Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 12(1):49-57

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Cost Changes in UK Design and Build Projects

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Abstract

The UK construction industry has seen many improvements over recent years, however one of the main ongoing issues is cost. Many projects face the problem of exceeding their initial budget resulting in unanticipated additional costs. It is important to avoid the client going over budget as this can ultimately affect the feasibility of a project. This research aim to investigate the factors driving cost changes in design and build projects within the residential sector in the UK construction industry. The gap in knowledge this study intends to contribute, is to investigate and proffer solutions to the causes of variance between contract sum and final account in design and build procurement option in the UK residential building projects. The research began with a brief literature review on different procurement routes and the factors which drive cost changes in construction projects. The findings of the literature review were used as the basis of the positivist research approach. The research used a mixed methodological approach, consisting of a questionnaire survey and semi-structured interviews to investigate the research problem. This research identified the design and build procurement route has succeeded in improving overall cost performance of construction projects by allocating the responsibilities of certain additional costs to contractors. However, despite these improvements, cost overruns are still problematic. Regardless of the chosen procurement route, complete design information at tender stage is essential to reducing cost overruns. This research established that subcontractors' performance ultimately depends upon the quality of site management. It is recommended to minimise any additional costs to a project, firstly design information should be complete at the time of tender and secondly the construction phase of the project should be managed by suitably qualified and experienced site management team. However, this study was limited to the residential building industry in the UK, hence further studies is highly recommended in developing countries as factors that causes this differences in contract sum and final account may be prioritised differently from the analysis within this study.

Keywords: Procurement Routes, Design And Build, Cost Overrun, Delay, Variation.

INTRODUCTION

The construction industry is a large contributor to the UK economy accounting for almost 7% of the Gross Value Added (GVA). In Q2 2015, the value of construction output was £22.5 billion and £6.6 billion of this output came from the private housing sector, an increase of 12% on the previous year [1]. With global population forecast to increase by 9 million people over the next 40 years the demand for housing is set to continue with up to 2.5 million new homes required in the UK alone by 2025 [2]. Despite this contribution to the GVA, the construction industry has a reputation for failing to meet deadlines (timing), cost and quality targets [3]. Most literature [4; 5; 6; 7; 8; and 9], have found that delays and cost overruns are a common occurrence in the construction industry which results in a loss of profit for the business and economy.

Egan (10) discovered that projects are widely seen as unpredictable in terms of delivery on time, within budget and to the standards of quality expected. The main issues raised by the report were low and unreliable rate of profitability in the business, with little research and development in the industry combined with 'crisis' in training the workforce, which resulted in clients' dissatisfaction and poor project success. Although much has changed, and the recent Government strategy 'Construction 2025' was actioned with the aim to lowering costs, emissions and delivery

time whilst increasing exports [2]. Like any other business, construction companies aim to make profit, however a common problem is variance in costs between the contract sum and final account [9]. Clients' expects the delivery of quality project/s within the agreed time scale and budget from the onset [11]. Any delay experienced within the construction stage of a project is likely to lead to both time and cost overrun which can lead to project abandonment. Ultimately delays and cost overruns can affect both the viability and profitability of the project, making this subject area very significant to the construction industry.

Recent research has revealed that there are many factors which contribute to a variance between contract sum and final account that occur during the construction process, for example, poor contract management, difficulties in procuring materials and poor estimation at tender stage [12; 4; 5; and 13]. Much of the research in this area has mainly focused on the construction industry in developing countries, although the problem identified is more extreme in these countries when compared to the UK. However, there are many examples of UK construction projects that have experienced cost overruns, programme delays, and technical quality issues too. Some high-profile examples include the Wembley Stadium, the Olympic Park, the Public Gallery project in the Midlands and the Scottish Parliament project [7]. Hence, due to the construction industry's' contribution to the UK economy, similar research within the housing sector could also be beneficial.

Previous research has become repetitive, with most listing factors that contributes to cost overrun without showing the rational evolving systematic and holistic techniques. The authors raise the point that the past research focuses on singular causes of cost overrun and recommend that future research should adopt a systematic approach in identifying and modelling risk factors on construction projects. This study will use a list of factors affecting cost overruns as identified in previous literature and additionally, will take on board the recommendations made in previous studies whilst collecting and analysing the data using a systematic approach. Furthermore, the study will investigate the factors affecting variations between contract sum and final account within the UK construction industry, focusing on residential sector and on contracts let as fixed-price lump sum design and build contracts.

The Procurement Routes

Procurement in construction deals with sourcing the activities, negotiation the contract and strategic selection of the processes involved in securing goods and services for successfully delivering a construction project [14]. There are several methods of procuring construction projects that will be discussed in this section. Love et al (15) described the selection of the correct procurement method as critical to overall client satisfaction and project success.

Traditional Contracts with Bill of Quantity (BoQ): this involve the client appointing a design team, that will prepare design drawings and bill of quantities (BoQ) before asking contractors to tender and selecting a contractor to execute the work. This option uses the bills to itemise elements of contract works in both tendering for works and contract management. In the past, traditional procurement methods have worked well for the construction industry, offering design certainty, clear risk allocation and simplicity but its lack of cost saving, speed and the separation of design from construction has changed the clients' perception on its usage [16]. Many literatures have criticised the use of BoQs at tender stage as they do not have the predictive capabilities required to give an accurate final cost of a project [12]. This can be due to incomplete information in the drawings and specifications used at tender stage, leading to poor understanding of client's requirements and assumptions [17].

In recent years, the UK construction industry has moved away from traditional procurement methods to more integrated routes such as design and build contracts [7; and 18]. This in turn has seen the use of BoQs in tendering decline, however the BoQ are still seen to be useful as a post contract management tool [19].

Integrated Procurement Routes

One of the recommendations made by the Egan Report (10) was to move towards a more integrated procurement solution in the construction industry, hence the introduction of the following:

Management contracting; a partially integrated procurement route whereby the client engages a management contractor to manage the whole building process [20]. Management contracting, and construction management were commonly used procurement methods in the 1980s and 1990s, however their popularity has diminished in recent years. Under this route the client engages a design team and a separate construction manager to co-ordinate the design and construction teams rather than allocating the responsibility to one single contractor [20].

Fully integrated partnering initiatives aims to encouraging teamwork and conflict resolution at low level with less rigid contract conditions [21]. It can either be project partnering where parties collaborate to deliver a single project or strategic partnering which is based upon long-term relationships. Partnering is based upon trust, mutual understanding, a shared project objective and openness. These components can be

achieved through economic incentive contracts, continuous structured meetings and a predetermined dispute resolution method with the aim of on-going development and improvement. Successful partnering can offer increased productivity, improved quality and client satisfaction with time and cost savings in comparison to traditional approaches [22].

However, the benefits of a project partnership can be lost when the team disperses. Strategic partnering is best suited to long term partnerships to realise the benefits of a strong relationship. Partnering agreements were a popular method of procurement in the early 2000's but their popularity has also decreased, with a dramatic decrease in their use over the past ten years [23]. The Private Finance Initiative (PFI) launched in 1992 by the UK Government, is one example of an integrated, whole life cycle approach to procurement [21]. This was later criticized by the UK government for not given value for money as it gave rise to PF2 project in 2012. However, due to the drawbacks attributed to these other procurement options, the focus of this study is on design and build route as it is currently the most popular method of procurement adopted in the UK as revealed below in table 1.

Table 1 - Trends in Methods of Procurement – by value of contracts

	1987 %	1989 %	1991 %	1993 %	1995 %	1998 %	2001 %	2004 %	2007 %	2010 %
Lump Sum – Firm BQ	52.1	52.3	48.3	41.6	43.7	28.4	20.3	23.2	13.2	18.8
Lump Sum – Spec & Drawings	17.7	10.2	7.0	8.3	12.2	10.0	20.2	10.7	18.2	22.6
Lump Sum – Design & Build	12.2	10.9	14.8	35.7	30.1	41.4	42.7	43.2	32.6	39.2
Target contracts	-	-	-	-	-	-	-	11.6	7.6	17.1
Remeasurement – Approx. BQ	3.4	3.6	2.5	4.1	2.4	1.7	2.8	2.9	2.0	0.7
Prime Cost Plus Fixed Fee	5.2	1.1	0.1	0.2	0.5	0.3	0.3	<0.1	0.2	0.6
Management Contract	9.4	15.0	7.9	6.2	6.9	10.4	2.3	0.8	1.1	0.0
Construction Management	-	6.9	19.4	3.9	4.2	7.7	9.6	0.9	9.6	0.1
Partnering Agreements	-	-	-	-	-	-	1.7	6.6	15.6	0.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: RICS [23]

Design and Build Contracts (D&B)

RICS (23) has reported a continuous increase in the use of D&B contracts over the past 20 years. As can be seen in table 1, there has been a dramatic decrease in the use of traditional lump sum contracts from over half of all contracts to just 18.8%. On the other hand, the use of lump-sum design and build contracts has increased by over 25%. Larkin et al (7), suggesting this increase is due to the potential advantages in terms of time, cost and innovation offered, however it is also noted that poor management and identification of risks can jeopardise both the client and contractor. D&B contracts have been the most used for a larger value of contacts over the past twenty years, raising the question of why the industry still suffers from cost and time overruns. Although D&B projects should in theory reduce the communication barriers experienced in traditional contracting, it is still common for breakdowns of communication to occur [7].

Fixed-price lump sum contracts are now the norm however the risk of variance between contract sum and final account remains. In D&B procurement the tenderer takes on responsibility for the D&B of a project for a fixed-price lump sum. The client will issue 'Employer's Requirements' which is a brief detailing their specific needs along with all relevant information. The tenderers will then undertake the design of the project to meet the employer's requirements and submit their Contractor's Proposal for a fixed-price lump sum. The contractor bears the risk even where the employer's requirements lack specificity [24]. The increase in popularity of integrated procurement routes may have reduced the use of BoQs, hence reducing the risk of variance between contract sum and final account relating to the use of BoQs during tender. However, with no dramatic fall in the industry's problem, cost overruns and delay, this suggests there are other factors which may lead to a discrepancy between contract sum and final account.

Cost Overruns

Clients want price certainty in a project that is delivered on time to quality specification. The contract sum is based upon the initial budget estimate and clients do not expect this to be exceeded [11]. However, change is inevitable in construction, therefore contingency sums are often included to allow for any unforeseen events, avoiding any costs exceeding the budget. Yakubu and Ming Sun (9) survey, showed that more than half experienced cost overruns of over 10% of the contract value. Many researchers have found that cost overruns are not uncommon, and this could be due to the factors that characterise the construction industry [7].

Factors Causing Cost Overrun for UK Construction Projects

There are various risk factors during the construction phase of a project that can lead to a variance between the contract sum and final account figures. Construction projects across the world share similar characteristics, however different economic, political and environmental factors are likely to affect project cost and unanticipated variances causing contract sum

to exceed budget and hence needing reconciliation with final account.

In Jackson (6) study, a survey was carried out where it was identified that the main reasons for cost overruns in the UK construction industry are illustrated in table 2. The findings demonstrations that the main cause of cost overrun is design change with most of these changes being client driven. Another cause is design development originating from incomplete or inadequate design at tender stage resulting in design changes later in the construction process. The lack of early design information relates to the next three causes of cost overrun: information availability; design brief and estimating method. Without key information such as design and existing site conditions available at tender stage the initial cost estimates are likely to be inaccurate.

The findings also highlighted the importance of "suitably qualified, experienced design and construction teams" to the success of a project in terms of organisation, management and communication [6].

Further causes of cost overrun include unrealistic time constraints, site conditions, organisation, claims, commercial pressures, people, procurement route and external factors.

Olawale (25) reveal the top five project control inhibiting factors as (design changes; risk and uncertainty; inaccurate estimate of project duration; non-performance of subcontractors and complexity of works). However, Henjewele et al. (26) study, argued that the main factors affecting the development phase of a project were found to be design change and conditions imposed by the higher authorities for the approval of the projects. Other factors at this stage included movement in construction costs, changes in departmental policies, changes in PFI guidelines and changes in clients' requirements. During the operation phase of a project they found that request for additional works, policy change and change in FM services were the main factors leading to variations.

The main risk factors in cost overruns as found in the UK based research have been confined into 10 main risk factor categories as illustrated in table 3. The UK based research has identified design and client driven change alongside inflation and market conditions as the main causes of cost overruns.

Table 2 - Perceived reasons causing cost overrun in UK building projects

Rank	Reason	Number of responses	Examples (percentage of responses in category)
1	Design change	52	client driven (76%); design variations (24%)
2	Design development	36	incomplete design at tender (38%); too much generally (33%); initial design inadequate or lacks detail (28%)
3	Information availability	32	general lack of information (44%); lack of information at tender stage (38%); lack of information at briefing (19%)
4	Design brief	31	lack of detail and definition, badly developed, incomplete, or incorrect (84%); client not know what they want (16%)
5	Estimating method	29	poor cost advice (31%); inadequate contingency allowance or assessment of risks (31%); base method used for calculation (21%); stubborn client attitude (17%)
6	Design team performance	26	designers attitude, input, whims, understanding of cost and value (46%); M&E estimates (25%); inadequate cost control (21%); designers awareness as to areas of cost risk and subsequent risk management (7%)
7	Project management	24	design management (21%); contract and site management (17%); control (13%); communication routes (13%); sub contractor and supplier interface and management (8%); leadership (8%); lack of value management (8%); management approach (4%); decision-making (4%)
=8	Time limits	19	unrealistic design development periods (47%); delays by employer and client driven speed (32%); no time to carry out realistic budgets or cost control (11%); unrealistic construction periods (11%)
=8	Site conditions	19	ground works (53%); unforeseen site conditions, constraints, restrictions, Murphy's Law – basically things go wrong (37%); dry rot or asbestos in refurbishment's (11%)
10	Organisation	15	general poor preparation and planning (40%); pre tender (33%); inadequate surveys and investigation of existing site conditions (27%)
11	Claims	14	aggressive or claims conscious contractors, contractors risk pressure, late information release (100%)
=12	Commercial pressures	13	fee competition (46%); tight bidding conditions (31%); confrontational approach of industry (15%); corner cutting clients (8%)
=12	People	13	inexperience, too optimistic, intuition, knowledge, qualifications, team, personal or practical skills (70%); consultants (23%), contractor (7%)
14	Procurement route	10	wrong contract used, inappropriate allocation of risk in contract document (100%)
15	External factors	8	changes in pricing conditions, indices, inflation, statutory factors, market trends (100%)

Source: Jackson [6].

Table 3: Main Factors comparison for UK Research

Main risk factor categories	Jackson (2002)	Olawale (2010)	Henjewele, Sun & Fewings (2012)
Design / Client driven change	1	1	1
Poor estimation of cost / duration	1	1	
Lack of information at tender stage	1	1	
Procurement route	1		
Poor financing / payments	1	1	
Inflation / market conditions	1	1	1
Unexpected site and weather conditions	1	1	
Government policies		1	1
Poor subcontractor performance		1	
Lack of qualifications / experience in management team	1	1	

RESEARCH METHODOLOGY

The two types of research methodology are quantitative or qualitative. These two types of research methodology can be used in the same study in a mixed methods approach [27]. A positivistic paradigm base research is best suited to a quantitative or mixed methodology whereas interpretivism would benefit more from a qualitative methodology [28].

Therefore, this research is using the mixed methods approach. This research follows a positivistic paradigm in investigating the factors which lead to variations between contract sum and final account within the UK construction industry.

The literature review identified factors which are known to cause cost overruns in construction project whilst previous research also highlighted the need to explore the connections between these factors and the deductive approach allows the research to explain causal relationships between data. This research will use a mixed methodology to collect both quantitative and qualitative data to answer the research question.

The population of the sample consisted of client, main contractor, and consultants in the UK construction industry.

Table 4 – Type of respondents' companies

Type of company	Results	Percentage of respondents
Client organisation	9	37.5%
Consultancy	1	4.2%
Main contractor	11	45.8%
Subcontractor	1	4.2%
Other	2	8.3%

The sample of interviewees have a strong wealth of experience in various construction projects. Participant A: a project director with 24 years' experience in the construction industry, worked in various sectors including commercial, retail and civil works, with main experience in residential developments. Participant B: with 20 years construction experience mainly in government projects, residential refurbishments and residential new builds and is currently a Senior Development Surveyor. Participant C: worked in residential developments for 10 years and is currently a Commercial Manager.

Findings from the Questionnaire Survey

Sources of Variation

The respondents completing the survey rank the ten risk factors in order of important or impact they have on variations during construction. Figure 2. show, 50% of the respondents selected change in the design or scope of work as having the highest impact on variations and 29% of respondents agreed that

Government policies were least likely to have an impact on variations.

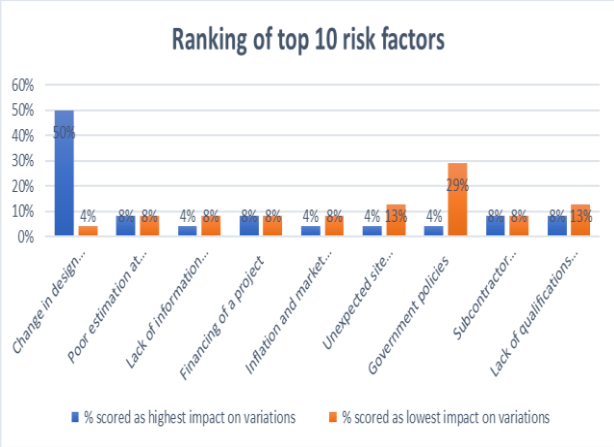

Figure 1: Most and least important factors in influencing variations

Relative Importance Index (RII) was applied to the numerical data that was collected in this part of the survey. The 9-point numbering system, with 1 being the highest cause of variation and 9 being the lowest, was converted to an RII using the following formula as adopted by Olawale (25):

Relative importance index (RII) = $\sum w \div (H \times N)$

Where w is the total weight given to each factor ranging from 1-9, H is the highest ranking available and N is the total number of respondents who have answered the question.

Table 5 Ranking of top 10 risk factors

Risk factor leading to variations	Rank	RII
Change in design and/or scope of work	1	0.33
Subcontractor performance	2	0.49
Lack of information available at tender	3	0.50
Poor estimation at tender	4	0.52
Lack of qualifications and/or experience within the project team	5	0.56
Inflation and market fluctuations	6	0.61
Financing of a project	7	0.63
Unexpected site and/or weather conditions	8	0.64
Government policies	9	0.74

Table 5. provides the RII of the risk factors that the respondents consider have the biggest impact on variations in construction projects. The table shows that 'change in design and/or scope of work' is the factor which is most likely to have an impact on variations in construction projects with a RII of 0.33. This is followed by 'subcontractor performance' (RII of 0.49), 'lack of information available at tender' (RII of 0.50), 'Poor estimation at tender' (RII of 0.52), 'lack of qualifications and/or experience within the project team' (RII of 0.56), 'inflation and market fluctuations' (RII of 0.61), 'financing of a project' (RII of 0.63), 'unexpected site and/or weather conditions' (RII of 0.64) and 'Government policies' (RII of 0.74).

Findings from the Semi-structured Interviews

Sources, Types and Cost Implications of Variations

The following section presents the interview findings on the different sources of variation in construction projects, the type of variation for each trade and the cost implications of various types of variation.

Participant A – Project Director; had strong views that a lack of information at tender stage is a root cause of variations within a construction project, stressing that clear and defined requirements from a client at tender stage is the key to success in construction projects.

"I think that the root cause of most of delays that I have encountered have been poor information, which has led to poor understanding of the information, or lack of understanding of the information, which has led to a lack of specificity. So, a lack of specific definition in terms of what the scope would be …….

He noted his preference for traditional procurement route with a full bill of quantities over the design and build route in terms of time and quality, believed inflation and market conditions are not likely to have an impact on developers and agreed that poor subcontractor performance can be critical factor in terms of cost implications and the types of trade affected by variations. Agreed that with good selection processes and management on site this factor rarely leads to variations in construction projects.

Participant B – Senior Development Surveyor; experience of variations resulting from client and design team driven changes, were caused by a lack of or poor information at tender stage. it is likely to lead to poor estimation as the estimator does not have sufficient information to form an accurate price. Not of the opinion that poor financing or payments issue can cause variations and believe that government policies had little impact on the construction industry within the UK due to the contribution the sector makes to the economy. He reemphasis that a force majeure can result in additional costs for the main contractor, the project may not suffer but believed that the most important factor was site management.

Participant C – Commercial Manager; agreed that design and client driven changes can lead to variations but believed that this is under the client's control. In terms of poor estimation at tender stage he thinks that is likely to lead to additional costs for the subcontractor which may lead to poor subcontractor performance on

site. He also believed that Government policies are likely to lead to variations in relation to residential developers on how to deal with section 106 agreements, affordable housing policy's, and the new immigration laws, which could result in additional costs to the labour element of the construction industry whilst concluding that market inflation will have effect on contractor's profit margin.

Connections between the Main Factors Contributing to Variations

The semi structure interviews set out to assess the connections between the main factors contributing to variations. Rather than purely ranking the risk factors, it is important to understand the connections between the different factors and how they link to one another. The findings from this qualitative research found two main risk factors (lack of Information at Tender Stage and Poor Subcontractor's Performance) that were strongly linked to other factors.

Lack of information at tender stage can directly have an impact on poor estimation of cost or duration of a project at tender, the chosen procurement route at tender and design or client driven change/s during the construction period. Additionally, Poor Subcontractor Performance strongly relates to poor estimation of costs/duration at tender, poor financing/payments and lack of qualifications/experience in the management team that have an influence on this factor.

ANALYSIS AND DISCUSSION

This analysis presents the trends on different procurement types, factors causing cost overrun for UK construction projects and the methodology adopted for this study. The analysis of the findings of both the questionnaire survey and semi-structured interviews, identifying certain patterns in the sources of variations to construction projects. The main finding of this study is that design change due to lack of information at tender is a key factor contributing to variations and resulting in cost implications for construction projects. Other factors that could affect and result in variation and invariably cost over run are the choice of procurement option, design and client driven change, tender stage factors, management of construction and experience and capabilities of the project team, Inflation and market fluctuations, cost of financing, unexpected site and weather conditions and Government policies.

Mechanical and Electrical ranked as having the most variations, followed by internal finishes, dry lining, façade, groundworks, brick and blockwork and finally substructure and frame. It appears that internal trades are more likely to experience variations than external trades. Participant B said that no trade is prone to variations than the other, but the site management is the deciding factor, any trade that is poorly managed is susceptible to variations. It is possible that there are no signification patterns and trends in relation to variations by trade.

Cost Implications of Variations

The survey found that 11 out of 12 projects experienced an increase in costs. This increase ranged from 4% - 56% of the original budget value. This supports research by Yakubu and Ming Sun (9) which found that more than half of the UK construction companies studied, exceeded the original budget cost by over 10%. The project that saw a decrease from budget to final cost had a £0.5million saving which equates to 1% of the budget value. When compared to the average overspend of 21% the 1% saving is minimal. These findings from the questionnaire survey confirm that cost overruns are still a problem in the UK construction industry. A consistent finding across the interviews was that, all the top ten factors can lead to additional costs but not necessarily result in cost overruns for the project overall. It has become apparent that only certain factors result in a project cost overrun, many of the additional costs related to variations are absorbed by the contractors rather than the client. This could be due to the nature of design and build procurement where risk falls on the contractor as suggested by [24].

Connections between Factors

Ahiaga-Dagbui et al., (29) in his research argued that despite a plethora of research into the problem, cost overruns are still very much existent within the industry. As confirmed by this study, construction projects are running over budget with an average overspend of 21% the original budget value. Results of the questionnaire survey found that change in design and scope of work was the most important factor in variations. The highest causes of change in design and scope of work was client driven changes and incomplete design at tender stage. These findings are consistent with those of the semi-structured interviews. The interview findings suggest a strong correlation between lack of information at tender stage and poor estimation, chosen procurement route and design or client driven change. Figure 6. illustrates how a lack of information at tender stage influences other factors throughout the construction process and can result in additional costs to the project.

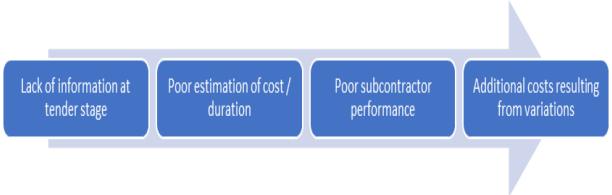

Figure 2.: Example of how lack of information at tender can lead to additional costs

The lack of key information at tender stage such as complete design and site surveys is likely to result in inaccurate cost estimating. Poor estimation of the cost and project duration can have an impact on subcontractor performance on site, such as incorrect/poor quality materials and lack of labour resource. The poor performance of a subcontractor can ultimately result in additional costs to a project due to the increase in required remedial works (17) and variation orders. This theory is supported by research carried out by Jackson (6), which found that design development which originates from lack of information at tender stage is the second main cause of cost overruns on UK construction projects.

This is just one example of how the different risk factors can interrelate. The interviews also found that many, if not all the factors leading to variations overlap with one another. The chosen procurement route can depend upon the information available at tender stage which in turn, can affect the accuracy of the estimation of costs. Poor estimation of costs can lead to poor payments later in the project and poor subcontractor performance on site, however subcontractor performance is also highly affected by the level of experience and qualifications of the site management team. If the information available at tender is incomplete this directly results in design change later in the project to fill in any missing parts. Three factors that do not seem to directly affect those mentioned previously are: inflation and market conditions; Government policy changes and unexpected site and weather conditions. It was found that these are key factors in contributing to variations however they are ranked as the lowest risk. When these factors do occur, they have the potential to increase costs massively. However, the likelihood of these factors occurring is low therefore they are not at the higher end of the scale.

CONCLUSION AND RECOMMENDATIONS

The study investigated the factors driving cost changes in UK Design and Build projects with an intention to examine cost variance between contract sum and final account in the context of the UK house building industry. Four key findings were established in the course of this study; (a) the study has confirmed that design and build is the most popular method of procurement. However traditional methods are not entirely dismissed, it remains the second most popular procurement route, (b) Lack of information at tender stage has been identified to be the most significant factor and the key source/s of variation due to the multiple connections between the various other factors contributing to variations, (c) another signification factor contributing to variations is using suitably qualified and experienced site management team as previous research has highlighted poor subcontractor performance as an important factor in cost overruns on construction projects. However, this research has established that good or bad subcontractor performance ultimately depends upon the quality of site management, and (d) finally key findings indicate change in Government policies, unexpected site and weather conditions and problems in financing a project are all factors which have the potential to result in enormous cost overruns for a project though less significant when compared to those mentioned in (a) to (c) It is suggested that this finding may be specific to the UK construction industry and residential developers, hence for this reason, they remain key factors but low risk.

It should be noted that regardless of the chosen procurement route, complete design information is essential at tender stage in reducing cost overruns for UK building projects. It is therefore recommended that the full design information is completed as early as possible in a project to minimise variations and potential cost overruns. It is also important that there is a suitably qualified and experienced site management team in place to manage the contractors during the construction phase of a project. The management team should have full access to all design information and the capability of managing the subcontractor's performance.

It is recommended that further research is carried out to investigate these factors (Government policies, unexpected site and weather conditions and problems in financing a project), in-depth in future research and their potential effect on project cost overruns.

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