On the Shore of the Lough: navigating sustainability in the rural context

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ABSTRACT

The narrative around sustainable projects often follows considerations of acontextual best practice, standards, and inter disciplinary integration. Such formalised approaches may be appropriate for large projects often with repeat clients, however smaller independent builds may not reflect these contextual norms. In these cases localised independent suppliers, builders, architects and trades are dependent on each other for ongoing work and each is very focused on maintaining good working relationships. As actors navigate the terrain of builds which incorporate unfamiliar technologies, these sensitivities can make contractual and day-day conflict management a key determinant of how projects unfold and how sustainable practices are realised. New building techniques, updated best practice and modern methods of construction (MMC) further test team dynamics and the old legitimacy of pathways and people. This research focuses on understanding how day-day issues are experienced in practice on smaller independent builds and draws upon concepts of localised learning and embeddedness. Using ethnographic methods in a single case study of a new-build residential project in rural Northern Ireland, the research takes three episodes during the build to explore these concepts. The build uses MMC and traditional procurement centring on a local supply chain. Findings indicate that subtle informal practices around the concept of embeddedness, coupled with active strategies of conflict avoidance were mobilised to navigate uncertainties of technology inclusion and associated challenges. These informal practices centred on protecting and nurturing relationships between project actors and became major barriers to adoption of new technologies, decision making, client satisfaction and sustainable outcomes. These findings prompt further examination of the issues surrounding this particular context and open new ways to explore how harmony between old and new methods of construction and sustainability standards can be achieved.

INTRODUCTION

Enacting sustainability is now recognised as a key component when procuring a new building. The UK government has sought to shape the emerging sustainability discourse through a long-standing tradition of improvement agendas. This has resulted in a multiplicity of government reports targeting improvement within the contextual sensitivities of the construction sector. The target audience for these reports and recommendations is typically large, well-resourced organisations who have found challenges in adopting the recommendations for best practice and standards in the context of construction projects. This is compounded in certain segments of the construction sector, for example small and medium sized (SME) who undertake 70% of the construction output (Fernie et al., 2001; Murray and Langford, 2003). Many of these SMEs are engaged in domestic work, e.g. house building, and have little support or guidance regarding how they might engage in the changing landscape around sustainability and associated themes such as modern methods of construction (MMC). To give such SMEs and their clients better representation, the research focusses on how a client and their representative experienced the enactment of sustainability by SMEs during a one-off residential build project. The following sections give more context to the research.

The build

In contrast to new building developments commissioned by large developers working with national house builders, this research focussed on a bespoke house commissioned by a client interested in sustainability. The location is in rural Northern Ireland, where there is a tradition of small, highly embedded firms with established relationships and ways of working. The building of this house necessitated engaging with a small pool of such firms accustomed to constructing traditional block and brick houses which conform to local norms and regulations. Anecdotal stories from the client and client representative over the course of the build highlighted the realities of bespoke, innovative builds for small builders and local industry where the specified technologies and standards fall outside the normal vernacular. There appears to be a difference between how larger house builders engage with the sustainability agendas and what smaller builders do and know. This research aims to explore the reality of building a sustainable, modern house in this context, and how to engage in capacity building for sustainable development in in small building firms.

Small firms In Northern Ireland

Over half of businesses in Northern Ireland (NI) are located in rural areas, accounting for 20% of employees, and 25% of total business turnover (McAreavey, 2022). Within these rural business communities, SME construction firms with a turnover of less than £99,000 per annum are responsible for 37% of building projects and 32% of building construction (Rural policy for NI, 2021). 99% of all planning applications received in 2022/23 were for local builds, with 35% covering single dwellings in rural areas (Northern Ireland Planning stats, 22/23). It is also known that in this rural context, micro-politics (encompassing trust, norms, shared knowledge, perceptions, understanding and social network values) are critical to success (McAreavey 2006). This research is mobilised around the building of a bespoke house in a rural area and focuses on small, local house builders (often with under 10 employees, operating within a 30-mile radius). These builders typically manage and work on a small number of projects at a time and employ subcontractors from their local network.

POSITIONING THE PROBLEM

Literature relevant to the research is diverse but is structured in two simple parts. Firstly, rehearsing the historical improvement and guidance offered to the construction sector and the inherent challenges for SMEs. Second, turning attention toward understanding SMEs through the embeddedness and localised learning perspective, firmly placing the reality of SMEs in plain sight.

For many years the rhetoric around construction sector improvement, has been dominated by recommendations in the form of Government reports (e.g. Latham 1994, Egan 1998, DETR 2000, and Farmer 2016). Whilst such reports clearly have an audience and value, construction firms are repeatedly steered toward the adoption of generic improvement recipes promising methods to perform better, be more modern and to be more sustainable. Critics note there is little in such reports about context, about SMEs (despite representing the majority of the construction sector), about the rural or regional businesses providing key services, or about grass roots construction (Fernie *et al.* ,2001). This is exacerbated as the majority of tier 1 contractors (the target of many improvement initiatives and reports) outsource construction further down the supply chain to SMEs (Green, 2023).

SMEs (firms with less than 250 employees) appear to struggle to find guidance, advice and support appropriate to their reality, and that seems even more the case given the emerging sustainability discourse and reinvigorated MMC agendas. Regulations and policy around sustainability do not appear to be geared up for SMEs, with any guidance offered typically seeking to engage with the upper limit of the SME definition - the 'M' rather than the 'S' (Gerrard, 2022). The rhetoric for the 'M' sized firm typically covers financial constraints around initial costs and also how best to mobilise a return on investment. This rhetoric suggests that SMEs tend to operate on shorter time horizons, meaning sustainable investment is particularly challenging for them. Technical knowledge, awareness and confidence regarding new sustainable approaches can be seen as a challenge for SMEs, having few resources to engage in the uptake process, put these lessons into practice and develop capacity. For 'S' firms' guidance and support is even less developed and in the rural, local context of this research (with firms of less than 10 employees) this lack of understanding or support is amplified.

Connections between embeddedness and enacting sustainability have been rehearsed through a number of contextual settings, particularly across small, grass roots, rural, regional firms and their practices (Sharafizad et al., 2022). These concepts of embeddedness and localised learning offer fresh insights especially when associated with sustainability. Although conceptually somewhat illusive, Nystrom (2018) describes firms becoming the very fabric of a localised community, and learning through the localised position they occupy. This makes embeddedness and localised learning an important local commodity which can be hard to break into for those firms on the outside. Wigren-Kristoferson et al (2022) offer a useful desk study and analysis to provide some understanding of the terrain around embeddedness and localised learning. They point toward the complex and messy way such embeddedness unfolds at different levels and to differing degrees whilst seemingly enacted primarily through social interactions with cognitive, contextual and emotional aspects. Built environment SME's operating in (and indeed as part of) the fabric of a regional, or local sector must navigate the difficult terrain of one-off client relationships, localised contexts, and being embedded in a given rural localised setting when seeking to enact relationships. Embeddedness and localised learning are not new to research associated with the built environment, Kao et al., (2009) mobilised

them to make sense of how SMEs remain competitive over time within their regional and local context, whilst highlighting the dangers of becoming overly embedded and thus too inward looking.

The inclusion of sustainability within the debate about embeddedness and localised learning brings its own complications, with differences between social, environmental and economic sustainability. Sharafizad et al, (2022) propose to address particular issues for SMEs in a rural, regional or local context through new constructs of locally embedded sustainability values, spatially driven sustainability and locally adapted sustainably. Whilst such constructs are slippery to access empirically, they offer useful frames of reference for shaping the evolving discourse and demonstrate a nuanced fresh approach for understanding the enactment of sustainability for these contexts. When considering how negotiations such as sustainability are enacted, some research has privileged the concept of embeddedness as an active variable with agency (Valente, 2015; and Sharafizad et al.,2022). In essence, such concepts appear to have agency in how sustainability is enacted, and how relationships and conflict are perceived through the localised networks in terms of advancing the sustainability agenda and supporting the local business community. Munoz and Kimmitt (2019) advocate the value of small firms engaging in social sustainability, whilst others do the same regarding environmental sustainability (Kraus, et al 2022). The agency associated with that support is recognised as potentially playing a role in broader, even national sustainability agendas (Barbosa et al., 2020) mainly due to the very large number of SMEs collectively gaining a voice over time (Bakos et al., 2020). This underscores the need to engage with and understand the reality experienced by SMEs when trying to enact sustainability.

RESEARCH APPROACH

The research approach is aligned with the tradition of contextualist research, emphasising the need to study 'reality in flight' (cf. Pettigrew, 1998). The research mobilises 'iterative grounded theory' (Orton, 1997) as a key touchpoint, in essence an evolution and response to the criticisms of grounded theory developed by Glaser and Strauss (1967). Suddaby (2006) argues that the underpinning ideas of grounded theory should be approached with caution. Orton (1997) mobilised such caution, discarding the idea that researchers might leave our intellectual baggage outside the research (as proposed by grounded theory), instead enacting an 'iteration' between collecting and analysing data, together with reviewing existing theories and concepts in order to generate theoretical statements through sense making practices. Green et al., (2010; 119) state '*we remain suspicions of those who claim that theories "emerge" from the data'.* So, the authors claim no novelty here, as iterative grounded theory is already established even in the construction management literature, exemplars include the excellent work of Green et al., (2010). As such, the concepts of embeddedness and localised learning (to be mentioned on earlier and in forthcoming sections) were known to the authors, but in no way predetermined the empirical work but emerged as the empirical space and findings were interrogated through the iterative process described above.

Given this approach, the data collection centres on what can be described as a longitudinal case study of a single small building project in a rural location (outlined below). The longitudinal case study extends over a period of four years (further helping the iterative approach) and includes the period from initial design to handover of the building. The client is used as the 'lens' to understand the reality of the project as experienced through their eyes. Empirically the work reflected the pattern of 'iteration' between collecting and analysing data, together with reviewing existing theories and

concepts in order to generate statements (through the writing process) as outlined above (cf. Green et al., 2010.

Due to the size limitations of this publication, three episodes from the build have been taken from client accounts (the lens) and these have been mined to understand the complicated forces and interests at play during the build. Thematic analysis explores emergent themes and those suggested by concepts of localised learning and embeddedness. The following data section presents a background and description of the case study, followed by three episodes within it.

CASE STUDY: THREE EPISODES

Background to case study:

The case study is of a bespoke house building project in rural Northern Ireland, UK. The house was designed by a local architect, the project main contractor was a local builder who managed the project and coordinated other trades. The house is of timber frame construction and is thus aligned with MMC and the sustainability agenda. The timber frame was manufactured, supplied and erected by a non-local specialist timber frame contractor. The project was commissioned in 2020, construction began in June 2022 and was habitable by Autumn 2023. Most of the other subcontractors to the main builder came from a radius of within 30 miles from the build location. Similarly, local suppliers were used to provide most fixtures and fittings. The timber frame construction (MMC) was punctuated by triple glazed doors and windows, the equivalent of passive house standards of air tightness and insulation, and MVHR and air source heat pump systems. The design included a brise soleil and a Juliet balcony.

The following three episodes illustrate the embedded nature of the construction team, the reliance of the contractors on continuing relationships and the impact of new technologies and suppliers.

Episode1: the timber frame and air tightness

The builder had not used timber frame construction before. The architect had experience of using timber frame construction but had not used the timber frame supplier. Prior to groundworks starting, the client organised a site meeting to introduce the builder, architect and timber frame contractor. At that meeting, the timber frame supplier explained the sequence and responsibilities of the build: groundworks (main builder), erection of the timber frame and external membrane, installation of thermal insulation and airtightness testing (timber frame contractor) prior to hand back to the main contractor for internal finishing. Interestingly, the timber frame supplier also asked the builder to tender for a different building project in the area. The builder completed the groundworks on schedule, the timber frame was erected, and the building was weather tight within three weeks. Once the external shell and membrane were in place, the timber frame supplier was ready for insulation fill. The builder had not progressed internal to external penetrations (e.g. chimney flue, kitchen vent, fire nozzles), and so delayed the airtightness testing. The builder was unwilling to contact the kitchen supplier and fire nozzle system provider for details of connections. In line with his usual practice, and in order to progress internal finishing, the builder started to fit internal plaster boarding to the inside of the roof structure before airtightness testing had been completed. This resulted in a push-back from the timber frame supplier who was responsible for the air tightness performance until handover to the builder. The builder failed to see the importance of this requirement and was prepared to

continue by feigning ignorance. The timber frame supplier was not prepared to let the matter stand and insisted on compliance.

Episode2: the downstairs cloakroom

Cloakroom furnishings were supplied by a local bathroom supplier recommended by the builder, but not usually used by the plumber. The plumber found that the items did not fit as expected and proposed to customise the supplied equipment, rather than contacting the supplier. The client was unhappy and asked the supplier and plumber to sort out the issue between them. During a subsequent visit, the client found that the fittings had been changed, but that the toilet pan had now been sited with a 6 cm clearance from a sidewall of the cloakroom. The client asked the builder to address this. The builder agreed**.** Over two subsequent visits the toilet remained in its unsatisfactory position. The plumber did not answer calls**,** the builder did not address the issue with the client or with the plumber. The architect was enlisted by the client to raise the issue with the builder and stated that the building inspector would not be happy. No action was taken until finally the building inspector visited. The building inspector raised a point of modification on the location of the toilet, which was re-sited within the day.

Episode3: the MVHR vents

The client specified at the start of the project that gypsum rather than plastic vents were to be used in the internal fit out and supplied details of a suitable supplier. The plumber was unfamiliar with these. Six months later, after the client reiterated their instruction, the plumber sourced a sample vent but proceeded to try to convince the client that these vents were too large, too expensive and unnecessary. The client held firm and the plumber agreed to source and fit these, although the late order brought about a delay. Once installed, the plumber was enthusiastic about the product. The MVHR system was installed by the plumber, but the initial design, equipment sourcing, commissioning and balancing was done by a local MVHR firm which had been engaged by the plumber**.** The commissioning technicians had no prior experience of these vents which used a different balancing mechanism and were vociferously against their use. The plumber became very upset and apologetic towards the technicians and later told the client that the MVHR contractors were furious that their normal in-house plastic vents had not been used.

THROUGH THE LENS OF LOCALISED LEARNING AND EMBEDDEDNESS

This section highlights how the episodes and themes described above resonate with concepts from the localised learning and embeddedness perspective, whilst tensioned against the acontextual improvement rhetoric that targets large organisations.

First of all, as a reflection piece we set out the four emergent themes from the case study and then go on to connect and tension these with the literature in a broader discussion. Emergent themes and those identified in literature on localised learning and embeddedness have been brought together to reflect on the specificities of construction in localised rural networks.

Four themes are identified that run throughout the episodes and which indicate important issues within the context of this build: learning, conflict, circle of embeddedness and agglomeration.

Learning (within and outside networks): The concept of localised learning is promoted as a central component of regional sustainability by economic geographers (cf. Maskell *et al.*, 1998), and can be seen in this case study as an important theme. Learning and cooperative problem resolution within networks is a common theme. However, when a project actor comes from outside the network, different strategies are employed. Here the builder seems to believe that asking questions might expose weakness and jeopardise his position of authority. This is evidenced by the builder being willing to absorb knowledge from the timber frame supplier but being unwilling to ask questions to clarify or augment his understanding. Similarly, the builder was unwilling to pro-actively contact the stove supplier or fire spray suppliers to fill in the blanks in his knowledge.

Conflict (avoidance and resolution): Flint et al., (2013) identify the importance of conflict management in small firm networks, with actors within the network adopting accommodating behaviours in conflicts with each other and using compromising and collaborative strategies with local. The builder and sub-contractors all showed a pre-disposition to avoid conflict within their network, choosing either to ignore the issue or to accept compromise in terms of cost, time or quality of the outcome. Outside the network, the builder seemed to find it expedient to avoid pro-active expediting of delays and uncertainties, preferring rather to allocate lack of progress to these "outsiders". Resolution of conflict often stemmed from hierarchical perceptions. Conflict within the network was seen as very threatening and unpleasant. It seems that within rural networks, mutual dependencies on future work and continuing relationships make avoidance of conflict more important than client satisfaction or timely completion of the project to budget. This is evidenced when the builder used the building inspector's authority to push the plumber to re-site the toilet. Also, by the timber frame supplier using contractual risk to trump the builder's desire to proceed faster than the air tightness testing permitted. Finally, when the plumber took the MVHR commissioning technician's annoyance to heart and worried about continuing relationships.

Circle of Embeddedness (inside and outside): The circle of embeddedness differs from the concept of local networks or project teams. Uzzi (1996) describes embeddedness as 'an exchange system with unique opportunities relative to markets' and claims that firms 'organised in networks have a higher survival chance than do firms which maintain arm's-length market relationships. This project had actors from both within an embedded circle and those outside, albeit some within the local area network. Different rules of engagement seem to be at play in how these actors relate to each other. Those within the circle display high levels of trust and desires to maintain the status quo, whilst those within the local network but outside the circle display a wariness to intrude and a curious lack of proactive steps to join the circle. Those inside the circle display a reluctance to actively contact or engage with actors within the network but outside their circle. Those outside the circle and outside the local network displayed no hesitation in engaging with issues and making their demands clear. This was evidenced when the builder was not prepared to disturb the status quo with the plumber, but equally did not take steps to bring the kitchen fitter inside his circle. Jack and Anderson (2002) emphasise that there is no ideal endpoint for achieving embeddedness. It is better understood as an ongoing *process* aligned with the traditions around the process school (Whittington).

Agglomeration (opportunities and new alliances): Where economic and entrepreneurial activities tend to agglomerate at certain places and lead to patterns of national, regional and in this instance rural specialisation (Erikson and Lindgren, 2009). In this case, the rural specialisation is block

and brick housing, with oil fired boilers and adjustments and accommodations to the design made on site. Agglomeration based on the acquisition of new skills to capitalise on new opportunities happened in a few instances where future business opportunities were recognised, but this was by no means universal. This was evidenced when the timber frame supplier understood the opportunity to develop interactive learning between firms in the area for the purposes of knowledge creation around MMC and sustainability. Also, by offering the builder opportunities to tender on new timber frame projects, he got the builder to develop new skills. Conversely, the plumber showed no interest in developing relationships with a new bathroom supplier and was not interested in investing time in joint problem solving.

Looking across the emergent themes and connecting to literature

The sense across all the episodes is that the builder (and many of the other specialist sub-contractors and suppliers mentioned) *seemed* to recognise their position in a localised network. Some were heavily embedded within said network, such as the builder. That recognition influenced their behaviour regarding negotiations and even possible conflict. Through the localised learning and embeddedness lens the builder can be seen to both protect and promote their position and standing in the local network, seeking to further embed themselves and always looking to maintain existing network relationships (cf. Maskell et al., 1998). The perceived agency of these relationships by the builder demonstrates the enactment of embeddedness and the value of a localised network (cf. Uzzi, 1996). Such priorities made the builder extremely wary of new and unknown entrants because of the value of the network. However, such wariness was, at times, 'flexed' due to the possibilities to further future building projects (cf. Jack and Anderson, 2002).

The *modus operandi* was for the builder, and to a degree other supply side stakeholders, to privilege their relational ties when negotiating to avoid conflict and disputes at times to the detriment of the client's build project. That modus operandi extended to the technology (traditional brick, block, oil boilers) and their preferred process 'design as we build' rather than an emphasis on sustainably approaches and MMC. Yet, the build required an understanding of 'new stuff' (sustainable technologies and timber frames etc.) that was outside the knowledge and normal practices of the localised network in which the builder and subcontractors were all embedded. As evidenced, that manifested into a range of situations whereby the client asked for something that the builder struggled to deliver. The builder sought to protect their *apparent* knowledge, expertise, formal or informal power by discouraging negotiation about new sustainable technologies and methods which they themselves lacked knowledge or experience of. Efforts were made to avoid any conflict, disagreement or deviation from the accepted modus operandi of the localised network or upsetting fellow stakeholders. Issues of conflict avoidance and preserving future relationships were privileged against other commonly cited priorities in projects: cost, delivery and, importantly, client satisfaction. Conversely, literature also suggests that such innovation adoption (MMC, sustainability driven new technologies, materials and components) could, given the right conditions, actually be fuelled through continuous *localised learning* networks when associated regulatory regimes in the form of local building control play an active role.

The penultimate finding points toward an interconnectivity between the notions of path dependency and embeddedness. Teece *et al.'s* (1997) argument that the choices available to a firm are shaped, both positively and negatively, by the previous path that firm has travelled is relevant here. The builder

appeared to lack choice regarding sustainability, in part because of the path they have travelled, essentially being locked-in to certain traditional localised practices. Related to that point, there is a potential risk therefore of becoming over-embedded, signified by too much reliance on a limited localised network, by overly privileging them (to the detriment of the client and their build in this instance). Overly embedded firms run the risk of becoming blinkered, reducing what firms can see albeit a risk, threat or potential golden opportunity (for themselves and for society e.g. sustainability or building client relationships beyond a single project).

Finally, the range of nuanced practices resonate with themes proposed by Sharafizad et al., (2022), including a need for new constructs such as locally embedded sustainability values, spatially driven sustainable and locally adapted sustainably. This is sustainability within and driven by context and needs further unpacking in the future and an appropriate language developed.

CONCLUDING COMMENTS AND FUTURE DIRECTIONS

With the analysis above and the observations made in the previous section, there are several key implications for understanding the dynamics at work in the context of embedding sustainable builds in the rural context.

The client has a key role to play in making clear requirements and checking on key milestones and stages. Project managers are not a usual addition to builds of this type and are not welcomed by the builders. Architects are reluctant to act as project overseers and in many cases see their role as designers and visionaries rather than technical expediters of the build. This can leave the client to manage the project whilst possibly knowing the least about technologies and sustainability.

The builder is in the unenviable position of knowing what he knows and who he knows, but without the time or resource to understand new technologies and sustainable alternatives. He relies on the architect to provide technical detail, but risks revealing himself as less than perfectly informed. Being embedded in a circle allows him the luxury of trust but makes him vulnerable when enrolling new actors into the circle, even though this could agglomerate new knowledge and skills.

Set against the backdrop of the emerging sustainability agenda, the empirical findings point toward ongoing process of localised learning at project level, and through the whole localised network. That learning might at times, as in this case study, be to the detriment of the client's experience. This potential project-by-project incremental learning across a localised network demonstrates how change *could* happen from the ground up, rather than a generic top-down strategy looking to change the whole sector as per many improvement agenda reports.

The research primarily set out to understand how SMEs were enacting sustainability on the ground and in practice. That was set within a local, rural and regional context, whilst tensioned against national improvement agendas and sense making themes from economic geography (embeddedness and localised learning). It seems that sustainability within this contextual setting will need to be enacted across localised networks of stakeholders, not within isolated firms. The *modus operandi* of the localised network needs to shift as a whole. Any proposed improvement agendas targeting SMEs should consider how best to achieve that. Many of the concepts normally held to be instruments of success within improvement agendas (targets around time, cost, quality, MMC and KPIs) were not enacted by the builder or the supply chain (despite the hopes of the client).

The formal powers of the building control officer (and similar such posts) appeared to carry sufficient agency for the builder and stakeholders to be willing to engage in real negotiation within the network, despite possible disputes or conflicts and thus disrupt the established embedded working relationships. Again, this is an important point for any proposed improvement agendas targeting SMEs and how to tackle resistance to change.

Finally, echoing calls from Wigren-Kristoferson et al (2022), conclusions point toward a need for additional research, recognising its complexity, the connections between the themes discussed whilst moving toward finer-grained thinking around process, negotiation, local and practice theories.

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