Merging Inclusive Design and Energy Efficiency as a disruptive approach to housing renovation

Abstract

There is a pressing need for housing renovations that both accommodate lifelong living and significantly increase energy efficiency. Much research has been done on both inclusive design (ID) and energy efficiency (EE). However, they are typically treated independently and have been limited in their adoption. A simultaneous renovation for ID and EE might lead to new concepts that better fulfills the residents’ desire for comfort in addition to saving on energy and time.

ID and EE in combination

What is EE to you?

What is ID to you?

Would you include a 51

No

House ID

No

fig 4. Proposed relations as a unifying concept

Methodology

Literature Review

A literature review was undertaken for studies on the combination of ID and EE measures and incentives and barriers to their adoption. There were no studies that analyze the two concepts in tandem, so we reviewed individually considered with over 40 publications reviewed on EE measures, with particular focus on housing renovation and behavior, and over 35 publications on ID.

Survey

The questionnaire was administered at the Universal Design Living Lab in Hasselt, Belgium in May 2012. The purpose was to get a feeling for the attitudes toward EE, ID, and combination of the two. When selecting motivators multiple answers were possible.

Results

Literature Review

In ID literature there was a tendency to focus discussion on definitions and benefits (“Making the case”) of ID, with a distinct lack of field studies concerning adoption factors. The handful of studies that discussed barriers and incentives to adoption of ID measures (Coomaraswamy et al., 2006; Dong 2004) focused on the perspective of professionals involved in the process rather than the inhabitants’ perspective.

In contrast, there is a wealth of studies on factors of adoption for EE measures. While many of these studies treat the inhabitant as a rational consumer (where financial and environmental factors are most important), a more recent trend has identified non-energy motivations for adoption through a sociotechnical approach (Aune et al. 2007 and 2012; Bartu et al. 2006 and 2014; Greenwood et al. 2014; Mills & Rosenfeld 1999) or behavioral sciences (Dogan & Connelly 2013, Wolfe & Hendrick 2012).

Survey

In total there were 62 replies, 12 men and 50 women, 33 of which were visiting the Living Lab for professional reasons while the rest were split between students and private interests. A more recent trend has identified non-energy motivations for adoption through a sociotechnical approach (Aune et al. 2007 and 2012; Bartu et al. 2006 and 2014; Greenwood et al. 2014; Mills & Rosenfeld 1999) or behavioral sciences (Dogan & Connelly 2013, Wolfe & Hendrick 2012).

Discussion

In all surveys, when individuals’ income is beyond the level required for necessities, renovation can be elevated from the class of functional needs to discretionary expenditure in terms of ‘lifestyle’ pursuit (Feng 2013).

Comfort as a reason for action in renovations

Comfort is an often recurring criterion or motivation for EE adoption in literature. Shove (2003), Lindén et al. (2006), and Aune et al. point out that policy instruments must be in direct conversation with cultural preferences, particularly with comfort and convenience. Both the SERCC (Bartu et al., 2006) and COHERENO (2014) research projects identify improvement in comfort as an important motivator for energy efficiency renovations in Belgium.

Despite the lack of adoption studies in ID literature, based on the very nature of ID measures which are designed to increase comfort and ease of use, it is reasonable to assume that comfort would be a significant factor in ID adoption as well. Survey responses mentioned above seem to point in this direction as well.

Redefinition of the problem - a mismatch

Governmental policy objectives related to environmental concerns, energy independence and demographic and lifestyle shifts are not aligned with the objectives of residents who consider comfort improvement as one of the main reasons for carrying out renovations (Figure 8).

A broader Comfort

Comfort can be generally interpreted as ‘well, conscious satisfaction with the relationship between one’s body and the immediate environment’ (Givoni, 2001, p. 142): this definition encompasses the full physiological range of senses and is much wider than within EE literature comfort is most often understood conceptually as the technically defined parameter of ‘ Thermal comfort’. ID literature is more interested in the context of accessibility or usability. However, Chapple’s and Shove (2005) argue that comfort covers a much wider range of physiological sensation than currently contemplated by energy and environmental policy makers, and that the concept of comfort itself is malleable and in constant change.

Shove (2003) mentions comfort as a concept with dependency. Cole et al. (2006) goes even further to include social, psychological, cultural and contextual aspects into comfort.

Comfort as a unifying concept

The already established topics within EE (such as thermal comfort, humidity and air quality etc.) and ID (accessibility, usability, adaptability etc.) fell readily within the physiological aspects of comfort. In some sense comfort can be seen as an umbrella concept that includes both ID and EE and also be a key motivator for people that undertake renovations. Thus, comfort can be used as framework for the integrated design and application of ID and EE technical measures. It can also serve as a communication framework which represents the objectives of both the inhabitants and the policy makers (Figure 9).

Conclusion

When the concept of comfort is expanded to include the full range of physiological and cognitive aspects, the merging of ID and EE can offer inhabitants a more complete sense of comfort, and by doing so increasing adoption of both types of measures, in line with wider governmental and societal goals.