

Environmental assessment methodologies for commercial buildings: A study of the behavioral foundations influencing the uptake of the LEED scheme in the United States

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Abstract:

The quest for more sustainable buildings that produce less waste and water as well as use energy more efficiently has been going on for more than thirty years. Change towards a more sustainable construction industry is influenced by many factors, the effects of which are difficult to predict. Still, voluntary building assessment systems have become increasingly popular around the world address the issues that mandatory building codes have not been able to tackle. This is also the case in the United States, a country in which environmental decisions are made at multiple levels, notably federal, state, county and local level. Leadership in Energy and Environmental Design (LEED) and many more voluntary schemes such as Green Globes, BREEAM or Built it Green have pushed into the market.

The efficiency of these schemes is still widely debated but they have become a de facto reality for many building professionals. One topic that has been neglected, however, in both academic and policy discussions is how professionals (architects, engineers, real estate developers etc.) perceive and react to the change from state-mandated building codes to voluntary market-based schemes and what their motivations for the use of these schemes are.

In this paper, building on 14 face-to-face interviews with building professionals in Massachusetts and New York State, an online survey is currently being developed to investigate these questions. The aim of the final paper will be to distinguish behavioural responses between professional groups as well as LEED AP accredited and non-accredited professionals.

Keywords: Green buildings, LEED, Voluntary Environmental Programs, Environmental Psychology

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1. Introduction

In both industrialized and developing countries, buildings have been found to be one the leading source of greenhouse gas emissions and been linked to other environmentally damaging pollutants (Hart, 2009). As a response to this pressing issue, energy efficiency schemes, both voluntary and mandatory, have been implemented as policy instruments and strategies to reduce natural resource use and to improve the sustainability of the building life cycle. These issues have concerned both residential and commercial buildings and have been widely debated in most industrialized countries.

As an example, according to the United States Energy Information Administration (EIA), the carbon emissions of the non-residential building sector in the United States grew about 25% faster than carbon emissions of the overall economy between 1971 and 2004 (Hart, 2009).

In the commercial building sector, a large variety of voluntary assessment schemes have been developed to measure the energy impact of buildings. Some of the most prominent examples worldwide are the LEED, Green Globes and BREEAM schemes, launched by third party and mostly non-profit organizations. Several voluntary environmental assessment certification schemes are operant and building professionals have to choose between a plethora of programs, both government and third-party developed, when working with clients. Thus, the principles and workings of these systems have to be well understood, in particular the interaction between governmental (i.e. building codes) and third party interventions (LEED, Green Globes, BREEAM etc.) and the effect on their use by building professionals.

To this point, existing studies mainly focus on the technical or financial aspects of these schemes, not how they are used and perceived by the professionals that have to work with it.

A survey in the Architects Magazine, a professional journal in the United States, has revealed some astounding insights: In this survey, 71% of respondents stated that they know of someone, colleagues or other design professionals, “that do not believe that climate change is a major problem and/or do not believe that it is caused by human activity”. In addition to this, 33% of the respondents confirmed that “climate change skepticism in their professional network is common”.

Governance schemes, including voluntary certification programs, can only be successful if the “end users”, the building professionals, are convinced of their utility. Thus, this article does not seek to

evaluate the effectiveness of the schemes or to evaluate whether the use of these schemes is normatively wrong or right but investigate the behavioral foundations of the LEED uptake and adoption in the United States.

The purpose is to identify the factors that influence how building professionals perceive voluntary schemes as opposed to government-sponsored schemes. The main focus will be on the behavioral foundations of the professionals working with the LEED scheme, the most widely known and used third party building assessment and certification program.

2. Green buildings: a historical development

In order to fully understand the issue of voluntary environmental assessment schemes, it is necessary to trace back their development and place them into the context of the sustainable buildings discussion.

Environmental assessment schemes for buildings are not a new phenomenon and not specific to the United States. Around the world, numerous schemes have appeared over the last twenty years (Jonsson, 2006; Todd et al., 2001; Liu et al., 2006) and are complementing existing building codes.

Environmental design and construction principles have been traced back to the late 19th century (Cassidy, 2003). However, the first “green” design and construction movement started in the 1970s during the Global Energy Crisis. Papanek (1972) suggested in this study “Design for the real world” that building professionals needed to be socially responsible and criticized traditional approaches to architecture. These ideas were mostly adopted in the industrialized world and the issues discussed were incorporated in the 1980s into the sustainable development discussion (Rees, 1989) as well as the sustainable design movement (St. John, 1992). The number of publications in trade and professional journals on sustainable design techniques and the number of college classes on sustainable design increased subsequently.

During the 1990s, the efforts to provide instructions on green buildings to building professionals have manifested in more institutional structures such as the creation of BREEAM in the UK, the Leadership in Energy and Environmental Design (LEED) Rating System in the United States and the Green Globes in Canada and the US.

Yudelson (2004) explains this development by referring to demand growth for green buildings. However, green buildings are still being described as a niche market (NBN, 2006). Even though ecological design has frequently been believed to lead to higher costs during the construction process and therefore seen as unattractive to investors and other building professionals, the results are inconclusive (Thompson, 2003). Yates (2001) has suggested that the total costs over a longer period are not higher than for conventional buildings and that green construction can act as a way to manage the risks of changing regulations and liability lawsuits. At the same time, Roodman and Lensen (1995) have analyzed the claim that green buildings may have shorter resale times and faster value appreciation. However, Matthiessen and Morris (2004) suggested that cost savings, if applicable, depend on additional factors such as local building standards, timing or climate.

In most countries, however, voluntary green building assessment and certification schemes have become widely used in the building industry as a sign of sustainability and energy efficiency (Hart, 2009). In fact, one of the reasons for the popularity of these schemes has been growing market demand for services and products that contribute to increase energy efficiency (Smith et al., 2006). Even though these schemes are third party certified, the role of the government has been suggested in previous studies. According to Smith et al (2006), the demand has been driven largely by all kinds of government building project (municipal, state and federal). Additionally, government agencies as owners and buyers of commercial buildings have contributed to the increased use of third party certification schemes (Hart, 2009). This researcher suggests that their role as land use and taxing authorities and as the regulators of construction have been influential in the uptake of these schemes (Hart, 2009).

3. Energy efficiency for buildings in the United States: between building codes and voluntary assessment schemes

In order to understand the topic of voluntary green building schemes in the United States, it is helpful to have a look at the building industry. As in most countries, the construction and building industry is mainly separated in two segments, residential and commercial housing (including offices, factories, public buildings, colleges etc.). The building and construction industry in the United States is among the ten largest employment sectors (Doleta, 2004). Many different types of businesses are involved in the process and work on building development, additions projects, and alterations of existing structures or maintenance (Doleta, 2004).

The construction process involves many stakeholders and differ from case to case but involve in most of the cases local officials issuing permits, investors, commercial real estate developers, architects, building consultants, engineers (civil, mechanical, structural, water and plumbing), as well as real estate brokers and corporate clients.

The complex relationships between these groups that all contribute to the construction of a building is important when it comes to the governance of these processes.

Hence, constructing a sustainable building is a very complex issue. Traditionally, the United States has relied on building codes to set the standards for buildings, including sustainability standards (USGBC).

3.1 Building codes and energy efficiency in the United States: A governance issue and a professional challenge

Since Voluntary Schemes have often been described as complementary measures that go beyond existing building codes, it is especially important to understand the interaction between both schemes. Building codes generally specify the level of health, safety and environmental concerns. In most cases, they are part of the legal framework in a certain jurisdiction on the international, national, regional or municipal level.

The building industry and the codes remain largely fragmented (Hart, 2009) and building codes are being established by a complex network of agencies and other associations (Hart, 2009). Hart (2009) suggests that this system has been partly responsible for the slow improvements in building energy performance. The US Department of Energy (DOE) launched an attempt in the 1970s to establish binding building standards for energy efficiency but had to retract them after protests from the industry (Hart, 2009). Since the role of the federal government has been limited in this process, a large number of federal, state and local policies seek to influence decision making of building owners (Hart, 2009).

On the state level, some states such as California introduced stricter building codes during the energy crisis in the 1970s, but despite these efforts, nine states still had no such codes in 2008 (Hart, 2009). Therefore, some local governments have increasingly adopted energy codes to fill this gap, while in other states local administrations have chosen energy codes that go beyond the state mandates (Hart, 2009).

The enforcement of these codes has also been subject to discussion and has frequently been described as being too lenient (Hart, 2009).

Therefore, other groups and schemes have appeared to fill this void. In the 1980s, acting on a mandate of the DOE, the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) has started develop standards for energy efficiency by taking different professional opinions into account and used them as input for their codes (Hart, 2009).

The Congress adopted this form of third party governance and decided in 1990s that all US states have to adopt the ASHRAE standard as well as future modifications of the code if the DOE deemed this to be suitable (Hart, 2009).

In addition, the International Code Council (ICC), a non-profit and non-governmental organization, developed International Building Codes (IBC) that has been used throughout the United States. The ICC was founded in the 1990s with the goal to create a “single national system of model building codes” (Hart, 2009).

This co-existence of many energy efficiency schemes has led to a situation in which building professionals have to comply with local or state building codes that are compulsory but might also have to incorporate voluntary standards in order to meet client and regulators demands.

3.2 Voluntary green building assessment and certification schemes in the US: historical development

Voluntary environmental programs targeting industries have become increasingly popular in the United States since the 1990s (Maxwell and Lyon, 1999). This trend has been triggered by increasingly complex regulations, innovations and public sector budget cutbacks (Maxwell and Lyon, 1999).

As mentioned above, there are several voluntary schemes for non-residential buildings currently being used in the United States with several schemes operating on the national level such as LEED, Green Globes, BREEAM or Built it Green (Smith et al., 2006). These building assessment systems base the rating of the buildings to energy efficiency goals, comparable buildings or construction practices (Cole, 1999). Sustainable buildings in the US have been governed by incentives and mandates at the local (Theaker and Cole, 2001), county (Sussman, 2008), state (Circo, 2008) and federal level (Park,2007).

For instance, a certification program on the state level is California's CALGREEN scheme, even though this scheme is a hybrid with compulsory elements and voluntary additions. Some of the points required in Cal GREEN are compatible with the LEED scheme credits, some of them with the Built it Green Initiative. In addition, some cities across the US, including Oakland (California) require newly built non-residential buildings to be certifiable with LEED but do not always demand actual certification (Ratzlaff, 2005). In a survey conducted by the American Institute of Architects, ninety-two municipal green building programs were identified (Rainwater, 2007).

Given the large number of possibilities, requirements and standards, the building industry faces the issue how to react to this plethora of government mandated and third party governance schemes. In addition, voluntary certification schemes are not the only trend related to green buildings. In addition Zero- Net Building initiatives, Building Life Cycle Assessment or Passive houses have appeared and added to the complexity of green building construction.

Therefore, a situation has evolved where building professionals have to take into account compulsory building codes on the state and municipal level as well as the new voluntary assessment codes such as LEED, Green Globes or BREEAM.

3.3 LEED and the US Green Building Council

The LEED (Leadership in Energy and Environmental Design) Green Building Rating System is a voluntary rating system introduced in 2000 for developing high performance, sustainable buildings. Developed and maintained by the U.S. Green Building Council, the certification process assigns points along six assessment areas (Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Air, Quality and Innovation).

For the purpose of this study, the LEED scheme has been chosen as it is the most popular certification scheme in the United States to date.

There are several aspects and dimensions to LEED (which goes as well for other certification schemes) that might influence uptake and adoption of the LEED scheme by building professionals and public authorities.

The USGBC is a non-profit and non-governmental organization whose members come from all sectors of the building industry. After LEED has been developed in the late 90s, it has now more than 14,000 projects in 50 US states (USGBC, 2010). LEED aims to be a voluntary and transparent scheme in which the technical criteria developed under the supervision of specialized LEED committees are reviewed in a public process and by the USGBC. Based on the outcome, LEED Silver, Gold and Platinum certifications are awarded (USGBC, 2010).

In addition to the building certification scheme, the LEED program also offers educational dimension, the LEED accredited professional (AP) qualification. Professionals from all over the building industry as well as public officials can take the USGBC administered test and gain professional accreditation. While some professionals choose to become certified, this is not a pre-requisite for being able to work on a LEED building certification project.

3.4 Literature on Green buildings and LEED

While LEED has not been studied widely in a social science or academic framework, the green building literature is much larger and diverse.

Williams and Dair (2007) suggested in their study on barriers to sustainable building that the most commonly found issues were that sustainability measures were not considered by stakeholders. Most of the studies on the LEED scheme have been published in professionals or trade journals or as a report by public administrations such as state governments.

There are only a handful of academic studies on Voluntary Green Building Assessment and certification Schemes in general and on LEED in particular.

Kats et al. (2003) have investigated and analyzed the costs related to LEED certification in California and suggested that there is evidence “that sustainable building is a cost-effective investment”. In addition, Matthiessen and Morris (2004) have analyzed which LEED credits are most commonly pursued by building officials and concluded that some credits are often chosen even though they are relatively insignificant in the big picture of the scheme. In addition, easier stages of credits are preferred, certain credits are obtained at a minimal cost, and credits that can be interpreted as being in conflict with other interests are not frequently chosen.

In addition, Eichholtz et al. (2009) found in their study on LEED and Energy Star rated buildings in the US that buildings with a green rating lead to rental rates that are about three percent higher than in identical non-rated buildings.

Apart from the more technical articles on LEED, there have been some authors recently evaluating the governance dimension of the scheme.

Retzlaff (2009) has analyzed the use of LEED in Planning and Development Regulations, while Corbett and Muthulingam (2007) have focused on the signaling effect of LEED adoption (2007).

Del Percio (2004) discusses in his research on whether uniform sustainable standards are an imperative or an architectural fiction. Hart (2009) describes in his work the position of LEED between government regulations and private business interests.

In addition, Issa et al. (2010) have investigated the perception of research work investigating the cost premiums, long-term costs and health and productivity benefits of green buildings. Chan et al. (2009) investigated the market for green building in developed Asian cities from the perspectives of building designers.

Trade and industry journals have mostly published articles on obtaining LEED credits and certifying (see for example Vangeem and Marceau 2002, Hermann 2005, Yoon and Moeck 2005, Davis 2005, Miranda 2005).

Some studies have also focused on criticisms regarding the LEED scheme and have suggested that the certification process might be too costly and too easy at the same time and encourages “point chasing” (Rumsey and McLellan, 2005 ; Schendler and Udall, 2005). Some authors have also criticized that the credits selected for certification are frequently inconsistent with life-cycle analysis (Bowyer et al. ,2006 ;Scheuer and Keoleian, 2002).

These criticisms might contribute to the decision of some building professionals and public officials not to work with the LEED scheme. From the literature on Voluntary Environmental Schemes in the United States, assumptions can be made that technical, economic and financial, administrative,

organizational, policy, communication and educational aspects might play a role in the acceptance and use of the LEED scheme.

In addition, behavioral factors that might influence the uptake are assumed to play a major role as well. This will be analyzed in the following sections.

4. Theoretical framework: Behavioral factors and LEED

Since the LEED scheme is targeted at building professionals, it is important to understand in which contextual and behavioral factors influence the uptake of the LEED scheme and thereby shape its role as a policy instrument. Research on pro-environmental decisions on environmentally sensitive issues is plentiful, notably in the management and social psychology literature. However, most of the management literature focuses on strategic (Arragon-Correa, 1998; Stead and Stead, 1995), organizational (Lawrence and Morrell, 1995; Lober, 1996) or inter-organizational perspectives (Clair, Milliman and Mitroff, 1995) while social psychology focuses on the behavioral foundations of individuals in private settings. The present study aims to combine the two streams and analyze the behavioral foundations of LEED adoption in a professional role.

The theoretical framework to be used as a guideline in this context is the Reasoned Action Approach by Ajzen and Fishbein (2010), a social-psychological framework that evaluates both internal and external factors that shape decisions and lead to a certain behavior. This theoretical framework has frequently been used for studies on pro-environmental behavior and has proven to be useful. Even though it has been mostly applied to decisions of individuals in a private decision context, such as household recycling behavior, it has also been applied to studies on decisions in a professional role (Cordano and Frieze, 2000).

The reasoned action approach builds on two predecessor models, the theory of reasoned action (Fishbein and Ajzen, 1975) and the Theory of Planned Behavior (Ajzen, 1985).

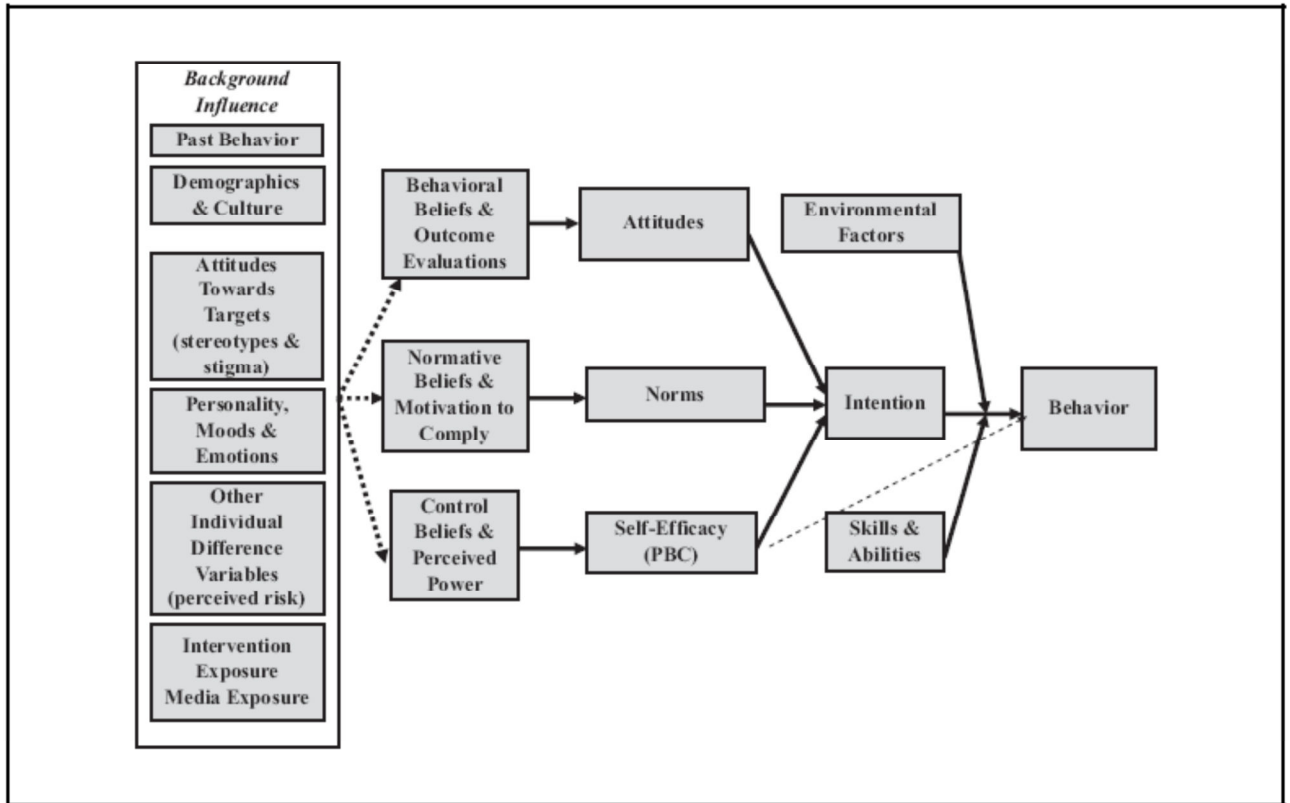
The theory of reasoned action (Fishbein and Ajzen, 1975) suggests that under complete volitional control, the behavior of the individual is determined by behavioral intention which is jointly determined by the attitude towards the specific behavior and subjective norms. Since, however, not every behavior is under volitional control, Ajzen (1985) included the variable of perceived behavioral control (PBC) and altered the models' name to "Theory of Planned Behavior" (TBP). PBC refers to 'the person's belief as to

how easy or difficult performance of the behavior is likely to be' (Ajzen & Madden, 1986) and has an effect on behavioral intention and thereby on a specific behavior.

The reasoned action approach builds on the assumption that behaviors can be predicted from behavioral intentions. These intentions to perform a behavior are in many cases good predictors of behavior even though there are some cases in which this assumption does not apply (Perkins, 2007). These intentions are in turn influenced by perceived behavioral control, subjective norms and attitudes towards a certain behavior. Attitudes refer to an individual's perceptions of the inconveniences and advantages of performing a behavior while subjective norms are related to what an individual perceives to be important to other people around them. The strength of these perceptions is then complemented by the motivation to comply.

The last factor, perceived behavioral control then refers to the ease that an individual believes to be able to carry out a certain action (Fishbein and Ajzen, 2010).

As a consequence, this framework is very useful to determine whether intentions or perception of control is more useful for predicting the uptake of voluntary environmental programs. Also, within this study, it will be interesting to see whether attitudes, subjective norms or perceived behavioral control are more decisive for decision-makers when it comes to the uptake of voluntary environmental programs. Since salient beliefs underlying the predictor variables also play a major role, such as behavioral, normative or control beliefs that influence the attitude, subjective norms and the perception of behavioral control. Therefore, the underlying scheme is beliefs that shape predictors, then intentions and actions. An additional strong point of this model is that additional variables can be included if they can capture an additional proportion of the variance in intention or behavior.



(Adapted from Fishbein and Ajzen, 2010)

Therefore, this model has shown to be useful in settings dealing with individuals in professional roles (see Cordano and Frieze, 2000).

5. Method

5.1. Sample and Procedure

The methodology used has been adapted to the theoretical framework. Fishbein and Ajzen (2010) have proposed detailed instructions for applying their model to a variety of situations and settings. Both researchers strongly recommend conducting a qualitative elicitation study to determine the underlying beliefs held by the target population(s) (Fishbein and Ajzen, 2010).

Elicitation studies establish the cognitive foundations of the beliefs the target population holds towards a specific behavior. The elicitation study tests the background influences and the beliefs underlying norms and attitudes towards and perceived control over a behavior (Downs and Hausenblas, 2005).

Hence, the first step is qualitative in the first instance to conduct an elicitation study, followed up by a quantitative survey.

The qualitative stage deals with obtaining background information on the perception of the LEED scheme and to construct variables and items appropriate to the target sample.

The interviews included open-ended questions and collected information regarding the respondents' reason for LEED certification and personal accreditation, sustainable building, attitudes towards building codes, green voluntary standards, the usefulness and credibility of the LEED scheme and the educational aspects of LEED. The information obtained is being used as a basis for the questionnaire design. The qualitative and quantitative parts target the same population, notably:

- Architects
- Engineers
- Real Estate Developers

Even though the interviews have been conducted in Massachusetts and New York State, the aim of the survey is to target the above mentioned professional groups in other states of the United States as well. It may be that LEED is perceived and used may differ from state to state since some states are known to be more environmentally conscious over all, such as Massachusetts and California. However, some interviewees suggested that the professional practices do not majorly differ as such from state to state. Therefore, a randomly selected sample of the addresses of members provided by the USGBC and regional yellow sites are being used to target the sample population.

5.2. Procedure and Data

The qualitative elicitation study has been conducted in the Massachusetts and New York State, United States, with interview participants from two building professions: architects and engineers (civil, mechanical and structural). The participants were identified and randomly selected via the US Green Building Council Member Database and a directory of professional associations to avoid bias towards building professionals holding positive perceptions and beliefs towards LEED.

They were first contacted by email in order to make an appointment for in total 14 face-to-face interviews. The interviews lasted between 20 to 60 minutes.

As for professional groups, ten architects (8 male and 2 female) as well as four engineers (4 male) were interviewed.

5.3. Analysis

The elicitation study's goal is to determine which background factors and underlying beliefs architects and engineers have of the whole LEED adoption and uptake process.

Using NVivo software for qualitative analysis, the participants' responses to the semi- structured interview questions were selected and grouped electronically following the method suggested by Fonteyn and Bauer-Wu (2005). These interviews allowed for participants "interpretations of everyday actions" (Goddard, 2004) as well as practices and general social settings (Janestick, 2002). While there was an interview guide based on the theoretical framework, emerging themes that were not related to the theoretical framework were also taken into consideration at this stage to allow for refining the model in the questionnaire study.

All the interviews were audio-taped, transcribed manually and then imported into NVivo. In order to gain the interviewees in-depth views and perception on working with the LEED scheme, the analysis started with a review of the transcripts in which the themes and key concepts were identified (Kumra, 2010). This facilitated the subsequent analysis of the data.

The use of Nvivo facilitated the identification of emergent themes across individuals responses and the thematic content analysis of the interview transcripts. The method suggested by Vinnicombe and Singh (2003) was followed and the transcripts imported into the program after which coding structure was developed by using key concepts emerging from the data. The next step was then to code text at the nodes of interest (Miles and Huberman, 1994) after which the participants' responses were examined in sets in order to identify emerging patterns from the data. These nodes were then positioned as seen fit in the analytical framework. Sets of responses were categorized to a number of nodes and particular themes; proceeding this way and categorizing data to the different nodes allows for " an overall confidence in the coding and a clear audit trail through the findings" (Kumra, 2010)

6. Preliminary results of the elicitation study

After having analyzed the transcripts, the emerging topics have been categorized building on the proposed theoretical framework as well as additional topics that have come up repeatedly during the interview process.

6.1. Normative Beliefs (Motivation to Comply)

The main theme in the normative beliefs section is to identify the stakeholders that seem to have a large impact on professionals' decision to work with the scheme and to get LEED accredited.

6.1.1. Role of Government support

The role of government support, either as a client or legislator, has been stressed by the majority of interviewees. This is particularly insightful, since LEED is a third party sponsored scheme and some state governments have parallel programs.

"The US government was actually one of the first adopters of LEED" (Respondent 3, architect)

"The government support is absolutely critical; many would not do it if there was no one helping them with it" (Respondent 7, architect)

"Our client base is largely academic and governments" (Respondent 6, architect)

6.1.2. Role of client demands

In addition, the demand of clients played a major role for architects and engineers to work with the LEED scheme. However, some of the architects also reported an active role in educating their clients, mostly when they dealt with private real estate developers.

"It was required by a client" (Respondent 6, architect)

"It is coming from owners, users. They are more pushing for the principles because they know LEED certification" (Respondent 7, architect)

"We find that LEED is difficult with the type of clients we have, mostly commercial clients..it is a difficult thing for owners to swallow" (Respondent 7, architect)

6.2. Behavioral Beliefs (Attitudes): Motivations for working with LEED or obtaining LEED accreditation

There were several responses to the motivations that drive LEED uptake and accreditation. The ones that were mostly referred to were showing commitment on an individual level towards sustainability. Some respondents also referred to the group effect which led them to consider working with LEED. This section notably referred to not being left out as well as being part of a “key group” within the office.

6.2.1 Individual

“In our office it was an individual initiative” (Respondent 7, architect)

“ It is something I think that , you know, demonstrates a personal commitment because it is voluntary, because the individual is motivated to learn and to become qualified in green buildings in some sense it distinguished the person who has it” (Respondent 11, architect)

“No, and I am not going to become LEED accredited. I mean, we do LEED buildings all the time and we know what is necessary” (Respondent 10, engineer).

6.2.2 Group effort

“And as a professional, you never want to feel like you have missed something and people are hearing more discussions about the stuff in meetings “(Respondent 8, architect)

“We started to form an internal group in our office and what we did is we said “why do not we do this, why should we not have a key group of individuals for the exam?”” (Respondent 9, architect)

6.3. Perceived behavioral control

Perceived behavioral control in this context referred to the ease of interviewees to work with the LEED scheme or get LEED accreditation. In some cases, the company was cited to have made the decision to work with LEED and tell their employees to get accredited. In other cases, the decision was up to the employees themselves. Other respondents cited willingness but faced resistance in their direct professional environment.

6.3.1. Barriers to work with LEED

"I have been through a battle just to introduce LEED into our regime in the office" (Respondent 7, architect)

6.3.2 No barriers to work with LEED

"It is perfectly voluntary, you do not need it to work on LEED projects, it is something I think that, you know, demonstrates a personal commitment because it is voluntary..." (Respondent 11, architect)

"I am sure if we wanted one of us LEED accredited, it would be a very simple thing to do" (Respondent 10, engineer)

6.3.2. No possibility to choose

"Oh, it was made for me. The president of my company told me to do it" (Respondent 12, engineer)

"I took the exam because I felt I had to" (Respondent 5, architect)

6.4 Educational aspects

In addition to the previous themes, that were related to the proposed framework, the Reasoned Action Approach (Ajzen and Fishbein, 2010), most respondents cited the educational aspect of LEED that was important for their decision to work with LEED. Two main emerging themes were the roles of the LEED accreditation exam as well as the role LEED assumed in educating building professionals about sustainability.

6.4.1 LEED accreditation

"Not necessary.. just another credential" (Respondent 3, architect)

"I do not think that clients would notice if some of our collaborators were LEED accredited though" (Respondent 4, architect)

"Because everyone could become LEED AP it did not mean anything anymore. I am LEED AP, but what does that really mean?" (Respondent 9, architect)

I think that it is very helpful to have gone through the educational portion, even though it is directed at a very specific scheme, the LEED scheme. It did introduce new concepts to me, but also made me realize that the LEED scheme is in some points not as sophisticated as I expected it to be." (Respondent 7, architect)

6.4.2. General awareness for sustainability among building professionals

"So LEED has helped to raise awareness and has helped to educate people but it is a very simplistic tool for a very complicated issue" (Respondent 5, architect)

"I think LEED was a step in a different direction, the metrics of it. When I studied for the exam, I found it bizarre in the beginning" (Respondent 6, architect)

"So LEED has been a forced education and I think it is a good thing (Respondent 8, architect)"

"The whole point of the LEED program was to change the way things were being done. So, there was a certain amount of reeducation not complete reeducation" (Respondent 12, architect)

6.5. Communication aspect

Additionally, LEED has been associated by many professionals as a useful communication tool that has altered the way different groups of building professionals interact.

"It has provided a common language" (Respondent 5, architect)

"With LEED it is probably easier in terms of a common principle and language when it comes to buildings. Now there are more voices to orchestrate; this can be a challenge" (Respondent 8, architect)

"I do not sense a difference in how it is used and interpreted by disciplines. Where you see some differences is the –and maybe that is too far off-topic- but one of the good thing about LEED is that it is written by a consensus process where there are stakeholders all aspects of the building industry. It is not only architects and government agencies but it is building owners, universities, product manufacturers and trade groups and so on" (Respondent 3, engineer)

“You always have to be on the same page with what you are designing regardless of whether you are looking for LEED certification or not” (Respondent 2, engineer)

6.6. The role of LEED in the governance framework

As for the question to evaluate the position of LEED in the current green building governance framework, the answers were mixed.

“LEED has become a standard for measuring building sustainability in this country” (Respondent 1, architect)

“What was LEED yesterday might be a code tomorrow” (Respondent 4, architect)

“But it is interesting, the idea that USGBC is an independent body that gives you something similar to the law... LEED now has a certain power as an organization. The LEED scheme has gotten very influential among a certain kind of people who pay for buildings and design buildings, but that is a very small part of the population” (Respondent 6, architect)

“The way things are going with governmental organizations, LEED being a third party scheme is a good thing” (Respondent 8, architect)

“So, personally, the fact that there are competing standards, I do not see it as a problem but what does happen is that it gets a little crazy which standard to follow to standards conflict. I have actually heard of buildings that have both a LEED and Green Globes certification. So, I do not know, it sounds a little silly that they are getting multiple certifications but for one reason or another they are doing it.” (Respondent 10, architect)

“As engineers and design professionals we are used to the building codes changing on a cyclical basis anyway so you know every three to five years we have to do with a new code, we have to learn a new code” (Respondent 2, engineer)

“What I sometimes find a little disturbing is the proliferation of standards from other groups” (Respondent 8, architect)

However, it must be noted that the findings presented in this section are limited to the fourteen respondents interviewed and their perceptions and beliefs of the LEED scheme and green building practices. In addition, the data can at this stage not be evaluated to be applicable to a wider section of building professionals- this will be the goal of the quantitative part of this study, described in the next section.

6. Research in process: Questionnaire Design

The questionnaire design, currently being developed consists of two components in addition to a socio-demographic part in which profession, firm size, firm location, the number of employees, years of professional experience , gender, age bracket, LEED personal accreditation, experience with Voluntary Green Building Schemes and building codes are being analyzed.

This permits to distinguish behavioral reactions between:

- LEED Accredited vs. non-accredited professionals
- Different professional groups involved in the construction process

The first part questions (PART A) are based on the results of the elicitation study including the reasons for choosing to work with LEED and obtain accreditation, and the differences in perception of a government vs. third-party sponsored voluntary green building scheme.

The second part of the questionnaire (PART B) relates to the theoretical framework of the Reasoned Action Approach.

After the pilot study, the questionnaire will be sent to ca. 20 000 building professionals within the United States. The sample size is quite large due to being able to distinguish between different professional groups, LEED accredited and non-accredited professionals.

7. Conclusion

The preliminary conclusion of the qualitative study has looked at the attitudes, control perceptions and subjective norms of engineers and architects that might influence their decision to work with the LEED scheme and obtain LEED accreditation. The results revealed that the uptake of the LEED scheme is related to the importance of government support, the role of client demands, individual attitudes, group efforts, barriers to work with LEED, educational aspects (of the LEED scheme overall and the professional accreditation exam), the communication aspect as well as the position of LEED in the overall green building governance structure. This work is currently being continued with a quantitative survey part.

References

- Ajzen, I. 1991. the theory of planned behavior. *Organizational Behavior and Human Decision Process*, 50: 179-211.
- Aragon-Correa, J. A. 1998. Strategic proactivity and firm approach to the natural environment. *Journal of Architectural Engineering*, 41(5): 556-567.
- Bowyer, J., J. Howe, K. Fernholz, A. Lindburg. 2006. Designation of environmentally preferable building materials – fundamental change needed within LEED. White Bear Lake, MN:: Dovetail Partners. Inc.
- Cassidy, R. 2003. Building Design and Construction White Paper on Sustainability., *Building Design and Construction*.
- Circo, C. 2008. Using mandates and incentives to promote sustainable construction and green building projects in the private sector: a call for more state land use policy initiatives. *Pennsylvania State Law Review*, 112(3): 731–782.
- Clair, J. A., Milliman, J., & Mitroff, I. I. 1995. Clash or cooperation? Understanding environmental organizations and their relationship to business. *Research in Corporate Social Performance and Policy, Supp*: 163-193.
- Cole, R. J. 1999. Building environmental assessment methods: clarifying intentions. *Building Research and Information*, 27(4/5): 230–246.
- Corbett, C. J., Muthulingam, S. 2007. Adoption of Voluntary Environmental Standards :The role of signaling and intrinsic benefits in the diffusion of the LEED Green Building Standards. Los Angeles: UCLA Anderson School of Management.
- Cordano, M. F., I.H. 2000. Pollution Reduction Preferences of U.S. Environmental Managers: Applying Ajzen's Theory of Planned Behavior.
- Davis, E. D. 2005. Water conservation strategies for LEED points. *Landscape architecture*, 95(6): 64-71.
- Del Percio, S. 2004. The Skyscraper, the Green Design and the LEED Green Building Rating System. *Environmental Law. & Policy Journal*, 28: 117-154.
- Doleta, U. S. D. o. L. 2004. America's Construction Industry: Identifying and Addressing Workforce Challenges. In E. the U.S. Department of Labor (DOL) & a. T. A. (ETA) (Eds.). Washington, DC.
- Eichholtz, P. K., N.; Quigley, J.M. 2009. Doing well by doing good? Green office buildings, *Center for the Study of Energy Markets Working Paper Series*: University of California Energy Institute.
- Fishbein, M., & Ajzen, I. 2009. *Predicting And Changing Behavior: The Reasoned Action Approach*: Psychology Press.

- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*. Reading, Mass: Addison-Wesley.
- Fonteyn, M. B.-W., S. 2005. Using qualitative evaluation in a feasibility study to improve and refine a complementary therapy intervention prior to subsequent research. *Complementary Therapies in Clinical Practice*, 11(4): 247-252.
- Goddard, A. 2004. "Budgetary practices and accountability habitus: a grounded theory". *Accounting, Auditing and Accountability Journal*, 17(4): 543-577.
- Hart, D. M. 2009. Don't worry about the government? The LEED-NC "Green Building" Rating System and Energy Efficiency in U.S. Commercial Buildings, *MIT-IPC-Energy Innovation Working Paper* Cambridge, MA: Massachusetts Institute of Technology.
- Herrmann, R. K. 2005. Building automation and LEED credits. *ASHRAE Journal*, 47(9): 10-17.
- Hurley, A. K. 2009. The Wide Spectrum of Green, *Architect Magazine*. Washington, DC.: Hanley Wood.
- Janestick, V. J. 2002. "The choreographer of qualitative research design. In N. K. Denzin (Ed.), *The Landscape of Qualitative Research: Theories and Issues*. Beverly Hills, CA: Sage Publications.
- Kats, G. a. E. C. 2003. The costs and financial benefits of green buildings: A report to California's sustainable building task force. Sacramento: California Sustainable Building Task Force.
- Kumra, S. 2010. Exploring career "choices" of work-centred women in a professional service firm. *International Journal*, 25(3): 227-243.
- Lawrence, A. T. a. D. M. 1995. Leading-edge environmental management: Motivation, opportunity, resources, and processes, *In Research in corporate social performance and policy*. Stamford, CT: JAI Press Inc.
- Liu, Y., Prasad, D., Li, J., Fu, Y., Liu, J. 2005. *A holistic approach to developing regionally specific framework for green building assessment tools in China*. Paper presented at the Proceedings of the 2005 World Sustainable Building Conference,, Tokyo, Japan.
- Matthiessen, L. a. M., P. 2004. Costing Green: A comprehensive database and budgeting methodology.
- Maxwell, J. W. L., T.P. 1999. What Causes US Voluntary Environmental Agreements., *The Efficiency of Voluntary Approaches in Environmental Policy – What Can Be Derived From Theory*: European Research Network on Voluntary Approaches for Environmental Protection.
- Miles, M. & Huberman, A. 1994. *Qualitative data analysis: An expanded sourcebook*: SAGE publications, Inc.

- Miranda, H. 2005. Achieving 'Low-Cost' LEED projects. *Heating/Piping/Air Conditioning Engineering*, 77(4): 32-40.
- NBN. 2006. Green Buildings barrel into the mainstream market, *Nations Building News*: National Association of Homebuilders.
- Papanek, V. J. 1972. *Design for the real world*. London: Thames and Hudson.
- Park, E. 2007. The U.S. federal green building policy. *Sustainable Development Law and Policy*, 8(1): 71.
- Rainwater, B. 2007. Local Leaders in Sustainability: A Study of Green Building Programs in Our Nation's Communities. Washington, DC: American Institute of Architects.
- Rees, W. 1989. *Planning for Sustainable Development*. Vancouver, BC: UBC Center for Human Settlements.
- Retzlaff, R. C. 2005. Building green: Onus or bonus?, *Zoning Practice*. Chicago: American Planning Association.
- Retzlaff, R. C. 2009. The Use of LEED in Planning and Development Regulation: An exploratory analysis. *Journal of Planning education and research*, 29: 67-77.
- Roodman, D. M. a. N. L. 1995. A building revolution: how ecology and health concerns are transforming construction, Vol. Worldwatch Paper 124. Washington, DC.: Worldwatch Institute.
- Rumsey, P. a. J. F. M. 2005. Rumsey, P. and J. F. McLellan. *Environmental Design and Construction*:: 55-56.
- Scheuer, C. W. a. G. A. K. 2002. Evaluation of LEED™ Using Life Cycle Assessment Methods.: National Institute of Standards and Technology.
- Smith, T., Miriam Fischlein, Sangwon Suh, and Pat & Huelman. 2006. *Green building rating systems: A comparison of the LEED and Green Globes systems in the U.S.* Minneapolis: University of Minnesota Press.
- St. John, A. 1992. *Sourcebook for Sustainable Design: A Guide to Environmentally Responsible Building Materials and Processes*. Boston: Boston Society of Architects.
- Stead, W. E. a. S., J.G. 1995. 'An empirical investigation of sustainability strategy implementation in industrial organizations', *Research in Corporate Social Performance and Policy*,: 43-66. Greenwich, CT: JAI Press.
- Sussman, E. 2008. Reshaping municipal and county laws to foster green building, energy efficiency, and renewable energy. *New York University Environmental Law Journal* 16(1): 1-43.

- Theaker, I. C., R. 2001. The role of local governments in fostering “green” buildings: a case study. *Building Research and Information*, 29(5): 394–408.
- Todd J.A., C., D., Geissler, S. and Lindsey, G. 2001. Comparative assessment of environmental performance tools and the role of the Green Building Challenge, . *Building Research and Information*, 29(5): 324-335.
- Udall, S. A. a. R. 2005. LEED is broken ... let’s fix it., *GRIST magazine*.
- Vangeem, M. G. a. M., M.L. 2002. Using concrete to maximize LEED™ points., *Concrete International*, 24(11): 69-74.
- Vinnicombe, S. & Singh, V. 2003. Locks and keys to the boardroom. *Women in Management Review*, 18(6): 325-333.
- Williams, K. a. D., C. . 2007. What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments. . *Sustainable Development* 15(3): 135-147.
- Yates, A. 2001. Quantifying the Business Benefits of Sustainable Buildings – Summary of existing research finds. London: Center for Sustainable Construction
- Yoon, Y. J. a. M. M. 2005. Two Studies that investigate the impact of ceiling and wall reflectance values on LEED credits. *Journal of Architectural Engineering*, 11(3): 81-90.
- Yudelson, J. 2004. *The Insider’s Guide to Marketing Green Buildings*. Portland, Oregon: Green Building Marketing