the urge of many young Ethiopians to live a modern life. In the long run, this resistance will lead to an overwhelming tension between urban vision and conservative urban society, and eventually to disaster. So, while the experts agree that resistance is not an acceptable pathway they are divided on how a compromise between past and future can be reached. There seem to be two factions: one that believes that creating a new society is possible through the erection of new cities (tabula rasa) and one that believes that there should be a compromise between plans and reality. The latter faction is supported by learning, mitigation and adaptation.

The only conception of resilience that does accommodate change in this study is durable or tfai (cf. Section 5.1.3). Expert 06 describes tfai as “adjusting her or himself without creating a big deal” (e-mail, 22 January 2018). tfai also translates as “tolerant” and “patient” (Abyssinica Dictionary, 2018), which has a striking resemblance with what Marianne De Laet and Annemarie Mol call “fluid” in their analysis of the Zimbabwe Bush Pump: “an object that isn’t to rigorously bounded, that doesn’t impose itself but tries to serve, that is adaptable, flexible and responsive” (Abyssinica Dictionary, 2018, p. 226). tfai and “fluid” indicate a resilience that is not only built on flexibility and tolerance but also on trying not to impose itself on others. Here, it is possible to see an overlap with the perceived pathway to resilience adaptation, which the experts describe as reactive and non-invasive, based on flexibility, acceptance and voluntary action.

6.2 Adjusting pathways: discourse with existing resilience theory

The analysis of the interviews reveals that the perceptions of the Ethiopian experts overlap to some degree with existing resilience theory. However, some resilience terms need some significant adjusting to allow for the local perspective. In Section 3, the authors review existing resilience theory and refer to three pathways to resilience, i.e., mechanisms of system change: persistence, transition and transformation (Meerow et al., 2016). However, all three actually presuppose a will to create resilience. When comparing the findings of Section 5.2 against these pathways, two differences become apparent: first, the study identifies five pathways to resilience. Second, not all of these pathways can actually be recognised as strategic pathways towards resilience.

The first two perceived pathways identified by the authors are tabula rasa and learning. Both pathways are strategic and aimed at improving the functionality and image of the city and therefore cannot at first glance both fall under what Meerow et al. (2016) call transformation. However, when the concept of transformation is scrutinised in the literature on urban resilience theory, it is evident that transformation has the goal of retaining “essentially the same function, structure, identity, and feedbacks” of the system (Walker et al., 2004, p. 5). Since the Ethiopian experts repeatedly emphasise that the aim of tabula rasa is to create a new, modern identity for Addis Ababa as well as a new, modern society, the authors...
of this paper conclude that *tabula rasa* cannot be included in among the group of pathways to resilience. This finding stands in opposition to that position upheld by Meerow *et al.* (2016) whose pathways consist of persistence, transition and transformation. Instead an entirely new urban system is created, and as of yet, nobody can know whether it will be resilient or not. Learning, on the other hand, resembles the characteristics of what Folke *et al.* (2010) call active transformation: It "open[s] up opportunities for re-evaluating the current situation, […] recombine[s] sources of experience and knowledge for learning, and spark[s] novelty and innovation" (p. 5). For an overview of the concepts included in each pathway, see Table I.

At first glance, the categorisation of resistance identified in this paper seems to overlap with what Meerow *et al.* (2016) call persistence in that it favours maintenance of status quo over change. However, again, the goal of resistance, as perceived by the Ethiopian experts, is not to create a resilient system, i.e., to strategically preserve urban identity and functionality, but simply to preserve the status quo (Cherenet, 2015). Folke *et al.* (2010) call this pathway denial and explain how it is usually overcome: "Getting beyond the state of denial, particularly in SESs with strong identity or cultural beliefs, is not easy and often requires a shock or at least a perceived crisis" (p. 5). So what about the third pathway to resilience mentioned by Meerow *et al.* (2016) called transition? This pathway seems to be absent in the perception of the interviewees. There is no gradual, yet strategic, pathway of dealing with change. A reason for this might be that all interviewees find that the physical structure of Addis Ababa’s old neighbourhood is no longer acceptable for its inhabitants, so they opt for upgrading (learning) or complete makeover (*tabula rasa*).

Adaptation as described in the interviews, on the other hand, is a reaction. One expert explicitly refers to incremental adaption to change, which would suggest a family connection to transition (c.f. Meerow *et al.* (2016)). The key aspect here is its non-strategic and reactive character. While adaptation does not really play a role in urban politics (Kegler, 2014), it is an immanent and relevant part of resilience theory: Holling (1973) first describes the adaptive cycle, and several authors following his theory highlight how understanding the adaptive cycle and its feedbacks will help to practically implement sustainable urban development (Du Plessis, 2008; Wu and Wu, 2013; Kegler, 2014). The authors of this paper are convinced that this particular research area could – and should – interest urban researchers and practitioners further as one key to overcoming resistance without a shock (Folke *et al.*, 2010).

Finally, practices of mitigation are mentioned by almost all of the interviewed experts. However, mitigation as described in this paper cannot be integrated into the hierarchy of "pathways to resilience" as described by Meerow *et al.* (2016), as it does not strategically target the maintenance of an urban system. It is also not quite the same mitigation-concept that Kegler (2014) describes as active and preventive. However, he highlights how important mitigation mechanisms are within an urban system to buffer future impacts of climate change, urbanisation and industrialisation (Kegler, 2014). Mitigation as perceived by the expert is a way of coping with the effects of change based on past experiences. Therefore, to strengthen, strategically engage and to expand these mechanisms, as long as there is no state-run mitigation system available, should be a key aspect of an urban resilience strategy for Addis Ababa. According to Harald Kegler, there is little room for mitigation in pathways that are targeted at overcoming the system like *tabula rasa*. This reinforces the authors’ conclusion of excluding *tabula rasa* from the group of pathways to resilience.

7. Conclusion

This study shows conceptions of urban resilience and perceived pathways to urban resilience in the urban expert community of Addis Ababa, Ethiopia. The findings of this study generally support the definitions and pathways to urban resilience that were developed by western academia. However, the study also highlights that the definitions and strategies developed in the west are not universal but local. Several important differences
are revealed by the study regarding the perception of and pathways to resilience that need to be incorporated when in the Ethiopian context.

Current urban resilience literature is constantly trying to become more precise and trying to develop a universal canon of definitions as well as analysis and implementation strategies. The study at hand contributes to the extant literature by providing a local perspective that highlights that there cannot and should not be a universal understanding of urban resilience. While certain terms such as transformation, transition and persistence should remain universal, their accuracy and capacity need to be adjusted to the respective local context. Only in so doing can urban resilience strategies be successful. Using the example of Ethiopia, this study also demonstrates how much more research needs to be done outside Europe or America to make urban resilience a truly global movement.

Notes
1. Viruru and Cannella (2006) point out that speaking in English is a re-enforcement of western hegemony and hence often unsuitable to express non-western phenomena.
2. The experts remain vague when referring to an “urban society”. Usually, the interviewees use the word “we” to refer to it. This implies an exclusion of the federal government of Ethiopia and Addis Ababa city council, as well as foreigners who are referred to as “they”. This society has a specific urban identity that is rooted in Addis Ababa’s history.

References


Further reading


Appendix

<table>
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Table AII. Overview of interviews

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<td>6</td>
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Table AI. Occupational area of experts
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Sustainability ratings in residential development: a worthwhile endeavour?

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Madeline Judge and Angela Paladino
Faculty of Business and Economics, University of Melbourne, Melbourne, Australia

Abstract
Purpose – Rating tools for the built environment were designed to engage consumers and enhance sustainability and resilience. However, the intended outcomes of these rating systems appear to have limited implementation in the residential new housing market in Australia. The purpose of this paper is to investigate consumers’ motivations and experiences who have purchased houses that are situated in a sustainability-based certified development and will have been required to comply with mandatory dwelling certification.

Design/methodology/approach – The paper explores the awareness and perception of sustainability ratings and whether the motivations for purchasing in the sustainably certified development have heightened their awareness of sustainability and the resilience of new housing. This has been investigated through a pilot study of consumers who have purchased land in a certified estate and built a new home, through an online survey.

Findings – The findings reveal that the rating systems are at present not having the desired influence as first thought; that is, to inform consumers of the sustainability of a dwelling or property and to instigate trust of the environmental credentials of the property.

Research limitations/implications – This illuminating case study of participants who have purchased a sustainable rated development demonstrates that regardless of their concern for environmental issues, consumers have both low awareness and trust in the ratings. Despite this, consumers do seek value from these credentials to the overall property.

Originality/value – This study aims to illustrate the disconnect in engagement between developers, builders and new home buyers in relation to sustainability certification and implementation.

Keywords Sustainability, Housing, Consumer decision-making, Residential development, Sustainability rating tools

Paper type Research paper

Introduction
There is an increasing need to enhance the sustainability of the built environment. This is due to it being a substantial consumer of limited resources, materials and energy; while also contributing greatly to emissions during construction and operation. Residential buildings globally contribute somewhere in the order of 17 per cent to carbon dioxide emissions and consume 27 per cent of energy, and the building sector per se, accounts for 40 per cent of global energy consumption with anticipated increases expected (Najet et al., 2015). Further one third of the world’s energy-related greenhouse gas emissions are attributable to buildings (Robert and Kummert, 2012). The building sector in Australia is responsible for 45 per cent of annual energy consumption, 40 per cent of raw energy consumption, 12 per cent of water consumption and in addition produces 44 per cent of the nation’s solid waste (Pitt and Sherry, 2014; Hayles and Holdsworth, 2008). There are in excess of 200,000 new homes built each year in Australia (Housing Industry Association Economics, 2015) and with each new home the social,
economic and environmental repercussions of their current construction approach in regards to the level of sustainability are locked in and will impact current and future generations in Australia for the next 50–100 years.

Rating tools have been developed to assist in the measurement of sustainability objectives and provide a communication platform with consumers. However, the use and desire by consumers of sustainability certifications in new housing is limited, with builders and other stakeholders blaming the consumer for a lack of interest and not willing to pay for a more sustainable dwelling (Pitt and Sherry, 2014). This project seeks to understand the awareness, motivations and experiences of people who have purchased certified houses in voluntary certified sustainable developments. Specifically, this project will investigate consumers’ preferences in relation to the home, neighbourhood and sustainability. Further, it will examine their awareness of the variety of rating systems available in the market for homes and developments and whether these influence perception, trust, willingness to pay and value. There is only one mandatory rating for residential new homes in Australia and at this stage sustainability certifications for developments are voluntary. There are advantages in the sustainability certification programs, particularly when thorough third-party verification systems are used which reduces the moral hazard potential for misinformation provided to consumers. As the third-party verification is perceived to provide independent verification and endorsement of sustainability credentials. Further, voluntary certifications can be used by developers to advertise the sustainable characteristics of the development, potentially enhancing marketing edge and appealing to consumer desire for sustainability. This has the potential to enhance the resilience of these new urban communities.

This paper reports on a pilot project, which seeks to understand new home buyers (consumers)[1] desire for sustainability attributes, incorporated into the design of their homes and the overall development. This research does this through investigating the following research questions:

**RQ1.** What awareness do housing consumers have of the rating tools?

**RQ2.** Does being an environmentally friendly consumers drive decision-making for more sustainable housing choices?

**RQ3.** What do consumers want in a home and does this align with the rating systems available?

The investigation is centred on an understanding of the awareness, value and willingness to pay for attaining a dwelling in a certified estate. The results contribute to the extant literature examining consumers’ engagement, motivation and decision-making in relation to sustainability. They elucidate our understanding of pro-environmental behaviour and examine why people want to buy “sustainable housing”, what design features are preferred, and what values are placed on more sustainable community living and housing. This has practical implications for the development industry and government.

**Background**

Australia has a complexity of issues facing the housing sector, from housing affordability and urban sprawl to housing sustainability and responding to the challenges of climate change. These issues are not singular to the Australian environment but are widespread across developed countries. However, Australia’s dwelling energy efficiency and sustainability levels lags behind other developed nations, particularly in relation to new homes (CSR, 2014; Obst, 2015). The prolific development of sustainability and energy efficiency rating tools have developed over the past two decades in an attempt to engage consumers in the sustainability agenda. Further, the rating systems developed
in the Australian context have been designed to create an effective “third-party” verification system. Done to provide a way in which to avoid misinterpretation of sustainability or energy efficiency characteristics and quality, and to prevent potential market mistrust or failure through incomplete knowledge, understanding or information provided (Akerlof, 1970). Although a range of rating systems in the Australian context, comprising both mandatory and voluntary approaches to sustainability (and/or energy efficiency) appear to be having only incremental effects in terms of market penetration and engagement; perhaps still due to the limited awareness, knowledge and trust in the certification schemes. As recent research suggests, there is a perception by builders that consumers (home buyers) disengagement with sustainability and energy efficiency is one of the key barriers to enhanced sustainability in the new home sector (Pitt and Sherry, 2014).

Various mechanisms have been created to increase the sustainability of dwellings in Australia. These mechanisms comprise both mandatory requirements and voluntary schemes. For the new housing market, there is a mandatory requirement under the National Construction Code that new dwellings must meet a six star energy efficiency rating under the Nationwide House Energy Rating Scheme (DweTool1). However, the mandatory requirements, as evidenced by Pitt and Sherry (2014), Burke (2011) and Jewell (2015), have not necessarily produced and enhanced the designed level of sustainability and energy efficiency implementation in new housing. Aside from the mandatory requirement, which only examines the dwellings designed thermal performance, there are a range of voluntary tools which are used in order to increase awareness and engagement, reward best practice and to create better developments and dwellings. A sample of these voluntary tools, which have been allocated pseudonyms for the purpose of this research, include DweTool2 (for dwellings) and for the development certifications DevTool1, DevTool2 and DevTool3 (as shown in Table I).

One of the barriers identified by Pitt and Sherry (2014) was consumers’ lack of engagement and willingness to pay for sustainability and energy efficiency requirements and opportunities. Albeit this perspective was provided by other stakeholders involved in the construction process, yet the report did not survey the actual consumers. Studies which have examined consumer demand and engagement in sustainability; have found homeowners, home buyers and prospective purchasers do seek sustainability attributes (Buys et al., 2005; Sitar and Krajnc, 2008; Mandell and Wilhelms, 2011). However, other studies have demonstrated that a lack of knowledge, education and awareness of sustainability opportunities together with unknown cost implications prevents their greater engagement in sustainability initiatives in the home (see e.g. Warren-Myers et al., 2012; Dalton et al., 2008; Crabtree and Hes, 2009; Crabtree, 2006; Williams and Dair, 2007). In the renovation of homes, Warren-Myers et al. (2012) found visible sustainable features, like solar panels, were preferred over more economical features like insulation. Indeed, Paladino and Pandit (2010) also found this for consumers of green power. Consumers sought some form of visible acknowledgement for doing the “right thing” and purchasing green power. This suggests that sustainability and energy efficiency features have some tacit relationship

<table>
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Table I. Rating tool summary information
with identity and its display to others. This is supported by Brekke and McNeill (2003), who proffer that consumption of particular goods are visible signals of identity and are displayed to confirm oneself as a “good” member of society. In this scenario, housing becomes an identity signal. Brekke and Howarth (2002) surmise that housing style and display is tantamount to your income, and consequently the ability of those wanting to achieve affluence, mimic housing standards of the “rich”. However, although consumers often consider sustainability, it is often the focus of those high socioeconomic members of society. In contrast, for the general population, sustainability is not considered due to perceptions of high cost and lack of knowledge (Eves and Kippes, 2010; Hurth, 2010).

The costs of sustainability are perceived as a major barrier to homeowners, limiting their desire and willingness to pay for sustainability and energy efficiency features (Dalton et al., 2008; Maller et al., 2011; Warren-Myers et al., 2012). Examining the cost implications and weighing up the benefits perceived and received requires knowledge and information. This information unfortunately is in short supply from new homebuilders through their websites and in standard inclusions for new homes (Warren-Myers and McRae, 2017; Warren-Myers et al., 2017), limiting capacity for home buyers to justify the possible costs to receive the benefits, if there are “additional” costs per se. This is further compounded by the uncertainty of whether there is any value add as a result of the sustainable features incorporated in homes.

Recent study by Fuerst and Warren-Myers (2018) who examined the Australian Capital Territory (ACT) found significant results that energy efficiency ratings and certain sustainable features demonstrated a value premium in both sales and rental prices. This supports the previous study done by the ABS (2008) and confers with international studies that identify value in sustainability certification and energy efficiency features for residential markets (see Brounen and Kok, 2011; Fuerst et al., 2015; Feige et al., 2013). The ABS (2008) study found a linear relationship where incremental premium was achieved for each half star in the certification. Fuerst and Warren-Myers (2018) also found premiums associated with the higher star ratings for both sales and rentals, identified two interesting aspects of the rating. First, the sales market did not demonstrate a linear relationship, instead a premium peak was found at seven stars, (one star above the mandatory six star requirement for new homes), which the authors suggest may be evidence of satisficing. Where known standards for new homes is six stars, so there is a desire to be better than the standard. There were also premiums found for particular energy-related features within the home. The second aspect discovered was the loopholes in the mandatory disclosure within the rental market, which the authors suggested had created a quasi-voluntary environment, having a greater impact on premiums and identifying that particular features not only affected the value in the home but also increased disclosure. Further the quasi-voluntary nature of the system in the rating sector actually demonstrated stronger premiums for those properties with certification, once non-disclosure was taken into account. The key imperative of ascertaining whether a market will value a certification is strongly based on consumer awareness and the level of disclosure. As the ACT has the longest running disclosure programme globally and the requirement to display the rating on any advertising material and provide the certification in the Contract of Sale has likely had a strong influence on engagement by consumers. These studies do demonstrate in the Australian market the potential for both voluntary and mandatory rating tool programs, with the key element being how this information is communicated with consumers. In the ACT all ratings are required to be displayed on advertising material, in particular the online housing websites, providing a high level of transparency but also another attribute in which consumers’ use to assess and compare properties. Which is not evident in other sales or rental advertisements in other states of Australia.
Awareness and knowledge play a significant role in consumers’ decision-making and willingness to pay for sustainability, and there is evidence to suggest this has a relationship with identity signalling. This research investigates a group of new home buyers (consumers) who have specifically purchased in an environmentally certified estate, and investigates whether they demonstrate increased awareness, value and willingness to pay for sustainability certifications due to the choices they have made.

Method
This paper reports on the pilot study of consumers who have purchased a new home in an estate that has been certified using a sustainability certification. The sample was collected through developers who chose to certify their estates through a mainstream certification programme. The developers assisted in the survey dissemination to maintain anonymity of their customers. As such, they sent out an e-mail to their broad client database and included an explanatory e-mail about the research, endorsed by the organisation with a link to the survey.

The purpose of the survey was to investigate: new home buyers (consumers) awareness and perception of the different rating systems; their understanding and awareness of the certifications their own properties are subject to; and whether the attributes they identify as important align with the designed rating tools available. The theoretical framework is underpinned by applying consumer based approaches that examines brand image and customers willingness to pay, although much of the extant literature applies this to low-cost retail goods (Anselmsson et al., 2014). This research applies the framework to a high-cost good. In particular the survey investigates awareness and familiarity (Ba and Pavlou, 2002); perception (Lassar et al., 1995); trust (Doney and Cannon, 1997) that contribute to willingness to pay in conjunction with environmental concern or consumerism (Hansla et al., 2008) to build a greater understanding of what drives more sustainable action and purchasing in relation to rating tools and housing.

The research approach utilised an online survey, as this was the pilot study for a proposed much larger study. The investigation process was designed with this in mind, in order to create greater ease in data gathering of the proposed much larger sample (future research), which would then also provide automation to data handling and would be low cost (Andrews et al., 2003). Further, given the length of the survey, the online platform allows for saving of the survey for later completion, which is noted as one of the benefits of online surveys (Smith, 1997). The survey based in an online environment focused on utilising structured and closed-ended questions, with several free response options to provide greater depth, perception and understanding of responses provided after the closed response questions. This has been noted as a successful approach where research has demonstrated that 70 per cent of respondents often provide further information and explanations through the open ended question/s provided after structured responses (Andrews et al., 2002).

This research investigates five commonly used rating systems in Victoria; the tools have been allocated pseudonyms for the purposes of this study (Table I). Two rating tools relate only to the dwelling, with one focusing on the thermal performance of the dwelling through assessment of the design features and also has a mandatory requirement for new homes (DweTool1). The other tool is performance based assessing the energy efficiency of the home (DweTool2). There are three rating tools that assess the sustainability and environmental attributes of the development; these are DevTool1, DevTool2 and DevTool3. All three tools use a multi-assessment system of different sustainability and environmental categories, which then have subsequent individual criteria that are allocated points if achieved. As these are development tools they involve a combination of actual physical features to be included into the development, but also prescriptions for dwelling to be built.
in the development estate. For example, all homes have to reach a certain star rating and have water tanks.

The online survey used a range of different question types including open- and closed-ended questions; seven-point Likert scales; and ranking questions. This research was approved by relevant ethics committee and ethics protocols were maintained during the project. Analysis of the data was undertaken using predominately SPSS 24 and comprised descriptive statistics, factor analysis and correlations.

The survey was developed in several stages and took respondents approximately 30 min to complete. The sections that are reported in this paper comprise:

1. Introductory information – enquiring about the housing development they had purchased in, the builder who constructed their home; whether the home was for investment or owner occupation and if this was their first home. This comprised a combination of open questions allowing for free text response for example in the identification of builder and residential estate; and closed questions, that were highly structured, for example were they an owner occupier or investor; or a first home buyer or purchasing their second, third and fourth home.

2. Perception of housing attributes – investigated what level of importance consumers placed on certain characteristics and amenities associated with the dwelling, the neighbourhood and sustainability. These questions used an extensive list of characteristics for homes, sustainability attributes and features associated with neighbourhood amenities. These were chosen by the researchers from the literature, existing rating tools, known valuation and sales aspects. Participants had the additional option to provide their own suggestions.

3. Perceptions of housing certifications – investigated consumers’ perceptions of the different rating tools that are commonly known in the sector, namely DweTool1, DweTool2, DevTool1, DevTool2 and DevTool. The survey also showed the logo and investigated their familiarity with the logo, its representation and perceived value. These questions were structured using a seven-point Likert scale, 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neither, 5 = Somewhat Agree, 6 = Agree and 7 = Strongly Agree.

4. Current owners’ understanding of their homes’ certification – analysed consumers current knowledge of the ratings and certifications affecting the properties they had built and purchased. These questions again used a combination of structured response questions and where applicable the seven-point Likert scale was used.

5. Demographics – analysed the purchaser profile and household type. These questions comprised a combination of structured questions and some free response answers.

The consumer sample for this pilot study comprised 33 responses, elicited through the customer database of developers in Victoria, Australia, whose developments were voluntary sustainably certified projects. Respondents included in this list had purchased land within the certified estate and built a new home. Predominately 84 per cent of survey respondents bought land and built a new home, and only 16 per cent had at the point of the survey only purchased the land and were in the processing of building a new home. The distribution of experience in housing found that 30 per cent were first home buyers, and for 39 per cent this comprised their third (or more) purchase of a new home. The profile of certified developments participants is shown in Table II.
Results

The results section is structured as follows: analysis of consumers’ awareness and perception of common housing sustainability certifications; examination of consumers’ awareness of their own dwelling and development certifications; and analysis of the housing characteristics consumers seek.

Consumer awareness and perception of common housing sustainability certifications

The survey sought to investigate consumers’ awareness and perception of the different environmental rating schemes that are commonly used in new housing, either through the dwelling itself or the development. In examining perceptions related to the ratings tools, participants were asked to respond to the following questions using a seven-point Likert scale (1 = Strongly Disagree, 4 = Neither and 7 = Strongly agree):

1. I am familiar with this logo;
2. This logo represents a requirement for high environmental standards;
3. I do not know what this logo represents;
4. I trust this logo;
5. I would pay more to purchase a property with this logo; and
6. I believe the resale value of my home will be better with this logo.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>%</th>
<th>Housing choice information</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td>Type of purchase</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>64</td>
<td>Purchased and built a new dwelling</td>
<td>84</td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>Only purchased a parcel of land</td>
<td>16</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>Purpose of Purchase</td>
<td></td>
</tr>
<tr>
<td>Below 30</td>
<td>6</td>
<td>Personal occupancy</td>
<td>84</td>
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<tr>
<td>30–45</td>
<td>58</td>
<td>Investment</td>
<td>9</td>
</tr>
<tr>
<td>Above 45</td>
<td>36</td>
<td>Other</td>
<td>6</td>
</tr>
<tr>
<td>Nationality: Australian</td>
<td>100</td>
<td>Other</td>
<td>6</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>Housing Experience</td>
<td></td>
</tr>
<tr>
<td>Some high school</td>
<td>9</td>
<td>First home</td>
<td>30</td>
</tr>
<tr>
<td>High school graduate</td>
<td>6</td>
<td>Second home</td>
<td>12</td>
</tr>
<tr>
<td>Some university</td>
<td>9</td>
<td>Third home (or more)</td>
<td>39</td>
</tr>
<tr>
<td>Trade certificate</td>
<td>15</td>
<td>First investment</td>
<td>12</td>
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<tr>
<td>Bachelor degree</td>
<td>31</td>
<td>Second investment</td>
<td>3</td>
</tr>
<tr>
<td>Master degree</td>
<td>27</td>
<td>Third investment (or more)</td>
<td>3</td>
</tr>
<tr>
<td>Doctorate</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td>Consumer identified developments³</td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>73</td>
<td>Dev 1</td>
<td>3</td>
</tr>
<tr>
<td>Part-time</td>
<td>15</td>
<td>Dev 2</td>
<td>36</td>
</tr>
<tr>
<td>Unemployed</td>
<td>6</td>
<td>Dev 3</td>
<td>15</td>
</tr>
<tr>
<td>Retired</td>
<td>3</td>
<td>Dev 4</td>
<td>3</td>
</tr>
<tr>
<td>Student</td>
<td>3</td>
<td>Dev 5</td>
<td>6</td>
</tr>
<tr>
<td>Annual household income</td>
<td></td>
<td>Dev 6</td>
<td>3</td>
</tr>
<tr>
<td>$0–$20,799</td>
<td>3</td>
<td>Dev 7</td>
<td>3</td>
</tr>
<tr>
<td>$20,800–$51,999</td>
<td>9</td>
<td>Dev 8</td>
<td>24</td>
</tr>
<tr>
<td>$52,000–$103,999</td>
<td>31</td>
<td>Not disclosed</td>
<td>6</td>
</tr>
<tr>
<td>$104,000–$181,999</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$182,000 +</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table II. Summary statistics

Note: ⁠³A pseudonym has been used to protect the identity of the consumers’ certified developments.
To analyse consumers’ responses about the rating tools Cronbach’s α was used to test six items as noted below for reliability, achieving a score of 0.93. An overview of the analysis across the questions is shown in Table III.

The analysis found that consumers’ familiarity with the different rating tools overall tended towards the “not familiar” end, (“not familiar” being the lower end of the Likert scale 1–3) compared to consumers “familiarity” (being the upper end of the Likert scale 5–7). There was an increasingly greater proportion of “neither” (Likert scale = 4) noted. Specifically, DweTool1 had 46 per cent of responses unfamiliar, DevTool1 64 per cent and DevTool2 55 per cent. The dwelling rating DweTool1 had the highest level of familiarity and awareness with 42 per cent as shown in Figure 1. Likely due to its compulsory nature that all new dwellings are required to achieve a 6 star DweTool1 rating under the National Construction Code and the length of time this particular system has been used in the residential sector. Familiarity with the two development rating tools was similar, with only 27 per cent DevTool1 and DevTool2 24 per cent. The second most familiar tool was DevTool1 (27 per cent), which given respondents were selectively sampled from DevTool1 estates, this was expected to be significantly higher. Although the developments were not DevTool2 certified, the awareness of the DevTool2 tool was only slightly less than the DevTool1.

To examine whether housing consumers had a pro-environmental attitude that might affect the responses and drive a stronger sustainability emphasis in the results, respondents were asked if they thought of themselves as an environmentally friendly consumer. The consideration of self-reporting environmental identity has been much discussed as whether reported opinions and actual actions match, as noted by Young et al. (2009). However, the purpose in this project was to ascertain whether the consumers’ perceived themselves to be

<table>
<thead>
<tr>
<th>Rating tool</th>
<th>Familiarity (Q1)</th>
<th>High environmental standards (Q2)</th>
<th>Donot know logo (Q3)</th>
<th>Trust logo (Q4)</th>
<th>Pay more (Q5)</th>
<th>Higher resale value (Q6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DweTool1</td>
<td>3.5 2.3</td>
<td>1.8</td>
<td>3.9 1.9</td>
<td>3.5 1.8</td>
<td>3.8 1.9</td>
<td>3.5 1.6</td>
</tr>
<tr>
<td>DevTool2</td>
<td>3.0 1.9</td>
<td>1.7</td>
<td>4.5 2.1</td>
<td>3.8 1.6</td>
<td>3.3 1.6</td>
<td>3.5 1.6</td>
</tr>
<tr>
<td>DevTool1</td>
<td>2.9 2.1</td>
<td>1.8</td>
<td>4.6 2.4</td>
<td>3.8 1.6</td>
<td>3.3 1.7</td>
<td>3.5 1.8</td>
</tr>
<tr>
<td>DweTool2</td>
<td>2.2 1.7</td>
<td>1.6</td>
<td>4.9 2.2</td>
<td>3.4 1.6</td>
<td>3.1 1.5</td>
<td>3.2 1.6</td>
</tr>
<tr>
<td>DevTool3</td>
<td>1.6 1.0</td>
<td>1.3</td>
<td>5.3 2.1</td>
<td>3.0 1.4</td>
<td>2.9 1.4</td>
<td>3.0 1.5</td>
</tr>
</tbody>
</table>

Table III.
Rating tool question descriptive statistics

Figure 1.
Familiarity with the different certifications
environmentally friendly, in order to interogate and interpret the other responses in terms of their familiarity with rating systems and subsequent decision-making observations (Caruana et al., 2016).

The results identified that the majority identified themselves as environmentally friendly consumers (79 per cent, mean = 5.4); and considered themselves to be very concerned with environmental issues (76 per cent, mean = 5.3). The responses were highly positive as shown in Figure 2, indicating that the sample demonstrated a bias towards being environmentally considerate and the distribution of the responses demonstrated by the positive skew. The results would suggest that the majority of respondents to this survey believe themselves to be both an environmentally friendly consumer and also think of themselves as someone who is concerned about the environment. This information was used to further test the responses to familiarity, perception of high environmental standards, trust, willingness to pay and value.

Using the non-parametric two-tailed Spearman’s model to test for correlations, it was found that there was a significant relationship (at 0.01 level) between DevTool2 and DweTool1 ratings; DevTool2 and DevTool1 (which explains the similarities in results) ($r(33) = 0.415$, $p = 0.016$). A significant correlation was found between the three lesser-known tools DweTool2 and DevTool3 and also with DevTool1. There was not, however, a significant relationship between DweTool1 and DevTool1, only with DevTool2, which is interesting because consumers in these estates have certified DweTool1 homes in a DevTool1 certified estate, yet this does not have significant correlation.

In the examination of consumers’ perception of whether rating systems represented high environmental standards, Table IV demonstrates the relationship between familiarity with the tools and perception of perceived high environmental standards. DweTool1 had the

<table>
<thead>
<tr>
<th>Rating tool</th>
<th>Familiarity (Q1)</th>
<th>High environmental standards (Q2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>DweTool1</td>
<td>3.5</td>
<td>2.3</td>
</tr>
<tr>
<td>DevTool2</td>
<td>3.0</td>
<td>1.9</td>
</tr>
<tr>
<td>DevTool1</td>
<td>2.9</td>
<td>2.1</td>
</tr>
<tr>
<td>DweTool2</td>
<td>2.2</td>
<td>1.7</td>
</tr>
<tr>
<td>DevTool3</td>
<td>1.6</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Figure 2. Consumers’ perception as to type of consumer and environmental concern

Table IV. Rating tool question 1 and 2 comparison
highest “agree” frequency of 42 per cent of respondents with a mean of 4.0. While DevTool1 and DevTool2 achieving a frequency of 24 per cent agree, their mean results were 3.8 and 3.6, respectively. There was a substantially larger proportion of “neither” identified by respondents (except for DweTool1 and DevTool2, all the other ratings had 50 per cent or greater identifying “neither”), which may be related to their lack of familiarity with the rating systems, when tested using a $\chi^2$ test this was found to be significant.

DweTool1 was perceived to have high environmental standards, yet it did not align with the responses about consumers’ perceived trust in the environmental certification, with only 36 per cent indicating that they trusted the certification (mean = 3.9). Further consumers’ willingness to pay more for a dwelling with a DweTool1 rating was only a third of respondents (mean = 3.5). Yet, 42 per cent (mean = 3.8) indicated they believed a DweTool1 rating would increase the resale value of their home. Overall, DweTool1 was the most familiar rating system and had the strongest responses from respondents across the six questions. This is not unsurprising as the rating is a mandatory requirement for new homes, and all of the participants were building new homes in new residential estates. Whereas the other rating systems are undertaken on a voluntary basis by the developer or builder, and subsequently is highly dependent on the builder or developer’s approach for informing consumers and marketing the rating, given the purposeful sampling from a certified development (DevTool1) it is surprising the tool did not receive stronger results. As demonstrated in Table V, the increase in participants choosing “Neither” for questions 4 (trust in the rating), 5 (willingness to pay more) and 6 (increase resale value in the home) increases and comprises the majority answer for most of the rating tools, with the exception of DweTool1. This suggests that consumers perhaps are not engaged in trusting the rating system or paying more to have the rating. This may be attributable to their lack of awareness. Yet interestingly, question 6, which was their perception that the rating would increase the resale value their home had a slight increase in frequency of response over their willingness to pay. So consumers are suggesting they perceive a greater value in homes that have a rating in the future, but are not willing to pay to acquire the rating.

**Consumer awareness of their own dwelling and development certifications**

When asked whether consumers were aware of the rating their home and development had achieved, there was a high proportion of participants who were unaware of the rating (46 per cent for the dwelling; 43 per cent for the development) or thought their dwelling and development did not have a rating (15 per cent).

Participants were firstly asked about whether they knew what certification their development had. Only 42 per cent were aware of the rating the development had, 43 per cent did not know if there was a rating and 15 per cent indicated there was not a rating. These results are interesting to note, because the sample chosen for this survey, were selectively chosen from developments that had been certified. Additional fieldwork was undertaken investigating the developments where the majority of respondents had noted they had purchased in. Information provided to potential purchasers was spot checked

<table>
<thead>
<tr>
<th>Rating</th>
<th>Disagree (%)</th>
<th>Neither (%)</th>
<th>Agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q4</td>
<td>Q5</td>
<td>Q6</td>
</tr>
<tr>
<td>DweTool1</td>
<td>27</td>
<td>30</td>
<td>27</td>
</tr>
<tr>
<td>DevTool2</td>
<td>22</td>
<td>36</td>
<td>27</td>
</tr>
<tr>
<td>DevTool1</td>
<td>21</td>
<td>38</td>
<td>27</td>
</tr>
<tr>
<td>DweTool2</td>
<td>33</td>
<td>42</td>
<td>36</td>
</tr>
<tr>
<td>DevTool3</td>
<td>42</td>
<td>39</td>
<td>39</td>
</tr>
</tbody>
</table>

**Table V.**
Rating tool questions 4, 5 and 6 frequency response analysis
physically through the display suites and websites of the developments. The developments comprised a residential subdivision that had applied for the sustainability certification. The developments investigated to check the type of information provided included Dev 2 a large subdivision situated in the growth areas of Melbourne (36 per cent respondents), Dev 8 a large subdivision in regional Victoria (25 per cent respondents), and Dev 3 is a small residential subdivision in the north eastern suburbs of Melbourne (15 per cent respondents). Physical investigation of the sales offices revealed that the level of information provided varied widely. Dev 2 had no information at all regarding the sustainability certification the development holds in either their physical display suite material or website. Dev 8 did have a logo and reference to the sustainability certification in their physical marketing brochure, and on their website a statement. However, there was no detail or information about what the certification meant or what categories the estate had been certified for or what the benefits or features this certification had. Conversely, an additional development in the area that was visited with the same sustainability certification did not refer to it in any printed material or on their websites. Only one development, Dev 3, the smallest development (15 per cent) had the certification logo on the front of the webpage and contained information about the certification categories and building requirements.

The consumers were then asked about the certification their home (dwelling) had, which all of these homes were required to meet the mandatory requirements set down in the building code, which is to achieve a six star DweTool1 rating. A similar lack of knowledge was demonstrated by the consumers in their knowledge of their home certification, with only 39 per cent noting they knew their dwelling had a rating, 46 per cent were unsure and 15 per cent did not think they had a rating.

The majority of these respondents were unaware of the certifications for both the development and the dwelling. The findings pertaining to the developments, which are voluntarily certified, are highly dependent on the developers’ communication with the purchasers. Consequently, this lack of awareness may be linked to poor communication between developers and purchasers. In contrast, the mandatory requirements for the dwellings had an unusual parallel, given the high awareness of DweTool1 in the previous section. Here consumers lacked awareness of the actual certification that their dwelling had. However, when asked about their awareness of the federal government minimum requirements for a dwelling under the Building Code of Australia for energy efficiency, 70 per cent said that they were aware of this. This illustrates a clear disconnect between the concept of the rating and the actual code requirements for consumers. Alternatively, it could point to the significant influence of government in guiding awareness, garnering trust and being the custodian of a ratings scheme. This is similar to findings found by Smith and Paladino (2010) for organic food certification schemes.

**Ratings and the effect on decision-making**

The findings so far contrast significantly to participant statements in relation to how certifications affect decision making. Low levels of awareness, trust and identification of whether their own properties had a rating would suggest that the certifications did not play a significant role in their choices. The role of certifications in decision-making was investigated in the survey. Using a seven-point Likert scale, participants were asked to agree or disagree with the following statements:

1. The sustainability certification played a role in my decision to purchase property.
2. I was willing to pay more for my property because it had a sustainability certification.
3. The sustainability certification played a role in the type of house I have built.
(4) The sustainability certification has changed the way in which I use and occupy my dwelling.

(5) I believe the sustainability certification has increased the resale value of my property and/or dwelling.

Figure 3 depicts the results about how sustainability certification and its role influenced their decisions and attitudes. These results reflect a subset of participants who identified that they were aware that their dwelling and development had a rating.

The first question as to whether the sustainability certification played a role in their decision to purchase the property had the highest positive response, with 44% of respondents agreeing or strongly agreeing with this (mean = 4.1). In total, 32% of responses indicated they agreed that the type of home and certification had affected the way in which they used their home (mean = 4.1). Only 36% of respondents indicated they would be willing-to-pay more for a certification (mean = 3.9). In total, 52% respondents believed that certification would increase the value of the property (mean = 4.7).

Housing characteristics consumers seek
Investigation into consumers’ preferences for different characteristics when choosing a home were sub-categorised into characteristics pertaining to the dwelling, neighbourhood and sustainability. The characteristics desired in a home were ranked based on frequency of consumers’ designation of high importance (Likert scale rating 5–7), as shown in Table VI. Findings show consumer preferences for characteristics in the dwelling, in the neighbourhood and regarding sustainability. The purpose of investigating what consumers’ want in a home was to identify what desirable elements align with the certifications, which could assist in promoting a particular certification. In doing so, new opportunities for demand are identified. The lists were compiled from existing rating tools, marketing media used to sell estates and homes and known attributes considered of value in a home.

When turning our attention to particular dwelling attributes, “comfort” was identified as the most important attribute of a home, followed by quality build and then low bills. Price came seventh despite being traditionally identified as an important consideration. Neighbourhood attributes that were deemed important were the walkability of the neighbourhood, proximity to parks and then transport. These characteristics are often highlighted in the marketing of developments with a strong focus on open space provisions.

![Figure 3. The effect of certification on decision-making](image-url)
The sustainability characteristics that were identified as the most important were LED lighting and energy efficient features, followed by increased insulation. These two items have a relationship with low bills in the dwelling characteristic considerations, and the LED lights, which represents a link to aesthetic function. Table VI lists these results.

When re-examining the data across the different characteristics associated with the dwelling, neighbourhood and sustainability, we also restricted the analysis to those who identified those categories to be of high importance. To do this, we combined the housing, sustainability and neighbourhood attributes. Table VII depicts these findings. The order of importance demonstrated some change, noting dwelling comfort and quality build still outweighed other attributes. However, sustainability characteristics, such as LED lighting and energy efficiency, featured more prominently. Similarly, proximity to parks (a neighbourhood characteristics) ranked number 5 and provides an interesting profile of what participants look for in searching for a new home. The top ten most important characteristics consumers’ sought were: dwelling comfort; quality; and sustainability and proximity to parks.

Discussion
The need to increase the level of sustainability and resilience in the built environment is imperative. It is clear the developers and builders need to engage more with and encourage...
consumers to enhance and increase their demand for sustainability. Driving the suppliers to provide residential housing and estates that are more resilient, incorporating more sustainable homes and broader estates initiatives. This would then have the added benefit of reducing the need for future retrofitting or modification in the future of homes and residential areas.

Rating tools over the past two decades have facilitated the communication of sustainability characteristics of homes and estate developments. However, there is a lack of clear relationships between consumer engagement and rating tools to drive increased demand for sustainability. This research has investigated consumer awareness and knowledge of rating certifications, seeking to investigate the relationship between awareness, trust, value and willingness to pay for certifications. It also investigated whether the certifications played a role in the home selection choice and whether consumers were willing-to-pay more. An additional area of investigation was the alignment of current rating systems and consumer desires. An output of this study has been to identify current barriers to consumer engagement in sustainability certifications, which is limiting sustainability adoption in new homes and jeopardising future building resilience. It investigated a group of new home buyers who have specifically purchased in an environmentally certified estate, and the research uncovered that although many of the participants identified as “environmentally friendly”, there was limited awareness of sustainability certifications generally, low trust levels and a poor level of willingness to pay. Many of the participants who had purchased in a certified estate and built a certified home were unable to identify whether their home or development had a rating.

Despite collecting data from participants residing in certified estates and having built certified homes, the level of awareness of the rating for their development and dwelling was poor. Given respondent responses that the ratings have a role to play in their decision making, perceived value and resale implications, it was puzzling to see the lack of knowledge about the ratings they actually had for their dwelling and development. The lack of awareness supports findings by Warren-Myers (2017), who examined whether new home buyers (consumers) were provided with information pertaining to their six star rating for their dwelling (DweTool1). In the interviewed sample of 20 consumers, 25 per cent actually received a stamped plan or certificate indicating their six star rating. In contrast, online survey results found 48 per cent had been provided with some information at the conclusion of their build. Consequently, the provision of information regarding DweTool1 is scant and thereby may explain some of the low levels of knowledge exhibited about their respective dwelling certification. This was found in the spot investigation of the websites and display suites of the developments. As noted earlier, there was a lack of information and disclosure of the certification to potential purchasers of those from the certified estates; further from a dwelling perspective, this experience supports a large study of the Housing Industry of Australia’s Top 100 homebuilders’ websites and the limited amount of sustainability information communicated by Warren-Myers and McRae (2017). The lack of information could suggest a level of moral hazard, resulting in the distrust or lack of awareness demonstrated by consumers in this study. The voluntary tools, namely the development tools, are expensive for developers to acquire and comply with and are used primarily as a marketing tool to engage purchasers. However, consumers still exhibited a low awareness and trust in the certifications. In conjunction with poor levels of information provided, this indicates that substantial improvement in media and communication of certifications is required. The desire that consumers have to achieve sustainability is evident in the analysis. Despite this they are not seeking appropriate information and nor is it provided. There is opportunity here to increase the communication and provision of sustainability related information and to provide consumers with a better understanding of the benefits.
So, what are consumers looking for? A simple analysis of characteristics that consumers consider are important in new homes focused on comfort and quality building with sustainability considerations of LED lighting and energy efficiency featuring prominently, and proximity to parks another key consideration. The features were derived from commonly listed sustainability features, dwelling characteristics and neighbourhood amenities. In terms of how this aligns with existing tools, Table VIII demonstrates the alignment or misalignment with current important characteristics.

<table>
<thead>
<tr>
<th>Consumers</th>
<th>DwTool1</th>
<th>DwTool2</th>
<th>DevTool1 Multi</th>
<th>DevTool2 communities</th>
<th>DevTool3</th>
<th>Rating tool sustainability categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwelling comfort (1)</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Thermal comfort</td>
</tr>
<tr>
<td>Dwelling comfort (1)</td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Neighbourhood walkability (1)</td>
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<td>✔️</td>
<td></td>
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<td>Accessibility</td>
</tr>
<tr>
<td>Neighbourhood walkability (1)</td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Amenities</td>
</tr>
<tr>
<td>Neighbourhood walkability (1) Public transport (3)</td>
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<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td>Transport/ location</td>
</tr>
<tr>
<td>Sustainability LED lighting (1) EE features</td>
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<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td>Energy/ GHG</td>
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<tr>
<td>Double Glazing(6)</td>
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<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Materials</td>
</tr>
<tr>
<td>Solar hot Water(7)</td>
<td>✔️</td>
<td>✔️</td>
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<td>Land use</td>
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<td>Economic Prosperity</td>
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<td>✔️</td>
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<td></td>
<td>Water</td>
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<tr>
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<td>✔️</td>
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<td>Waste</td>
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<tr>
<td>Neighbourhood proximity to parks (2)</td>
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<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Management</td>
</tr>
<tr>
<td>Dwelling low bills (3)</td>
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<td>✔️</td>
<td></td>
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<td>Pollution/ Emissions</td>
</tr>
<tr>
<td>Dwelling and sustainability water saving and recycling (5)</td>
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<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td>Ecology</td>
</tr>
<tr>
<td>Neighbourhood community (4)</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Innovation and design process</td>
</tr>
<tr>
<td>Sustainability solar orientation (4)</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
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<td>Education</td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Community/ Culture</td>
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<tr>
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<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Engagement</td>
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<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Climate change</td>
</tr>
<tr>
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<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>resilience/adaption</td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Urban design</td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Safety</td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td>Heat island effects</td>
</tr>
</tbody>
</table>

Table VIII. The misalignment of rating systems and consumer desires.
consumers seek in a new home. The table details on the left-hand side the categories identified by consumers and the right-hand side details the list of sustainability categories across the rating tools. The notations within the table are where the rating tool categories align with desires of the consumers.

Results showed that decisions were primarily driven by a desire for comfort (as measured via thermal comfort and indoor environment quality). However, this has limited inclusion across the rating tools. When considering thermal comfort, the DweTool1 rating system ranking, currently used as a mandatory requirement for new homes is based on thermal performance. Features often associated with comfort include consideration of indoor environment quality. This aspect is a consideration for the DevTool2 and DevTool3 tools, which extend to include other comfort-based features like noise level considerations, volatile organic compounds or air quality, lighting levels, daylight, views and private external space. Therefore, from a consumer perspective, DevTool2 has multiple tool options and this aligns with their multi-tool[2], which would appear to be the most useful and best aligned with consumer needs and desires for sustainability in their home, yet unfortunately, this tool has now been removed and is no longer an operational option for developers or consumers to choose.

All rating tools appear to focus on energy, which does align somewhat with consumer desires and assists in creating a built environment that contributes to reducing energy consumption and emission production than its predecessors. Energy assessment has long been identified as a key element to focus on because of its tangible and measurable capacity in both kilowatt hours, carbon emissions and also cost. These tangible aspects have driven many of the rating systems for a variety of reasons, particularly because cost-benefit analysis can be performed. However, the development-based rating tools that focus on energy attributes for dwellings are likely to be less specific and are more guideline based, rather than include specific provisioning reflected in DweTool1 and DweTool2. A better-aligned rating tool may assist in creating touchpoints of consumer concern that will appeal to them and draw them to seek out ratings and encourage greater implementation and value for the rating tools for their new homes. By increasing the voluntary desire for rating tools, this should drive the desire and value for rating tools, which will hopefully result in and contribute to the creation of more sustainable homes and generate greater resilience of the new housing stock.

The findings of this research are limited by the small sample size, which limits the ability of generalising the implications of this research. As noted previously this is a pilot study, and the sample size and focused collection approach means there is a level of bias to contend with. To demonstrate the significance of these findings, this research needs to be expanded and enlarged to clarify and justify the research findings and their implications through a larger survey the findings. The findings of this pilot study will inform future research comprising an expanded version (larger sample size) and more in-depth survey developed to clarify and interrogate the particular findings demonstrated in this study. Further, the research will look to examine new home buyers (consumers) in the broader Australian housing market, who are building new homes, but not necessarily situated in sustainably certified estates.

**Limitations**

This study has a range of limitations. As it is a pilot study, the sample size is small, although it has provided an interesting perspective when considering the background of the sample. As all participants had purchased within a sustainability certified estate and built a home with a sustainability certification, it was surprising to note the low level of awareness. It was expected by the researchers that as consumers in this sample purchased
within a known sustainability certified estate this would potentially create a significant level of bias amongst the sample. This potential bias was perhaps noted in the responses to their level of environmental consumerism, yet this did not translate across to an increased awareness nor a majority knowing their home and development was sustainably certified. Due to the small sample and the possible bias, the generalisability of the findings is limited. However, the findings of the research demonstrate an important consideration for industry and government in the lack of awareness and knowledge consumers have on the rating systems, even though they have purchased at a voluntarily certified estate and built a home, which requires a mandatory rating. Future research and the expansion of this research will seek to remove the bias and examine consumers from a range of certified and non-certified estates.

Conclusion
This study demonstrates that consumers in sustainable developments like to believe that they are environmentally friendly consumers and that sustainability and environmental considerations play a role in their decision making. However, when actually purchasing a new home, this study demonstrates that even in a target sample where they have purchased within an estate with sustainable attributes and certification, there is little attention paid to certification in the process of purchasing a house. As a result, the objective of sustainability rating systems is to engage consumers in creating a more sustainable built environment, yet this is clearly not being achieved as shown in this study due to limited awareness and trust in certifications. This may be because of the lack of communication of the consumers of the existence of the rating and/or the known benefits of the rating. Given the desire to identify themselves as environmentally friendly consumers, to create greater engagement in sustainability ratings, better communication is required for consumers. Educating, demonstrating value and benefits, and engaging consumers in certification outcomes could potentially drive increased knowledge, awareness and value in the rating systems available.

The research also found that what consumers’ desire in a home is not often provided for within the rating systems. Many of these desires and needs are considered part of the sustainability spectrum and are identified across different rating systems, but not necessary within the same one. For developers, much could be done to better align future rating systems with actual wants, needs and desires of consumers, which might then engender greater engagement, uptake and value considerations for environmental ratings. Teamed with appropriate communication and education this might then allow for greater uptake of more sustainable dwellings in the future, reducing the environmental and emissions footprints created by new housing and a more resilient built environment for future generations. In conclusion, this study demonstrates the disconnect in engagement between developers, builders and new home buyers (consumers) in relation to sustainability certification and implementation. Further, the research suggests that rating tools are a worthwhile endeavour if, they are properly communicated to consumers to raise awareness, trust and understanding of the ratings; align the rating systems with consumers’ wants, needs and desires whilst achieving sustainability elements; provide direction to consumers as to the benefits and value both tangible and intangible.

Notes
1. Homebuyers are housing consumers, hereafter in this paper referred to as consumers.
2. This only deals with multi-unit developments at present and has subsequently been transferred to a legacy tool. It can no longer be used in this format.
References


**Further reading**


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Advancing real estate decision making: understanding known, unknown and unknowable risks

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School of Property, Construction and Project Management, RMIT University, Melbourne, Australia

Abstract

Purpose – Whilst existing literature on real estate risk management focuses almost exclusively on holistic risk management techniques, documented increases in frequency and magnitude of unforeseen, rare and extreme events can throw up sudden, unexpected shocks that can challenge recognised real estate decision-making strategies. The paper aims to discuss this issue.

Design/methodology/approach – To advance real estate decision-making practice in this area, this research paper takes the skillfully conceptualised downside risk framework presented by Diebold et al. (2010), being the known (K), the unknown (u) and the unknowable (U) risk categories, to provide a blueprint for effective real estate decision making in a changing global environment.

Findings – In recording categories of risk, managing uncertainty can be achieved by an interrelated approach of adaption, robustness and resilience. This is important part of a real estate manager’s decision-making toolkit as risk recognition and knowledge of KuU event categories can augment an effective management strategy.

Originality/value – The mastery of modern real estate risk management can be better served by understanding and managing extreme downside risk events. Creating a comprehensive risk management framework can enhance comparative real estate performance whereby unprepared competitors fail in a world increasingly affected by large, highly improbable and unpredictable events.

Keywords Risk management framework, Real estate performance, Extreme risk events, Real estate risk management

Paper type Conceptual paper

1. Introduction

The word “risk” originated from the early Italian risicare which means “to dare”. In this sense, risk is a choice of actions we dare to take. Since the beginning of recorded history, gambling is the very essence of risk taking that breaks through into the laws of probability. Whereas the modern concept of risk is rooted in the Hindu–Arabic numbering system, the academic study of risk initiated during the Renaissance. Until human discovered established risk boundaries, the future was a mirror of the past. Hence, the radical idea that defines the boundary between the past and the modern is the mastery of risk (Bernstein, 1996).

Modern risk theory is grounded in the literature concerned with known outcomes and probabilities, whereas the uncertainty means known outcomes but unknown probabilities. Risks can occur in either tails of an empirical distribution but the downside risk associated with the lower tail is the main focus in risk management literature (Granger, 2010). On a holistic perspective, there are four important points to remember in dealing with risk, namely (Edwards and Bowen, 2013, p. 11):

(1) probability that an event will occur;
(2) event and its nature;
Furthermore, Edwards and Bowen (2013) explained, it is hard to draw a clear distinction between risk and uncertainty. In a two-tailed risk definition, the risk is equated with uncertainty as in “if there is uncertainty there must be risk”. If the downside risk definition is used then the statement becomes “if there is risk there must be uncertainty, but if there is uncertainty there need not be risk” (Granger, 2010 p. 42). In simple terms, uncertainty involves unknowns with no measurable probability of outcome as compared to the “known” properties of risk.

The introduction of probability in the definition of risk automatically implies its evaluation. The deconstruction of model/data dichotomy into its constituent parts: model/no model, data/no data can be used to analyse risks in various situations (O’Roarty, 2005). Likewise, Diebold et al. (2010) skilfully conceptualised the downside risks into known (K), the unknown (u) and the unknowable (U) risk categories based on model/data dichotomy developed on the grounds of both empirical and methodological knowledge.

The K event is where it is known what could happen and when, e.g. the Year 2000 computer bug. These events can be measured and the disruption (worst case) forecast. For u events, these may be quantifiable even though it may not be known when they will occur, e.g. earthquakes. The U event is difficult, if not impossible, to model. It is hard to imagine what kinds of event might fit into this category, i.e. asteroids colliding with earth (Higgins and Perera, 2016).

Bringing forth different authors’ interpretations on KuU, this research paper aims to conceptualise known–unknown risks with reference to applications in a real estate environment. In developing a conceptual framework, key factors, constructs or variables with recognised relationships can be established and described in depth (Miles et al., 2013).

Following this introduction, Section 2 provides a framework for defining KuU risks. Section 3 looks at knowledge as a theory and measurement in order to classify KuU risks in the model/data dichotomy. This is followed by Section 4 which addresses the knowledge transition from U to K with the availability of models and data. This is then extended in Section 5 by analysing the impact of KuU risks on the real estate environment by linking the concepts to real estate strategies. The last section provides the concluding remarks.

2. KuU event framework

The “knowns and unknowns” is a famous adage from former US Defence Secretary Donald Rumsfeld in response to a question raised at the US Department of Defence news briefing on 12 February 2002 about the lack of evidence of the supply of weapons of mass destruction to terrorist groups. According to Rumsfeld, there exist three forms of knowledge and non-knowledge associated with risk. It is useful to categorise future risks into three main groups: known (K) risk, the unknown (u) risk and the unknowable (U) risk, and they alternately termed in different ways: known as known–knowns, known–unknowns and unknown–unknowns; white swans, grey swans and black swans, respectively (Casti, 2011; Daase and Kessler, 2007; Diebold et al., 2010; Sikich, 2010). Out of them, black swan is a popular term in risk management made famous by Nassim Nicholas Taleb, which has triplet characteristics: extreme impact, rarity and retrospective predictability. It is instructive to examine each of the KuU categories and match them up with real estate situations.

2.1 Known risks (known–knowns)—K

The risks associated with K can be measured and disruption forecasted. The corresponding co-risks will usually have been established from prior experience and their usefulness will be understood and appreciated (Granger, 2010). According to Sikich (2010), these events can
occur as a result of short-sightedness. For example, urbanisation, the rise of global middle class, shift of economic power to developing countries, ageing demographics and global interconnectedness are demographic related known risks in the real estate frontier.

The dynamical models with the use of tools from applied mathematics and computational analysis effectively address many questions of practical concern such as the theory of chaotic dynamical systems. In another direction, network analysis gives the possibility for understanding the deep connective structure of systems, and to identify pressure points in that structure whose removal could lead to catastrophic systemic collapse (Casti, 2011). For instance, real estate in developing countries is skewed in favour of the K risk knowledge, primarily because of limited local historical event data and the focus on comparative market performance benchmarks.

2.2 Unknown risks (known−unknowns)—\(u\)
This type of \(u\) event is certainly the most commonly encountered situation but the extent and full implications remain unclear due to the lack of \textit{ex ante} judgement. These events may be quantifiable but the time of occurrence is unknown. However, there are events where the location, timing and extent of the event are difficult to quantify (Granger, 2010). Possible illustrations are a virus that evolves into a new and unexpected form, a natural event of an unusually large magnitude in a location where it is not expected. For example, in real estate, natural disasters (tsunami, earthquakes, hurricane, volcanic eruption) or a new virulent form of computer virus can be quantifiable even though we may not know when they will occur.

“Perfect storm” is another term used to describe \(u\) risks, which are mostly aleatory uncertainties (randomness) in conjunctions of rare but known events. An example is a devastating storm in the northern Atlantic that caught some boats by surprise and killed 12 people in October 1991. It was the result of a conjunction of a storm that started over the USA, a cold front coming from the North, and the tail of a tropical storm coming from the South. All three types were known before and occur regularly, but their conjunction is very rare (Paté-Cornell, 2012).

There is a lot of measured real estate associated data which require processes using statistical and actuarial techniques to either construct a model that fits the data or to be able to infer what is more or less likely to turn up at the next observation. For example: severe weather events and real estate structures. The important point to note about this real estate uncertainty is that the weather data are generally aggregated and are processed without benefit of any underlying dynamical model.

2.3 Unknowable risks (unknown−unknowns)—\(U\)
This is the risk associated with a \(U\) event which is difficult, if not impossible, to model due to lack of knowledge in hand. This includes all the risks that cannot be identified in advance. No probabilities can be specified for some or all events and no realistic boundaries can be stated for the consequences. An example is part of a comet striking the earth, alien invasion and grey goo catastrophe (hypothetical world’s end scenario involving molecular nanotechnology). The science fiction shelf is littered with imaginative scenarios for how this type of global shock might take place. In recognising the \(U\) category, it is worth pointing out that if an event occurs, the level of awareness afterwards can be included in the \(u\) category and so some form of provision/adjustment can be made in future decisions (Casti, 2011; Granger, 2010; Makridakis \textit{et al.}, 2009; Taleb, 2008).

2.4 Unknown−known risks
Defence Secretary Donald Rumsfeld conceals the fourth category which is “unknown−knowns”. These are the risks which are deliberately forgotten, suppressed or repressed. This type of
uncertainty is quantifiable but without data available to authenticate or substantiate. The resolution of this uncertainty rests in the distinction between implicit vs explicit knowledge. Methodological tools are available to bring out emergent properties with a set of background assumptions (Casti, 2011; Daase and Kessler, 2007). A particular scenario of the World 2020 can be adopted for a real estate example. One possibility is artificial intelligence providing autonomous driverless cars. The simulation may produce unexpected consequences on real estate as autonomous cars with self-parking systems will likely not require defined car parking spaces and so ultimately change the urban landscape.

3. **KuU knowledge as measurement and as theory**

The introduction of probability in the definition of risk automatically implies its evaluation, which can be done only with relevant data. The deconstruction of model/data dichotomy into its constituent parts: model/no model and data/no data can be used to analyse risks in various property situations (O’Roarty, 2005). The aforementioned four classes of uncertainties are summarised in Table I along with the possible models/data combination and methodologies appropriate to each category. These elements can then form the backbone of any scientific study of the unknown.

Since knowledge is both measurement and theory, the KuU paradigm can be envisioned as a measurement and as a theory as given in Table I. Knowledge as measurement focusses on measuring possible outcomes with associated probabilities, whilst knowledge as theory focusses on the conceptual model that helps to understand the underlying structure of the phenomenon. These two are mutually reinforcing uncertainty pillars as better measurement provides the grist for the theory mill whereas better theory stimulates improved measurement (Diebold et al., 2010).

To understand the different classes of uncertainties, current events can provide examples where possible measurement and theory knowledge can provide improved outcomes. In residential real estate, recent central bank policies are highly accommodative towards credit markets which have provided unprecedented capital growth in many housing markets. The supply of mortgage credit in the housing market is a risk which can challenge the dichotomy of measurement and theory where the affect, is to an extent an unknown, and pre-existing local housing market information is currently contemporaneous in context to the monetary markets.

Better measurement in part means better data. Data can be obtained through more precise and timely measurement of previously measured phenomena, correspond to intrinsically new data about the phenomena that previously did not exist, technological advances in data capture, transmission and organisation. However, better data in dealing with U is necessarily much more a conjecture. Yet, the collection and analysis of data regarding near misses that were narrowly forefended and may provide into the domain of U and alternative outcomes (Diebold et al., 2010).

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Data</th>
<th>Empirical knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Known—knowns—threat (dynamic system theory, network analysis)</td>
<td>Unknown—knowns—risk (simulation)</td>
</tr>
<tr>
<td>No model</td>
<td>Known—unknowns—ignorance (statistical techniques)</td>
<td>Unknown—unknowns—disaster (imagination and scenarios/stories)</td>
</tr>
</tbody>
</table>

**Table I.** Model/data dichotomy of four classes of uncertainties

*Sources: Casti (2011) and Daase and Kessler (2007)*
4. Knowledge transition

With the understanding of KuU risks in their theoretical perspective, Figure 1 illustrates a schematic classification under sub-layers with respect to empirical knowledge by means of the availability of existing literature; methodological knowledge with regard to the quantification by assigning probabilities; impact across the timeline; and, finally, the level of awareness.

In defining these categories, relevant information can be sourced on known–known events for decision-making purposes. This compares to unknown–unknown events, which are difficult for individuals to even identify and therefore quantify. This leaves the known–unknown category, where there is known information although there needs to be corporate real estate strategies alongside the development of probability theory, as past events may be random and vary in magnitude, for example building surveillance to foil possible terrorist plots (Evans, 2012).

Figure 1 depicts the knowledge transits with the increasing level of awareness from total ignorance to determinism. When the data are available for U events then it transits to the simple u category, further with the development of models, the knowledge subsequently transits to the known category.

A similar illustration is made available by Snowden (2003) with the Cynefin framework which has four quadrants to explain complex social environments: simple, complicated, complex and chaotic, as shown Figure 2. With the availability of empirical and methodological knowledge, knowledge transits from U to u then to knowable and finally to K. However, the obvious domain is next to Chaos, because the extreme obviousness easily produces catastrophic failure. Thus, the boundary is represented by a cliff. Therefore, the transition from K to U is like falling off the cliff due to loss of control.

The existing risk management theories and the decision-making drivers can focus almost exclusively on known risk. However, a large fraction of real-world risk management challenges falls in the domain of unknown category. Both Bralver and Borge (2010) and Diebold et al. (2010) believed that known situations are often of relevance, but the most present risks ranged from uncertain to U which brought forward the attention to the uncertainty. In a real estate context, known risks, such as flooding and terrorism, although somewhat difficult to entertain, can be planned for and managed, but it is the unknown possibilities associated with events such as pandemics which can leave

![Figure 1. Distinguishing the knowns and unknowns event framework](image-url)

Source: Higgins and Perera (2016)
organisations vulnerable. Testing and research are generic measures to meet this type of U event. Consequently, the level of awareness has been increased and such events are included in the known–unknown category.

5. KuU risks in real estate
The performance of any property cannot be judged without assessing the risks. The sectoral linkage of commercial real estate characterises its risk profile, dynamic profile of uncertainty, and the composition of K, u and U as unique across the spectrum of asset classes (Bardhan and Edelstein, 2010). However, the pricing of property is based on conventional property valuation techniques as risks are commonly pooled to provide a measurement of value. Thus, property valuation techniques fail to notice K, u and U risks separately (Higgins, 2015).

The uncertainty, risk profile and the knowability of real estate are dependent on the uncertainty of the mix of factors. Figure 3 provides an overview of the thematic classification

<table>
<thead>
<tr>
<th>Socio-cultural factors</th>
<th>Technological developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferences</td>
<td>Materials, internet</td>
</tr>
<tr>
<td>Property rights</td>
<td>Mortgage structure, MBS</td>
</tr>
<tr>
<td>Economic/ regulatory changes</td>
<td>Changes in financial systems</td>
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<th>Socio-cultural factors</th>
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<tr>
<td>Economic/ regulatory changes</td>
<td>Changes in financial systems</td>
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Source: Bardhan and Edelstein (2010, p. 147)
KuU risks in real estate. The real estate outcomes are determined by a number of economic and non-economic factors as featured below.

According to Bardhan and Edelstein (2010), the historical background of KuU real estate frontier highlights how several non-economic sources of uncertainty have interacted with the real estate market and driven into major changes as demonstrated by following examples:

1. The development of property rights for land created the first defensible property and marks an influential moment in real estate markets;
2. Socio-cultural developments intricately intertwined with the demand for land such as unforeseeable situations include the massive rural-urban migration, the changing feudal structure and industrial capitalism;
3. The evolution of the structure of family and the household has been the source of unexpected change in real estate market;
4. The creation of specialised real estate brought about by the rise of professionalisation as well as by organisational imperatives;
5. Technological advances have also altered the uncertainty frontier such as the development of new material and advanced engineering techniques; and
6. New fields of finance lead to the emergence of innovative finance, including real estate finance creating an uncertain change in real estate performance.

Table II summarises Bardhan and Edelstein (2010) elements of uncertainty on real estate and classifies them by examples into the KuU framework. A mere overview of Table II shows that a few groups of uncertainties are known in terms of future evolution and possible impact on real estate, although real-world challenges are at the other end of the spectrum towards uncertainty.

In many instances, the science of evaluating Table II risks is in the unknown category, since many of the probabilities are unknown. For example, changing population factors include socio-cultural trends which are often within defined boundaries, i.e. immigration quotas. Thus, a number of demographic related risk drivers may be foreseeable to a certain extent and can be categorised under K but given the room for U category (mass immigration). With the advancement of geological sciences, environmental parameters become apparent.

<table>
<thead>
<tr>
<th>KuU event examples creating real estate uncertainty</th>
<th>K</th>
<th>u</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social-cultural factors</strong></td>
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<tr>
<td>Migration by populations</td>
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<tr>
<td>Cultural shocks (land conflicts, religious disputes)</td>
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<tr>
<td>Environmental and natural catastrophic issues (pandemics)</td>
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<tr>
<td><strong>Technological developments</strong></td>
<td></td>
<td></td>
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<tr>
<td>Digital environment (cyber-attacks)</td>
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<td></td>
<td></td>
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<tr>
<td>Artificial intelligence (autonomous weapons)</td>
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<td></td>
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<tr>
<td>Biological science (genetically modified crops)</td>
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<td></td>
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<tr>
<td><strong>Changes in financial systems</strong></td>
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<tr>
<td>Innovative investment products (complex derivatives)</td>
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<tr>
<td>Global capital markets (currency crisis)</td>
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<td></td>
<td></td>
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<tr>
<td>Capital market legislation (liquidity and capital adequacy risk)</td>
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<tr>
<td><strong>Economic/regulatory changes</strong></td>
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<tr>
<td>Anti-bribery and corruption policies</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Resource scarcity (water security)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Asset bubbles (housing markets)</td>
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</table>

Table II. KuU events impacting on real estate uncertainty.

Advancing real estate decision making
but timing and magnitude remains unclear. Further, there may be new forms of unknowable futures without any prior evidence.

Globalisation is a driver of the real estate economy with increasing economic and financial integration, whilst brings an elevated risk of contagion. For example, global financial markets can be a known space influenced on local real estate markets. Likewise, global sourcing of industrial supply chains can impact on the demand for real estate space as with increased interconnectedness with technology (ecommerce, internet shopping) can create u and perhaps U nature as to unknown interactions of factors in an unpredictable form.

Real estate assets are characterised by lumpiness and illiquidity. The global financial crisis (GFC) of 2007–2009 has increased liquidity risk and credit default. Knowing the characteristics of real estate assets, the structure of real estate transactions can move from the realm of K to u and even to the U. One of the most significant macroeconomic medium that affects real estate is through the credit market via interest rate movements. The impact is significant due to higher gearing levels which significantly add to the cost of capital. A housing bubble burst is an example of a u to U event, with low probability but with extremely high impact which may not be unable to capture through mathematical modelling.

Incorrect assessment of prepayments by mortgage borrowers can lead to cash flow volatility and uncertainty in the mortgage security market. KuU is a renewal process by which transits from uncertainties to a better understanding of prepayment behaviour driven by previous level of knowledge about prepayment risk. Further, government interventions have an impact on the real estate market including local rent control regulations and tax laws.

Higgins (2015) categorised the impact of u risks related to the impact on real estate place/location and space/operation. First, place risks (earthquakes, hurricanes and severe weather) can damage physical buildings. Second, the space risk (GFC, cyber-attacks) associated with the economic loss for the space occupier that may spread across several unrelated locations. Therefore, real estate decision should incorporate sufficient understanding of possible occurrences of known–unknown events to make viable corporate real estate decisions.

6. KuU risk management
Successful risk management requires constant review of the KuU which can promote improved decision making. Decision makers implicitly or explicitly assess K, u and as much of U as possible. Implicit risk assessment based on decision makers’ intuition but the field of risk assessment usually is better to be explicit and as logical as possible. They have to act upon their beliefs about all the important variables, not just the hard facts known to them (Bralver and Borge, 2010; Diebold et al., 2010). Figure 4 illustrates decision maker’s imperatives towards assessing the risks. The three broad categories of KuU are divided into six distinct types. Decision makers convert them all into assessed risks with identified events and assigned probabilities (Bralver and Borge, 2010).

This assessment can be achieved through “reference class forecasting,” a method based on the Nobel Prize winning work of Daniel Kahneman and Amos Tversky. This technique takes into account the outcomes of similar projects conducted in other organisations (Buhl, 2012; Flyvbjerg and Budzier, 2011).

In another perspective, Snowden (2003) mapped four different new approaches in the Cynefin framework to decision making in complex social environments as before mentioned in Section 4. The proposed decision-making strategies are summarised as follows:

1. Simple/known >> sense, categorise and respond >> best practice.
2. Complicated/knowable >> sense, analyse and respond >> good practice.
3. Complex >> probe, sense, respond >> emergent practice.
However, according to Taleb (2008), instead of trying to anticipate these uncertain events, the most appropriate response is to reduce the vulnerability to them. Risk management should be about lessening the impact of these events instead of engineered solutions which perpetuate illusions of human control over the environment.

In a risk-prone environment, a mechanism to identify, model and manage random events, unpredictable shocks and volatility is a key requirement in real estate decision making. The focus on knowledge leads to a situation beyond a certain pre-set threshold to improved agility and reduced vulnerability towards unpredictable major events. Figure 5 represents a schematic model to categorise KuU events with the potential real estate strategy response.

Figure 5 places the low-predictability, high-impact events into arrangement of KuU risk categories alongside detailing staged strategies for inclusion in the real estate decision-making process. A systematic and broad guide to non-predictive decision making under uncertainty can be detailed with real estate operational examples as follows:

1. Adaptation: change the policy in response to the change in conditions. Designing for real estate flexibility: rearrangement of global real estate organisations

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**Types of Risks**

<table>
<thead>
<tr>
<th>Known Certainty</th>
<th>Known events</th>
</tr>
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<tbody>
<tr>
<td>Known risk</td>
<td>Known events</td>
</tr>
<tr>
<td>Known probabilities=100%</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Known Risk</th>
<th>Known events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known probabilities</td>
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</table>

<table>
<thead>
<tr>
<th>Uncertain risk</th>
<th>Uncertain events</th>
</tr>
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<tbody>
<tr>
<td>Uncertain probabilities</td>
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<table>
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<tr>
<th>Ambiguous risk</th>
<th>Uncertain events</th>
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<tbody>
<tr>
<td>Uncertain probabilities</td>
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</table>

<table>
<thead>
<tr>
<th>Unidentified risk</th>
<th>Not yet identified</th>
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</table>

<table>
<thead>
<tr>
<th>Unidentifiable risk</th>
<th>Cannot be identified</th>
</tr>
</thead>
</table>

**Examples**

- Population growth in China and India
- Ageing of population
- Location specific risk
- Natural catastrophes
- Policy changes
- Financial Crisis
- 9/11 attack (before 9/11)
- Biological Warfare

**Source:** Adapted from Bralver and Borge (2010)
structure and efficiency brings the workplace flexibility through modularity, agile planning approaches and limiting the project financing multiplier. If a KuU event occurs in one location, the system can be maintained in the alternative location to maintain continuity.

(2) Robustness: plan for the most pessimistic future scenario. Implementing safety barriers: a simple real estate approach is to standardise terminology and reporting processes. This one framework toolset and single vocabulary can improve knowledge sharing across multinational real estate organisations.

(3) Resilience: make the assurance of recovery after a future occurrence. Global real estate partnerships can create operational teams that transcend geographic and temporal boundaries and so provide ideal flexibility with lower costs. The shared information is also advantageous with improved management knowledge.

In conditions of uncertainty, an interrelated strategy of adaption, resistance and resilience can reduce the impact and provide a response to KuU events. These three overlapping (not mutually exclusive) approaches can reduce vulnerability and offer improved certainty across the identified risk spectrum. This conceptual framework offers real estate decision makers an opportunity to succeed in a world affected by increasingly large, highly improbable and unpredictable events where unprepared competing real estate operations will fail.

7. Conclusions
Real estate practitioners should be aware of the existence and distinction of K, u and U risks, as K risks provide certainty through the available data and are often amenable to statistical treatment (e.g. Year 2000 computer bug), u events are the most common quantifiable situations, but the time and location may be unknown (e.g. earthquakes), whereas the U risks are difficult or impossible to model (e.g. asteroid showers). In addition to the three categories of uncertainty, the fourth category is known–unknowns, whereby uncertainty is quantifiable but without data available to authenticate or substantiate.

Classification of the four classes of uncertainty can be based on the possible model/data combination by deconstructing into its constituent parts, model/no model and data/no data. Furthermore, the KuU paradigm can envision both as a measurement and a theory. Knowledge, as a measurement approach, focusses on measuring possible outcomes with associated probabilities aided by better data and better econometric models to interpret the data, whilst knowledge as theory focusses on the conceptual model that helps to understand the underlying structure of the phenomenon.

In understanding KuU risks, it is evident that real estate decision makers are provided with contradictory information. In the past there was an argument to disregard the type of risk and convert them all into assessed risks, with identified events and assigned probabilities. However, the risk management research agenda suggests there should be more focus on lessening the vulnerability beyond the quantitative forecasting judgements, as to anticipate low-probability, high-impact events. A framework that includes adaption, resistance and resilience can significantly assist in managing these risk events. If overlooked, adverse risk exposure can have a major consequence and ruin many real estate decisions.

References


Further reading
About the authors

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Efficacy of adaptive reuse for the redevelopment of underutilised historical buildings

Towards the regeneration of New Zealand’s provincial town centres

Itohan Esther Aigwi and Temitope Egbelakin
School of Engineering and Advanced Technology, Massey University, Auckland, New Zealand, and
Jason Ingham
Department of Civil and Environmental Engineering, University of Auckland, Auckland, New Zealand

Abstract

Purpose – Most provincial town centres in New Zealand typically feature old and vacant historical buildings, the majority of which possess heritage values. The growing perception that it is cheaper to repurpose vacant historical buildings rather than demolishing and rebuilding them is one of the factors that have made the adaptive reuse approach so popular. However, will this also be the case for provincial town centres in New Zealand? The purpose of this paper is to identify and explore the key factors that could influence the efficacy of adaptive reuse, and check for significant differences in the effect that each perceived factor would have on the adaptive reuse efficacy as a justifiable resilient and sustainable approach towards the regeneration of a major provincial town centre in New Zealand that is currently experiencing inner-city shrinkage.

Design/methodology/approach – A focus group workshop was conducted with 22 stakeholders involved in an existing town centre regeneration agenda for Whanganui. Closed-ended questionnaires were administered to the workshop participants to measure their opinions regarding the efficacy of the adaptive reuse approach for the regeneration of Whanganui’s town centre. The participant mix comprised a combination of structural engineers, quantity surveyors, architects, estate valuers, building owners/developers, legal representatives, heritage representatives and local government council representatives.

Findings – The study reported a high proportion of respondents that strongly agreed to the positive impacts of adaptive reuse with regards to the discussed priority aspects, hence, justifying the efficacy of the approach, towards delivering a vibrant town centre for Whanganui. Also, the Friedman’s analysis suggests that no significant differences existed among all perceived adaptive reuse efficacy criteria by the workshop participants, therefore justifying the approach.

Originality/value – This paper’s originality pertains to the practicality of changing the use of vacant historical buildings in Whanganui, which is one of New Zealand’s major provincial town centres, to renegotiate resilience and sustainable urban regeneration for the area.

Keywords Resilience, Historical buildings, Adaptive reuse, Efficacy, Provincial, Town centre regeneration

Paper type Research paper

Introduction

Old historic buildings typically possess features capable of contributing to society’s culture and preservation of its architectural history in an extensive manner (Langston et al., 2007). A significant number of these historical buildings play a crucial role in the socio-economic and cultural development of society (CPWD, 2013) by providing a physical link and

The study discussed in this paper was (partially) supported by QuakeCoRE, a New Zealand Tertiary Education Commission-funded Centre. The authors wish to express gratitude to all participants of the focus group workshop for their huge contributions to the study.
progression of cultural evidence to the past (Goodwin et al., 2009). Also, inner-city historical buildings are usually considered assets for the development of local tourism, due to the heritage and socio-cultural values they possess (Bedate et al., 2004; Pedersen, 2002; Ahmad, 2006). However, empirical evidence has identified factors such as urban shrinkage (Martinez-Fernandez et al., 2012), obsolescence (Langston, 2011) and self-congruity perspectives (Sirgy et al., 2005), to be responsible for the underutilisation of historical buildings. It is therefore essential to preserve and maintain these buildings due to the core heritage and cultural values they present.

In New Zealand, most provincial town centres typically feature old and vacant historical buildings, the majority of which possess heritage values. Findings from a recent study identified building conditions, socio-economic factors and building regulations, as causal factors to the high vacancy rate of historical buildings in New Zealand’s provincial town centres (Esther Yakubu et al., 2017). The conservation and reuse of these disused buildings could go a long way in contributing to the growing need for regenerating the inner-cities of these provincial town centres. The adaptive reuse trend has been noticeably recognised from previous studies as a practical approach in improving resilience and sustainability of obsolete historical buildings (Bullen and Love, 2011a; Bullen and Love, 2010; Bullen, 2007; Langston and Shen, 2007; Wilkinson et al., 2009; Gallant and Blickle, 2005; Ball, 2002; Douglas, 2006; Latham, 2016; Pearce et al., 2004). This reuse inclination emphasises the need to retain the original identity, character, structure and real significance of older historical buildings through the adaptive reuse process (ICOMOS Australia, 2013).

Furthermore, the growing perception that it is cheaper to convert older buildings for newer functions rather than demolishing and rebuilding them is one of the significant factors that have contributed to the vast interest in the adaptive reuse approach (Ball, 2002; Pearce et al., 2004). In a quest to minimise the social and economic costs of redeveloping an urban area to be more resilient and sustainable, adaptive reuse approach is beneficial to governments, communities, building owners and developers (Wilkinson et al., 2009; Bullen and Love, 2011a). Although some cities have started to realise that an essential aspect of any successful urban regeneration plan is the reuse of historical buildings for new functions, the objectives of adapting historical buildings appear to overlap with several desired outcomes of resilience and sustainability (Ball, 1999). Hence, there is a need to consider the efficacy of using the adaptive reuse approach as an effective strategy for urban regeneration plans (Bullen and Love, 2009).

In the above context, the study discussed in this paper focuses on identifying and exploring the key factors that could influence the efficacy of adaptive reuse, and also, checking for significant differences in the effect that each perceived factor would have on the adaptive reuse efficacy as a justifiable resilient and sustainable town centre regeneration (TCR) approach. A focus group workshop was conducted with relevant stakeholders involved in an existing TCR agenda for Whanganui, a major provincial area in New Zealand. Findings from this study offer potential strategic insights on how vacant historical buildings that are adapted for new uses could the resilient and sustainable growth of provincial town centres in New Zealand and other areas of the world.

Overview of the current situation
Whanganui is a typical provincial town located on the west coast of the North Island in New Zealand and has a town centre famous for its collection of built heritage precincts (Esther Yakubu et al., 2017). These heritage buildings possess some original architectural character that dates as far back as pre-1935. In the past, Whanganui had about 10 per cent of the total number of heritage buildings in New Zealand. Accordingly, due to their popularity with visitors, these buildings were worth about NZD40m a year to the economy of the local area (Statistics New Zealand, 2017).
With a territorial area of about 2,400 km² inhabited by about 43,000 people, Whanganui has a population density of approximately 18 people per km², and has experienced population decline at a rate of 1.1 per cent (i.e. by 486 people) since the 2006 census (Statistics New Zealand, 2017). Statistics from the 2013 census presents the total number of vacant buildings in Whanganui to be 1,839, as compared to 1,449 buildings from the 2006 census (Statistics New Zealand, 2017). This trend depicts an increase in vacant buildings in the region with a vacancy rate of 21.2 per cent. According to Esther Yakubu et al. (2017), socio-economic factors, poor building conditions and building regulations were identified as dominant contributing factors to the steady decline of Whanganui’s town centre.

The local review of Whanganui district council’s 2010 district plan led to the introduction of Whanganui’s existing TCR strategy, with the overall vision of making Whanganui’s town centre visible (Whanganui District Council, 2016). The strategy focuses on providing a general comprehensive plan that will balance conflicting stakeholder objectives and interests, to achieve best resilient and sustainable outcomes for the area (Whanganui District Council, 2016).

Research objectives

(1) To identify and explore the key factors that could influence the efficacy of adaptive reuse in regenerating Whanganui’s town centre; and

(2) to check for significant differences in the effect that each perceived factor would have on adaptive reuse efficacy, towards a justifiable resilient and sustainable town centre regeneration.

Literature review

In this section, a review of the contextually relevant literature to the indicators of urban regeneration, and the concepts of resilience and adaptive reuse is covered.

The rationale for regenerating provincial town centres

Historical buildings in typical provincial town centres usually experience high vacancy rate due to some contributing factors such as poor building conditions, socio-economic factors and building regulations (Esther Yakubu et al., 2017), hence, causing these buildings to be irrelevant to the original purpose for which they were built. The resultant effect of these identified factors on typical provincial town centres is “urban shrinkage” (Martinez-Fernandez et al., 2012; Rink et al., 2010; Wiechmann and Pallagst, 2012; Esther Yakubu et al., 2017). Some socio-economic factors have been reported to contribute to a high vacancy rate of historical buildings in provincial town centres (Esther Yakubu et al., 2017). The social factors were identified as: population decline, mass emigration from inner-city, reduced disability and car park access, and competition from modern construction, while low property values, depressed property market and high lease cost were identified as the causal economic factors (Esther Yakubu et al., 2017).

Furthermore, an issue widely ignored by researchers is that when considering sustainable activities, there is a wide margin in the relationship between low occupancy levels of historical buildings in provincial town centres, when compared to bigger cities, which usually experience housing shortage (Buttimer and Ott, 2007). Within the limits of sustainability agenda, there is substantial debate necessitating the improvement of the historical building stock in all areas including provincial town centres (Brundtland Commission, 1987). This debate is driven by the potential financial and socio-cultural resources that would most likely be gained by the affected communities (Kohler and Hassler, 2002). In recognising the significance of vacant historical buildings, little consideration is given to the buildings in provincial town centres in New Zealand (Esther Yakubu et al., 2017). Acknowledging this fact
will, therefore, promote both cultural and socio-economic vitality for these areas through encouraging the efficient reuse of heritage resources (Myers and Wyatt, 2004). Also, the reliance on market-centred policy and community self-help solutions that most government promoters have not been so far justifiable in bringing the town centre of these smaller cities back to life (Alston, 2004).

Adaptive reuse in the context of community resilience

Resilience describes the manner in which various systems can “bounce back” after experiencing disturbances, and this has been established in the fields of ecology, physical sciences and engineering (Bodin and Wiman, 2004; Walker et al., 2004; Woods et al., 2012). Several meanings have been attributed to the term “resilience”, and have been applied to diverse contexts, ranging from social, economic, community, psychological, ecological and physical resilience, to disaster resilience (Gallopín, 2006; Klein et al., 2003; Manyena, 2006; Norris et al., 2008; Zhou et al., 2010; Smith et al., 2016). Although resilience has become more popular over the years and has been defined in several ways (Pendall et al., 2010), its numerous definitions are still argued to be vague and fuzzy (Markusen, 2003; Bhamra et al., 2011). The concept of resilience was initially introduced within environmentally friendly systems, and later on adopted by sociology or economic systems, which usually require the consideration of some socio-economic entities such as cities, regions or countries in spatial settings (Dolega and Celińska-Janowicz, 2015).

Community resilience is the ability of a community to tackle a disturbance by anticipating for it, preparing for it responding to it and recovering from it (Foster, 2007a, b). From an economic point of view, Hill et al. (2008) define community resilience as the ability of a community to successfully recover from an economic shock that has thrown the area off its growth pathway or has the potential to do so. Likewise, a more general description of economic resilience suggests the degree to which local authorities can ride global economic blows, work within the limits of their urban area and have high social inclusion levels by quickly bouncing back to normal state after a disturbance (Ashby et al., 2009). Still on the focus of community resilience, the introduction of the adaptive reuse approach as a viable tool to regenerate provincial urban areas posed with declining socio-economic and environmental well-being of its residents could go a long way in promoting resilience for the sustainable development of the areas.

The rationale behind the concept of community resilience through adaptive reuse presents a potential for changing its focus in existing urban regeneration plans by improving some rigid conservative interventions and analysis. To begin with, resilience thinking considers the alteration of a system as normal, with the inclusion of dynamism as an intrinsic fragment of the manner in which systems operate. The resilience thinking also emphasises the essence of assuming alteration and elucidating stability, contrary to assuming stability and elucidating alteration (Folke et al., 2003). Furthermore, the resilience concept has been included in this paper to justify the importance of radical adaptive reuse strategies that will generate better opportunities for urban regeneration, through an increase in community-led social, economic and environmental initiatives (Brown, 2011). However, suggestions from some post-recession urban regeneration analysis conducted in Hong Kong and London infer that resilience could be better seen as a dynamic process whereby alteration and constant reinvention of a system justify its socio-economic and environmental strength, rather than just “bouncing back” (Raco and Street, 2012).

What is adaptive reuse?

Old vacant historical buildings that are fast approaching possible demolition could be considered as “raw material mines” for new building projects (Langston, 2008). Simply leaving the fabric and basic structure of these historical buildings intact and changing their use has
been argued to be a more sustainable approach, when compared to assigning building materials from demolition to new building applications (Ball, 1999; Douglas, 2006; Langston, 2008; Bullen and Love, 2009; Wilkinson et al., 2009). This technique is labelled “adaptive reuse”. Adaptive reuse, also referred to as “adaptation” in some literature, implies: the change of use of an existing building (Douglas, 2006); the retention of the original fabric and structure of the building (Bullen and Love, 2009); or the extension of the useful life of the building (Mansfield, 2002). The adaptive reuse process involves the conservation of functionally obsolete or old disused historical buildings for new and more appropriate functions (Shehata et al., 2015; Ijla and Broström, 2015). Moreover, the adaptive reuse approach focuses on repurposing an existing building to enable it to function as a contemporary building while preserving its useful features (Douglas, 2006; Wilkinson et al., 2009). Adaptive reuse could occur either “within use” or “across use” (Wilkinson et al., 2009). For instance, the “within use” concept would entail an existing commercial building being reused for other commercial purposes, while the “across use” concept would involve changing the use of the commercial building for residential purposes (Ellison and Sayce, 2007).

The adaptive reuse approach which has been successfully used to redevelop different kinds of existing buildings, from government buildings, defence estates, airfields, to historical buildings, is also considered a strong base for most sustainable development plans and government policies in most parts of the world (Langston and Shen, 2007). Looking beyond conservation and satisfying the desires of new users, adaptive reuse could contribute to improving the economic, socio-cultural and environmental conditions of provincial areas that desire regeneration (Bullen and Love, 2010; Bullen and Love, 2011b). With the aim of increasing the number of reused historical buildings in provincial towns, the adaptive reuse approach has also been argued to be a more sustainable alternative for promoting and incentivising seismic resilience and urban revitalisation efforts in active seismic areas (Ijla and Broström, 2015) such as New Zealand. Likewise, to support the sustainability agenda of provincial urban areas, having a significant proportion of old vacant historical buildings, a broader urban regeneration strategy could be that these buildings be reused as a substitute to demolition and rebuild (Ball, 1999; Wilkinson et al., 2009; Bullen and Love, 2011b). Hence, the benefits of adaptive reuse have been identified to improve the economic, social and environmental performance of existing buildings (Bullen, 2007), including heritage buildings (Bullen and Love, 2011b; Yung and Chan, 2011). However, building owners and property developers may still show reluctance in embracing this strategy due to: some perceived problems relating to increased maintenance, seismic safety, health and safety, building design inefficiencies, decreased rental returns, zoning, uncertainty and commercial risk (Bullen and Love, 2010).

Furthermore, in modern conservation theory, adaptive reuse could be considered an essential approach towards actualising viable urban regeneration strategies. Some existing theories on the adaptive reuse approach have been compared and classified based on its efficacy for urban regeneration, and also from the perspectives of architecture and heritage preservation. Accordingly, a typological theoretical approach to the efficacy of adaptive reuse involves the historical analysis of adapted case study buildings, organised based on the building type (Latham, 2016) and host space typology (Douglas, 2006). The focus of the typological approach is on the cause of the building deterioration, the barriers and critical success factors towards reusing each building typology (Plevoets and Van Cleempoel, 2011). Unlike the typological approach, a technical theoretical approach focuses on the technical improvements of the load-bearing structure, the building envelope, and the comfort, safety and energy efficiency of the adapted buildings (Douglas, 2006; Highfield and Gorse, 2009). Moreover, a strategic theoretical approach of adaptive reuse emphasises an analysis of the different strategies and processes to be adopted for the conversion of existing historical buildings through, suggested possible methods of justifying the alteration of an existing
building (Breitling and Cramer, 2012; Brooker and Stone, 2018; Plevoets and Van Cleempoe, 2011). Additionally, a creative approach initiates an adaptive reuse plan of action that would synergise the typological, technical and strategic approaches to incorporate the practical aspects of adaptive reuse for potential end users of adapted historical buildings (Hasnain and Mohseni, 2018).

While some historical buildings have been adapted to suit new functions in a slightly pragmatic manner over the years (Powell, 1999), a critical reflection on the efficacy of the adaptive reuse approach for urban regeneration is quite recent (de Arce, 2014). There is a need for better understanding of some priority aspects that could impact the reuse of obsolete historical buildings, towards achieving justifiable resilient provincial town centres. These factors are discussed comprehensively in the subsequent sub-sections.

**Impacts of adapting vacant historical buildings in provincial areas**

Some significant impacts of adaptive reuse to provincial town centres are discussed in the following sub-sections under the headings: economic aspects, socio-cultural aspects, environmental aspects, built heritage preservation, seismic resilience, building usability and TCR.

**Economic aspects.** An adapted historical building’s new function should be able to benefit its users economically. It is often expected that the building’s new use will possess the potential to generate profit for its future maintenance. A successful adaptive reuse project should contribute to an increase in the values of property in the area, and also, boost cultural tourism (Misirhsoy and Günce, 2016). For instance, a historical building that is repurposed to serve a new function as an art gallery will enable the users to sell their products within the building’s premises, hence making the physical continued existence of the building to depend on its economic sustainability. The indicators for measuring the economic benefits of adaptive reuse projects should include: the numbers of newly established businesses and employment prospects for the local workforce; increased value of surrounding properties, and increased revenue from tourism for local businesses (Engelhardt and Rogers, 2009; Jonas, 2006; Chan and Lee, 2008).

The adaptive reuse process is usually faster and cheaper than demolishing an existing building and rebuilding it from scratch, except there is a requirement for a full structural reconstruction (Langston et al., 2007). The required time to demolish and reconstruct a given floor area of an existing building has been suggested to be about twice the time needed to redevelop the same floor area, with adaptive reuse (Johnson, 1996; Larkham, 2002). This reduced redevelopment timeframe will also reduce both the financing cost and the impact of inflation on the costs of construction (Highfield and Gorse, 2009; Langston et al., 2007). As a result, there will be less disruption to cash flow and operations of organisations that do not wish to relocate, thus reducing the expenses from temporary accommodations. Furthermore, the costs of adaptive reuse projects are usually lower than the cost of demolition and rebuild (Douglas, 2006), given that the contract periods of adaptive reuse projects are usually shorter, and also the structural materials of the existing buildings are already in place, the borrowing cost would be reduced (Shipley et al., 2006). The demolition and reconstruction of existing buildings are most often more expensive than changing the use of the building (Bullen, 2007; Shipley et al., 2006; Douglas, 2006; Ball, 2002). Additionally, the adaptive reuse approach has been demonstrated to be a preferable option in the revitalisation of the economic condition of a community through increased property values (Yiu and Leung, 2005). A Hong Kong study investigated the impact of repurposing historical buildings for new functions on a highly dense existing residential property (Chau et al., 2003). It was revealed from this study that there was a 9.8 per cent increase in the value of the property compared to another existing building in the same area that did not go through
the adaptation process (Chau et al., 2003). In another Hong Kong study, the impact of adaptive reuse on residential property was also investigated (Yau et al., 2008). Findings from the study showed that there was an improvement of 6.6 per cent in the value of the repurposed property (Yau et al., 2008).

However, there are some cases where the cost of repurposing older buildings for new functions surpasses that of a new build (Kohler and Yang, 2007); most especially, when the existing buildings have structural complexities, legislation or listing requirements (Wilkinson et al., 2009). Also, because the process of developing a new building from scratch is relatively more straightforward, its cost could be argued to be often lower than that of the adaptive reuse process (Bullen, 2007). In a study done in Canada, uncertainty and erroneous risk perception of high adaptation costs by bankers made it more difficult for property developers to secure financial support for projects relating to adaptive reuse (Shipley et al., 2006). When considering categorising the disruptions caused by the process of adapting historical buildings into indirect costs, the economic argument of adaptive reuse may be weakened (Chau et al., 2003). These disruptions could come as a result of the loss of convenience during the redevelopment process, and also the loss of goodwill from tenants into indirect costs. Also, some historical buildings may not have the capacity to reach new building regulatory standards even after undergoing the adaptive reuse process (Bullen and Love, 2011b). As a result, these buildings (especially commercial buildings) would degenerate to a state where their layout is inappropriate for change of use, making them uneconomical (Bullen and Love, 2011a, c, b; Wilkinson et al., 2009).

**Social-cultural aspects.** Socio-cultural factors would incorporate the impacts of a historical building’s newly adapted function to its local area, the quality of life within the community and other socio-cultural activities. These historical buildings help to link residents to their roots by serving as collective memory, with which they can all reflect on their personal and cultural identities (Butina–Watson and Bentley, 2007). Although socio-cultural aspects are often less prioritised for adaptive reuse projects possibly because they are difficult to measure, to achieve a successful adaptive reuse project, repurposed historical buildings should be socio-culturally justifiable (Misirlisoy and Günçe, 2016). The new use of the repurposed historical buildings should be able to attend to the needs of the local community and also contribute socio-cultural benefits to its users by proposing new activities for them. A most suitable function could lead to an increase in the quality of lifestyle and education in the area (Misirlisoy and Günçe, 2016). Furthermore, the adaptive reuse of historical buildings could also enhance the cultural diversity and significance of a place by promoting the continuity of societal life (Engelhardt et al., 2007).

The social merits of adapting vacant historical buildings for new functions could occasionally be provided through the core heritage values possessed by the buildings (Langston et al., 2007). Redeveloping historical buildings for other uses could go a long way in presenting attractive streetscapes that could add character, and provide a secure image and sense of status to communities (Bullen, 2007). The resultant decline in vacant or dilapidated buildings would potentially create a more vibrant community and increased living standards from revitalisation and increased investment (Esther Yakubu et al., 2017). Also, other unsocial behaviours and crime would be significantly reduced.

**Environmental aspects.** The process of repurposing historical building for new functions involves lesser material consumption, reduced energy consumption, reduced transportation energy and reduced pollution from construction, hence promotes resilient and sustainable places (Itard and Klunder, 2007). Moreover, the adaptive reuse process can contribute to climate change through reducing the emissions of CO2 (Bullen, 2007). The change of use approach is safer in reducing the extent of environmental disturbances that may arise from hazardous materials, ground contamination, dust and hazard from
falling materials (Bullen and Love, 2010). This disturbance could cause interference with eco-systems, habitat degradation and reduced biodiversity, and hence decrease air and water quality, which could, in turn, encourage the spread of diseases to humans and animals (Koren and Butler, 2006).

Instead of owners of existing historical buildings and property developers just settling for demolition, the change of use strategy offers a better way to efficiently and effectively redevelop these buildings in a manner that will not pose any harm to the environment. Most historical buildings contain embodied energy (Binder, 2003), which could be saved by reusing the building’s functionality, components and recycled materials (Bullen and Love, 2010). Additionally, in the case of site work downtime caused by inclement weather, the adaptive reuse process could reduce this issue through the presence of work enclosure presented by the existing buildings. Also, the process of demolishing heritage buildings and rebuilding could waste materials (DEH, 2004), and also pose significant threats to environmental sustainability. Findings from a study done in the Netherlands revealed that the adaptive reuse process would lead to the generation of less waste, use of fewer materials and most likely lesser energy, as compared to demolishing and rebuilding (Itard and Klunder, 2007).

However, it has been argued that the required standards (i.e. the quality of thermal, acoustic and indoor air) of applying the adaptive reuse for existing buildings may not be attainable (Bullen, 2007). For instance, there will be varying compliance with functional standards, because it will depend on the physical state and required end use of the building (Wilkinson et al., 2009). Although adaptive reuse does not contain the creative element of a new building, creativity is, however, argued to depend on being able to fit contemporary needs into what already exists (Bullen, 2007). The performance of an adapted existing building may not completely match that of an entirely new building, but its social gain could balance this limitation (O'Donnell, 2004).

**Built heritage preservation.** Heritage preservation charters mandate that when historical buildings with heritage values are being redeveloped, their architectural and heritage character should be maintained and conserved for sustainability (ICOMOS, 1931; ICOMOS Australia, 2013). Accordingly, this mandate on heritage preservation has led to the scheduling of several heritage buildings into district plans, thereby protecting them from unsympathetic alterations or demolition through regulations. Built heritage conservation through adaptive reuse has been suggested as practical and sustainable concepts for urban regeneration planning (Nasser, 2003; Alpopi and Manole, 2013). Moreover, the adaptive reuse approach has been well thought-out as an essential strategy towards the conservation of built heritage (Jessen and Schneider, 2003). Although the benefits of repurposing historical buildings for new functions have been argued to promote built heritage preservation (Plevoets and Van Cleempoel, 2011), some literature emphasise the success of the new functions and local community development as vital adaptive reuse goals (Douglas, 2006; Rodwell, 2008; Shehata et al., 2015). The optimistic interaction between built heritage preservation, adaptive reuse and TCR is that the conservation of heritage buildings will secure successful TCR projects by safeguarding the social, economic and environmental benefits of the built heritage expenditures, through adaptive reuse (Rojas, 1999).

**Seismic resilience and building usability.** Since New Zealand is located in an active seismic region of the world, it is always important to include seismic resilience in its resilience and sustainable development plans. The purpose of seismic resilience in New Zealand’s provincial areas would be to recover or maintain functionality and create adjustments that would accommodate thriving and learning during earthquakes, while reducing the adverse effects of future earthquake occurrences in the areas (Smith et al., 2016). A provincial area could be considered as seismic resilient if it possesses the capacity to absorb and minimise the disruptive and adverse effects of an earthquake and efficiently respond to the
earthquake event (Bruneau et al., 2003). The adaptive reuse concept could be considered a feasible approach to renegotiate seismic resilience for the vacant historical buildings in New Zealand’s provincial areas as most of these buildings are being assessed as earthquake-prone (Esther Yakubu et al., 2017). Since most change of use alterations would trigger the seismic strengthening requirements of earthquake-prone buildings (EPBs) if the value exceeds 25 per cent of the building’s rateable value (MBIE, 2017), adaptive reuse could therefore serve as a useful approach to motivate building investors to retrofit these EPBs, towards creating a seismic resilient community.

Building usability is another important aspect to consider when changing the use of a historical building. According to Elzeyadi (2002), successfully reused spaces should typically reflect the following psycho-social and physical qualities: aesthetics and ambient comfort, ergonomics, and space utilisation, lighting quality, privacy, heritage value, life safety and security, temperature, maintenance services, noise and auditory levels, and relative humidity. Quite a few methodologies for the selection of optimal new adapted functions for vacant historical buildings have been developed with emphasis on the need for a strong compatibility between the spatial characteristics of the buildings and the requirements of the new adapted functions (Hong Kong Buildings Department, 2016; Langston, 2011; Langston et al., 2007). Accordingly, Hillier and Hanson (1989) have developed a model (Space Syntax) that could be used to investigate the extent to which the design alteration of historical buildings and space arrangement can address the socio-spatial and possible economic needs of the new adapted functions.

Adaptive reuse and TCR. TCR is a holistic and integrated approach adopted for the resolution of urban problems to generate a resilient improvement in the physical, social, economic and environmental conditions of a degenerated urban area (Roberts and Sykes, 2000). The TCR strategy is a response to the opportunities and challenges of urban deterioration in a specific place, and at a particular time (Roberts and Sykes, 2000). Most TCR strategies usually involve the group effort of local authorities, public, private and other voluntary sectors to achieve a clear aim of improving the quality of life for residents of a community. The theory of urban regeneration is primarily concerned with the organisational and institutional dynamics of managing urban change, through displaying several essential features (Roberts et al., 2016).

In the domain of TCR, adaptive reuse could catalyse the improvement of the liveability of historic precincts, which is the desired outcome of the relationship between human and environmental characteristics (Van Kamp et al., 2003). Liveability is greatly influenced by the conditions of public spaces such as streets, public facilities, parks, etc., where people can interact with one another naturally. Hence, repurposing vacant historical buildings for new functions could substantially contribute to improving the livability of provincial precincts through the stimulation of prospects for resilient and sustainable social interactions among community members (Yung and Chan, 2012). Typical liveability indicators include property values, business activities and tourism, numbers of visitors per day, community character and pride, social cohesion and equity, and diversified land use (Dale and Newman, 2009; Van Kamp et al., 2003). Therefore, embracing the adaptive reuse could provide an added benefit to the regeneration of New Zealand’s shrinking provincial town centres in a sustainable way (Esther Yakubu et al., 2017). The adaptive reuse strategy could also motivate local authorities and owners of vacant historical buildings in provincial town centres to minimise the economic, socio-cultural and environmental costs, in a quest for a continued urban development.

Research method
This study focuses on examining the efficacy of using the adaptive reuse approach to regenerate Whanganui’s town centre, and in doing so, identifies and explores influential factors to the usefulness of adapting obsolete and vacant historical building for new functions.
A focus group workshop was conducted with relevant stakeholders to explore their assumptions, beliefs and opinions regarding the research topic (Krueger and Casey, 2014). Closed-ended questionnaires were administered to the focus group participants to measure their opinions regarding the efficacy of the adaptive reuse approach to regenerate Whanganui's town centre. The rationale for using the focus group technique is that it is a practically cost-effective way of gathering many data within a short timeframe, and also, the data can be easily quantified with little impact on its reliability and validity (Popper, 2005). The focus group approach also allowed the workshop participants to probe, prompt and clarify questions with the workshop facilitators.

The purposeful sampling technique was used to choose participants for the focus group workshop, based on their vast knowledge regarding Whanganui's existing TCR pursuit. Purposeful sampling allows research to be carried out in a particular setting where individuals or events are deliberately selected to provide detailed insights on a research focus (Maxwell, 2013). This sampling approach also promotes the involvement of participants who are experienced in the subject matter (Babbie, 2013; Easterby-Smith et al., 2012; Neuman, 2014). The participant mix comprised a combination of structural engineers, quantity surveyors, architects, estate valuers, building owners/developers, legal representatives, heritage representatives and local government council representatives. The profile of the focus group workshop participants is provided in Table I. A total of 22 participants attended the focus group workshop. The administered questionnaires were exclusively completed by all participants in about 45 min and returned to the workshop facilitators.

Responses from the questionnaire survey were analysed using the IBM SPSS statistical software. The responses were collated, number-coded and manually entered into the SPSS

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profession of participants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building owners/developers</td>
<td>6</td>
<td>27.3</td>
</tr>
<tr>
<td>Building professionals</td>
<td>4</td>
<td>18.2</td>
</tr>
<tr>
<td>Local council representatives</td>
<td>7</td>
<td>31.7</td>
</tr>
<tr>
<td>Heritage representatives</td>
<td>4</td>
<td>18.2</td>
</tr>
<tr>
<td>Legal representatives</td>
<td>1</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td>100</td>
</tr>
<tr>
<td><strong>Organisational portfolio</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior management</td>
<td>12</td>
<td>54.6</td>
</tr>
<tr>
<td>Middle management</td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td>Supervisor/team leader</td>
<td>5</td>
<td>22.7</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>22</td>
<td>100</td>
</tr>
<tr>
<td><strong>Level of professional experience (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1</td>
<td>1</td>
<td>4.6</td>
</tr>
<tr>
<td>1–5</td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td>6–10</td>
<td>5</td>
<td>22.7</td>
</tr>
<tr>
<td>11–20</td>
<td>4</td>
<td>18.2</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>9</td>
<td>40.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td>100</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>14</td>
<td>63.6</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>36.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>22</td>
<td>100</td>
</tr>
</tbody>
</table>

Table I. Profile of focus group workshop participants
spreadsheet with each question number as column heading and separate rows for each participant’s answers. The spreadsheet data were checked for accuracy, and the proportion of participants who selected each response was calculated and displayed on bar charts. To measure the level of internal consistency of all completed questionnaire items, a reliability test was done in SPSS using the Cronbach’s $\alpha$ technique (Tavakol and Dennick, 2011). Additionally, the Friedman (1937) test was used to check for significant differences in the effect that each perceived questionnaire item under separate priority aspects would have on the efficacy of adaptive reuse, towards Whanganui’s town centre regeneration.

**Questionnaire reliability check**

The reliability of a data collection instrument is the extent to which it consistently measures a concept. For this study, the Cronbach’s $\alpha$ test (Tavakol and Dennick, 2011) was used to assess the degree of internal consistency among the set criteria that were assessed in the questionnaires. From the following equation, the $\alpha$ coefficient was evaluated as:

$$\alpha = \frac{k \times \bar{\tau}}{\bar{v} + (k-1)\bar{\tau}} \geq 0.7 < 0.8,$$

where $k$ is the total number of questions; $\bar{\tau}$ the average of the covariance that exist between all items; and $\bar{v}$ the average of the variance of items.

From the SPSS analysis, the Cronbach’s $\alpha$ coefficient of 0.706 > 0.7 (refer to Tables II–IV) indicates an acceptable level of internal consistency among all the measured items in the questionnaire.

**Friedman’s test**

The Friedman’s test was employed for this study since adaptive reuse efficacy was repeatedly measured under different priority aspects of Whanganui’s TCR plan. For this

<table>
<thead>
<tr>
<th>Cases</th>
<th>No. of participants</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>22</td>
<td>100.0</td>
</tr>
<tr>
<td>Excludeda</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Notes:** Scale: all questions on the significance of adaptive reuse to Whanganui's town centre regeneration strategy. *Listwise deletion based on all variables in the procedure

<table>
<thead>
<tr>
<th>Item means</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
<th>Maximum/ Minimum</th>
<th>Variance</th>
<th>Total no. of questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item variances</td>
<td>0.947</td>
<td>0.251</td>
<td>1.446</td>
<td>1.195</td>
<td>5.759</td>
<td>25</td>
</tr>
</tbody>
</table>

**Note:** Scale: all questions on the significance of adaptive reuse to Whanganui’s town centre regeneration strategy

<table>
<thead>
<tr>
<th>Cronbach’s $\alpha$</th>
<th>Cronbach’s $\alpha$ based on standardised items</th>
<th>Total no. of questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.706</td>
<td>0.651</td>
<td>25</td>
</tr>
</tbody>
</table>
study, the null hypothesis is that there would be no significant differences in the effect that each perceived questionnaire item under separate priority aspects would have on the efficacy of adaptive reuse. Accordingly, the decision rule would imply that if the significance value \(p\) is less than 0.05, the null hypothesis should be rejected.

**Findings and discussion**

The results from the questionnaire survey highlight factors that could influence the decision-making process of adapting obsolete and vacant historical buildings for new functions in Whanganui's town centre. A five-point Likert scale was used to weigh the attitudes (i.e. 1 = positive attitude; 5 = negative attitude) of the focus group participants by allowing them to express the extent of their opinions, and also levels of agreement or disagreement regarding each item of the questionnaire (Likert, 1932). Responses from the SPSS analysis are provided below.

**The significance of adaptive reuse to Whanganui's TCR strategy**

In response to the opportunities and challenges of urban deterioration in Whanganui (Roberts and Sykes, 2000), this study established the significance of using the adaptive reuse approach as a viable technique that would provide resilient town centre for the area. Adaptive reuse was considered by a significant proportion of the focus group participants to be a very effective approach to regenerating Whanganui's town centre because it was considered a more sustainable way to promote seismic resilience, the preservation of heritage buildings, and also improve the economic and socio-cultural sustainability of the area. Accordingly, about 82 per cent of respondents believed to a large extent that built heritage preservation from adaptive reuse would drive Whanganui's existing TCR strategy. Other adaptive reuse significant factors the respondents believed would contribute to driving Whanganui's TCR strategy to a large extent were found to include: compliance practices to present and future earthquake requirements (69 per cent), the usability of the historical building (57 per cent) and the increased future value of building (80 per cent). As far as the structure of historical buildings remains functional, 74 per cent of the respondents believed to a large extent that adaptive reuse would be a most resilient and sustainable approach for the regeneration of Whanganui's town centre. The high proportion of participants that believed to a large extent the usefulness of adaptive reuse through built heritage preservation imply that a conservation culture of built heritage in Whanganui would promote the socio-economic and environmental benefits of heritage expenditures through adaptive reuse. Also, most owners of old historical buildings would be motivated to upgrade their buildings, as a response to the declining usability of the buildings through adaptive reuse (Pearce *et al.*, 2004).

Furthermore, from an economic perspective, the adaptive reuse approach was considered to a large extent by 71 per cent of the respondents to be a much faster and cheaper alternative for redeveloping historical buildings when compared to the cost and time it would take to demolish and rebuild from scratch (Johnson, 1996; Larkham, 2002). This high response regarding the economic impact on the usefulness of adaptive reuse is significant given that a reduced redevelopment timeframe will bring about the lesser impact of inflation on the construction costs, hence reduced disruption to cash flow (Langston, 2008). Also, 75 per cent of the respondents believed to a large extent that adapting historical buildings for new functions would boost the eco-efficiency of the buildings, by using low energy impact materials, well-organised heating and insulation. Additionally, 69 per cent of the respondents believed to a large extent that changing the functions of the historical buildings in Whanganui's town centre would present an excellent opportunity to transform Whanganui's built environment in a more aesthetically appealing way. Hence, the preserved historical buildings would promote the retention of architectural streetscapes and a maintained sense of place for the area (Hong and Chen, 2017).
Adaptive reuse prospects and obstacles relevant to Whanganui’s TCR agenda

Findings from the questionnaire survey show the proportion of respondents who strongly agreed to some prospects and obstacles that may influence a successful adaptation of historical buildings in Whanganui’s town centre. The prospects include: enhanced property market due to strategic location of building (86.4 per cent), prospects for technical innovation (68.2 per cent), increased inner-city population density (63.6 per cent), high demand for redeveloped historical buildings (77.3 per cent) and higher economic prospects in comparison to demolition and rebuild (72.7 per cent). Furthermore, when compared to a similar adaptive reuse survey carried out by Bullen (2007), the adaptive reuse approach was also significantly supported as a positive approach, and a more sustainable option that would promote the long-term usefulness of existing buildings than demolishing and rebuilding them. For the adaptive prospects, results from the Friedman’s statistical analysis (\( p = 0.487 > 0.05 \)) imply that the null hypothesis should be retained. Refer to Figure 1, Tables V and VI for a representation of these findings.

On the flip side, the respondents strongly agreed that the following factors could serve as obstacles to a resilient and sustainable regeneration of Whanganui’s town centre: seismic regulatory requirements (81.8 per cent), heritage regulatory requirements (77.3 per cent), health and safety regulatory requirements (68.2 per cent), feasibility of reusing building materials (72.7 per cent), impact on aesthetic fabric (59.1 per cent), availability and cost of materials to match existing fittings, elements and fixtures (54.6 per cent), procedure for planning approval (63.6 per cent), non-strategic building location and marketability (86.4 per cent) and structural integrity after redevelopment (77.3 per cent).

In a similar study, some of the above barriers were also believed to impede the efficacy of adaptive reuse for existing buildings, towards sustainable urban regeneration (Bullen, 2007). The finding suggests that the location of historical buildings is a critical marketability component for adaptive reuse. For instance, a historical building sited in an unplanned location would have a lower marketability potential after a redevelopment process. Hence, this becomes a key obstacle to the adaptive reuse process. Other significant proportions of the identified obstacles were connected to regulations, which may be considered too rigid when incorporating technical and safe innovations into the adaptive reuse process. Besides, a \( p \)-value of 0.220 > 0.05 from the Friedman’s statistical analysis implies that the null hypothesis should be retained. Refer to Figure 2, Tables VII and VIII for a summary of these findings.

<table>
<thead>
<tr>
<th>Prospects of adaptive reuse to Whanganui’s TCR strategy</th>
<th>Mean rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1: Enhanced property market from strategic location</td>
<td>2.66</td>
</tr>
<tr>
<td>A2: Technical innovation</td>
<td>3.18</td>
</tr>
<tr>
<td>A3: Increased inner-city population density</td>
<td>3.23</td>
</tr>
<tr>
<td>A4: High demand for redeveloped historical buildings</td>
<td>2.91</td>
</tr>
<tr>
<td>A5: Increased economic opportunity</td>
<td>3.02</td>
</tr>
</tbody>
</table>

Figure 1.
Prospects of adaptive reuse to Whanganui’s TCR strategy
Efficacy of adaptive reuse to the economic viability of Whanganui’s town centre

As the identification of value for money on development projects is indeed commonly related to monetary return, respondents were asked the extent to which they believed adapted new functions for vacant historical buildings would contribute to Whanganui’s economic resilience and sustainability in the aspects of some identified economic criteria. While 68.2 per cent of the respondents believed that new functions for the vacant historical buildings would to some extent promote Whanganui’s economic viability by increasing revenue from tourism, 81.8 per cent believed to a large extent that the new function of the building would boost local commercial activities in Whanganui’s town centre. Accordingly, about 72.7 per cent of the respondents also believed to a large extent that increased commercial activities in Whanganui’s town centre from the building’s new function will trigger a corresponding increase in property and land values of neighbouring buildings.

Table VI.

| Test statisticsa |  
|-----------------|---
| \( N \)          | 22  
| \( \chi^2 \)     | 3.441  
| df              | 4  
| Asymptotic significance | 0.487  

Figure 2.
Obstacles of adaptive reuse to Whanganui’s TCR strategy

Table VII.

| Ranks |  
|-------|---
| B1    | 4.66  
| B2    | 4.77  
| B3    | 5.09  
| B4    | 5.00  
| B5    | 5.45  
| B6    | 5.86  
| B7    | 5.41  
| B8    | 4.34  
| B9    | 4.41  

Table VIII.

| Test statisticsa |  
|-----------------|---
| \( N \)          | 22  
| \( \chi^2 \)     | 10.693  
| df              | 8  
| Asymptotic significance | 0.220  

\( N \): Number of respondents.
\( \chi^2 \): Chi-squared statistic.
df: Degrees of freedom.
Asymptotic significance: Asymptotic probability of the test statistic.

---

Mean rank

| B1: Seismic regulatory requirements | 81.8%  
| B2: Heritage regulatory requirements | 77.3%  
| B3: Health and safety regulatory requirements | 68.2%  
| B4: Feasibility of construction material reuse | 72.7%  
| B5: Impact on aesthetic fabric | 59.1%  
| B6: Availability and cost of materials to match existing elements | 54.6%  
| B7: Procedure for planning approval | 63.6%  
| B8: Non-strategic building location and marketability | 86.4%  
| B9: Building’s structural Integrity after redevelopment | 77.3%  

---

\( \chi^2 \): Chi-squared statistic (asymptotic).
Asymptotic significance: Asymptotic probability of the test statistic.
The key to realising economic prospects from adaptive reuse projects is discovering the right combination of new uses for the older buildings (Plevoets and Van Cleempoel, 2011; Langston et al., 2007). The successful adaptation of an abandoned historical building could result in employment and arousal of the economic growth of the surrounding environment (Chan and Lee, 2008). For an adaptive reuse project to become economically viable, its revenue should be adequate to cover both redevelopment and running costs, with lesser or no dependence on external sources of funds, while gaining profits for the expected beneficiary groups (Bullen and Love, 2009). Such benefits which include an increase in cost recovery, productivity rate, work efficiency and increased number of visitors and tourists to an area will typically indicate how economically viable the new adapted function will be for that area (Shehata et al., 2015). Results from the Friedman’s statistical analysis ($p = 0.689 > 0.05$) imply that the null hypothesis should be retained. Figure 3, Tables IX and X illustrate these findings.

**Efficacy of adaptive reuse to Whanganui’s socio-cultural sustainability**

In total, 77.3 per cent of the focus group respondents strongly agreed that new functions for the vacant historical buildings in Whanganui’s town centre would promote the socio-cultural capability of the area through an increase in the lifecycle of the buildings. The respondents also strongly agreed that the adapted buildings would contribute to the cultural significance of the place (81.8 per cent). Moreover, while 86.4 per cent of the respondents agreed that the adaptive reuse approach would promote Whanganui’s socio-cultural aspects by creating common cultural identity for the residents of the area, 68.2 per cent of the participants agreed that a sense of belonging and attachment to the area would be felt by the residents of Whanganui if the adaptive reuse approach is adopted to redevelop the obsolete historical buildings in the town centre. These above findings suggest that apart from monetary return on investment from adaptive reuse redevelopment projects, socio-cultural aspects are becoming progressively significant (Langston et al., 2007). Also, concerns such as the functionality and cultural efficiency of historical buildings are crucial to resilience assessments in a broader social context.

| C1: Increased local commercial activities | 81.8% |
| C2: Increase in property and land value of nearby buildings | 72.7% |
| C3: Increased revenue from tourism | 68.2% |

**Figure 3.** Efficacy of adaptive reuse to Whanganui’s economic viability

<table>
<thead>
<tr>
<th>Mean rank</th>
<th>Table IX. Ranks</th>
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<tr>
<td>C1</td>
<td>2.05</td>
</tr>
<tr>
<td>C2</td>
<td>2.07</td>
</tr>
<tr>
<td>C3</td>
<td>1.89</td>
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| $N$     | 22   |
| $\chi^2$ | 0.745 |
| df      | 2    |
| Asymptotic significance | 0.689 |

**Table X. Friedman’s test statistics**
Correspondingly, findings from the Friedman’s statistical analysis (\( p = 0.769 > 0.05 \)) imply that the null hypothesis should be retained. Figure 4, Tables XI and XII depict these findings.

**Efficacy of adaptive reuse to the preservation of Whanganui’s built heritage**

When questioned about the efficacy of adaptive reuse to the preservation of built heritage in Whanganui’s town centre, 77.3 per cent of the respondents strongly agreed that the adaptive reuse approach would go a long way in promoting the retention of the visual heritage features of Whanganui’s main streetscape, while 68.2 per cent agreed to the conservation of the history and narration of the town’s existence. Also, 68.2 per cent of the respondents strongly agreed that embracing the adaptive reuse approach in redeveloping vacant historical buildings would stimulate the preservation of Whanganui’s built heritage by sustaining the architectural history of the central streetscape. Moreover, 81.8 per cent strongly agreed that the memories of the abandoned historical buildings would be preserved through adaptive reuse.

The above responses on the impact of adaptive reuse on the preservation of built heritage in Whanganui’s town centre are in line with findings from a similar survey done by Mısırlısoy and Günçe (2016). The study attributed some benefits of architectural conservation through adaptive reuse to sustainable urban regeneration, hence extending the role of architectural conservation from just heritage preservation to urban regeneration and sustainable development (Bullen and Love, 2011a). Results from the Friedman’s statistical analysis (\( p = 0.649 > 0.05 \)) imply that the null hypothesis should be retained. Refer to Figure 5, Tables XIII and XIV for a representation of these findings.

**Conclusion**

The prevalence of vacant historical buildings in New Zealand’s provincial town centres could be considered an important drive for adaptive reuse, as this concept is a fast-growing...
The study discussed in this paper examined the efficacy of the adaptive reuse approach to revitalise underutilised historical buildings in one of New Zealand’s major provincial areas, as a substitute for cosmetic maintenance or demolition and rebuild of these buildings. The practicality of the adaptive reuse approach endorses the potentials of Whanganui’s disused historical buildings in a manner that is both resilient and sustainable. The majority of responses from this study emphasised the usefulness of adaptive reuse within the priority aspects of Whanganui’s existing TCR strategy. Given that the significance, prospects and obstacles of adaptive reuse, and its efficacy on economic, socio-cultural and built heritage preservation aspects with regards to the regeneration of Whanganui’s town centre were also highlighted. The study reported a high proportion of respondents that strongly agreed to the positive impacts of adaptive reuse, which justifies the efficacy of this approach in delivering a vibrant town centre for Whanganui. Also, findings from the Friedman’s analysis suggest that no significant differences existed among all measured adaptive reuse efficacy criteria by the workshop participants, therefore justifying the approach.

The participants of the focus group workshop strongly believed that the adaptive reuse process would be able to create an economically viable town centre for Whanganui, and also, building owners and investors would most likely be able to get a return on investment after redeveloping their historical buildings. Also, the preservation of built heritage through adaptive reuse would help to maintain the cultural identity of vacant historical buildings in provincial town centres in New Zealand by providing a new life for the buildings. The adaptive reuse process should not interfere with the heritage values of existing buildings, especially in situations where the components and materials that were originally used to construct the buildings are no more readily available and have to be specially manufactured. While the adaptive reuse approach is important in a quest to attain low-level energy consumption and environmental sustainability goals (Thomsen and Van der Flier, 2006), it should not be considered in isolation from environmental issues (Misirlisoy and Günçe, 2016).

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**Figure 5.**

Efficacy of adaptive reuse to Whanganui’s built heritage preservation

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**Table XIII.**

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<td>E1</td>
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**Table XIV.**

<table>
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<th>N</th>
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<tr>
<td>$\chi^2$</td>
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<td>df</td>
<td>3</td>
</tr>
<tr>
<td>Asymptotic significance</td>
<td>0.649</td>
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Redevelopment of historical buildings
The high proportion (81.8 per cent) of participants that strongly considered seismic regulatory requirements as an obstacle to adaptive reuse suggest that a better understanding of its efficacy by potential building owners and investors would serve as a very good start to motivate these stakeholders in strengthening EPBs, towards developing seismic resilient communities. Furthermore, since the adaptive reuse of historical buildings is still a developing seismic resilience concept in New Zealand, it could be made more attractive to building owners and investors through the introduction of legislation that will minimise planning and building code requirements, and also incorporate flexibility in the design of new buildings to be able to accommodate new functions for the buildings in the future. Accordingly, there is an urgent call for the development of policies and strategies that will promote adaptive reuse for the resilient and sustainable redevelopement of historical building stock, towards regenerating shrinking provincial town centres in New Zealand. Moreover, some array of options need to be well evaluated by building owners and developers when considering using the adaptive reuse approach to redevelop their buildings for new functions.

However, some doubts regarding the efficacy of adaptive reuse may still exist due to too much concentration on only economic aspects by potential investors and developers. Raising awareness by educating the public on other potentials of adaptive reuse, such as socio-cultural, environmental and heritage preservation aspects, would go a long way in promoting resilient and sustainable urban areas through adaptive reuse. Besides, in the course of this study, some questions regarding developing an adaptive reuse strategy to balance the diverse interests of different stakeholders involved in an urban regeneration decision-making process emerged. These questions would be addressed in future research. A community approach to stakeholder engagement should be considered in typical adaptive reuse decision-making processes, to identify and select the most appropriate new functions for underutilised historical buildings, based on the identified needs of the communities. Adaptive reuse should, therefore, be embraced by building investors/owners, building professionals, local authorities and communities, as a justifiable resilient and sustainable approach towards regenerating shrinking town centres in New Zealand and other parts of the world.

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Adaptability of mass housing: size modification of flats as a response to segregation

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Abstract

Purpose – When dwellings fail to respond to residents’ needs, housing will suffer from segregation and buildings will possibly be demolished ahead of their time. This paper focuses on the lack of variation in the sizes of dwellings as a factor in residential segregation. It examines this issue in the context of Finnish mass housing built in the 1960s and 1970s. The purpose of the paper is to review how mass housing layouts can be adapted to produce the currently absent flat sizes.

Design/methodology/approach – The paper operates at the intersection of human geography, building stock research and adaptability research. First, statistical data are utilized to investigate how dwellings and households of different sizes are distributed over the Finnish housing stock. Second, the building layouts of mass housing are examined in detail. Third, the potential that flats in mass housing have for size modification is reviewed.

Findings – There is a disparity of available dwelling sizes between different housing types, and statistics show that the proportion of large households has decreased significantly in blocks of flats over the last decades. The lack of large dwellings in mass housing may contribute as one factor to the segregation of the neighborhoods built in the 1960s and 1970s. The findings show how the variation of apartment sizes can be increased in mass housing.

Originality/value – The housing stock is rarely examined in detail in segregation research, even though it is a major determinant for a city’s social structure. This paper argues that to address segregation sustainably, it is necessary to understand the housing stock better and to view it as an adaptable asset.

Keywords Flexibility, Adaptability, Housing stock, Mass housing, Apartment sizes, Residential segregation

Paper type Research paper

1. Introduction

The adaptive capacity of existing buildings is a crucial aspect of the resilience and sustainability of cities. Buildings are long-lasting objects that could technically outlast generations of people. As human populations’ demographics change and people’s way to live, dwell and work transform over time, buildings must adapt to those changes. And they do to some extent – some better, most not particularly well – even though they have not been designed for this in mind (Brand, 1994).

In the case of housing, obsolescence, i.e. the need for better adaptation, is often manifested though residential segregation. Segregation is usually regarded as a negative phenomenon because it typically occurs in relation to race, ethnicity and/or income. When the least desirable housing is left for the people with the least choice, it often leads to a geographical concentration of physical decay and social problems. In Europe, the phenomenon concerns post-war mass housing in particular. One popular policy response to the segregation of these estates is replacing the buildings (van Beckhoven et al., 2009). Alas, this results in them being demolished way before their potential life, which is neither ecologically nor socially sustainable.

The current paper deals with the housing stock and its adaptability in the context of segregation and vice versa. The investigation is focused on the European context and more specifically, on the Finnish housing stock and the quantitatively most significant part thereof: multi-storey mass housing built in the 1960s and 1970s. These estates, erected with precast concrete technology are usually situated on urban fringes. The paper is premised on an idea
that these buildings can be helped to adapt better. In terms of adaptability, the research will zoom in on the possibility to change dwelling sizes by merging adjacent flats together.

The paper’s approach operates at the interface of human geography, building stock studies and adaptability research. In human geography – the discipline traditionally concerned with segregation – the physical space is seen to underlie the social space (see e.g. Murdie, 1969). Human geographers observe residential segregation through the spatial analysis of the demographic variables of a city’s inhabitants, so for them segregation is the result of the population fitting itself into the available housing stock. However, human geographers rarely analyze the housing stock itself in depth, let alone its adaptation potential.

This is where the analysis can be deepened with building stock research. This branch of research investigates the composition, properties, performance and dynamics of existing building stocks (see e.g. Kohler and Hassler, 2002). In addition, in building stock research buildings are not viewed as merely stationary assets, but as flexible ones whose value can be preserved on a long-term basis through adaptation. Housing adaptability and flexibility research, then again, already has long traditions in architectural research (see e.g. Schneider and Till, 2007; Schmidt and Austin, 2016).

So, it follows that this paper, a case study for Finland, is a combination of three approaches: the first one influenced by human geography; the second one stemming from building stock studies; and the third one arising from housing adaptability research. This is also where the novelty and originality of the paper lies in terms of methodologies. It not only examines how people are distributed among different building types in the housing stock, as in human geography. It also looks closer at the dwelling sizes and layouts of a focal part of that stock (post-war mass housing), as in building stock research. Finally, the research delves further into how the dwelling sizes in that part of the stock can be adapted to accommodate changes in demographics and lifestyles, as in housing adaptability research. In terms of results, the paper first finds out that the post-war mass housing stock lacks spacious homes and, subsequently, large households (families). Second, the paper reviews how the mass housing layouts can be adapted to produce the large flats that are currently absent. To sum up, the paper considers the lack of variation in dwelling sizes as a factor that can contribute to segregation, and introduces the size adaptation of dwellings as one policy response.

2. Theoretical background

2.1 Modernist mass housing, its critique and segregation

Today, massive urban growth is a global phenomenon that concerns both the developed and the developing countries. In Europe, the mass production of housing in the twentieth century stemmed from urbanization as well as the enormous housing shortages following the Word Wars. The main aim of the modernist housing design was to secure adequate living conditions for an increasing urban population, which was made possible by the development of new building materials, such as prefabricated concrete. This led to building industrially produced blocks of flats in large housing estates at the outskirts of cities.

European mass housing started off as being more or less socio-economically neutral, but the proportion of middle-class residents in it began soon to decline. In segregation theory, a neighborhood’s initial social status is usually seen to be connected to its original physical quality and the design of housing. Thenceforth, a process of downgrading takes place, which is related to both the buildings’ physical decline over time and their relative depreciation in value as new housing options become available. (van Beckhoven et al., 2009). As higher-income households have spatially more options than lower-income households due to their higher financial resources (van Kempen and Özüekren, 1998), neighborhoods will filter from higher-status socioeconomic groups to lower-status ones (van Beckhoven et al., 2009).

The usual explanation for the depreciation process of European mass housing is that it represented relatively low initial quality in both technical and aesthetic terms. Then, the
filtering process led to “a spiral of decline” encompassing intertwined social, economic and physical problems. The socio-economic segregation of many mass housing neighborhoods took first place within native European populations, and an ethnic dimension was not introduced until the end of the twentieth century. (van Beckhoven et al., 2009).

2.2 The Finnish context

Although the pattern of segregation in Finland largely follows in the footsteps of other Northwestern European countries, there are some local traits to consider. Finland was one of the last of these countries to industrialize and urbanize. This took place as late as the 1960s and 1970s – an era known for the Great Migration of the Baby Boomers from the countryside – when mass housing estates were erected swiftly on the outskirts of cities and towns. Even today, about one-fifth of all Finns still live in these estates, which indicates their quantitative significance. The larger the community, the more likely mass housing will be the typical residence; in the largest cities, up to half the population live in this type of block. Unlike some other Nordic and North European countries, where social-rented housing is more common, Finland is a classic homeowner nation. Even in mass housing, two-thirds of the flats are owner-occupied and only one-third are socially rented. Both types of tenure were subsidized by the government. In addition, the majority of the blocks were made mid-rise, so the scale of these areas is much smaller than that of mass housing in many other countries (Tanninen, 2004).

Probably because of these local features, mass housing has not been subject to as extensive stigmatization in Finland as elsewhere in Western Europe. What is more, Finnish mass housing estates are not a coherent group but different neighborhoods have differing trajectories (see e.g. Kemppainen, 2017). However, because of their quantitative significance; the ageing of the buildings and subsequent repair needs; as well as the weakening socioeconomic position of some estates, this type of housing has long been a key issue in Finnish housing policies. The neighborhoods came under public scrutiny after the severe economic recession of the early 1990s, as studies suggested that some of them covered persistent preponderance of precarious groups and a significant proportion of the elderly population (Tanninen, 2004; Stjernberg, 2017). When immigration into Finland really started to take off in the late 1990s and early 2000s, many of the newcomers settled in these very same neighborhoods in the largest cities. Therefore, the question of ethnic segregation has emerged and dominated the discussion about mass housing since then. It must be noted, though, that the proportion of immigrants – in Finland in general, as well as in the mass housing estates – is small compared to the rest of Europe.

Due to the aforementioned reasons, Finnish mass housing areas often suffer from an unfavorable status in comparison to other neighborhoods. The inhabitants' opinion does not fully support the negative conclusions: according to a recent study (Kemppainen, 2017), the perceived disorders were only slightly higher in mass housing areas than in other comparable neighborhoods. Overall, the problems with mass housing neighborhoods in Finland are much smaller than they are in many other European countries. Having said this, though, it should be noted that despite the ever-increasing urbanization, Finnish inhabitants' dreams of a house still remain strong – two-thirds of Finns would prefer to live in low-rise housing, and only one-third in block of flats (Strandell, 2017).

2.3 The case for adaptability and flexibility

Adaptability and flexibility discussions have been important in the context of mass housing from the very beginning. Because the functionalist housing design was in many ways related to the efficient use of space, manifested in an extreme form in the “minimum dwelling,” the adaptable and flexible capacities of that space became also important (Leupen, 2006, p. 9). Open spatial solutions, enabled by the reinforced concrete technology,
gave birth to many successful examples of flexible housing (see e.g. Schneider and Till, 2007). In true mass production, however, these qualitative goals often had to yield to the technical and quantitative aims. In Finland, for instance, the development of the mass housing system incorporated the targets of flexibility, extendibility and even movability. Alas, these aims were greatly abated during the process (Hankonen, 1994, pp. 207-215).

So, a second wave of this discourse stemmed from a critique toward the “tight-fit functionalism” (Rabeneck, Sheppard and Town, 1973, p. 698) and modernist mass housing (e.g. Habraken, 1972). Habraken (1972) was one of the first theorists to criticize the lack of flexibility and residents ability to influence their homes in mass housing. He emphasized that housing is not static but a process that alters in time, so he highlighted that residents should be able to adapt the dwelling to their changing needs.

The concepts of adaptability and flexibility are vast, and they can be considered as umbrella terms for an array of subtopics. Generally, they incorporate the idea of accommodating change in time. Two main approaches to the main topic can be recognized. The first approach focuses on a building’s potential for a versatile usage (often labeled as “adaptability,” “multi-functionality” or “polyvalence”). The second approach emphasizes a building’s potential to be physically transformed or changed (often titled “flexibility,” “convertibility,” “modifiability” or “transformability”). Habraken (2008, p. 290) pointed out that:

Words like “adaptability”, “flexibility”, and “polyvalence” have multiple and often overlapping meanings that make it virtually impossible to come up with a vocabulary acceptable to everybody. This paper uses the term “adaptability” for the various ways buildings or their sub-parts can respond to the changing circumstances. Referring to the latest literature, Schmidt and Austin (2016) have identified six basic types of adaptability. These are adjustable, versatile, refitable, scalable, convertible and movable spaces. The current study is mainly linked to the scalability of spaces, which stands for the capacity to change the size of a spatial unit (a building, a dwelling, etc.). According to Pinder et al. (2017, p. 13), scalable housing can “[a]llow for expansion/shrinkage to accommodate changes in family demographics/lifestyles.”

The changes in family demographics are what constitute “a dwelling career.” The size and composition of households normally follow foreseeable patterns according to a person’s age. Relationships are formed, families are founded and, eventually, new smaller households are formed due to family contraction. Therefore, many people’s preferences for a particular type and size of dwelling can be explained by a person’s dwelling career phase (van Kempen and Özüekren, 1998). For instance, a study in Finland (Vilkama et al., 2013) found that the principal reason for households to leave “ethnicized” mass housing neighborhoods is not related to their alleged deprived state, but rather to the fact that a suitable home is not available there. Therefore, it makes sense to study the scalability of the dwellings in this type of housing.

2.4 Emerging changes in housing
As for lifestyles, the second topic mentioned by Pinder et al. (2017), many of the challenges that housing is facing in the twenty-first century are indeed related to the diversification of the population and subsequently, housing cultures. It is just that the looming global ecological crisis denotes that housing needs can no longer be fulfilled by simply building new housing, as in the twentieth century, but rather by adapting existing housing. Some of the current trends in housing that may influence the need for more varied and adaptable apartment sizes are discussed in the following sections.

The growth of small and one-person households, often in connection with ageing, is a global phenomenon that focuses particularly on urban areas. As in the rest of Europe, in Finland the number of people living permanently in the same dwelling has been steadily declining, from 3.34 people in 1960 to 2.03 people in 2016 (OSF, 2016). Especially the amount of
one-person households is continually growing, and a large proportion of them are elderly people (OSF, 2016). Although the median age of the Finnish population currently equals the EU average, Finns are one of the most rapidly ageing populations in Europe (Eurostat, 2017a).

Simultaneously, there is an increasing awareness of the disadvantages of living alone (see e.g. Kauppinen et al., 2014). Emerging housing concepts and services built around a culture of sharing assets and facilitating social bonds can be expected to place novel requirements on existing housing, too. Living arrangements that encourage sharing resources and space might create welcomed chances for people of different ages and life situations (see e.g. Tummers, 2015). However, they also require a different kind of configuration from the dwelling in comparison to conventional housing. Not only is a large size required, but also the room structure has to be less hierarchical to accommodate different users demanding an equal amount of space.

The plurality of today’s family structures is a widely considered theme in the European context. Also the Finnish family of the twenty-first century has been identified as more diverse, pluralistic and multicultural than before (Keurulainen, 2014). Because of this, the existing housing stock should also offer options for the diverse needs of diverse families, including multi-generational and extended families, reconstituted families and families with members living in different places. Compared to the traditional nuclear family, these family types usually have a larger or more fluctuating number of members, which can result in an increased need for space.

The ways to dwell also change because new innovations create novel opportunities. The evolution of information and communication technologies has allowed people to work, shop and learn irrespective of time and place. Telecommuting has become increasingly popular in Europe (see e.g. Picu and Dinu, 2016). As the boundaries between work, home, family and leisure blur in the post-industrial society (e.g. Desrochers et al., 2005), needs for more integrated work–family arrangements emerge. This also presents new challenges for residential environments. These can include co-working bases for the neighborhood’s remote workers or a housing solution where the workplace, possibly with a separate entrance, may be a part of the dwelling or to have a close connection to it.

Despite the decreasing household size, studies (e.g. Vuolanto and Manninen, 2006; Lankinen and Lönnqvist, 2010) usually recommend increasing the number of larger homes in Finland. This is because their demand is only partly explained by the size of households but increasingly by their expectation for a higher living standard (Vuolanto and Manninen, 2006). For instance, Stjernberg (2017) has shown that the mass housing neighborhoods that have the highest socio-economic status also have an above-average proportion of large dwellings. Even though there is no overcrowding issue in Finland in an international comparison (Eurostat, 2017b), and there has been a significant decrease of housing density over time (Lankinen and Lönnqvist, 2010), the living area per person is still noticeably smaller here than in comparable regions, such as other Nordic countries or West European cities (Tanninen, 2004; Lankinen and Lönnqvist, 2010). The average size of a Finnish dwelling is below the EU average, primarily because of rented dwellings, which are 30 percent (ca. 20 m²) smaller than the EU average (Eurostat, 2017b).

3. Materials and methods
As follows from the interdisciplinary ethos of the paper, the paper employs a multi-method approach: a statistical study, a typological study and, finally, an adaptability study.

3.1 Statistical study
The research begins with a study of how Finnish households are distributed over the housing stock (a human geography informed approach). The motivation is first to
understand 1960s and 1970s mass housing better in the larger context of the Finnish housing market, and only then to see how mass housing could be adapted to meet current needs and expectations. The data cover a total of 2.62m households, the entire Finnish population. It includes all types of people, and all sizes and types of dwellings in Finland, 2.55m homes, which represents Finland’s entire housing stock.

The investigation is spatial at a very high aggregate level of the community type, but a finer spatial level is revealed because different forms of housing are usually located in distinct areas. This assumption, which underpins this study, is also supported by many authors (e.g. van Kempen and Özüekren, 1998; Vuolanto and Manninen, 2006).

The research questions are:

*RQ1.* How are dwellings of different sizes distributed among different building types?

*RQ2.* How are Finnish households of different sizes distributed among them?

*RQ3.* Has the distribution of these households changed in the last 30 years?

To answer these questions, the research uses descriptive statistics, most of the data for which were downloaded from the StatFin online service (OSF, 2012, 2014) and supplemented with a mass housing database (Asumisen rahoitus- ja kehittämiskeskus, 2014).

3.2 Typological study

Having shown the scarcity of large homes in blocks of flats, particularly in mass housing, the paper then zooms in on the building layouts in mass housing, to understand them better. The investigation is based on a typological approach, and the results will act as the basis for the final part of the paper, i.e. the adaptability study. The research question is:

*RQ4.* What kind of building layouts does mass housing encompass?

The study is based on previous typological research on Finnish mass housing. The original data consist of the plans of 320 randomly selected mass housing blocks of flats in 51 Finnish cities and towns, built by several construction companies, but with highly similar techniques and requirements. The same data have previously been used to identify recurring flat types (Kaasalainen and Huuhka, 2016a; Kaasalainen, 2015), and staircase unit types (Achrén, 2015). The recognized types are considered to represent the entire mass housing stock in Finland. The methodological approach for their identification is described in detail in the aforementioned papers. The current study combines the findings of the two previous studies, i.e. matches the flat types with staircase unit types, to create a typology of layouts for whole buildings.

3.3 Adaptability study

In architectural research, typologies are usually used for classifying the built heritage from a historical perspective, as it has been used above. Kaasalainen and Huuhka (2016a, b), however, suggest that typologies can also be useful in mapping the future modification potential of contemporary buildings. The last part of the study takes advantage of this approach. It is based on a design-aided method.

The research question is:

*RQ5.* How can the identified typical layouts be modified to produce larger homes (now missing) by merging adjacent flats?

The potential for mergers is evaluated by examining the numbers of interfaces between flats. Studying the opportunities for mergers results in the creation of a new typology, this time about the flats’ scalability potential.
4. Statistical study: forms of housing in Finland and their evolution

4.1 Housing stock: housing types and dwelling sizes

Figure 1 shows how dwellings of different sizes are distributed among different housing types in the Finnish housing stock. The average size of a home is 3.0 rooms, but the distribution of dwelling sizes is clearly divergent for different building types. There is an average difference of about two rooms between houses (4.0 rooms) and flats (2.2 rooms), with row-houses (2.8 rooms) coming in between. In mass housing, the average size is even slightly smaller than it is in the rest of the stock of flats.

4.2 Households: distribution over the housing stock

Figure 2 shows how households of different sizes are currently distributed in the housing stock, both in terms of the form of the housing and the size of the dwelling. Only one-person households reside primarily in flats, while houses are the dominant form of housing for all larger household groups. A clear difference in housing density can be also observed according to the housing form: households of the same size have, on average, 1.0–1.6 fewer rooms at their disposal if they live in flats rather than houses. This is a logical consequence of the dwelling size distribution of the housing stock (i.e. Figure 1).

4.3 Evolution of the distribution of households over 30 years

Figure 3 presents how households of different size are distributed between different housing types in different types of communities in two cross-section years (1985 and 2012). The distribution predictably reflects the housing stocks of the communities; the proportion of households living in flats is higher in more urban communities. The data reveal two distinctive patterns of change.

First, while one-person households in urban settings usually live in flats, the proportion of such households living in row-houses has increased. Second, the proportion of households with two or more members has decreased in flats and increased in houses in all area types.

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**Note:** Kitchen does not count as a room  
**Sources:** 1OSF (2014) and 2Asumisen rahoitus- ja kehittämiskeskus (2014)
Only the largest (seven-person) households in the capital region buck this trend, as the proportion of such households in flats in urban areas has increased. In urban settings, some of this tendency to "leave" flats is also directed into row-houses.

4.4 Discussion for the statistical study
If one accepts the assumption that different housing types are located in distinct areas, the observed disparity in the dwelling sizes of distinct building types could explain some aspects of the distribution of Finnish households of different size and wealth within the city structure. If housing is indeed a "scarce resource" (Rex and Moore, 1967, as quoted in van Kempen and Özüekren, 1998, p. 1640), large flats are particularly rare gems (< 9 percent), and even more so in mass housing (< 5 percent). So, households looking for larger homes, be it due to their family size or their preference for spacious housing, are not very likely to find one in a block of flats.

The clearest trend over last 30 years has indeed been that the proportion of households larger than one person has decreased in blocks of flats. This can be assumed to reflect two parallel phenomena shown by previous research: first, the increase in households' wealth, which enables them to live more spaciously, and second, the increased supply of larger dwellings in low-rise housing estates, in parallel with the lack of those dwellings in blocks of flats, particularly mass housing. This may also mean that households that prefer or rely on the social-rented sector have no access to larger homes even if their family size requires it. The increase in the proportion of the largest (seven-person) households in flats in the capital region may very well be a symptom of this. Housing subsidies are scaled according to the household size, but social-rented dwellings are almost solely situated in blocks of flats that have very few family-sized homes. So, in the next sections, the paper examines how the proportion of large dwellings could be increased in mass housing.

Source: OSF (2014)

Figure 2. Distribution of households of different sizes in the housing stock according to the housing type and dwelling size

Adaptability of mass housing
Figure 3: Shares of households of different size in four types of communities in the end of 1985 and 2012.

Source: OSF (2012)
5. Typological study: mass housing building layouts

5.1 Composition of the housing

First, there is a need to briefly review the results of the previous studies that this examination is based on. The left side of Figures 4 and 5 shows staircase unit types and their prevalence that have been identified from mass housing (Achrén, 2015). The recognized flat types and their prevalence (Kaasalainen and Huuhka, 2016a) are shown on the right. Slab blocks are three times more prevalent than point blocks, and they also have a greater number of staircase unit types and a higher occurrence of them (65 percent). Point blocks, on the other hand, only have one identified staircase unit type, which covers a much smaller proportion of the buildings (38 percent). In all, the identified types cover almost 60 percent of staircase units in mass housing, while the flat types cover even more – circa 80 percent of the flats. For all flats of different sizes, there is always one type (coded “X-1A,” where X stands for the number of rooms) that is clearly more prevalent than the others. These results provide the starting point for the examination of the adaptation possibilities.

Now, the original contribution of this paper starts from matching the staircase unit types with the flat types. Figure 6 and Table I present the results of this. When matched with staircase unit types, the prevalent flat types (the “X-1As”) are, with a few notable exceptions, also the most common types.

5.2 Discussion for the typological study

The flat types created in the previous study are “idealized” in that their measurements are the mean values, whereas the staircase unit types represent “sets” of adjacent flat types, with no measured dimensional information. The measurements for actual flats and staircase units may differ from the dimensions derived from the idealized types in any dimension.

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<tr>
<th>STAIRCASE UNIT TYPES</th>
<th>FLAT TYPES</th>
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<td>2-1-1-2/3-3-3</td>
<td>2-1-1-2/3-3-3</td>
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</table>

Notes: For legibility reasons, the staircase unit types and the flat types are not on the same scale. The codes for staircase unit types differ from those used by Achrén (2015). Since most slab blocks consist of multiple staircase units, a building can have more than one staircase unit type.

Figure 4. Staircase unit types (Achrén, 2015) and flat types (Kaasalainen and Huuhka, 2016a)
The possibility to actually make a connection for a merger (e.g. install an internal stairway) between two real flats in a given building will inevitably depend on the specific dimensions of the flats in question, in addition to structural matters. The investigation on the possible mergers presented next will, however, provide a general understanding about the scalability potential of mass housing.

6. Adaptability study: scalability by merging flats

6.1 Scalability potential of flats

Table II shows the interfaces between adjacent flats while Figure 7 illustrates the progression of possible combinations of flats in horizontal, vertical and horizontal-vertical directions. Because of the way the flats are positioned in the building, the interfaces are created at specific locations. Figure 8 highlights the possible locations of horizontal connections (new doorways) and Figure 9 shows the possible locations of vertical connections (new internal stairs).

6.2 Discussion for the adaptability study

Large dwellings of four or five rooms can be created in most of the staircase unit types of mass housing by merging flats. Generally there are more opportunities for creating five-room units than four-room ones, but the number of four-room units can be increased in the most common slab block types. Table III summarizes the opportunities for increasing the number of large flats, up to seven rooms, in the order of the overall prevalence of the staircase unit types.

The greater the number of dwellings in the staircase, the better are the opportunities for creating different combinations. In two-dwelling staircases (e.g. 3-3, 3-4, 2-3), the dwellings are already relatively large, and combining them typically results in overly large new dwellings with six rooms or more. Furthermore, if these large dwellings are created in a horizontal direction, the resulting layouts are inefficient, and can make it difficult for people to orient themselves. For example, the flats may have long corridors, or they may lack a
clear internal hierarchy. If such dwellings are needed, it is often better to do it in a vertical direction, as this will result in more compact floor plans.

Increasing the number of four-room flats typically involves consuming one-room flats, and increasing the number of five-room flats typically involves consuming the most common type of flat in these buildings, i.e. L-shaped two-room flats (types 2-1X). Four-room dwellings can be created fairly simply with horizontal joints in four staircase unit types: 2-1-3, 2-2-2, 3-1-3 and 3-1-1-3. Although the two latter types are rare, the first two are
the most common types found in slab blocks. Vertical joints are no good for making four-room flats, but they can be used to create five-room dwellings in all but three of the staircase unit types. This usually requires a vertical connection (staircase types 2-1-2, 2-1-3, 2-1-4, 2-3, 3-3/2-1-2), although a horizontal connection is sometimes possible in rare staircase unit types.

Placing the internal stairway for the vertical connection is relatively easy in the majority of the flat types, although it does not work well with types 2-1A and 3-3 since placing the staircase in the living room may take up too much space. This is unfortunate, as the 2-1A type is the most common in the stock. Replacing walk-in closets with stairs is an especially convenient solution, but this can only be done in a few flat types.

Some flat types are harder to connect in the horizontal direction than others. These include types 1-1B, 2-3B, 2-2 and 3-2. Types 1-1B and 2-3B, which are relatively rare, have a bathroom and kitchenette at the side, so they are difficult to connect with the adjoining flat on that side. Types 2-2 and 3-2 are more common, although they only occur in point blocks and always face each other. If these flats have a walk-in closet they can be connected through it, but otherwise they must be connected through the kitchen, which disrupts the internal hierarchy.

The doubling up of bathrooms and kitchens can be an issue when flats are combined. In larger flats, the problem is minor: a second kitchen can be turned into a bedroom; a kitchenette into a sleeping alcove or walk-in closet; and a bathroom can become a toilet, a shower or a utility room. Double bathrooms are more of a problem when small flats (one-room flats or small two-room flats) are combined together, since there is less need for two bathrooms in a smaller flat.

<table>
<thead>
<tr>
<th>Building type</th>
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<th>Prevalent flat types</th>
<th>Share of staircase unit types in which the flat type occurs (%)</th>
<th>Other occurring flat types</th>
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Notes: ²The staircase unit types with doubled one-room units (2-1-1-2; 3-1-1-3) are rare and considered a subtype of the single one-room unit type (2-1-2; 3-1-3). However, as the flat types of 3-1-1-3 differ from those of 3-1-3, the subtypes are included in the table.
In emerging forms of living some of the aspects mentioned above as inconveniences may also become assets. In co-housing or multi-generational living, for instance, having more entrances, bathrooms and kitchens may not be a disadvantage at all. In these types of housing, the lack of a hierarchy characteristic to the dwelling of a nuclear family may also be a desirable feature. Families with backgrounds in non-western cultures may also prefer different kinds of spatial hierarchies than what functionalist housing normally has to offer. In practice, what size and kind of dwellings are needed naturally presupposes an analysis of the local housing market situation and the aims of the intervention.

7. Final discussion and conclusion

This paper has operated at the intersection of human geography (segregation research), building stock research and adaptability research. Segregation is broad and complex issue that generates a wide range of needs for mapping the characteristics of the housing stock. This paper has focused on the lack of variation in the sizes of dwellings as a factor in

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Notes: When flats with two full kitchens are combined, one of the kitchens becomes redundant and can be converted into a bedroom. Therefore, the room number of the new flat exceeds the sum of the old room numbers by 1 (e.g. two two-room flats with kitchens make one five-room flat). On the other hand, when two-room flats with two kitchenettes are combined, the new flat becomes so large that a full kitchen is needed, so the number of rooms is one fewer than the sum of the old rooms. The combinations also result in two bathrooms, but that is considered as acceptable, or even necessary when the number of rooms is increased.

Table II. Interfaces of flats and room counts resulting from combining flats

In emerging forms of living some of the aspects mentioned above as inconveniences may also become assets. In co-housing or multi-generational living, for instance, having more entrances, bathrooms and kitchens may not be a disadvantage at all. In these types of housing, the lack of a hierarchy characteristic to the dwelling of a nuclear family may also be a desirable feature. Families with backgrounds in non-western cultures may also prefer different kinds of spatial hierarchies than what functionalist housing normally has to offer. In practice, what size and kind of dwellings are needed naturally presupposes an analysis of the local housing market situation and the aims of the intervention.

7. Final discussion and conclusion

This paper has operated at the intersection of human geography (segregation research), building stock research and adaptability research. Segregation is broad and complex issue that generates a wide range of needs for mapping the characteristics of the housing stock. This paper has focused on the lack of variation in the sizes of dwellings as a factor in
residential segregation and examined this issue in the context of adaptability of Finnish mass housing built in the 1960s and 1970s. Besides pointing out the problems caused by the unequal distribution of homes of different sizes in the Finnish housing stock, this paper also showed how the supply of large dwellings could be increased in mass housing – the part of the stock particularly short of them.

In terms of housing prices, mass housing – whether social-rented or owner-occupied – usually represents the most affordable part of the housing stock, in particular when situated in the stigmatized neighborhoods. Therefore, increasing large dwellings in these areas by the means of flat mergers can be financially accessible for a larger number of households than the new construction of those dwellings, which is generally high-priced. The households that already live in the area but that are making a socio-economic climb could be a valuable asset in decreasing segregation. However, the absence of more spacious dwellings can be one influencing factor for those households’ in deciding whether to stay or go. One may only ponder whether one reason behind many Finns’ dream of living in a house is in fact a desire for a more spacious dwelling.

Moreover, when new homes are constructed in these areas as a socio-economic balancing measure, they are often for owner-occupied housing and to replace social-rented dwellings. Many low-income families that already live in these areas only have access to the social-rented sector and based on the study’s results it would seem that the shortage of large apartments in this type of housing may force many of such families to live in cramped conditions. Even though the housing subsidies are designed to scale according to the

Figure 7. Possible flat combinations in slab block staircase units and point block staircase units

Note: Since most slab blocks consist of multiple staircase units, a building can have more than one staircase plan type
household size, the subsidy does not enable the beneficiary families to live less crampedly if no large social-rented dwellings are provided.

Policies to mitigate residential segregation usually aim at diversifying the population structure in the disadvantages areas. This usually encompasses providing different types of tenure and ways of financing, typically in connection with replacing existing buildings with new ones. However, diversifying the sizes and typologies of dwellings can be seen as a measure that could contribute to this target, too. What is more, if even some of the emerging changes in housing, such as co-housing, multi-generational living and working from home become mainstream, the scalability of dwellings – both in the existing stock and in new buildings – gains further importance. Although this paper concentrated on the adaptation of existing buildings, it is not at all the only means to redress the balance, but rather one factor in a larger picture.

Many unresolved issues for future research still remain in the relation between segregation and housing – many to do with the quality of housing, the economic equation and not only the size of the dwelling. Nevertheless, this study suggests that planners, policy makers and property owners concerned with segregation should at the very least ensure they are properly informed about the dwelling sizes in the existing stock before they make decisions for

Note: Primary connection points are circled with solid lines and secondary connection points with dashed lines

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balancing measures. Even more importantly, if it is accepted that buildings can no longer be viewed as disposable commodities (for the sake of sustainability if nothing else) then it must also be acknowledged that older housing can – and should – be adapted to accommodate the ever-rotating changes in demographics and households’ housing preferences.

**Acknowledgments**

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**Table III.** Opportunities to increase large flats in the known staircase unit types

<table>
<thead>
<tr>
<th>Staircase unit type</th>
<th>4-room dwellings</th>
<th>5-room dwellings</th>
<th>6-room dwellings</th>
<th>7-room dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:1:3</td>
<td>H</td>
<td>V</td>
<td>H-V</td>
<td>H, V</td>
</tr>
<tr>
<td>2:1:2/3:3</td>
<td>H-V</td>
<td>V</td>
<td>H</td>
<td>H, V, H-V</td>
</tr>
<tr>
<td>2:2:2</td>
<td>H</td>
<td>V</td>
<td></td>
<td>H, H-V</td>
</tr>
<tr>
<td>3:4</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:1(1):2</td>
<td>V (H)</td>
<td>H, H-V</td>
<td>H-V (H)</td>
<td></td>
</tr>
<tr>
<td>3:3</td>
<td>V</td>
<td>H</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>2:1:4</td>
<td>H, V</td>
<td>H-V</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>3:1(1):3</td>
<td>(H)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** H, horizontal connection; V, vertical connection, H-V, horizontal-vertical connection (H) the combination is possible in the more rare version of the staircase unit type, e.g. 2:1-1-2. Horizontal connections are technically the simplest to perform, while horizontal-vertical require the most effort.
project by Hanna Achrén (2015) and Tapio Kaasalainen (2015). In addition, the authors wish to thank Achrén, Kaasalainen and Jani H. Hakanen for their valuable contribution in collecting the research material and Achrén for the preliminary processing of that material. The authors also wish to express their gratitude to the anonymous reviewers for their constructive criticism, and to Adrian Benfield for the language advice.

References


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The importance of user memory in understanding housing quality

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Abstract

Purpose – Housing quality is determined by both objective and subjective dynamics. This research was conducted to explore the importance of users’ memory as a tool for assessing housing quality. While objective features of the surroundings generally require physical measurements, subjective features can be supported by residents’ memories. Memory studies can therefore be used as a research tool to understand the housing environment as they provide important references to the past, present, and future. The purpose of this paper is to explore the relationship between users’ (residents) memory and housing quality.

Design/methodology/approach – The methodology comprised a literature review of spatial quality studies and a field study of a modern housing estate in Istanbul. For the field study, housing quality was examined through the memories of residents in the neighbourhood, buildings, and units. With the research, site observations were made, a questionnaire was issued to residents, and in-depth interviews were conducted with residents who had lived there the longest. New dimensions of housing quality problems were then discussed in the conclusion with reference to residents’ memories.

Findings – Memory studies can be used as a research tool to understand the housing environment, as they provide important references to the past, present and future. In the conclusion, new dimensions of the housing quality problems were discussed with the help of the residents’ memories. It was seen that different dimensions of housing quality can be revealed with the help of user memory.

Research limitations/implications – In all, 40 of the total residents (101) accepted to make questionnaires. In-depth interviews were conducted with three long-term residents that are the only ones still alive and had lived the area since the beginning of the life after construction.

Originality/value – With the aim of developing new tools and methods to analyse housing quality, this research presents a new perspective by utilising users’ memories to evaluate spatial quality.

Keywords Housing stock, Housing quality, Modern housing estates, Spatial quality, User memory

Paper type Research paper

1. Introduction

One of the main issues on the built environment agenda in the twenty-first century is the “quality problems of existing housing stock”. As an expression of quality of life, spatial quality is a multi-dimensional concept that encompasses both objective and subjective features and reflects individual needs, values, and satisfaction in relation to the conditions of a building and its surroundings.

Throughout history, all societies have shaped their environments in line with their own social, cultural, economic and geographical assets. However, the world now has a huge stock of housing with spatial quality problems attributable to factors such as material deterioration and improper use. Thus, housing stock has become one of the main targets of recently implemented urban transformation policies. Unfortunately, however, the stock of modern period buildings with social and cultural heritage value is now at risk from these neo-liberal urban policies. Rather than demolishing the stock, it is vital in
terms of sustainability to develop improvement strategies and programmes to improve spatial quality.

To develop such strategies for existing housing stock, current conditions need to be understood using spatial quality assessments. Spatial quality involves individual as well as collective elements of satisfaction. It is influenced by a variety of factors and subjective dynamics, such as the notion that individual perceptions are as important as objective factors, including physical characteristics. It is thus important to understand the senses, feelings and emotional relations people have with their surroundings. As Heidegger (1971) noted, a building is not just a dwelling, it is a place where people can be alive and part of nature, with all the feelings, senses and memories that encompasses. Moreover, as Bachelard (1964) pointed out, a house is not only a physical space, it is a space that contains compressed time and is thus a place for memories. Memory, on the other hand, relates to personal experience and the events and objects that surround around us throughout the course of our lives. When we recall places, events, and people we recreate past sights and other senses in our minds (Rowe, 1995, p. 31).

User memory is therefore a potential tool that can provide valuable information to help understand the problems of housing quality and thus facilitate the development of a quality improvement strategy. Housing encompasses different stages, including design, building use, modifications and maintenance. All these stages can be observed and experienced by users, and memories can provide both evidence and feelings about places in the past. A complex relationship exists between those memories and the experiences of spaces and the built environment.

When people talk about events from their past, two different selves are drawn upon: the experiencing-self and the remembering-self. The experiencing-self lives in the present but can also live in the past through memory. The remembering-self recalls past experiences and what was felt and thought at the time. People tend to make decisions based on what they remember rather than their actual experience. Therefore, memory matters more than experience (Cabanac, 1992; Kahneman and Jason, 2005). To understand the spatial perceptions and knowledge of users, questions must be directed to the remembering-self and focus on experiences because people cannot comment on a place of which they have no memories or feelings.

This research pays careful attention to the potential that individuals’ memories offer in terms of understanding housing quality and focusses on the interrelation between subjective perceptions and objective features of the built environment. It aims to reveal the relationship between residents’ (users) memories of their housing environment and their perceptions of quality through a case study based in Istanbul. The utilisation of users’ memory as a tool provides a new perspective on perceptions of quality and satisfaction.

The underlying research assumptions are therefore as follows.

Memories can be more powerful than experience when describing the quality of housing and can be used as a tool to measure levels of spatial quality and residents’ satisfaction.

The feelings and thoughts of users provide an opportunity to obtain embedded information on their housing environment. Memories can also help elucidate changing social conditions such as place attachment and neighbour relations along with physical changes in housing environments.

The research methodology comprises the use of various integrated data collection techniques involving a literature review of studies on housing quality, archival research and a field study of a modern housing estate in Istanbul. The field study comprises site observations, completion of an open-ended and multiple-choice questionnaire, and semi-structured in-depth interviews with long-term residents.

To understand the concept of spatial quality, theories on space and quality were examined in terms of user satisfaction and perception. Several case studies focussing on the
measurement of quality level were also examined and classified. The history and current conditions of modern architectural housing heritage in Turkey were then considered in detail. For the field study, one of the most important estates in Turkish modern architecture, the 4th Levent Housing Estate, was chosen. The estate was designed by the modernist architect and planner, Professor Kemal Ahmet Aru, and built in the 1950s. The planning and buildings in the area reflect the style of the 1930–1970 period of Turkish modern architecture. Although the estate is still in use after many years, it has serious and visible spatial quality problems.

The field study was conducted in three stages. First, observations were made during site visits, following which a questionnaire was issued to 40 current residents, focusing on their memories. The questionnaire contained 30 open-ended and multiple-choice questions addressing three main topics: evaluations of neighbourhood level, building level and apartment level quality. Semi-structured in-depth interviews were then conducted with long-term residents. There are currently only three long-term residents who have lived through all the stages from the design of the housing estate to moving there in the 1950s. These residents have now lived for more than 45 years on the housing estate. In-depth interviews were conducted with these older residents to listen to their memories and gain understanding and insight into their knowledge of local housing and the neighbourhood.

Based on the findings of the study, the potential for employing users’ memory as a tool for remembering the original physical and social characteristics of the housing estate and the existing quality of the housing were discussed. While searching for new tools and studies, it was clear there was an insufficient number of research projects on the interrelation between memory and quality problems. Focusing on memory as a new tool for use in research on spatial housing quality also sheds new light on the complex nature of collecting data for quality assessment.

2. The existing modern architectural housing stock in Turkey and quality problems

The existing modern architectural housing stock in Turkey dates from the late 1920s and early 1930s. In the post-war period, Turkey, like other post-war countries, experienced a housing shortage. To solve this problem, massive and affordable modernist housing projects were built. In Europe, modernist professionals such as Ernst May and Le Corbusier published articles on the use of new materials and developed strategies that were a response to the building of unhealthy and uncomfortable living areas (Heynen, 1999). Their new ideas were put into practice in urban planning, building and product designs that define not only the historical period but also a lifestyle based on a simple and pure approach to design.

With the establishment of the Republic of Turkey, new development projects based on a modern vision were realised in urban areas. In the 1930s, new urban planning and mass housing projects were developed in big cities such as Istanbul and Ankara. Early examples of such housing settlements were built on the peripheries of the cities. A large part of the modern architectural housing stock was built between 1930 and 1970 by Turkish and European architects based in Turkey (Bozdogan, 2001).

Today, most of these buildings are still in use and now suffer from several spatial quality problems. Since the time these estates were first built, many things have changed in the cities; they are now denser, transportation is busier, user profiles are different, and building materials and technology have been updated. These old buildings have not adapted to these changes, apart from individual initiatives involving physical implementations.

Instead of solving the quality problems associated with this old building stock, demolition has been the usual approach in recent years. Since neo-liberal economic policies first focussed on urban areas from the 1980s, urban transformation projects have been an important driver of the country’s economy. The private sector (comprising construction
companies) has become a leading actor in such projects. Although the law on urban transformation promises a more qualified built environment, it has been used primarily for revenue generation by developing new projects on urban lands. The construction companies generally demolish the existing stock and build new, denser houses on the same land (Tekeli, 2011). Alongside problematic squatter areas, many modern housing estates that are an important part of Turkey’s architectural heritage have become primary targets of urban transformation. With its distinctive architectural and planning characteristics, modern housing stock needs to be dealt with through special regulations and modes of implementation to ensure spatial, social, cultural and economic sustainability.

Although modern housing settlements have the potential to requalify urban spaces, buildings, and units, the current lack of housing regeneration policies and maintenance services has led to an increase in the number of housing problems (Sadıkoğlu and Özsoy, 2017).

To improve the quality of the built environment, it is important to develop housing regeneration strategies as well as implement urban transformation policies and to requalify and sustain the existing architectural housing heritage. New tools and techniques may therefore help in developing quality improvement strategies in Turkey.

3. Users’ memory and the idea of housing quality

3.1 Understanding housing quality

The word “quality” has been variously defined in different professions. In general, it relates to being either good or bad. Good quality means that a product meets the users/customers’ needs leading to user/customer satisfaction (Juran, 1989). “Quality” implies care in relation to user satisfaction, so it cannot be thought of separately from user behaviour. Özsoy et al. (1996) define quality as being suitable for use and having the ability to meet users’ needs.

Quality thus reflects satisfaction among users. According to Berry (1991), user satisfaction is the most important determinant of quality. Campbell et al. (1976) associate quality with satisfaction based on users’ expectations. It involves subjective and objective, as well as individual and collective, elements of satisfaction (Marans and Stimson, 2011).

Spreng and Olshavsky (1993) stress that quality relates not only to user satisfaction but also to the performance of a building. Products perform in relation to expectations and needs. There are three different situations that can affect the level of quality. First, performance may be above the user’s expectations which are sufficient to ensure their satisfaction. Second, the product’s performance may be below expectations, which means the user will not be satisfied and s/he will define the product as poorly qualified. Third, the performance may be equal to expectations; this usually results in disinterest and no accurate information on satisfaction can be obtained. Thus, the quality of a product bears a strong relationship to its performance (Spreng and Olshavsky, 1993).

Marans (1981) considers user satisfaction to be the most important criterion for housing quality. Newman and Duncan (1979) contend that satisfaction is a form of behaviour. Therefore, it is important to understand how quality and behaviour come together in everyday life (Gutman and Westergaard, 1974).

Housing quality in relation to existing dwellings is an important factor affecting quality of life. The housing environment cannot be considered without reference to the wide variety of human beings who live there. People make various connections with their housing environment at different levels: urban, building and units. They belong to a place; they recall their experiences, their senses and sometimes miss the place as it was in the past.

It is not only physical factors but also senses, feelings and emotional relations people have with places that determine their spatial quality. Several factors therefore affect the perception of spatial quality. Rapoport (1969) argues that the perception of space can be achieved through the senses as well as through various individual filters. The universally stable elements of a place, such as shapes, colours and textures, are what people experience
with their physical senses; nevertheless, people experience places differently. People’s perceptions differ because they are based on individual characteristics and experiences (Arnheim, 1969). The life stories of residents are important and provide clues to their perceptions of the spatial qualities of housing and should be viewed as part of a dynamic and individual process (Amerigo, 2002). The quality of housing can therefore be evaluated using a range of methods and tools.

In summary, user satisfaction and perception and the performance of a building are the primary issues in housing quality research. Subjective perception is as important as objective measurement. Quality depends on physical, social, cultural and psychological parameters relating to the individual as well as to collective elements. The life stories of users can render invisible (hidden) quality problems visible. Conducting research on housing quality through memory studies may provide a deeper understanding of users’ expectations and spatial quality perceptions.

### 3.2 Studies on housing quality and users’ memory

No memory is possible outside the frameworks used by people living in society to determine and retrieve their recollections. (Halbwachs, 1992, p. 43)

The built environment consists of physical elements, such as buildings and materials, and the social-cultural and economic relations between its users (Lynch, 1960). It is a product of both individual and collective memory. With an increasing focus on sustainability, recent initiatives by the United Nations and the World Bank have focussed on improving the quality of all aspects of the built environment (Hall and Peiffer, 2000; UN, 2016). As well as enhancing quality of life by improving spatial quality, their ideas will help to preserve the heritage and identity of a city from past to future generations.

People create connections with their immediate environment. During their lifetimes, they make and collect memories in places and cannot evaluate their environment without being affected by their feelings about a place. Therefore, when focussing on individuals’ stories, it is important to remember they are part of a memory when evaluating their quality. There are different research tools and methods that can be used to evaluate the level of quality of existing housing stock, such as historical evaluation analysis and ethnographic research.

Andrews (2001) points out that housing quality can be understood by examining physical conditions such as recreational comfort and aesthetics. Pearson et al. (2013) stressed that the measurement of housing quality levels should be conducted by examining the social relations between dwellers in a housing building or cluster. The two-step research conducted by Clark and Kearns (2012) shows that both physical and psychological parameters must be addressed to understand the level of quality.

Gann et al. (2003) focus on the different actors who use housing for different reasons. The knowledge and feelings of the actors, including house-cleaners, technicians, and guests, can help to create another perspective on housing quality. Users are not always the owners of houses, yet their ideas and feelings are just as important.

Physical, socio-cultural and psychological environments all affect the level of quality. Although the most important actors are the users, relations between users and other actors are also significant factors to consider. Quality of life is negatively affected if users experience social and psychological problems within their houses and neighbourhoods (Cooper-Marcus, 1975; Marans, 1981).

According to Andersen (2008), one of the most important factors is dissatisfaction with a residential unit, which should be assessed using both objective, observable criteria and subjective criteria. Although an individual’s feelings and thoughts are important, subjective comments and evaluations can cause confusion when evaluating spatial quality, making it difficult to achieve reliable and clear results. Gann (2003) contends that quality parameters
should be determined by the physical and sensory related concerns of users. Residential quality encompasses a variety of factors such as building structure, social conditions, and environmental features (Kabisch et al., 2018).

Research conducted by Zalejska-Jonsson (2014) in Poland showed that physical findings differ from users’ comments about the spatial quality of their houses. Although the physical (technical) results vary in different housing locations, the levels of housing satisfaction among different users were often found to be similar. This indicates that users cannot comment on their houses using only physical parameters.

Özsoy et al. (1996) developed a quality assessment model to measure housing performance. Collecting and analysing subjective and objective evaluations in existing residential settlements within an integrated system provides good opportunities to obtain detailed and correct data. Bruscaglioni et al.’s (2015) research showed that the quality of residential spaces cannot be evaluated by physical characteristics alone, and that the life stories of users are equally as important in obtaining accurate results. These findings show that ethnographic research techniques are necessary in determining spatial quality. Therefore, in terms of quality, it is important to understand the daily lives and routines of residents and users.

Greenberg and Crossney (2007) found that users create simple mental models from their perceptions which they then use to define their environment. This means that all users have different experiences of spaces and places. To understand and assess quality, any research undertaken without listening to occupants’ stories therefore makes no sense (Lawrence, 1987).

When evaluating housing satisfaction, the stories of individuals living in modern housing estates need to be listened to intensively. For instance, Orazi (2015) interviewed the residents of 21 modern architectural housing estates in the UK. These estates were built during the 30 years after the Second World War and are the product of an era of optimistic and collective lifestyles. When listening to residents’ memories and feelings, Orazi (2015) found that the buildings have a social as well as an economic value. A documentation project by photographer Anton Rodriguez involved interviewing 22 residents of apartments situated on the Barbican Estates. He documented their interior spaces and asked 6 open-ended questions addressing their personal characteristics, occupations, reasons for moving to Barbican, occupation period, favourite features of the building, and their feelings about the apartments. The users not only talked about the physical conditions of their housing, they emphasised the cultural value of the building and how this was an important element of housing satisfaction (Thow, 2016).

The various research findings on understanding housing quality therefore show that individual’s feelings, stories and characteristics are important factors to consider when evaluating housing quality.

4. 4th Levent Housing Estate: evaluating housing quality
Understanding housing quality is important when developing strategies for the requalification or regeneration of existing modern housing stock. It is difficult and complex to find common ground among users when they all have individual opinions and exhibit different behaviour regarding their homes. However, even though dwellings are used differently, a holistic quality improvement strategy needs to be applied to organise dwellings in multi-family apartment buildings. The first task is to listen and understand the needs and views of all users on the housing estate.

The chosen area for the field study, the 4th Levent Housing Estate, has experienced various quality problems in recent years. This research therefore provides useful data that will form a potential resource for the development of a housing regeneration strategy as well as being a pilot study on the use of memory to evaluate housing quality.

The methodology for the field study comprised three different techniques: site observations, questionnaires completed by 40 residents (comprising 30 questions: 12 open-ended and 18
multiple choice) and semi-structured in-depth interviews with three long-term residents. Site observations were conducted by the authors between 2014 and 2016 where the aim was to understand the current spatial quality problems in 47 multi-family housing buildings, including 101 apartments. After collecting the data during site visits, a questionnaire was designed for the users of dwelling units. The results pointed to some significant spatial quality problems in this area. In-depth interviews were then designed that focussed on these issues.

Interviews were conducted with three residents who have lived on the housing estate since it was first constructed. These people are very important because their memories of the estate go back to the 1950s. The 4th Levent Housing Estate is one of the most important mass housing projects in the context of Turkish modern architecture. The design and construction of the neighbourhood was undertaken in four separate periods, starting in 1951 and finishing in 1958 (Figure 1).

At this time, the neighbourhood was on the periphery of Istanbul. The project was developed for middle- and low-income users who could own the housing by obtaining special bank loans from the Emlak Eytam Bank. The architect wanted to create a modern lifestyle within the neighbourhood and drew upon modern architectural and urban design principles. In the 1950s, no other types of neighbourhood had gardens, social areas, car parks, a cinema, or other facilities. As a modern garden city, the 4th Levent Housing Estate comprised different types of multi-family buildings and houses (Figure 2).

Following the rapid urbanisation of the 1960s and the construction of the first bridge connecting the European side to the Asian side, the area began to change as building and traffic density in the area increased. By the late 1980s and early 1990s, the area had become one of the most popular shopping and finance districts in the city. Several skyscraper office buildings, gated community residential buildings, and shopping malls were constructed during this period (Plate 1).

During the 2000s, the area went through major changes in terms of architecture and urban design. The residential identity (or function) of the neighbourhood changed and became a mostly commercial and business area. In response, local residents organised themselves into non-governmental community societies that opposed the changing characteristics of the neighbourhood. In 2008, this housing estate was listed as a modern architectural heritage site (at an urban level). Changes in the characteristics of users and buildings, along with a lack of maintenance, have since contributed to spatial quality problems.

4.1 Site observations

To ascertain and analyse quality problems on the housing estate, several site visits were made between 2014 and 2016. Site observations were made of total 47 multi-family apartment buildings in the neighbourhood. During these site visits, modifications to original features and individual interventions were observed. These were carried out by individual users to solve different quality problems. This indicates that some users were not satisfied with the current conditions of the housing estate and had tried to solve the spatial quality problems by themselves.

The site observations revealed four main quality problems; in addition to the extra space required, there were problems with the heating-cooling systems, insulation, and security. Due to changes in technology, the original heating and cooling systems were now insufficient. New government regulations on energy-efficiency had affected the buildings and they required extra insulation. The original insulation systems no longer complied with current regulations. Some users had transformed their open spaces into closed areas because they needed the extra indoor space. Security issues led some users to change the windows and doors, adding extra protection from burglary through iron bars and security cameras. Individual modifications to the buildings also disrupted the unity of the original design of both forms and facades (Plate 2).
Figure 1.
Levent neighbourhood and 4th Levent Housing Estate

Source: Arû (1954)
The main causes of these problems were material deterioration, improper usage, lack of adaptation to recent technologies, and user characteristics that were at odds with their needs. The findings from the site observations show that housing quality is not only related to residents’ dwellings but also to neighbouring buildings which also affects the quality of housing. The housing quality problems should therefore be evaluated at three different levels: urban (neighbourhood), building (block), and apartment (unit). Having analysed the data from the site observations, a questionnaire was designed to ascertain the main reasons for these changes, focussing on past and current situations. To evaluate housing quality, user memory was the primary tool that was drawn upon.

4.2 Questionnaires for residents
Face-to-face appointments were arranged with residents between May 2015 and July 2015 to provide them with the questionnaires. The questionnaire comprised three main sections: neighbourhood, building, and apartment levels. Quality problems and satisfaction levels were considered in relation to these three different scales. This helped elucidate differences and similarities in quality problems in different environments. The questions addressed both subjective and objective features of quality. However, it was difficult to reach all those who agreed to complete the questionnaires. Of the 101 residential users contacted, only 40 completed the questionnaire.

Source: Drawing by Arû (1954)

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Figure 2.
Examples from 4th Levent Housing Typology

Source: Url-1 (2017)

Plate 1.
Levent neighbourhood in the 2000s
After providing demographic data, users were asked to answer questions using their memories and to compare past and recent conditions of the urban areas, buildings, and apartments. To evaluate housing quality within the area, questions relating to quality and satisfaction with the neighbourhood, buildings and apartments were included, encompassing both objective conditions and users’ subjective feelings. Regression analysis using SPSS software was then used to analyse the data.

**Demographic information.** According to the demographics of the users who completed the questionnaires, women made up 52.5 per cent, while men consisted of 47.5 per cent of the total respondents. Overall, 40 per cent of users were aged 65 or over, and 42.5 per cent had graduated from university or held a higher degree. Regarding occupation, 37.5 per cent of users were now retired. In terms of ownership, 70 per cent of users were home-owners while 30 per cent were tenants. There was also a substantial group of long-term occupants (47.5 per cent) who had lived in the area for over 31 years (Figure 3).

Ownership status and duration of use (occupancy period) affects the perception of housing quality. Behaviour and experience differed between home-owners and tenants, of which the occupancy period was an important factor. Residents can have strong feelings about their dwellings, especially if they have lived for a long time in the same area.

![Figure 3. How many years have you been living in the neighbourhood?](Source: Photo by the Authors (2015))
The longer people live in the same area, the more information can be gathered about historical changes. Overall, 47.5 per cent of users were able to make comparisons that went back 31 years.

**Neighbourhood level quality evaluation.** First, neighbourhood level quality problems and satisfaction levels were explored. For instance, 87.5 per cent of users replied “Yes” to the question “Do you feel you belong in this neighbourhood?” (Figure 4).

Furthermore, when asked “Do you think you will leave the neighbourhood in the future?”, 80 per cent replied “No”.

To elicit their thoughts on neighbourhood quality level, users were asked “Do you think this neighbourhood has enough spatial quality?”, to which 45 per cent replied “Qualified”, 50 per cent said they were “Indecisive”, and the rest (5 per cent) replied “No” (Figure 5).

When asked “What makes you dissatisfied today with the neighbourhood compared to the past?”, the responses included: changes in the functions of the neighbourhood from housing to office use, increasing numbers of skyscrapers and mixed-use buildings, an increasing population, more traffic, and changing social relationships.

When asked “What kind of quality problems are there in your neighbourhood?”, the problems listed mainly related to material deterioration and lack of maintenance. It was clear that people felt attached to their neighbourhoods because although they listed several quality problems, they did not want to categorise their neighbourhood as “unqualified”. Making comparisons with the past revealed invisible social-psychological factors such as the importance of relationships, which was a key factor in the evaluation of quality along with physical aspects.

**Building level quality evaluation.** When the residents were asked to evaluate the quality of their buildings compared to the past, 75 per cent of users listed quality problems related to material deterioration and ageing, such as the infrastructure and installation; 15 per cent, however, said there were no quality problems (Figure 6).

The remaining 10 per cent complained about changing neighbourhood relationships and how these had deteriorated due to changes in function from residential to business. These people also stated that the feeling of being in a community had decreased.

**Apartment level quality evaluation.** When users were asked “Does your apartment have spatial quality?”. While, 65 per cent replied “Yes, it is qualified”, 12.5 per cent answered “No”, and the remaining 22.5 per cent responded “Partially qualified” (Figure 7).

Among the general quality problems listed were infrastructure, installation, electricity, heating, cooling and insulation, all of which were related to material deterioration or lack of maintenance.
The questionnaires show that, in relation to the quality of the housing estate, users focussed not only on physical problems but also on social and psychological problems. They compared the current situation with the past as they remembered it. Thus, memories changed their perceptions of spatial quality and provided a different perspective to help understand housing quality.

Social changes in the area over time have affected ideas about quality at neighbourhood, building, and apartment levels. The primary changes have taken place as a result of the conversion of residential units into office place. The feeling of belonging to the area (place attachment) of office users differs from the feelings of residential users. This means that, although residents want to feel the area is their home, office users do not need this type of connection. If business decreases, or rents are raised, they can change their neighbourhoods more easily than residential users. Thus, the duration of occupation among office users is shorter than that of residential users. These rapid and ongoing changes can make residential users feel more unsettled in terms of security, neighbourhood relations, and crowding. This directly affects neighbourhood relationships and community ideals.

4.3 In-depth interviews with three long-term residents

The three residents who had lived in the area for the longest amount of time were contacted. These were the only residents who had lived in the area for more than 45 years, and indeed had been there since the estate was first constructed in the 1950s. The length of occupancy may therefore be an important factor to consider in the evaluation of housing quality. In-depth interviews were conducted to gather the respondents’ ideas and knowledge of housing quality based on their memories of the neighbourhood, the buildings, and the apartments. It was important to talk to these long-term residents as part of a historical process of understanding the changes they had witnessed in the area. These interviews also provided different perspectives due to their long periods of occupancy.

The in-depth interviews were semi-structured in design and the main topics were based on the findings of the questionnaire which suggested that, aside from physical changes,
social, economic and cultural changes were upsetting users and affecting quality. The interview topics therefore focussed on the problems created by these changes. These included: increasing office use, weak neighbour relations, and a diminishing feeling of community. A total of eight open-ended questions were put to the interviewees. When replying to questions, interviewees also included their own stories related to the area.

The three long-term residents were first asked to recall their memories of their first day in the settlement. They were asked to compare the 1950s to the present day in terms of spatial quality. Comments were collected on three different scales (neighbourhood, building and dwelling unit) and for three different periods (past, present and future). After the interviews, a list of comments was compiled to explain how memories affect ideas about quality.

The first interview was with U1, an 80-year-old retired man who had lived in the area since 1962, an early period in the life of the buildings. He had witnessed all the changes in the neighbourhood (Plate 3). When talking about the spatial quality of the neighbourhood, he focussed on the negative effects of constructing new skyscrapers and office buildings, which had increased in the 1980s. He stated that once the nature of the neighbourhood had changed from residential to commercial, spatial quality problems had emerged.

U1 stated that the details of construction materials, the plans, and the organisation of the neighbourhood were of a high quality. He said that when he first moved to the area, he: “visited the site during construction in the 1950s. I remember that the construction materials and techniques were of high quality. I know some materials were produced in Italy, such as the bathroom tiles and fixtures. We are still using the original installations from the 1950s. I have not changed any of the original items in my apartment” (U1, 2015).

He stressed that existing quality problems were due to the age of the materials. He therefore believed that the way the plan was organised was useful for all periods of life and for all ages. During the interview, he talked about his life in the apartment and how he and his family used the place, albeit on different terms: “We have been living in the same apartment since 1962, we had children, raised them and now they have new families and have left our apartment. We have lived almost a full life-cycle in the same apartment with the same plan organisation and materials. We have had happy times in our apartment” (U1, 2015).

He explained that his apartment was originally of high quality, although it now had some problems (Table I):

I am happy with my apartment, but I am not happy with our new neighbours who are office employees. Today there are ten families in our 40-unit apartment building and 30 of the apartments are used as offices. In the old days, we all knew each other, we did not have any security problems, our building and neighbourhood were so peaceful then. (U1, 2015)
U1 focussed on the evaluation of the neighbourhood and the characteristics of buildings both in the past and in recent years. He said that functional changes in apartment blocks from residential to office use had decreased relations with the neighbours.

The second interview was conducted with U2, an 82-year-old woman who had lived in the neighbourhood for over 50 years. During the interview, she focussed on recent increases in the number of office buildings, the traffic and the people in the area. When talking about the past, she recalled the area as being calm and prestigious, and a place where intellectuals, famous actors, writers, and artists lived: “In the 1950s, the 4th Levent Housing Estate was a symbol of a prestigious lifestyle. I remember many famous singers, actors, and artists lived here. There was a cinema, we organised several cinema nights with our community. Today, I only know my old neighbours, and I do not know the newcomers. If we sustain our good social relations, I think it helps the old neighbours’ community feelings” (U2, 2015).

According to U2, the urban and architectural design of the settlement and construction materials were originally of a high quality, but more than 50 years later the materials had now aged and a lack of adaptation to new technologies had now led users to feel dissatisfied with their homes (Table II):

<table>
<thead>
<tr>
<th>Interview Summary</th>
<th>USER-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community feeling and social areas</td>
<td>Management system</td>
</tr>
<tr>
<td>Nothing</td>
<td>Nothing</td>
</tr>
</tbody>
</table>

| PRESENT |
|-------------------|--------|
| Central | Functionality and being heritage | Plan organization and economic value |
| Traffic, skyscraper and lack of car parking areas | Office usage | Installation and infrastructural problems |
| Economic value | Nothing | Nothing |

| FUTURE |
|-------------------|--------|
| Lack of maintenance | Office usage | Installation and infrastructural problems |

U2 compared the sale prices of apartments in the past to today’s prices and stressed that changes in function in the neighbourhood had caused the cost of rent and sale prices to increase. The details she gave regarding community feelings were similar to those in the first interview. Feelings of community can clearly be understood with the help of memories and affect perceptions of housing quality.

The third interview was conducted with U3, who is 89 and has lived in the area for 46 years. He moved to another neighbourhood in 2005 because of the increasing traffic and population density. During the interview, he focussed on the negative changes that he felt had taken place in the neighbourhood since 1959. When he talked about the past, he mostly listed positive characteristics of the neighbourhood, the building and his
We lived in our apartment for 46 years, I think, the biggest changes are due to the density of the traffic and the changing neighbour relations. In the beginning, after construction, on this housing estate, there were intellectuals, such as writers, poets and musicians living here. With the increasing population density and decrease in popularity, they left the neighbourhood and the apartments started to be rented or sold to office users. We lost our neighbours and our community feeling (U3, 2015).

When telling his story about his apartment and the neighbourhood, he focussed on social relations and the differences between the past and the present. When he talked about the materials, the design, and building quality of the apartments, he appreciated the architects, builders and suppliers of the housing settlement: “The most fascinating things were the quartz mosaics that were used for interior design. The technical equipment such as the heating system, the fixtures, electricity equipment, and installations were supplied from the most qualified brands of the time. We have never changed our systems. We loved our apartment, and if there had been no changes in the neighbourhood, we would not have left it” (U3, 2015).

He stated they had been happy as a family when they used social areas such as the cinema and other public areas, but several problems now exist in these areas today. In the interview, he criticised aggressive and negative evaluations of the neighbourhood in terms of its changing user profile (Table III).

When the three in-depth interviews with the long-term residents were examined, several common themes on three different scales related to the past, present and future were evident. While these users listed positive features in the past, they were more negative about the recent situation and their future predictions (Table IV).

These three interviews provide some insight into the relationship between users’ memories and an understanding of housing quality. They elicited more positive comments about the past than they did about the present and the future. They all complained about changes in the neighbourhood in recent years. Notably, the problems they listed were similar to those given in the questionnaire: population density, changing neighbourhood

<table>
<thead>
<tr>
<th>Interview Summary</th>
<th>USER-2</th>
<th>Neighbourhood</th>
<th>Building</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAST POSITIVE</td>
<td>Community feeling and social areas, good urban design</td>
<td>High quality construction materials</td>
<td>Plan Organization</td>
<td></td>
</tr>
<tr>
<td>PAST NEGATIVE</td>
<td>Non-central location</td>
<td>Nothing</td>
<td>Nothing</td>
<td></td>
</tr>
<tr>
<td>PRESENT POSITIVE</td>
<td>Central location, security, good neighbour relations</td>
<td>Plan Organization</td>
<td>Plan Organization</td>
<td></td>
</tr>
<tr>
<td>PRESENT NEGATIVE</td>
<td>Skyscraper and increasing rental costs</td>
<td>Lack of maintenance</td>
<td>Installation and infrastructural problems</td>
<td></td>
</tr>
<tr>
<td>FUTURE POSITIVE</td>
<td>Economic value</td>
<td>Heritage value</td>
<td>Economic value</td>
<td></td>
</tr>
<tr>
<td>FUTURE NEGATIVE</td>
<td>Lack of maintenance</td>
<td>Lack of maintenance</td>
<td>Installation and infrastructural problems</td>
<td></td>
</tr>
</tbody>
</table>

Table II. Summary of the interview with U2
characteristics, a loss of community feeling, and traffic. In both the questionnaire and the in-depth interviews, users were more positive about the quality of their apartment units than they were about the buildings and neighbourhood. This could be because they can control their own apartment units whenever they need maintenance or a change, whereas they cannot individually control the buildings and the neighbourhood.

5. Findings and conclusion
Recent urban transformation activities can sometimes be harmful for the existing built environment, resulting in slums, informal settlements or demolished neighbourhoods.
Although an important component of Turkey’s architectural heritage, 1930–1970 period housing estates can sometimes be the objects of such intervention. Instead of demolishing existing modern housing estates, some regeneration strategies have aimed to improve the quality of housing. However, before developing quality improvement strategies, the current conditions of housing, as seen by users, needs to be understood.

Housing quality is determined by both objective and subjective dynamics. This research focussed on the importance of users’ memory as a tool for assessing and sustaining housing quality. Focussing on individuals’ life stories provides an insight into their ideas regarding the perception of spatial quality. As this differs from one person to another, it is necessary to combine subjective perceptions with technical measurements. Thus, objective features of the surroundings generally comprise physical measurements while subjective features can be supported by residents’ memories.

The findings revealed a strong relationship between perceived housing quality and memories. The feelings and thoughts of users can provide embedded (invisible) information about their surroundings. In terms of the aim of the research, individual memories can be used as a tool to measure spatial quality levels and residents’ satisfaction. As well as providing information into the physical conditions of the area, memories can also provide insight into changing social conditions and relations.

To elicit both subjective and objective features of quality, site observations, questionnaires and in-depth interview research techniques were used in combination to show “how users” memories can be useful in helping to evaluate spatial quality? The findings and techniques thus complemented one another. For instance, site observations helped in the design of the questionnaires, the findings of which then helped in the development of semi-structured interview questions.

Through site visits, current housing conditions were observed. These included key quality problems relating to the heating and cooling systems, insulation, security and lack of space.

The questionnaire was utilised to explore users’ thoughts on housing quality and related problems in the neighbourhood, apartment buildings, and units. The residents were asked to draw upon their memories when replying to the questions. The findings show that there were several spatial quality problems, mostly related to ageing materials and a lack of adaptation to new technologies or user needs. Alongside these physical problems, users pointed to other dimensions of housing quality such as social and psychological problems.

When users compared the current situation with that of the past, they mentioned physical problems such as electricity, heating, cooling or the requirement for extra space. Importantly, however, they also focussed on social changes in the area, primarily changes in social relations that can only really be revealed through memories.

When recalling their life stories in the neighbourhood during the in-depth interviews, interviewees used their memories to describe their feelings and ideas about the places where they live and to compare past and present. Positive recollections of the neighbourhood and buildings from the past were invaluable. Moreover, users have experienced the spaces then and now, and so have a better chance of comparing both times and places.

Physical problems can be understood through on-site observations and measurements or material tests; however, to understand the social and psychological problems that directly affect satisfaction with housing quality, long-term residents’ life stories relating to their housing environments need to be listened to. A comparison of the past and recent conditions by users can provide an insight into the effects of social, cultural, economic, and spatial changes. Critiques made during such comparisons employ a rich combination of feelings, senses and ideas.
Individual perceptions and considerations thus play an important role in determining quality. It therefore makes little sense to conduct research that evaluates spatial quality without listening to users’ experiences. Many factors have been determined from different field studies and research on spatial quality assessment, but this research shows that, besides the physical parameters, psychological parameters that can only be understood through emotions should also be included.

The key conclusion to be drawn is that spatial quality perception is not based on physical factors alone, but also on the memories of users who can change our ideas and make the seemingly invisible problems visible.

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