CONSUMER DEMAND FOR ZERO CARBON HOMES WITHIN THE UK

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Household emissions currently account for some 25% of the overall CO2 emissions within the UK, whose government has a clearly defined series of directives, strategies and targets aimed at achieving widespread zero carbon (Zc) housing by 2016. Lack of consumer demand is a potential hindrance to the drive for Zc homes and therefore it becomes vital that the delivery of such homes align with the attitudes and values of potential home buyers. This extends to consumer buying decisions as a result of differing levels of concern and motivation surrounding carbon emissions, with some home buyers engaging in more pro-environmental behaviour than others due to varying levels of awareness of the benefits to be gained from Zc homes. To date, there is little evidence within the existing literature to either confirm or refute the presence of a buoyant market demand for Zc homes. Consequently, this research focuses on buyer decisions related to Zc, private, housing. The findings from the analysis of a number of questionnaire responses provides views and opinions of potential home buyers when asked to consider the drivers of their choice of new home and views on Zc homes. The findings suggest that consumers currently have a moderate to strong Zc awareness and are able to determine potential benefits of the concept. However, such awareness does not necessarily result in increased pro-environmental behaviour, which is often dependant on a much wider range of contributing factors.

Keywords: consumer demand, zero carbon homes.

INTRODUCTION

There is clearly increasing Government pressure on the construction industry to provide carbon friendly, sustainable homes within the housing market and this pressure source serves an the impetus for investigation into the current level of consumer demand for Zc homes in the UK. However, in order to validate success, such homes must have sufficient consumer appeal as will generate interest and concomitant sales. If consumers are unwilling to accept Zc homes as an equivalent to 'traditional' homes i.e. in terms of building methods, then house builders may find themselves constructing homes which buyers do not wish to live in and which may then be classified as not fit for purpose and perhaps unmarketable.

This research aims to discover the current level of consumer awareness of the term "Zc homes" and to determine whether or not consumers would consider buying and living in one. Additionally, the research sets out to reveal consumer feelings towards the moving home process and the factors influencing house purchases.

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LITERATURE REVIEW

The success of Zc housing primarily depends on the associated level of consumer acceptance, which must align with the thoughts, attitudes, values, and wants of potential home buyers, particularly when faced with a variety of factors which have the ability to influence consumer decisions (Wright, 2006). This research blends elements of psychology, sociology and anthropology in order to assess the mental and emotional behavioural traits consumers display when undertaking complex and comprehensive decisions surrounding pre-purchase evaluations, problem-solving and cognitive information processing (Foxhall et al., 1998). The home buying decision making process (HBDMP), involves five logical steps: need recognition, information search, alternative evaluation, purchase and post-purchase evaluation (Pizam, 2005; Dibb et al., 2006), and each of these are used as assessment tools to filter out unwanted options. However, the complexity of the decision making process can range from careful analysis to irrational impulse buying (Danziger, 2004) depending on the decision making difficulty (DMD). As environmentally conscious consumers are no longer considered to be a niche market, the need for definitive motivators to encourage change within the green audience remains (Twichell and Carlson, 2009). According to Lorenzoni et al., (2007) “it is not enough for people to know about climate change in order to be engaged; they also need to care about it and be motivated and able to take action”. As a result, decisions are generally classified into two broad categories depending on the level of motivation felt by consumers towards “high involvement - cognitive purchases” and “low involvement- uncommitted purchases”. The cognitive consumer is likely to worry about the perceived functional, monetary, social and psychological risks associated with the home buying process, particularly if it is one of significant personal meaning or is of a substantially high value. Conversely, routine purchasing does not seem to entail a high level of involvement or commitment from the consumer, which is commonly associated with low value, low risk purchases (Foxhall et al., 1998; Twichell and Carlson, 2009).

Maslow (1943) suggests that the motivation for any action made by a human being originates from an unfulfilled need, which should be met, or at least sated. Maslow saw physiological needs: the basic things that keep humans alive, as the base: followed by safety needs, social needs, with the less tangible needs of esteem and self-actualization following on. When applied to the housing market, it is clear that some house builders develop affordable social housing to provide accommodation that meets the basic needs of safety. At the other end of the spectrum, some house builders may employ architects to design accommodation that meets the needs of personal expression and thus fulfils the “esteem” and “self actualisation” levels. However, it is generally accepted that very few buyers satisfy the higher levels, instead opting to purchase homes to satisfy the basic need for shelter.

However, a high level of motivation and enthusiasm for the Zc concept alone will not necessarily translate to increased Zc purchases. Commonly referred to as the "value-action" gap, this debate has been the subject of particular controversy over the years when assessing how consumers structure their attitudes to display behaviour in a rational way. Kollmuss and Agyeman (2002), suggest there are three crucial behavioural traits (egoistic, social-altruism and biospheric orientations) which will determine a person’s level of motivation influencing their decision to purchase a Zc home. This view enhancing the work of Stern et al., (1993) who state that egoistic consumers often focus on maximising their own outcomes and may value themselves more than others and the environment. However, when egoistic consumers feel
personally threatened by the effects of environmental damage, they can be influenced
to pay meticulous attention to the problem. As the name implies, a social-altruistic
consumer will have values reflecting concern for the welfare of others which is likely
to include environmental and Zc issues. Schwartz (1977) argues that many consumers
worry about the environment because they believe that there are wider implications to
be considered and that any destruction caused to the planet will threaten the well-
being of others. Alternatively, a biospheric natured consumer will possess a strong
sense of value and care for the environment, which stems from an appreciation of all
living things. As a result, it is possible to conclude that an egoistic consumer will
display self-enhancing behaviour and that social-altruistic and biospheric consumers
display self-transcendent behaviour. Furthermore, many studies including that of De
Groot and Steg (2008) have found that consumers with selfless values are more likely
to have stronger pro-environmental beliefs compared to that of self-centred
personalities.

However, personal feelings towards the Zc concept will differ from individual to
individual; so much so, that there is an ongoing debate regarding the differences
between the male and female mind and the effect this has on personal behavioural
traits. Despite a lack of evidence outlining any physical differences between the male
and female brain, many psychologists believe that there are significant functional
differences. For example, Baron-Cohen (2005) suggests there are common brain types
which appear on the empathising-systemising scale, which claim to go beyond
anecdotal evidence. For example, a strong empathising brain (E type) is one which is
commonly associated with emotions, feelings and thoughts. As a result, E type brains
are more widely recognised in women who are often associated with intuition and a
softer in disposition compared to males. A strong systemising brain (S type) on the
other hand, is associated with the male mind which is considered more utilitarian,
competitive and more willing to take risks, particularly with money (Bakewell and
Mitchell, 2006). The final type of brain is one which is equally strong in both
systemising and empathising: the balanced brain (B type).

Despite such obvious processing differences between the male and female mind,
consumers may also base their house purchasing decisions on several economic and
socio-cultural factors. For example, economic factors include the supply and demand
of homes within the marketplace, interest rates and inflation, mortgage lending
conditions, house prices and consumer spending as well as consumer confidence.
Socio-cultural factors, on the other hand, vary extensively and are intrinsically
connected to the buyer’s personal likes and dislikes which are driven by a number of
factors including: individual genes (gender, nature and nurture) which have been
moulded to shape particular human behaviour (Kosslyn and Rosenberg, 2001; Lippa,
2005), the nature of society, social class, relationships with friends and family and
lifestyle choices.

However, economic and socio-cultural factors will affect certain types of consumers
more than others. For example, according to Kotler (1984) and Levy and Kwai-Choi
Lee (2004), individuals can be classified as either: information gatherers, influencers,
decision makers, purchasers or users within the household. This is known as the
decision making unit (DMU), where it is suggested by Wright (2006) that the more
complex the decision, the more people will be involved in the buying process.

Understanding all of these factors (illustrated in Figure. 1) enables marketers and
house builders alike, to influence and predict consumer buying behaviour and thus
adapt their services/homes to align with values of the potential buyers, in the hope of generating more sales.

**Figure 1: Factors influencing consumer decisions**

**METHODOLOGY**

Whilst there are distinctions between philosophical assumptions associated with both quantitative and qualitative paradigms, it is possible to combine both methods for use within a single study. Commonly referred to as a “mixed method” research approach, this process uses the strengths of one method to enhance the other (Morgan, 1998) which is achieved by encapsulating both qualitative and quantitative dataset results to provide a comprehensive understanding of the research questions, resulting in a balanced view of the topic in a study which is as accurate and thorough as possible. This is emphasised by Amaratunga et al., (2002) who believes that a combined quantitative and qualitative approach is the most effective technique used to prevent bias. Additionally, this integrated approach has been praised for its legitimacy in creating a more comprehensive representation of both statistical trends and participant perspectives, rejecting dogmatism, allowing cross validation of the results (Johnston and Onwuegbuzie, 2004) and ensuring the discovery of a robust set of conclusions in a way not possible when considering the datasets in isolation (Giddings, 2006).

As consumer opinions and views are the driving force behind the research, a qualitative approach has been undertaken through questionnaire responses, in order to test the theory of consumer buyer behaviour. In particular, simple random sampling has been intentionally selected to identify a variety of consumers to highlight a difference of perspectives, providing data in a high-quality qualitative study. As a result, a small sample size of 35 respondents was selected in order to provide information which is both rich and deep in nature which is commonly unobtainable.
from large sample sizes. This specific sample size was also selected to closely resemble the normal statistical distribution and provide a representation of the wider population.

Interviews had been considered but later discounted due to the impractical nature and time constraints of the sample size. This research method has generated data and results that are not only objective but which also provide a wider view of consumer opinions effecting buyer decisions. As a result, the quantitative data underpins the broader qualitative approach adopted in this work.

Employees were selected from a large organisation situated in the West of Scotland (n=1500+) as potential candidates for the research, providing access to a wide variety of respondents of differing ages, backgrounds, interests and indeed, housing requirements. The demographic characteristics of the respondents can be seen in Table 1. A list of names were transferred onto a Microsoft Excel spreadsheet and the function =RAND() tool was used to populate random numbers uniformly between 0-1 for each candidate to ensure equal probability of being selected. Each column was arranged in chronological order from lowest to highest. The questionnaire was then administered to the first 35 respondents on the list who were asked to complete the survey in their free time. A pre-screening of the employees was also undertaken to ensure that there was no overlap between the respondents, where a total of 30 questionnaires were returned providing an 86% response rate.

Table 1: Demographic characteristics of the respondents

<table>
<thead>
<tr>
<th>Age (n=30)</th>
<th>20-24</th>
<th>25-29</th>
<th>30-34</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
<th>50-54</th>
<th>55-59</th>
<th>60-64</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>3%</td>
<td>7%</td>
<td>23%</td>
<td>10%</td>
<td>10%</td>
<td>7%</td>
<td>20%</td>
<td>14%</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex (n=30)</th>
<th>Male = 60%</th>
<th>Female = 40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital status</td>
<td>Single = 30%*</td>
<td>Married = 67%</td>
</tr>
</tbody>
</table>

*Single - Never married or registered in a same-sex civil partnership

The questionnaire was delivered personally to each respondent and collected five working days later in order to maximize returns. As a result, follow-up emails were not necessary. The questionnaire, itself, was limited to a three page booklet to ensure that respondents were fully engaged at all times and would not become discouraged. The questionnaire covered a variety of subject areas including: consumer attitudes and opinions of the home buying process, the factors which influence their decisions, which member of the family makes the decisions within the household as well as general green buying tendencies. Throughout the questionnaire, respondents were asked to rate a variety of factors using a five-point likert scale on their buying decisions. Similarly, an ordinal ranking technique was also employed to determine the factors influencing house purchase decisions on a scale from one to ten.

The data analysis was completed in two interlinked phases. The first phase involved examining basic descriptive statistical analysis with a later view to undertake correlations and associations between consumer demographics, the home buying process and green tendencies, in an effort to compare current results with those of past research in terms of direction and significance of the relationships. The second phase
of the analysis process aims to use of a multiple regression technique to establish relationships between several independent variables.

RESULTS

A comprehensive analysis of the results has been obtained from the stated questionnaire, in order to determine:

- Whether or not consumers are knowledgeable about Zc homes
- The factors which influence house buying decisions
- Whether or not specific purchases are made by the male, female or jointly within a household

Section one of the questionnaire (seen in Figure 2 to the left) asked consumers to consider their current knowledge of Zc homes. The results obtained show that the majority of consumers questioned (87%) did not currently own or rent a Zc home and that the remaining consumers (13%) were unsure whether or not they owned or rented a Zc home. However, the majority of respondents were aware of the term “Zc”, albeit to varying degrees. In selecting their response, consumers chose “somewhat aware” most often (56%) followed by “very aware” (20%). Less popular responses included “extremely aware” (10%), “neither aware nor unaware” (7%) and “unaware” (7%).

![Figure 2: Responses regarding consumer awareness, benefits influencing decisions and likelihood of purchase/renting](image)

Similarly, the vast majority of respondents (Figure 2 centre section) (83%) claimed to understand the benefits of Zc homes. “Energy efficiency” (50%) was considered the most prominent benefit encouraging Zc sales. This was followed by “making a valuable contribution to society” (10%) and reduced heating costs (3%). Those who selected “other” (20%) did so as they believed all three options were benefits of Zc homes. The remaining 17% of respondents, who did not understand the benefits of Zc homes.
homes, did so as a result of a “limited number of Zc homes available within the marketplace” (13%) and “lack of media attention to raise awareness” (4%).

When asked to rate whether or not they would consider purchasing or renting a Zc home (Figure 2 right hand section) in the future, consumers generally answered positively. In rating their response, some consumers seemed “likely” (30%) or “very likely” (13%) to purchase or rent a Zc, while others were “unlikely” (20%) or “very unlikely” (4%). An additional 33% were “neither likely nor unlikely” to purchase or rent a Zc home.

Section two of the questionnaire asked consumers to consider the home purchase process. Votes were cast regarding the first word(s) which came to mind when thinking about moving home. In this instance the words “stressful” and “fresh start/new beginnings” both received 28% as seen in Figure 3. Similarly, “exciting” and “expensive” both received 17%. “Time consuming” received the least number of votes (10%).

![Figure 3: Feelings when moving home](image)

In selecting responses with regards to choice within the marketplace, consumers selected “sufficient range” the most often (40%) followed by “poor range” and “good range” both selected by 20% of respondents. Less popular responses included “insufficient range” (17%) and “extensive range” of options available (3%).

As illustrated in Table 2, the mean ratings of a variety of factors influencing home choices show that the “price of a home” is the most important factor influencing consumer decisions (M = 5.33). This was followed by “good living space” (M = 5.96), “sufficient number of bedrooms” (M = 6.29), “proximity to public amenities” (M = 6.38) and “proximity to work” (M = 6.46).

**Table 2: Factors influencing house purchases**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean (M)</th>
<th>Factors</th>
<th>Mean (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of new home</td>
<td>5.33</td>
<td>Wanting to move to a new area/location</td>
<td>8.38</td>
</tr>
<tr>
<td>Good living space</td>
<td>5.96</td>
<td>Wanting new beginnings</td>
<td>8.63</td>
</tr>
<tr>
<td>Sufficient number of bedrooms</td>
<td>6.29</td>
<td>Good flow/layout within the home</td>
<td>8.83</td>
</tr>
<tr>
<td>Proximity to public amenities</td>
<td>6.38</td>
<td>Proximity to family/friends</td>
<td>8.88</td>
</tr>
<tr>
<td>Proximity to work</td>
<td>6.46</td>
<td>Wanting to buy</td>
<td>9.54</td>
</tr>
</tbody>
</table>
Finally, section three asked consumers to consider who makes the decisions within their household. As a result, Table 3 shows a comparison between male, female and joint decision making for a range of popular decisions. As respondents who have never been married, never been registered in a same sex civil partnership or who live alone, ultimately make their own lifestyle decisions, such candidates have been excluded from the following sample. As a result, 67% of the respondents provided the following data set which shows that 100% of respondents agree that the home purchase decision is made jointly. Similarly, undertaking major construction work within the home, the decision regarding whether or not to start a family, going on holiday within the UK and going on holiday abroad were also considered highly as joint decisions.

Table 3: Male and female and joint decision making

<table>
<thead>
<tr>
<th>Decisions</th>
<th>Male</th>
<th>Female</th>
<th>Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing a home</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Undertaking major construction work within the home</td>
<td>1</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Whether or not to start a family</td>
<td>0</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Going on holiday within the UK</td>
<td>0</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Installing media services such as telephone, internet and sky/virgin media packages</td>
<td>5</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Purchasing a computer/laptop</td>
<td>9</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Purchasing food</td>
<td>0</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Selecting schools for children</td>
<td>0</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Undertaking cosmetic/minor construction work within the home</td>
<td>3</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Whether or not to start a new job</td>
<td>2</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Purchasing a car</td>
<td>3</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Going on holiday abroad</td>
<td>1</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Purchasing clothing</td>
<td>0</td>
<td>7</td>
<td>13</td>
</tr>
</tbody>
</table>

CONCLUSIONS

This paper develops an extended conceptual framework of consumer buying decisions particularly with regards to Zc homes, potentially allowing house builders to understand the factors which increase customer satisfaction thus resulting in increased sales.

The first section of the paper set out to discover the level of consumer awareness of the term "Zc homes", whether or not consumers would consider living in one and the level of awareness of the benefits encouraging them to do so. The findings gathered suggest that consumers currently have a moderate to strong Zc awareness. This is particularly important as increased awareness may result in increased acceptance of the concept. Such high levels of awareness may be the result of increased media attention in the form of television programmes on sustainability and innovative housing techniques such as those featured on “Grand Designs”. However, there seems to be no direct correlation between consumer viewpoints and “real” tenancies to purchase Zc homes. As a result, it may be argued that many consumers do not have stipulated rational values which influence particular actions, where their attitudes towards Zc homes can be momentary. Similarly, it was discovered that opinions are split regarding whether or not consumers would consider living in a Zc home. This is particularly important as it highlights an uncertainty amongst consumers which may require further investigation, in order to provide reasons as to why this is the case. Additionally, it was discovered that the vast majority of respondents understood the
benefits of Zc homes. This is important as it is the many benefits of the concept which are the major driving force, encouraging consumers to purchase such homes.

The second section of the paper, on the other hand, set out to reveal consumer feelings towards the moving home process, opinions on the current level of choice within the marketplace and the factors influencing house purchases, where it was discovered that the majority of consumers agreed that the moving home process was both stressful, yet exciting. Excitement may be felt by consumers as the result of the new home being classified as a new/fresh start which aligns with the results obtained from the top ten factors influencing house purchase decisions, a theory which may extend to self-reinvention. However, this process is often considered stressful as humans are generally creatures of habit. Similarly, it was discovered that consumers are “satisfied” with the range of homes currently available within the marketplace. This is particularly important as Zc homes are more likely to be accepted if they can align with the current homes available within the marketplace.

When considering the factors which influence house purchases, the results can be classified into four potential themes. For example, good living space, sufficient number of bedrooms and a good flow/layout within the home all relate to day to day practicalities. On the other hand, the homes proximity to public amenities, work and family/friends as well as the consumers wants and requirement to move to a new area, all relate to the location of the property. Similarly, the price of the new home combined with the consumers request to step onto the property ladder are both considered financial drivers of the move. Additionally, a longing for new beginnings may relate to personal psychological needs. As a result, it may be argued that Zc homes must be constructed with everyday practicalities in mind, built in popular locations, be reasonably priced to appeal to a wide range of house buyers and be marketed as a fresh idea. In the future, the research intends to explore areas relating to family decision making, gender, nature and nurture, social class and lifestyle choices.

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