HARNESSING THE MOTIVATIONS OF ARCHITECTURAL DESIGNERS TO ENGAGE WITH SUSTAINABLE CONSTRUCTION

Niamh Murtagh[1], Aeli Roberts and Richard Hind

The Bartlett School of Construction and Project Management, UCL, UK

Engagement with the sustainability agenda is not only organisational but also personal. However, there has been little attention paid in the construction literature to psychological factors which can influence sustainable construction. Drawing on psychological theories of motivation, the current study aimed to address this gap. Owner-managers of 16 small architectural design practices in the London area were interviewed and inductive thematic analysis was conducted on their responses. Four clusters of themes emerged: excellence in design, self-identity, enjoyment and other job motivations, which included impact on people. These intrinsic motivations are likely to be pursued for their own sake but also align strongly with sustainability objectives. By associating sustainability goals with intrinsic motivations, sustainability discourses come to be not only about climate change or the environment but more fundamentally a part of what people want to do each day. In this way, the reach of sustainable design may be extended beyond those who have a personal interest and commitment to the environment, and may contribute to industry-wide change.

Keywords: architectural design, motivation, sustainability.

INTRODUCTION

The evidence for climate change is now unequivocal (IPCC 2014). Recent IPCC reports make clear the importance of construction and the built environment to climate change, and the potential to contribute to mitigation. Buildings consume around one third of global energy, and generate about the same proportion of black carbon emissions (i.e. carbon in particulate form) (ibid). Trends including population growth, urban migration and provision of adequate housing in developing countries may contribute to two- to three-fold increases of energy use and emissions by mid-century (ibid.). However, buildings also offer the greatest low-cost potential to reduce carbon emissions of any sector (IPCC 2007). The construction industry therefore has crucial responsibility to realise major improvements in the built environment.

Looking for ways in which to increase engagement of the industry with sustainable construction, the current study examined intrinsic motivations of architectural designers in very small practices. To explain our focus, we begin by reviewing the importance of small businesses in construction and specify how sustainability was defined in this study. The literature on SMEs and sustainability is then briefly reviewed, in particular the evidence for the significance of individual, psychological attributes of owner-managers of small businesses. The psychology literature is drawn

[1] n.murtagh@ucl.ac.uk

Murtagh, N, Roberts, A and Hind R (2015) Harnessing the motivations of architectural designers to engage with sustainable construction *In:* Raidén, A B and Aboagye-Nimo, E (Eds) *Procs 31st Annual ARCOM Conference*, 7-9 September 2015, Lincoln, UK, Association of Researchers in Construction Management, 427-436.

upon to differentiate between attitudes, values and motivations and the theoretical framework of self-determination theory (Ryan and Deci 2000) is outlined.

Research on sustainability in construction has burgeoned over the last two decades (Hill and Bowen, 1997, Kibert, 2007, Clarke *et al*., 2008, Davies and Oreszczyn, 2012). Such research has tended to concentrate on large organisations. This focus is understandable due to the impact of major projects, their scale, complexity and cost. However, SMEs (small-to-medium enterprises) comprise the majority of the industry. SMEs are defined by the EU as businesses with fewer than 250 employees and turnover of under €50M, with micro enterprises defined as those with fewer than 10 employees (EU 2013). SMEs deliver 72% of turnover and employ 85% of workers in construction in the UK (BIS 2013). The significant improvement in sustainability of the built environment that the industry must deliver therefore depends critically on the engagement and action of SMEs (Hillary, 2000, Tilley, 2000).

Defining the term 'sustainability' can be problematic (Johnston *et al*., 2007, White, 2013). Kibert's (1994) definition of 'sustainable construction', as the creation of healthy, resource-efficient buildings designed from ecological principles, is usefully both succinct and broad-ranging. Nevertheless, within construction, different roles have different understandings of sustainability and different scope to influence sustainable outcomes. For example, the sustainability features which a planner could seek may vary greatly from those pursued by a services engineer. In order to focus the current research, we targeted SME architectural designers. For this study, we defined sustainable construction as encompassing the environmental impacts of construction, particularly the consumption of energy and the generation of carbon emissions and of waste, in the building process and in the operational use of the built product.

Existing research on SMEs and sustainability has looked at 'barriers' and 'drivers'. Barriers that have been described include lack of resources, especially time, lack of knowledge and training (Smith *et al*., 2000), absence of customer demand, absence of legislation (Gerstenfeld and Roberts, 2000, Hillary, 2004) and assumption of increased costs (Simpson *et al*., 2004). Drivers include legislation, competitiveness, customer demand and interest groups (Gerstenfeld and Roberts, 2000, Hillary, 2000, Tan *et al*., 2011). Argument has been made for the need to pressure SMEs into greater action on sustainability, via regulation and market forces (Bianchi and Noci, 1998). In the few studies with SMEs in construction, the role of the client in driving sustainability was emphasised (Revell and Blackburn, 2005, Revell, 2007). These drivers (regulation, market demand) have been considered as external influences, but a number of studies have suggested that factors within the organisation may be more important (Gerstenfeld and Roberts, 2000, Quinn, 1997). Internal drivers have included cost reduction and new market opportunities (Van Hemel and Cramer, 2002) but beyond these business drivers, factors which relate to people have been discussed, such as environmental concern (Van Hemel and Cramer, 2002), values and attitudes of owner-managers (Perez-Sanchez *et al*., 2003, Tzschentke *et al*., 2008, Hillary, 2000) and personal motivation (Petts, 2000). We would argue that the recognition and examination of personal motivations are an essential component in understanding how small businesses operate. As Roxas and Coetzer (2012: 463) note: *"beliefs, values, attitudes and strategic mental models of the owner-managers ultimately determine the strategic direction, configurations and practices of the firm"*. However, owner-manager attitudes towards sustainability do not necessarily translate into action (Cassells and Lewis, 2011). There is thus a need to investigate not only motivations

around sustainability but motivations more generally, to examine how they may advance sustainability in construction.

Studies which have considered attitudes, values and motivations in SMEs have tended to confound these concepts but attitudes, values and motivation are understood as different constructs in the psychology literature. While attitudes are based on beliefs, values are defined as part of self-identity (Gatersleben *et al*., 2012). In contrast, motivation may be defined as how behaviour is triggered, energised, sustained and directed (Wiener, 1992). Theoretical understanding of motivation links it closely with conation, or intention. Traditionally, three facets of mind have been studied within the discipline of psychology: cognition (what people think), affect (how people feel) and conation (why people choose to act as they do). The conative perspective of motivation sees the individual as *"intentional, planful, deliberate, goal-oriented…proactive"* (Huitt and Cain, 2005: 1) and it is this perspective which informed the current study. We wanted to explore what drives people in their work, and specifically owner-managers of micro-business in architectural design, to identify whether their motivations could align with sustainability goals. People in organisations are multiply-motivated and pursue many goals simultaneously (Babiak and Trendafilova, 2011) and therefore we examined their motivations in general, not only those around sustainability and the environment.

Self-determination theory (SDT; Ryan and Deci, 2000) provided an apposite theoretical framework. SDT conceptualises the person as possessing fundamental needs for autonomy and competence, and was therefore particularly relevant for examining the motivations of business owner-managers. The individual is conceived to be innately driven to learn and grow. These innate drives can motivate behaviour although motivated behaviour can be enabled or thwarted by context. Forms of motivation range along a spectrum from extrinsic to intrinsic. Context can offer extrinsic inducements such as customer demand, increased market share or fear of regulatory non-compliance. With extrinsic motivators, others wield control. While such motivators can be effective, their effect tends to be limited and motivated behaviour is maintained only while they remain in force. In contrast, behaviour motivated intrinsically tends to persist longer and to be more resilient in the face of obstacles. Such intrinsic motivations are triggered by psychological factors within the person, such as identity (who the person perceives him/herself to be) and values (what is important to the person). The literature on SMEs and sustainability has tended to focus almost exclusively on extrinsic motivators, such as market demand and regulation. We wanted to address the gap on intrinsic motivations of SME owner-manager.

In sum then, people in general – and we may suggest SME owner-managers in particular - tend to be self-directed and intentional. They are multiply motivated and their motivations will be extrinsic and intrinsic. With respect to sustainability, it is likely that intrinsic motivations are more likely to drive persistent behaviour. This theoretical framing informed the research questions for our study: How do their individual motivations influence sustainable design by architects in micro-practices, and what scope is there for harnessing their intrinsic motivations to increase engagement with sustainability objectives?

METHOD

To address the research question in depth, we chose the qualitative method of semi-structured interviews and inductive thematic analysis. The interviews were conducted

in conjunction with a project delivering basic eco-design training. The interview schedule permitted wide-ranging discussion on delivering sustainable construction while the explanation of eco-design provided a focus to ensure commonality of understanding of sustainability in construction. The owner-managers of 16 micro-businesses were interviewed, in conjunction with the employees where possible. Of the 16, 11 had one or two employees and five had between 5 and 9 employees. The businesses were all based in the Greater London area and offered architectural design services (13), structural engineering services (2) and landscape design (1). Projects ranged from hundreds of pounds to £3million, with a 'typical' project size of under £100,000. The majority of work was in the domestic sector, primarily extensions and refurbishments as well as new build. The interviews, including training sessions, lasted between one and two hours and were audio-recorded and transcribed verbatim. Qualitative analysis software, NVivo V10, was used to aid analysis.

FINDINGS

In the extracts given, the business is indicated by Bn and individual speakers by Sn.

Excellence in design

A common theme in the responses was that of excellence in design. Participants spoke of seeking to do their best to meet the client's brief: *"...we appreciate that, for the small private client, the thing we do impacts them for a long time, so it's best to do it as best as you can"* [B15], and designing *"better than just doing it how we could do it"* [B9]. In many cases, they sought to go beyond what the client had requested, using their knowledge and creativity to offer more:

"Quite often, what I've done in the past, depending on the size of the project, is take the client's brief, do something fully compliant if you like and then turn it on its head and offer them something else and more often than not they might be interested in the something else" [B5].

A couple of participants contrasted their high standards for work they now do with work they had done before: *"My new model is that I will do a very nice job...I've done too much mediocre work during the recession. I'm not prepared to do it anymore...It's got to be high quality work"* [B10]. The strength of this as a motivator for some was clear in the following extract:

"Sometimes you go to work and you think you're actually going to do something that someone is going to be really really pleased with and when that turns out, that's the positive thing, that's what keeps it all going" [B5].

In a number of accounts, sustainable design appeared to align with excellence in design. The architects described sustainable design as *"designing responsibly"* [B9] and using *"proper architectural principles"* [B16]. As one participant summarised it, *"the issue is about the quality of the design, rather than the end result of its U value"* [B15]. Thus the participants pursued high quality in their designs, and some recognised ways in which designing for sustainability was part of pursuing design excellence.

Self-identity

In many ways, the architects' motivations appeared closely linked to self-identity, that is, who they saw themselves as being. A professional identity was in evidence, for example, B2 said, *"I couldn't really imagine myself doing something different"*, and

several participants referred to themselves and other architects as professionals. There was a clear sense of ownership of their designs:

"I remember when I used to work out on site and at the end of the day I could walk off and say 'do you know what, I built that today' ... and it's really rewarding" [B4]

In describing his motivation, another participant said *"I own all this and I get to finish it"* [B5]. One participant mentioned the *"ego and vanity"* of some of his earlier designs [B10] and another recognised the extent to which she identified with her design work: *"When you're designing something, you don't think of someone pulling it down, because that would hurt, wouldn't it?"* [B3]. This point on the relationship between their self-identity and their designs was made clear in a reflection by B16:

"I think there's a tendency in architecture, 'cause the nature of architects being who we are, we like things to have an enormous legacy."

In this extract, the speaker refers to identity as part of a profession or a group of people (*"who we are"*) and the extent to which the work of architects, the end-product of design and building, helps to construct that identity.

Some participants linked their interest in sustainable design explicitly to their self-identity, speaking about being *"passionate about recycling at home…Because I as a person am environmentally conscious, well try to be, you know and if I can do something then I will"* [B4] and the pervasiveness of their thinking about sustainability: *"It is always in the back of my mind because I am personally interested in the environment generally"* [B3].

So there was close alignment between their designs and their sense of self for the participant architects, and for some, their interest in sustainability was a further aspect of self-identity expressed in their work.

Enjoyment

In addition to pursuing excellence in design and self-identity, the architects' motivations in their work also centred on enjoyment. Several spoke of enjoying what they do: *"I think we're fortunate insofar as we do enjoy what we do… I love coming to work in the morning."* [B4]. Specifically for some, it was the creative process which they particularly enjoyed: *"I think we're quite lucky with the skills that we've got, that we get up in the morning and we can come in and we can do something creative."* [B9]. For others, it was the tangible nature of the outcome that carried the most positive emotions:

> S1: Creating something tangible.
>
> S2: Driving around and saying 'I did that'…
>
> S1: For me the tangibility of it is massive. [B4]

Thus the participants gained satisfaction and enjoyment from the creative and tangible aspects of their work.

Other motivations

Beyond excellence in design, self-identity and enjoyment, other motivations emerged. A few participants mentioned pay, although all also described other motivations alongside pay, for example, *"[Paying] the bill's second place but this is what I always wanted to do so that is the first place"* [B4].

A perhaps less expected motivation was the impact of their work on other people:

"You're making such a huge choice and influence… It basically shapes everything we do. And then we're just making really quick decisions that will affect people for a vast majority of their life." [B1]

This acknowledgement of influence on the lives of their clients, continuing well into the future, was evident in a number of the accounts. For example, B3 described how her work helped people: *"Sometimes I go and see a client and … I think they're thinking 'oh my God why did I buy this house', and you can actually make it work for them…"*. Describing a specific current project, B10 said *"I'm very aware that they're putting everything into it. We have to borrow some money"*. He begins this extract by talking about the clients (*"they"*) but moves on to acknowledge the joint nature of the project (*"we"*), clearly putting himself into his client's shoes. One architect, who worked primarily on old buildings, spoke of her love for heritage architecture as a motivation: *"I love old buildings and I always loved you know that idea of new life in old buildings and reusing buildings"* [B3].

As described above, the participants had volunteered for training on eco-design, so in the analysis we looked for indications of motivations specifically around sustainable design. Several architects noted the ethical dimension and even a moral imperative: *"It's wrong to do nothing. You've got to do something and you've got to think about what you're doing"* [B5]. It appeared that some participants had gradually realised their own role and responsibility:

"It's only in the last couple of years that I've really started to think, 'Actually got to start doing something about this,' rather than carrying on writing out Celotex on my drawings, you know, actually do something" [B11].

A final factor which appeared to influence motivations for sustainability was that of positive and negative attitudes. Of the 16 participating practices, only one expressed several negative beliefs about sustainable construction, including concerns over perceived difficulty and lack of knowledge, assumption of increased cost and reduced availability for sustainable materials. Other participants raised concerns that clients will always seek the cheapest option and choose minimal compliance with legislation. Negative attitudes such as these could be seen to frustrate motivation towards sustainable design. However, other architects took a positive view and the following extract is an example of a robustly positive approach:

"It's a very similar strategy that we have [with sustainability as] with actually planning which is we're always pushing the boundaries, because if you sit and say, 'Well we're just going to have that little box.' Yeah, you know you're going to get that, that's fine...but if you start going bigger and taller then you might not get all of that but you're going to get a hell of a lot more than if you just accepted the little box. So I think it's a very similar sort of process and thinking." [B9]

This speaker saw similarities between sustainability in design and other design aims. Her practice routinely dealt with constraints – planning constraints are mentioned in the extract – but took the view that attempting to 'push the boundaries' resulted in greater success. Her positive approach would seem to facilitate motivation towards sustainability. Thus, although attitudes and motivation are separate constructs, they are connected, with attitudes providing a context, positive or negative, which influence how motivations take shape and are played out.

DISCUSSION

The literature on sustainable construction points to the potentially considerable impact of personal motivations. We interviewed 16 owner-managers of micro enterprises offering architectural design services. Amongst the motivations for their work were: pursuit of excellence in design, self-identity, enjoyment and impact on people. These linked to sustainable design for some participants, and there were additional motivations around sustainability, specifically the ethical or moral imperative.

Some of the participants had understood the ethical dimension of sustainability and a few had described their moral motivation to pursue sustainable construction. This can be understood as an activated personal norm or moral obligation, which has been shown to contribute to pro-environmental behaviour (Stern *et al*., 1999). This speaks to professional as well as personal pride: these participants had realised their influential role and in fact their responsibility to try to make changes. The importance of the personal conviction of the architect-director has been noted previously (Blau, 1984), as has the moral responsibility of designers and the potential for designers to become agents of change (Farmer and Guy, 2010).

A point worth noting was the influence of attitudes on motivation. For one enterprise, a generally negative conception of sustainability appeared to make it unlikely that improvement would be pursued. In contrast, a few participants showed a robustly positive approach, through which they felt that they could achieve change. Extensive early research on attitudes has determined that, contrary to expectations, attitudes and behaviour correlate relatively weakly (Wicker, 1971) and other factors, including a sense of self-efficacy (Armitage and Conner, 2001), strengthen the predictive value of attitudes. This would suggest that more widespread knowledge about sustainable construction, by contributing to a sense of competence in the domain, could help to increase green design.

Beyond motivations that appeared directly to drive sustainable behaviour were other intrinsic motivations which, we argue, may be linked indirectly. The pursuit of excellence is perhaps not surprising for a professional group, particularly a set of individuals who were managing successful businesses. Although excellence of product lends itself to commercial value, here the focus was specifically on design rather than excellence as a marketing strategy. A number of respondents linked sustainable design to high quality and this suggests one way in which sustainability may gain wider appeal amongst designers. The participants provided interesting indications of the extent to which their self-identity, and that of architects in general, was bound up in their designs. These factors had been noted by Caven and Diop (2012) in their study of architects. They too found robust examples of the importance of the profession to self-identity and of creativity and they found these to be intrinsic rewards in the profession of architecture. Self-determination theory (Ryan and Deci, 2000) offers further insights into how such factors may contribute to motivation. The creativity of the design process is likely to be ‘intrinsically motivating’, that is, enjoyable in and of itself. Behaviour which supports or enacts an aspect of identity is also highly motivating. Norms such as ethical behaviour which have become internalised are also strong motivators. Thus creativity, professional identity and ethical concerns may all be considered as intrinsically motivating. As such, they are likely to drive behaviour that does not require additional external incentives and is likely to persist in the face of obstacles.

The study presented here involved only 16 architectural practices and statistical generalisability is not claimed. Nevertheless, theoretical understanding of human motivation suggests the potential for some of the findings to apply more generally in construction, beyond architects in micro enterprises. While the focus on design and creativity may be particular to designers, motivations around the pursuit of excellence, self-identity including pride in legacy, and impact on people, may be widespread amongst other construction professionals. Future research could usefully examine the motivations of other construction professionals to establish whether these or other motivations offer potential 'hooks' for sustainability.

CONCLUSIONS

Associations may be drawn between the intrinsic motivations in evidence in our participants' responses and goals of sustainable design. The participants spoke of ownership, of vanity and ego and of the general desire of architects to leave a lasting legacy. Sustainability goals of durability, designing for re-use and extended life for buildings aligns closely with desires for legacy thus achieves the aims of both.

With respect to client satisfaction, design for operational energy efficiency and application of passive design principles can be linked to greater comfort, efficiency and overall value to the client. The motivation of the participants to consider impact on people as fundamental to their design aligns with sustainability goals of a built environment which contributes to human well-being.

We argue therefore that there is considerable scope to connect sustainability goals with the wider motivations of architectural designers. The focus in this study has been on positive motivation for sustainability and positive motivations in work more generally but this is not to suggest that all businesses are motivated to become more environmentally sustainable. Indeed, attitudes from the study participants were not uniformly positive. In the population at large, attitudes to environment matters can vary considerably (Pidgeon, 2012). By associating sustainability goals with intrinsic motivations, discourses come to be not only about climate change or the environment but more fundamentally a part of what people want to do each day. In this way, the reach of sustainable design may be extended beyond those who have a personal interest and commitment.

Linking sustainability and intrinsic motivations is not automatic. Moral norms require activation in context to influence behaviour (Stern *et al*., 1999). Extrinsic motivations such as financial inducements can undermine intrinsic motivation (Ryan and Deci, 2000). Professional identity is developed through socialisation (Imrie and Street, 2014), both during education and within organisations. There is a need therefore to enhance curricula to embed sustainability goals more broadly in the everyday practice of design, and to develop more extensive discourses in organisations around impact on people. Designing for sustainability could increasingly become business-as-usual, meeting a diversity of motivations, rather than an often-contested, environment-specific 'add-on'.

REFERENCES

Armitage, C. J. and Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *"British Journal of Social Psychology"*, **40**, 471-499.

Babiak, K and Trendafilova, S (2011) Csr and environmental responsibility: Motives and pressures to adopt green management practices. *"Corporate Social Responsibility and Environmental Management"*, **18**(1), 11-24.

Bianchi, R and Noci, G (1998) 'Greening' SMEs' competitiveness. *"Small business economics"*, **11**, 269-81.

BIS (2013) *"UK construction: An economic analysis of the sector"*, London: UK Government Department of Business, Innovation and Skills.

Blau, J. R. (1984). *"Architects and firms"*, Boston, MA, MIT Press.

Cassells, S and Lewis, K (2011) SMEs and environmental responsibility: Do actions reflect attitudes? *"Corporate Social Responsibility and Environmental Management"*, **18**(3), 186-99.

Caven, V. and Diop, M. (2012). Architecture: a 'rewarding' career? An Anglo-French comparative study of intrinsic rewards in the architecture profession. *"Construction management and economics"*, **30**, 513-523.

Clarke, J A, Johnstone, C M, Kelly, N J, Strachan, P A and Tuohy, P (2008) The role of built environment energy efficiency in a sustainable UK energy economy. *"Energy Policy"*, **36**, 4605-9.

Davies, M and Oreszczyn, T (2012) The unintended consequences of decarbonising the built environment: A UK case study. *"Energy and Buildings"*, **46**, 80-5.

EU (2015) *"Fact and figures about the EU's small and medium enterprise (SME)"*. [Available online from http://bit.ly/1hvk7SN. Accessed online 18.1.2015]

Farmer, G. and Guy, S. (2010). Making morality: sustainable architecture and the pragmatic imagination. *"Building Research and Information"*, **38**, 368-378.

Gatersleben, B, Murtagh, N and Abrahamse, W (2012) Values, identity and pro-environmental behaviour. *"Contemporary Social Science"*, iFirst, 1-19.

Gerstenfeld, A and Roberts, H (2000) Size matters: Barriers and prospects for environmental management in SME enterprises. In: Hillary, R (Ed.), *"Small and medium-sized enterprises and the environment"*, Sheffield: Greenleaf Publishing.

Hill, R C and Bowen, P (1997) Sustainable construction: Principles and a framework for attainment. *"Construction Management and Economics"*, **15**(3), 223-39.

Hillary, R (2000) *"Small and medium-sized enterprises and the environment"*. Sheffield: Greenleaf Publishing.

Hillary, R (2004) Environment management systems and the smaller enterprise. *"Journal of Cleaner Production"*, **12**(6), 561-9.

Huitt, W G and Cain, S C (2015) An overview of the conative domain. *"Educational Psychology Interactive"*. Valdosta, GA: Valdosta State University

Imrie, R. and Street, E. (2014). Autonomy and the socialisation of architects. The journal of architecture, **19**, 723-739.

IPCC (2007)" Contribution of working groups i, ii and iii to the fourth assessment report of the intergovernmental panel on climate change". Geneva, Switzerland: IPCC.

IPCC (2014) *"Climate change 2014: Synthesis report"*. Geneva, Switzerland: IPCC.

Johnston, P, Everard, M, Santillo, D and Robert, K-H (2007) Reclaiming the definition of sustainability. *"Enviromental Science Pollution Research"*, **14**(1), 60-66.

Kibert, C J (1994) Establishing principles and a model for sustainable construction. In: *"Proceedings of the First International Conference on Sustainable Construction"*, 6-9 November, Tampa, Florida.

Kibert, C J (2007) The next generation of sustainable construction. *"Building Research and Information2, **35**(6), 595-601*.

Perez-Sanchez, D, Barton, J R and Bower, D (2003) Implementing environmental management in SMEs. "Corporate Social Responsibility and Environmental Management", **10**, 67-77.

Petts, J (2000) Small and medium-sized enterprises and environmental compliance. In: Hillary, R (Ed.), *"Small and medium-sized enterprises and the environment"*. Sheffield: Greenleaf Publishing.

Pidgeon, N. (2012). Public understanding of, and attitudes to, climate change: UK and international perspectives and policies. Climate policy, Sup01, S85-S106.

Quinn, J (1997) Personal ethics and business ethics: The ethical attitudes of owner/managers of small business. *"Journal of Business Ethics"*, **16**, 119-27.

Revell, A (2007) The ecological modernisaton of SMEs in the UK's construction industry. *"Geoforum"*, **38**, 114-26.

Revell, A and Blackburn, R (2005) The business case for sustainability? An examination of small firms in the UK's construction and restaurant. *"Business Strategy and the Environment"*, **16**, 404-20.

Roxas, B and Coetzer, A (2012) Institutional environment, managerial attitudes and environmental sustainability orientation of small firms. *"Journal of Business Ethics"*, **111**, 461-76.

Ryan, R M and Deci, E L (2000) Self-determination theory and facilitation of intrinsic motivation and well-being. *"American Psychologist"*, **55**(1), 68-78.

Simpson, M, Taylor, N and Barker, K (2004) Environmental responsibility in SMEs and competitive advantage. *"Business Strategy and the Environment"*, **13**(3), 156-71.

Smith, A, Kemp, R and Duff, C (2000) Small firms and the environment. In: Hillary, R (Ed.), *"Small and medium-sized enterprises and the environment"*. Sheffield: Greenleaf Publishing.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A. and Kalof, L. (1999). A value-belief-norm theory of support for social movements: the case of environmentalism. *"Human Ecology Review"*, **6**, 81-97.

Tan, Y, Shen, L and Yao, H (2011) Sustainable construction practice and contractors' competitiveness: A preliminary study. *"Habitat International"*, **35**, 225-30.

Tilley, F (2000) Small firms' environmental ethics. In: Halliday, R (Ed.), *"Small and medium-sized enterprises and the environment"*. Sheffield: Greenleaf Publishing.

Van Hemel, C and Cramer, J (2002) Barriers and stimuli for ecodesign in SMEs. *"Journal of Cleaner Production"*, 10, 439-53.

White, M A (2013) Sustainability: I know it when I see it. *"Ecological Economics"*, **86**, 213-7.

Wicker, A. W. (1971). Attitudes versus actions: the relationship of overt and behavioural responses to attitude objects. In: Thomas, K. (ed.) *"Attitudes and behaviour"*. Harmondsworth: Penguin Books.

Wiener, B (1992) *"Human motivation: Metaphors, theories, and research"*. London: Sage.