

Construction disputes in small to medium enterprise's in Ireland during recession

Construction
disputes

Identification of critical factors

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Abstract

Purpose – This paper aims to identify the critical factors causing construction disputes in small to medium enterprises (SMEs) in Ireland during the recent recession period from 2007 to 2013.

Design/methodology/approach – This study used a mixed-method approach incorporating a literature review, case studies and questionnaire survey, with results analysed using exploratory (data reduction) factor analysis.

Findings – The results indicate seven core critical factors which result in construction disputes in SMEs in Ireland during a recession: payment and extras; physical work conditions; poor financial/legal practise; changes to the agreed scope of works; time overrun; defects; and requests for increase in speed of project and long-term defects.

Research Limitations/implications – With Ireland emerging from the current economic recession and the prevalence of SMEs in the construction sector, it is essential to document the core critical factors of construction disputes which emerge within this particular segment of the built environment.

Practical Implications – To address the adversarial nature of the construction sector and the prevalence of SMEs, it is essential to identify and document the critical factors of construction disputes within this remit. It is envisaged that the results of this research will be acknowledged, and the recommendations adopted, by construction SMEs, particularly within Ireland, as they emerge from the economic recession.

Originality/value – This paper fulfils a gap in knowledge with the emergence of the economic recession and the identification of critical factors of construction dispute within SMEs in the Irish construction industry.

Keywords Ireland, SME, Recession, Factor analysis, Construction disputes, Small to medium enterprise

Paper type Research paper



Introduction

With the development and permeation of the global financial crash in 2007 to economies worldwide, Ireland suffered considerably and, in particular, its construction industry. With limited government interaction to stem the disintegration of the sector within

Ireland (Tansey and Spillane, 2014), small to medium enterprises (SMEs) deteriorated and substantial job losses ensued (DKM, 2013). With this global crash and the implosion of the Irish construction sector, significant changes followed in the manner in which construction stakeholders interact. With significant restrictions in cash flow, reduced credit facilities and limited opportunities for business, construction disputes increased. With this changing demeanour in which the construction sector operates, there is a necessity to review and consolidate information to identify the sources of construction disputes in SMEs in Ireland. Spillane *et al.* (2011) highlight that the construction industry in Ireland excels at dispute creation, while Tansey *et al.* (2014) argue that Ireland's construction sector has emerged negatively because of the recent economic crash. In the context of the built environment, DKM (2013) highlights how SMEs suffered the most and experienced significant contraction, primarily due to their dependence on the domestic market.

Previous research has been conducted on the Irish construction sector dispute resolution mechanisms, but this was conducted prior to the economic downturn (Owens, 2008). Therefore, the distinctive nature and gap in knowledge that this paper fulfils assess this aspect of the Irish construction industry, but from the aspect of the recent economic collapse. To this end, the aim of this paper is to identify the core critical factors which result in construction disputes in SMEs in Ireland during the recession period from 2007 to 2013. This covers both disputes between SMEs and also SMEs and their larger counterparts. In achieving this aim, a mixed-method approach is introduced, including a review of the effect of the economic recession on the construction sector. It is envisaged, with the continued affection of the Irish construction sector to engage in dispute, construction management professionals can adopt the findings herein to aid in the identification of critical factors of dispute in SMEs in Ireland, particularly during a recession. Furthermore, with the continued rising cost of dispute resolution within the built environment (Jannadia *et al.*, 2000; Mohamed *et al.*, 2014) and the proliferation of disputes among parties (Murphy *et al.*, 2014), it is essential that the industry reviews the period of economic turmoil, in order to be better placed, when such uncertainties return to the market. This is substantiated where Jones and Evans (2013) highlight the cyclical nature of the UK economy and the need to encourage recovery, growth and most importantly, develop on the failings of the past. To assist in this process and to provide an insight into the literature on the subject, an introduction into the core published works in this area is undertaken.

The effect of the economic recession on the construction sector and its disputes

The global economic recession which began in the USA, was caused by an interest rate increase in July 2007 (Knopp, 2010). On Monday, 15 September 2008, one of the largest investment banks in the world at the time, Lehman Brothers, collapsed and filed for bankruptcy (Swedberg, 2010), signalling the acute stage of the crisis. This economic failure sent shockwaves around the world and triggered the largest world recession since the Great Depression of the 1930s. According to Cummins (2011, p. 9), this global recession was triggered in the USA, mainly in the housing and property market, "[...] by low interest rates, lenient regulation and the easy availability of credit [...]" gross domestic product, which is a reliable measure of economic status, is widely used as an indicator of entry to, and exit from, recession (Knopp, 2010). During the economic

turmoil of this period, most of Europe and North America also fell into recession due to reduced economic activity. This resulted in significant adverse consequences throughout the construction industry.

Martin (2009) confirms that, for the first two years of the recent economic recession, the four industrial sectors that suffered the most job losses were the construction, manufacturing, financial and tourism sectors. Similarly, Katz (2010) highlights huge declines in construction, manufacturing and middle management employment in the USA, again as a result of the recession. While global labour numbers in construction have fallen, it appears that newly appointed workers and, in particular, immigrant workers, have been the first to be made redundant. Research has shown that immigrant workers face losing their job in times of recession due to, “[...] their low local-language skills and limited educational credentials [...] their contingent work contracts and arrangements, and the discrimination they face that can be exacerbated in times of recession” (Fix *et al.*, 2009, p. 2). Furthermore, an investigation into the effects on Asian migrant workers found that those working in various sectors, including light manufacturing and construction, were likely to be the first to lose their jobs in countries such as the Philippines, Singapore, Malaysia and Sri Lanka (Abella and Ducanes, 2009). It is important to note that the construction industry operates in a cyclic nature, and according to Arditi *et al.* (2000, p. 129), it is also a, “[...] volatile industry that is characterised by market ups and downs”. Taking this into account, it is important to determine why this recession has had such a significant effect on construction, if the industry is characterised by periods of economic growth and subsequent recession.

In Ireland, the construction industry has suffered due to the recent economic recession. Various commentators (Foster, 2008; Allen, 2009; O’Toole, 2009) identify two distinct economic growth periods, 1995 to 2001, which was driven by foreign direct investment, and 2001 to 2006/2007, a period characterised by construction, property market revenues and reduced rate credit. It was this “over investment” in this second period that caused the rapid deterioration of the construction industry once the recession occurred, while Lawless *et al.* (2012, p. 22) claim that, “[...] construction had become hugely over-provided with credit”. According to figures from the Department of the Environment, Heritage and Local Government (2010, p4), “during 2009, 46.5 per cent of all job losses were in construction”, thus illustrating the austerity and the extent to which the construction industry in Ireland has suffered in light of the 2007 economic recession. In relation to employment in construction, figures peaked at 286,200 in the second quarter of 2007, with the figure contracting at an alarming rate to 96,900 in early 2013, representing a 66 per cent decline over nearly six years (CSO, 2014a). However, the first quarter on quarter increase in construction employment since the recession began occurred during 2013. With regard to construction output, the Irish construction industry experienced a dramatic fall in output for four consecutive years, from a peak in early 2007 to a low in mid-2011 (Figure 1), thus further signalling the dramatic effect of the recession on the construction sector within Ireland.

As Figure 1 illustrates, records for the latter half of 2011 and during 2012 have fluctuated. However, in line with improving employment numbers, 2013 has shown modest increases in construction output, indicating that construction is slowly beginning to recover as the economy exits recession. The Ulster Bank Construction Purchasing Managers Index has also reported raised orders and the highest optimism since the recession began (Ulster Bank, 2013).

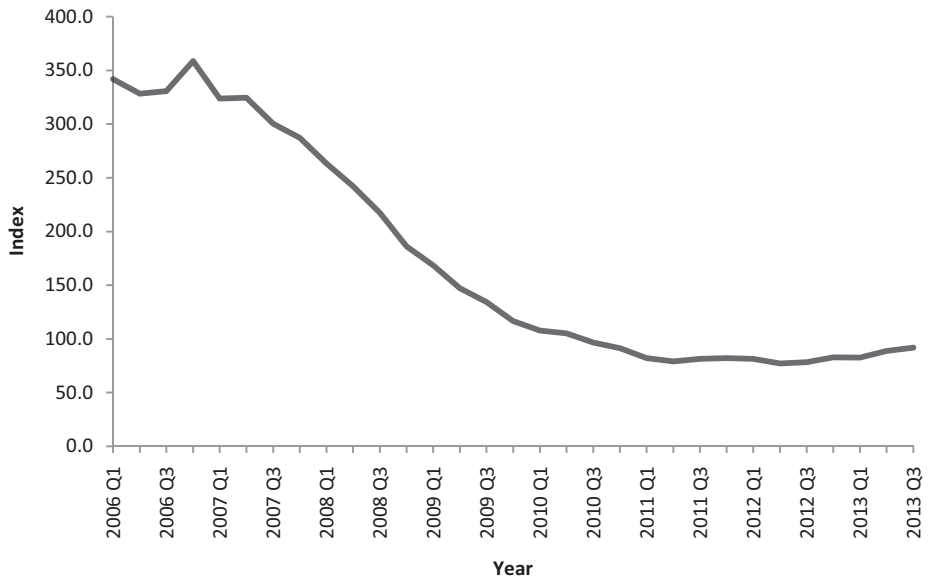


Figure 1.
Seasonally adjusted
quarterly
construction output
index

Note: Base year = 2010
Source: CSO (2014b)

However, with this declining trend came additional disputes within the construction sector (Sweet and Maxwell, 2010; Fitzgerald, 2012; Gibbs *et al.*, 2014), with Bhagatkar *et al.* (2015) highlighting that this is one of the most significant consequences of the economic downturn. Cheung and Yiu (2007) furthers this premise by outlining that dispute is a regular feature within the construction sector. Within this context, Kumaraswamy (1997) indicates that disputes can be destructive and it is this type of dispute that must be identified, managed and either avoided or mitigated against. Numerous sources are identified throughout the literature including cost/time overruns (Semple *et al.*, 1994), lack of appropriate communication (Loosemore, 1999), etc., but Cheung *et al.* (2009) provide a consolidation of the varying types of disputes with a total of 30 included. However, Chan and Suen (2005) summarise the plethora of sources of construction disputes in two overarching concepts, contractual and cultural issues leading to disputes; however, regardless of the source in question, all advocate proactive management of such sources.

Bhagatkar *et al.* (2015) reiterates this by suggesting those working within the sector to acknowledge the adverse effects the recession has while also encouraging the introduction of adequate support mechanisms to redress this increase in dispute creation. This aspect also reverberates throughout the construction sector, regardless of the geographical location. Honek *et al.* (2012) outline the effects the recent recession has had on the US construction sector, Sibanyama *et al.* (2012) focus on the Zambian Construction Industry, while Eadie *et al.* (2013) bring the topic back into context within the UK. On a positive note, Akintoye *et al.* (2014) outline that, with the emergence from recession, there have been a number of developments within the UK dispute

resolution process. They conclude that, as the world emerges from the economic recession, it encouraged the consideration and subsequent development of new approaches to dispute resolution. Subsequently, it is advantageous to take this opportunity to take a lessons-learned approach in the identification of the consequential results of this recent downturn, particularly in relation to disputes with SMEs within the Irish construction sector.

Research design

With the aim of this paper to identify and document the critical factors causing construction disputes in SMEs in Ireland during the recent economic recession, it is necessary to provide a justifiable approach in doing so. Initially, to ascertain and justify the methods used, it is essential to consider the ontological and epistemological viewpoints. In the context of ontological positioning, an objectivist approach, which is adopted as the main source of information from which this study derives, is based on a single demography in which their viewpoints and observations are documented, but cannot be concluded on with certainty. Within this premise, [Johnson and Duberley \(2000\)](#) indicate that there are a number of approaches within a management research context: positivism, neopositivism, critical theory and critical realism/pragmatism. By incorporating a critical realism approach, which includes bias-based conceptions where theories can evolve to describe it, it is then necessary to address the epistemological positioning. By taking a subjectivist approach, the researchers interpret human knowledge and perceptions, all of which are influenced by their judgement and knowledge, therefore developing the social surroundings being measured. From this premise, it is then possible to measure and validate the findings to confirm the reliability therein. From this standpoint, equal emphasis is placed on introducing both qualitative and quantitative research methods in an overarching mixed methodology. An inductive approach is adopted in this instance, as it takes observations from the field, to develop a proposed theory that can be applied in industry and academia alike.

Therefore, through adopting a critical realism approach to the research, incorporating action research to address the gap in knowledge, a mixed-method strategy is considered to ascertain and objectively identify and catalogue the various factors for consideration and subsequent discussion. Using mixed methods, both qualitative and quantitative research is adopted, to ascertain the necessary findings and distil the relevant information into a list of central critical factors of construction disputes. The qualitative research involves an insight into the effect of the economic recession on the construction sector. This provides the authors with a comprehensive overview and a thorough understanding of the topic under scrutiny ([Boote and Beile, 2005](#)).

Initially, to inform the authors of the subject in question, while also affirming the gap in knowledge, a detailed review of the published works on the subject is undertaken. This includes predominantly peer-reviewed material in the form of high-quality journal publications, international conference proceedings, books and edited book chapters. To complement these sources, government press releases are also used, particularly to gain an insight into the statistical and financial aspects of the research. The investigation is primarily undertaken using an internet-based scholarly search engine which focuses on academic literature over a traditional Web browser. Materials from various sources emerge, with those particularly relevant to the topic cited herein and referenced

accordingly. From the sources referred to and cited, a catalogue of potential factors is produced, all of which are reviewed and verified in the subsequent case studies and the associated interviews. Repetitious factors are amalgamated, while those that require further justification are reviewed during the interview process to confirm their validity and subsequent inclusion in the study. Table I documents the factors identified, in conjunction with those also highlighted from the case studies.

Based on the information gathered from the literature review, a case study approach is included, as it provides a platform on which to introduce triangulation to the research. Triangulation is considered to ascertain if two or more of the findings within the case studies correlate, while conversely assuring that the findings are accurate (Greene and McClintock, 1985). Additionally, with the introduction of a case study approach, this introduces phenomenological research, where the common meaning of several industry experts and their living experience within a particular topic is focused on.

To identify and include an appropriate number and categories of case studies, a two-stage identification process is adopted (Spillane and Oyedele, 2013). First, a minimum of 12 potential case studies are identified throughout Ireland, based on criterion selection. The criteria include:

Factor	Mean	Sampling adequacy
Main contractor defects	4.29	0.571
Sub-contractor defects	3.86	0.595
Building subsidence	4.01	0.806
Client changes to agreed scope of works	2.88	0.817
Main contractor changes to agreed scope of works	4.02	0.811
Sub-contractor changes to agreed scope of works	3.72	0.704
Claims for Extension of Time (EOT)	3.53	0.612
Delays in completion of work	3.74	0.600
Delays in payment	4.06	0.794
Directions for acceleration of project	4.16	0.851
Large contractors intent on not paying	3.42	0.765
Not receiving full payment	3.93	0.772
Lack of agreement on proceeding with extras	4.12	0.797
Excessive extras at end of construction ^a	4.16	0.800
Labour ^a	4.21	0.790
Confusion over work inspection/supervision responsibilities ^a	3.26	0.845
Pressure on developers from financial institutions	3.26	0.830
Clients/developers seeking to mitigate their losses and targeting industry professionals with Professional Indemnity Insurance	3.31	0.811
Advice from legal professionals	3.72	0.849
Construction firms trading insolvently	3.29	0.725
Site conditions	3.71	0.657
Weather	3.30	0.632
Restricted access to site	3.14	0.844
Interpretation of contracts	3.03	0.724

Table I.
List of factors with mean results and sampling adequacy

Note: ^aDenotes factors removed during the data reduction process

- the case study company must have the majority of their operations within Ireland; and
- the case study company must be classified as an SME.

The [European Commission \(2005\)](#) criteria for the classification of an SME is used in this instance. This stipulates that the number of employees directly employed must be less than 250 and the annual turnover less than or equal to €50mn per annum. Once 12 potential case studies have been identified, the second stage of incorporating random selection is undertaken. As a result of this process, three case studies are selected for final inclusion in the research and are detailed as follows.

The first case study is an examination of a civil engineering enterprise, where two members participate: the Managing Director and a Civil Engineer. The Managing Director, who is a qualified civil engineer and a chartered member of the Institution of Engineers of Ireland, has experience in various types of building disputes and has regularly practised as an expert witness in construction litigation since the early 1980s. The Managing Director also acts as an arbitrator on a number of building disputes in the southwest region of Ireland. The Civil Engineer is a graduate of University College Cork and is also currently in the process of achieving chartered member status of the Institute of Engineers Ireland. The Civil Engineer has five-years' experience in the firm, both in the design centre at the firm's offices and in the field on various sites in the southwest region.

The second case study is based on a quantity surveying consultancy, where three members participate; a practising partner of the firm, a senior associate and a junior associate. The consultancy has been in existence for over 25 years, with three branches throughout Ireland. The company at its peak had as many as 29 employees, but, as a result of the recession, has seen its employees' numbers drop to as low as eight.

The third case study incorporates a building contractor. This contracting firm has been in existence for over 20 years and started off primarily as a plant hire company. The firm is still involved in plant hire and also carries out some civil engineering works. The firm at its peak had in excess of 100 employees but, as a result of the recession, this figure dropped to a low of 40, but, at the time of the research, the contracting firm employs 70 full-time staff. Some examples of the work undertaken by the company includes hospitality, educational and business units, in addition to building restoration, ground works and concrete works. The participants interviewed are the Managing Director and the firm's Construction Manager. The Managing Director established the firm in the early 1990s with only one employee, and has extensive construction experience, leading the company through several highly successful projects. The Construction Manager joined the firm in 2002 and is positioned in an upper managerial role in the firm's current projects.

The discussion within each of the respective case studies follows a semi-structured basis, as the primary objective is to gather qualitative rich data. Prior to each of the respective interviews within each case study, the participants are informed of the context of the research, the general topics that will be discussed and the manner in which the discussions will be undertaken. Clarity is provided on the interview protocol, to stress that each individual has the right to decline, without penalty. An interview information and protocol sheet is also prepared to inform the interviewees of the content, while also providing contact details of the researchers, should the interviewees have any

questions or concerns that they wish to voice. The interviewers also provide detailed information highlighting and reassuring that the anonymity of both the case study and the participants is maintained. To measure the actuality of the research in question, while also providing focus on the topic under investigation, the authors reiterated, both prior to, and during the discussions, that the topic debated was concerned with the time period of 2008 to 2013 only, that is, the recent economic recession.

An engineering firm, a quantity surveying consultancy and a building contractor emerge and are the basis on which to analyse and develop a catalogue of factors for further discussion. For the purpose of extracting the relevant information from each of the case studies and the associated participants, either an open- or closed-ended questioning format can be adopted. In this instance, an open-ended questioning process insures that the attention of the focus group can be controlled while it also allows for the exploration of the attitudes and beliefs of the participants (Richardson *et al.*, 1965; Smith, 1975), and hence, its inclusion in this research. The interviewees are questioned collectively using a focus group format, as this is a particularly effective approach to answering research questions. Khan *et al.* (1991, p. 145) identifies a focus group as “[...] a qualitative method, in which the moderator, with the help of predetermined guidelines, stimulates free discussion among the participants on the subject of inquiry”. Once the qualitative data are gathered, oval mind-mapping techniques are introduced to elicit the core factors from each of the respective case studies. The oval mind-mapping process incorporates translating the large word-based transcripts into a digital graphical format that can be analysed using computational algorithms, to consolidate and refine the data. This process is essential to distil large and complex transcripts onto more succinct and lucid themes on which further discussions can stem. Subsequently, the factors identified from the oval map analysis of the case studies are amalgamated from those identified in the literature and introduced into the design of a questionnaire survey for circulation to a wider demography.

A questionnaire survey is introduced to obtain the viewpoints of a large proportion of the demography to complement those within the case studies. This approach focuses on professionals working within organisations that are categorised as construction SMEs operating within Ireland. This aids in verifying the factors identified in the literature reviewed and the case studies analysed, while also obtaining the viewpoints of a wider audience, thus aiding in affirming the validity and reliability of the data over a greater demography. The questionnaire is distributed at random using a mailing list obtained from the research team, who are members of various professional bodies, including the Association for Project Management (APM), the Chartered Institute of Building (CIOB) and the Royal Institute of Chartered Surveyors (RICS). This aids in assuring the random sampling approach, thus avoiding researcher bias, which can emerge where selective sampling is undertaken. Within this context, various circulation methods are considered including paper-based mailing, direct response and digital circulation; however, due to the ease of access and high success rate, electronic circulation via email is chosen as the preferred option as a large number of responses are attainable, while the responses are gathered in a standardised method, meaning the results are more objective and comparable (Boynton and Greenhalgh, 2004). To qualify as a suitable respondent to the questionnaire survey, two criteria have to be achieved prior to completing the questionnaire. These criteria include, first, working within Ireland during the economic recession of 2008 to 2013, and second, operating within an organisation that meets the

requirements of an SME status as prescribed earlier by the [European Commission \(2005\)](#). The targeted respondents are also identified as members of the various professional bodies highlighted above in addition to the Irish Small and Medium Enterprises Association, therefore, increasing the potential that the questionnaire survey reaching the demography under investigation, that is construction SME firms within Ireland.

In designing the questionnaire, all 24 factors are included ([Table I](#)), to quantify the critical factors in the causation of construction disputes with SMEs in Ireland during the previous recession period 2008 to 2013. These factors are an amalgamation of concepts identified in the literature and the case studies. Prior to circulation, the questionnaire survey is piloted with one industry and two academic professionals, to ensure that the survey measures the actuality in which it is designed, that the order and structure of the questions is coherent, while also assessing the ease at which the survey can be completed. During the piloting exercise, the same participants are used in each iteration, due to the familiarity, experience and knowledge of the area in question. To complement the exercise, a piloting answer sheet accompanied the draft questionnaire, to record the various comments of each of the reviewers. After a number of iterations and corrections, the questionnaire is deemed to be suitable and circulated as prescribed above. To assist in increasing the response rate, a tick node design is used, where the respondents can return completed questionnaires via email or by clicking the “submit” button within the form. Also, the authors provide the opportunity for respondents to field questions on the content in discussion, while also providing the right to reject and unsubscribe from future surveys on the topic. Additionally, on a weekly basis, email reminders were also circulated to those who had yet replied. In total, four reminders were circulated, where the survey was then closed and the link to the questionnaire made dormant. Once the quantitative data are gathered, data reduction using IBM’s Statistical Package for the Social Sciences (SPSS™) is used to find trends among the inputted data and to consolidate the factors into a number of core constructs for discussion.

Analytical results

In total, 598 questionnaires were circulated electronically to the demography highlighted above using an online, Web-based form. We received 131 responses, indicating a response rate of 21.9 per cent. Of the responses, ten were discarded: eight were respondents that are not working within an SME, one was a double entry from one respondent and the final response was removed, as they had no experience of working in Ireland. All entries recorded had complete datasets, and as the form was completed electronically, it was not possible to submit with any fields remaining blank. Subsequently, this equated to a usable response rate of complete surveys of 92.4 per cent, signifying an overall response rate of usable data at 20.2 per cent. Of the respondents, just under half are architects (57 responses), 17 responses are engineers, while the remaining 47 responses include quantity surveyors, project managers as well as various specialist sub-contractors. Of the respondents, 80 work within micro organisations (1-9 employees), 24 within small (10-49 employees), with the remaining 17 working in medium-sized organisations (50-249).

In total, 24 factors are included in the questionnaire survey, all of which are included in [Table I](#), where respondents are asked to indicate the extent to which they agree that each variable is a source of dispute for SMEs in the Irish construction sector during the

recent economic recession. A sliding five-point Likert scale is introduced, where respondents are asked how often each factor occurred in their respective SME in Ireland during the recession: 1 = never; 2 = rarely; 3 = sometimes; 4 = often; and 5 = always. Table II catalogues the 24 factors and their corresponding mean scores from the questionnaire survey, all of which are then scrutinised for suitability for data reduction and subsequent quantitative analysis.

Sources of construction disputes in SME's in Ireland during recession	Component							α	
	1	2	3	4	5	6	7	0.899	ρ^+
<i>1. Payment and Extras</i>									
Not receiving full payment	0.830							0.783	0.522
Large contractors intent on not paying	0.738								
Delays in payment	0.723								
Lack of agreement on proceeding with extras	0.618								
<i>2. Physical work conditions</i>									
Site conditions	0.886							0.803	0.497
Weather	0.773								
Restricted access to site	0.708								
Interpretation of contracts	0.546								
<i>3. Poor financial/legal practice</i>									
Clients/developers seeking to mitigate their losses and targeting industry professionals with Professional Indemnity Insurance	0.729							0.744	0.558
Advice from legal professionals	0.723								
Construction firms trading insolvently	0.624								
Pressure on developers from financial institutions	0.617								
<i>4. Changes to the agreed scope of works</i>									
Sub-contractor changes to agreed scope of works	0.852							0.704	0.496
Main contractor changes to agreed scope of works	0.703								
Client changes to agreed scope of works	0.501								
<i>5. Time overrun</i>									
Delays in completion of work	0.838							0.796	0.586
Claims for extension of time (EOT)	0.772								
<i>6. Defects</i>									
Main contractor defects	0.769							0.625	0.547
Sub-contractor defects	0.674								
<i>7. Requests for increase in speed of project and long-term defects</i>									
Building subsidence	0.694							0.537	0.624
Directions for acceleration of project	0.612								

Table II.
Data reduction and resultant groupings

Note: + Correlation is significant at the 0.01 level

Murphy *et al.* (2014) outline the necessity to ascertain the suitability of the data for analysis and subsequent reliability. A two-step verification process is adopted where both the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity are introduced, to check the suitability of the data for factor analysis. Field (2009) provides detailed insight in to this verification process, where KMO results must be above the minimum threshold of 0.5, with results preferable in excess of 0.7. In this instance, on assessing the suitability of the 24 factors, a KMO of 0.75 emerges, exceeding the minimum threshold. Second, Bartlett's test of sphericity is conducted, where the test compares the correlation matrix to an identity matrix. Again, Field (2009) outlines that results must not be in excess of 0.005, where, in this instance, Bartlett's test of sphericity is recorded at ≤ 0.000 ; hence, the data are suitable for further analysis. Furthermore, it is also beneficial to ascertain the sampling adequacy of each of the individual factors, where again, results should to be in excess of 0.5. Table II confirms that all of the factors achieve this minimum requirement, ranging from 0.571 to 0.851.

Once the suitability is affirmed, the data reduction process is carried out to consolidate a large set of variables into a more concise set of constructs. This ensures that all of the factors are considered, rather than taking account of the more prominent results. The data reduction process is undertaken using principal component analysis and varimax rotation, where eigenvalues ≥ 1 are extracted. In total, the 24 factors are deduced into seven core constructs, where three variables are removed, as indicated by an asterisks (*) in Table II. The resultant components explain 68.3 per cent of the variance in critical factors, resulting in construction disputes in SMEs in Ireland during recession.

Cronbach's alpha (α) is also introduced to ensure the internal validity of the variables within each component, by confirming that the factors measure more of that group than they would if placed in another. Results should be ≥ 0.5 , but preferably, ≥ 0.7 to demonstrate high internal consistency and validity within each of the respective constructs. Table II documents Cronbach's alpha (α) for each of the groups, where each records positive internal validity ($\geq +0.5$) for their respective groupings. When assessing each of the seven constructs as a whole, a Cronbach's alpha (α) of 0.899 emerges, which also indicates significant high internal reliability between the unobserved variable (critical factors causing construction disputes) and the respective constructs, which reiterates the significance of the high level of percentage variance explained (68.3 per cent) by the dataset.

To complement the data reduction process and to gauge which of the core critical factors causing construction disputes can be accredited to awareness of potential disputes, regression analysis is also introduced. Within the questionnaire circulated, each of the respondents are also asked, again based on a sliding five-point Likert scale; awareness of the primary critical factors resulting in disputes is essential for a construction SME to avoid potential disputes. The question represents the dependent variable with each of the 24 factors, the independent variables. The outcome of the regression analysis produces a statistically significant (>0.005) two-variable result: "lack of agreement on proceeding with extras" (23 per cent) and "interpretation of contracts" (5 per cent), thus constituting 28 per cent of construction disputes in SMEs in Ireland during recession alone. A Durbin Watson of 1.984 demonstrates that the residuals from the models are uncorrelated and provides a near perfect result of 2.0.

Finally, correlation analysis is introduced to measure the strength and direction of association between the respective components when measured against the critical factors which cause construction disputes in SMEs in Ireland during recession. Values range between 0 and 2, with values ± 1 . Values should be ≥ 0.5 , with values closer to 1 signifying high correlation. Results ranging from 0 to 1 indicate negative correlation, while results from 1 to 2 indicate positive correlation. Spearman correlation (ρ) is used in this instance, as the dataset is based on non-parametric data; that is, data which are constructed from the views and opinions of individuals, as is the case in this instance. All of the values present in Table II indicate that the components' correlation values are $\geq +0.5$, while also being statistically significant at the 0.01 level (+). This indicates that the results have a strong positive correlation on construction dispute resolution within SMEs in Ireland during the recent recession.

Discussion

From the data reduction and subsequent analysis, seven constructs represent 68.3 per cent of the variance in the core critical factors attributable to construction disputes emerging and are the basis for further discussion. Selected findings deduced from the case studies in conjunction with supporting literature will also be used to delineate the contents of the constructs and the findings therein.

Payment and extras

The first construct describes the relationship between four variables (not receiving full payment; large contractors intent on not paying; delays in payment; and lack of agreement on proceeding with extras). As the naming of the four-factor construct suggests, these variables relate to payment and extras as critical factors. The mean scores for these variables range from a low of 3.926 to a high of 4.157, with two variables' joint second highest of all considered. The variable "lack of agreement on proceeding with extras" is also significant in the linear regression analysis, where it accounts for 23 per cent of the total variance in the dependent variable. This analysis suggests that this variable is fundamental and significant in terms of awareness of the primary critical factors, which is essential for a construction SME to avoid potential disputes. In line with the quantitative results, the qualitative results also indicate that the first construct is a principle source of dispute in contracts to which construction SMEs are party to. Both case study one and case study three identify that a lack of agreement on proceeding with extras as a major source of dispute between contractor and client. Both case studies agree that extras need to be communicated as early as possible, approved, priced and signed off, before they are carried out. However, all case studies confirm that the problem of payment, especially from larger contractors, is a significant source of dispute within the industry during recession. To alleviate delay payments during the recession, the Construction Contracts Act 2013 was enacted; however, the Irish Government has faltered in its implementation, with the legislation still to come into force (CIF, 2014). The literature covers a wide array of critical factors that result in disputes. Research from Semple *et al.* (1994) reveal that an increase in the scope of the work acts as a primary contributing factor for dispute claims in the construction industry, while Goetz and Gibson (2009) indicate payment as a source of dispute. Further to this, an investigation by Kennedy (2006) into adjudication in the UK found that adjudication issues normally revolve around payment and valuation issues. This research adds to a recent

publication by [Shivambu and Thwala \(2014\)](#) who found that inadequate client payments are a principle reason for many delays in the delivery of public construction projects, indicating that inadequate client payments are a source of dispute.

Physical work conditions

Critical factors that result in dispute relating to physical work conditions epitomise the second construct from the data reduction process. The variables within this construct are: “site conditions”; “weather”; “restricted access to site”; and “interpretation of contracts”. While the variable “site conditions” is loaded as high as 0.886, the mean result for these four variables from the questionnaire is significantly lower. The results of the linear regression analysis reveal that, when both variables are combined, this construct explains just over 28 per cent of the variance of in the dependent variable. The results of the triangulation process reveal that none of the participants of any of the case studies spoke about physical conditions as a source of dispute in construction. Further to this, the only reference to any of the variables in the literature. [Goetz and Gibson \(2009\)](#) reveal that, in the period from 1980 to 2004, disputes over site conditions were 237.5 per cent less likely to lead to litigation than compared to disputes over modifications. [Semple et al. \(1994, p. 785\)](#) identifies an “[...] increase in scope of the work, weather, restricted access and acceleration [...]” as the most common contributing factors in claims in the Canadian construction sector. Therefore, a combination of a lack of evidence in the qualitative research and inconclusive results in the quantitative analysis indicate that, currently, physical work conditions are not a principle source of dispute in construction.

Poor financial/legal practise

The third construct consists of clients/developers seeking to mitigate their losses and target industry professionals with Professional Indemnity Insurance, advice from legal professionals, construction firms trading insolvently and pressure on developers from financial institutions. These particular critical factors all relate to either a financial or a legal basis. These variables have an overall mean of 3.506, which indicates uncertainty when respondents are asked to indicate the extent to which they agree that each variable is a current source of dispute in construction contracts to which SMEs are party to. There is limited information in the literature relating to these variables, while discussions negatively portraying the role legal professionals play in encouraging litigation are also scarce in claiming that poor financial/legal practise is a source of dispute in construction SMEs. The exception to this is in case study one, where the participants spoke about the role financial institutions currently play in pressurising developers to repay loans, forcing those to consider entering dispute with industry professionals to recoup finances owed. This example is only discussed in case study one, and so it is questionable as to whether this is a one-off incident that the engineering enterprise experienced. Based on the wider perceptions of those surveyed, it is reasonable to conclude that it is inconclusive whether poor financial/legal practise is a principle source of dispute in contracts to which Irish SMEs in recession are party to.

Changes to the agreed scope of works

Changes to the scope of works is the fourth construct emerging from the data reduction of the questionnaire. The three variables are all related to changes to the scope of works by different project stakeholders (sub-contractor changes to agreed

scope of works; main contractor changes to agreed scope of works; and client changes to agreed scope of works). Considering the literature, both [Goetz and Gibson \(2009\)](#), in conjunction with [Semple et al. \(1994\)](#), indicate that changes to the scope of works acts as a source of dispute in construction. Furthermore, as part of the qualitative research into the three case studies, changes to the agreed scope of works are discussed by participants of both case studies two and three. It emerged that main contractors may try to identify client changes to specifications in the agreed scope of works, to claim for additional payment. This pursuing of change orders is deemed a regular source of dispute, particularly in the case of larger building contractors. On reviewing the quantitative analysis, the results indicate that mean values of 4.017, 3.719 and 3.529 are all recorded. These values range from high to average in terms of the variables being considered as a source of dispute. Therefore, while the quantitative results tend to be unconvincing, the qualitative results strongly indicate that changes to the agreed scope of works are a regular source of dispute in contracts to which Irish SMEs in dispute during a recession are party to.

Time overrun

The fifth construct is a collection of two variables:

- (1) “delays in completion of work”; and
- (2) “claims for extension of time”, with a mean of 3.74 and 3.53, respectively.

Of the three case studies, this construct reverberated through. However, on reviewing the responses of the correspondents from the survey, mean results prove inconclusive. Literature on the subject of time overruns is covered in detail by several authors ([Semple et al., 1994](#); [Chan and Kumaraswamy, 1997](#); [Gardezi et al., 2014](#)), with [Aibinu and Jagboro \(2002\)](#) outlining that it is one of the more prevalent disputes to arise from projects that suffer delays in the Nigerian construction industry. Similar results are observed by [Sambasivan and Soon \(2007\)](#) in the Malaysian construction industry. More specifically, in a study of the Pakistan construction industry, [Gardezi et al. \(2014\)](#) identify the most significant causes of delay, resulting in time overrun beyond the specified completion date. Utilising a “positivist” tradition, they conclude that the client is the main instigator of delays, leading to disputes over extended time periods beyond contractually stipulated timeframes. From the array of literature, the overarching premise indicates that time overruns are a prominent feature in causes of dispute, particularly within the construction sector. Conversely, in the case of the Irish construction industry during the recent recession, the case studies have indicated that this is a particular trait on which SMEs have to consider, particularly given that some large contractors are acting in an adversarial manner by claiming extras and extension of time from changes in contract documentation. Moreover, as identified under the first construct, “payments and extras”, delayed payments to sub-contractors is depicted as a source of dispute across each of the case studies, which inadvertently causes time overruns with subcontractors intentionally missing completion dates. Even though the quantitative results prove inconclusive, the qualitative findings suggest that time overrun is a common source of dispute in construction SMEs in Ireland during periods of recession.

Defects

Sources of disputes relating to defects encapsulates the sixth construct resulting from the data reduction analysis of the questionnaire. This construct includes two variables:

- (1) “main contractor defects”; and
- (2) “sub-contractor defects” which record mean scores of 4.29 and 3.86, respectively.

The variable “main contractor defects” signifies the highest mean score of all factors considered in the quantitative analysis, indicating that this factor is one of the most common sources of dispute for SMEs in the Irish construction industry in recession. This is unsurprising given the substantial costs associated with rework and defects reported in the literature. For instance, [Love et al. \(1999\)](#) indicate that rework costs can attribute to in excess of 12.4 per cent of a total project value, while [Nielsen et al. \(2009\)](#) suggest that defects represent an economic loss of around 10 per cent of construction turnover. As part of the qualitative research, both case study one and case study two identify defects as a major source of dispute, both from a different perspective. Case study one portrays the construct in light of developers targeting industry professionals for building defects due to their professional indemnity insurance, while case study two references delayed payments to subcontractors, which causes reduced productivity, thus lowering quality and increasing defects. With regard to the literature, several studies affirm issues relating to defects emerge such as material quality, poor site management, inclement weather and poor workmanship as causes of delays on construction projects ([Kumaraswamy and Chan, 1998](#); [Majid and McCaffer, 1998](#); [Koushki and Kartam, 2004](#); [Sun and Meng, 2009](#)). However in the context of this study, little empirical research is available which highlights this construct as a source of dispute in the construction industry. Notwithstanding this, a study conducted by [Kilian and Gibson \(2005\)](#), in relation to the US Naval Facilities Engineering Command found that out of 22 primary causes of dispute, “quality” was ranked the seventh highest, across 666 construction cases litigated in the period from 1982 to 2002. Therefore, based on the qualitative and quantitative results, it is fair to conclude that defects are a regular source of dispute for construction SMEs in Ireland during recession.

Requests for increase in speed of project and long-term defects

The final two-factor construct concludes the core underlying critical factors of construction disputes in SMEs in Ireland during recession. Interestingly, this covers the aspects of “building subsidence” and “directions for acceleration of project”. Considering the relatively high mean scores of 4.01 and 4.16, respectively, there is little literature to endorse and affirm these variables. However, literature on the subject of acceleration, which is sometimes referred to as schedule compression or project time reduction, suggests that contractors may direct acceleration of a project to avoid penalties or recover from delays, while clients may order acceleration to meet business and operational opportunities ([Bakry et al., 2014](#)). Furthermore, [Semple et al. \(1994\)](#) carried out a documentation analysis on 24 construction projects in Western Canada and found that “acceleration” is one of four main causes of claims. They conclude that “acceleration” represents situations where the schedule is expedited using extra workers, overtime and/or extended work weeks. Moreover, during each of the case studies, dispute due to accelerating a project is voiced by a number of the participants, thus verifying these variables’ inclusion in the questionnaire survey. Conversely,

building subsidence is only discussed in detail in one case study and briefly highlighted in the second. Literature on the subject of disputes incorporating building subsidence is limited, but exists with regard to environmental disputes (Eom and Paek, 2009), although it is mainly depicted with regard to building defects and quality. For instance, Sassu and Falco (2014) report on legal disputes with regard to building defects in the province of Tuscany, Italy. They found that during the period from 1990 –to 2011, 24.5 per cent of all legal disputes were attributable to cracking, of which differential subsidence is part thereof, thus highlighting its significance. Therefore, the research suggests that construction management professionals should be aware of this variable but the frequency in which it occurs is limited.

Conclusion

With the Irish construction sector emerging from one of the most severe and lengthy recession periods in its history, this comes as an apt opportunity in which to assess and view lessons learned. One of the most negative aspects of the construction industry is the veracity in which disputes arise and plague the sector. This research delves into the aspect of identifying these critical factors which cause construction disputes within SMEs in Ireland, with particular emphasis on the characteristics of the recent recession. The results are scrutinised where seven core critical factors of construction disputes in SMEs in Ireland during recession emerge:

- (1) payment and extras;
- (2) physical work conditions;
- (3) poor financial/legal practise;
- (4) changes to the agreed scope of works;
- (5) time overrun;
- (6) defects; and
- (7) requests for increase in speed of project and long-term defects.

Each of the seven core critical factors occurs, to varying degrees, within each of the respective case studies. Although some of the constructs are more prominent than others, each should be given due care and consideration by construction management professionals, to successfully mitigate or eliminate such critical factors which result in construction disputes within SMEs in Ireland, particularly during recession. However, a note of caution and to affirm the validity of the findings herein. Although a large majority of the factors highlighted can and very often do occur due to other characteristics, such as poor management, lack of communication, misaligned contract terms, etc., during a period of recession, these factors may be exacerbated. The recent economic recession alone would not be a factor in isolation, but it provides a catalyst on which further critical factors emerge, as in this instance. Given this, with the marked increase in disputes during this period, it is essential for SMEs within Ireland, due to the increased adverse working environment and heightened competition, to take the opportunity to gain from the difficulties encountered during this time.

In Ireland, the industry was brought to a point of stagnation due to the impact of the recession, and a more efficient and less adversarial process can help struggling SMEs to emerge from the financial grip of this downturn. While protective legislation is certainly

helpful for SMEs, they should also be aware of the current potential critical factors, which can provide an advantageous position in the identification and mitigation measures to aid in dispute avoidance. The topic of legislation to stem the increase of disputes and the delay in enforcing the Construction Contracts Act 2013 failed to materialise within any of the case studies or those who wished to add additional comments to the questionnaire. This legislation is designed to mitigate such disputes, particularly in relation to payment; yet, the research suggests that the industry has yet to be informed of such legislation, of its questions on the effectiveness, as and when it is implemented in practise. These results can also be transferable to the UK and beyond, due to the similarity in working practises and procedures, while also taking the opportunity to identify potential lessons learned from the experiences of the Irish construction sector, which suffered the adverse effects of the economic recession to a greater extent than its neighbours. With the continued cost of mitigating disputes within the sector increasing and tender prices reduced, resulting in lower profit margins, it is for the benefit of all within the sector to embrace the findings herein, while also considering mitigation measures to counteract such factors highlighted. This will result in the industry become dispute adverse, more responsive to its clients and, ultimately, more profitable for all concerned.

The research also provides a platform for academic researchers in this field, where more important research questions have been uncovered. For instance, researchers could specifically examine payment disputes once the Construction Contracts Act 2013 is embedded within the Irish construction industry to assess its effect on mitigating the array of issues surrounding payment provisions within the sector. Second, with economies beginning to emerge from the economic recession in question, this also provides an apt opportunity to reassess legislation beyond Ireland into the UK and the provisions set out in the Housing Grants, Construction and Regeneration Act 1996. This subject has again come to the fore, with amendments to this legislation, including, among others, payment terms. To conclude, it is envisaged that both these pieces of legislation could be compared and contrasted once applied, to delve into the emergence of the industry since the recession and its fascination with dispute creation, not only in Ireland, but also further afield.

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