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Causes of Cost Overruns due to Outsourced Labour – Subcontractor’s Perspectives

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Project cost overrun is a significant concern in construction. Statistics reveal that more than 80% of construction projects have not been completed on agreed time or budget due to numerous factors. In the context of the UK construction industry, the subcontractor led approaches are highly encouraged to absorb their expertise and knowledge into the field, which will help projects to complete on time, cost and quality. However, most of the subcontractors are highly reliant on outsourced/external labour. Literature acknowledges the conflicts between main and sub-contractor as one of significant causes for cost overruns and further explains these are mainly due to the issues of sub contractor’s labour. However there is limited research on the impacts of outsourced labour in subcontractor’s cost overruns. Therefore, this research aims to bridge this gap by identifying the causes of cost overruns due to external labour. Apart from the literature review, the data was collected from a case study of a drywall subcontractor. As part of the case study, six construction professionals of the selected subcontractor were interviewed and thematic analysis was adopted to analyse the data. The results revealed; high wastage, poor workmanship and frequent rework, low productivity, issues with buildability and dayworks as the main causes for cost overruns due to outsourced labour. Moreover, subcontractors are averse to enforce strong performance measures on the outsourced labour due to the fear of low retention.

Key Words: Subcontractor, Cost Overrun, Outsourced Labour, Drywall Construction, UK

Introduction

Construction industry has been facing huge cost and time overruns, affecting all stakeholders (Alshihri, Al-Gahtani and Almohsen, 2022). During the past 70 years, either cost escalations have not decreased or construction cost estimates have not been improved (Herrera, Sánchez, Castañeda and Porras, 2020). This phenomenon is so rooted within the industry that it becomes a matter of routine where project managers try to protect themselves with an extra budget to cover such overruns. The Project finance is the significant element of the construction business, where financial risks and uncertainties pose challenges in project cost planning, which is critical for any organisation to succeed (Odeyinka, Lowe and Kaka, 2008). The UK construction industry encourage the subcontractor led approaches in construction to absorb their expertise and specialisations in to the projects, to ensure on

time, cost and quality delivery. However, most of the subcontractors are highly reliant on outsourced/external labour and this issue has been contributed to subcontractor’s cost overruns in numerous ways. Literature explains the cost overruns of principal (main) contractor, however limited attention has been paid to explore the cost overruns of subcontractors’ especially due to outsourced/external labour. The ‘outsourced labour’ considers within this paper refers to the hiring of required labour (skilled/semi-skilled) outside a company to perform services or create goods that were traditionally performed in-house by the company's own employees and staff. They can be freelance or hired through a third party/agency. This preliminary investigation was limited to drywall construction context only as majority of the building projects in the UK involves drywalls and relatively few studies have been examined labour productivity within this trade, where this study aims to bridge the gap.

Literature Review

The structure of the UK construction supply chain consists of several tiers, where the main contractor is clustered under Tier 1, and subcontractors are from Tier 2 and beyond (Department of Business, Innovation and Skills, 2013). In specific to building construction context, there are large number of trades and 80% of those trades/activities are undertaken by the subcontractors (Hinze and Tracey, 1994). In practice, the qualified sub-contractors are hired to perform specific tasks on a project due to their specialty, able to complete work quickly and a lesser cost than the main contractor (Arditi and Chotibhongs, 2005). The construction industry is experiencing cost overruns on a regular basis (Aljohani, Ahiaga-Dagbui, and Moore, 2017). Therefore, exploring the factors that influence the cost overruns of construction is vital in seeking the potential improvements of the industry. Literature acknowledge, contract award to the lowest bidder (Park and Papadopoulou, 2012), design related issues (Herrera, Sánchez, Castañeda and Porras, 2020), conflicts between parties (Keng, Mansor and Ching, 2018), cash flows and financial issues (Memon, Rahman and Aziz, 2012), unrealistic contract duration (Memon, Rahman and Azis, 2011), inaccurate cost estimates (Ammar, Abdel-Monem and El-Dash, 2022), price escalations and wastage (Wanjari and Dobariya, 2016; Herrera, Sánchez, Castañeda and Porras, 2020) are common and frequent causes for cost overruns in construction.

Above those, the shortage of skilled labour (Mahamid, 2017), and low labour productivity (Williams and Anderson, 2016) have been identified as two of significant issues in the construction, even though the industry is promoting the digital technologies. In the current supply chain, the subcontractor tend to sub-subcontract some of their works to other subcontractors, where the subcontractor is responsible for the productivity issues of the construction (Arditi and Chotibhongs, 2005). Even though, this arrangement has formed some convenience to the subcontractors, they are experiencing number of challenges in finding the appropriate sub-subcontractors (skilled labour trades). Such shortage will lead to low productivity and work quality and, subsequently, lead to delays and disputes. Despite the significant influence of subcontracting on-site productivity, this aspect has been omitted in construction productivity related literature. Possible explanations are that subcontractors collectively fit in the contractor's conceptual category within the research framework, or the volume of subcontracted work is kept to the minimum (Hsieh, 1998).

Research Methodology

Literature review was undertaken to identify the cost overruns in construction projects in general as well as in particular to the UK construction context. The intent was to identify the causes and effects of subcontractor’s cost overruns due to outsourced labour/sub-subcontracting of skilled labour. Case

study approach was adopted to study the problem in detailed. The selected case provided a good platform to study the problem appropriately as it was heavily impacted the cost overruns and fully dependent on the outsourced labour. Relatively, the subcontractor permitted the access to required data (project information, cost information, issues etc) which was another reason to select this case study. The case was based in the North West of England and the Drywall construction package was examined, which has been assigned to a subcontractor who used to hire the labour externally. The case was reviewed in detailed with a six (6) interviews among the subcontractor’s employees to understand the nature/type of cost overruns and the causes and effects of outsourced labour.

Data Collection and Analysis

The selected case was a five-story Nursing Home project located in Liverpool City Centre, UK. Structural frame, external façade and roof, have been completed in prior to drywall construction. The contract duration of the drywall package was 26 weeks. Two (2) project managers (PM1 & PM2), two (2) quantity surveyors (QS1 & QS2), and one (1) operational director (OD) took part in the interview process as they were currently engaged on that project. In addition to those five interviewees, a project manager (PM3) working for the same sub-contractor but had no engagement within the selected case also interviewed. The interview template was developed and 1 pilot interview was undertaken to check the readability and the clarity of the questions. With that minor amendments were considered in the two questions. All interviews were recorded and transcribed appropriately and analysed thematically. In spite of the fact that some of the themes had been created prior to interviews, new themes emerged, completely overshadowing previously developed themes. More than 60 nodes were developed during the coding process, which was further winnowed down and combined in to new themes.

Results and Discussion

Cost overruns associated with the main contractor and subcontractors are typically overlooked within the recent literature. Hence this section tunneled through to the causes of sub-contractors’ cost overruns due to outsourced/externally hired labour with an appropriate case study of drywall construction. The drywall package of the selected case study was undertaken by the selected sub-contractor and it was a labour intensive package. The sub-contractor hired the labour from an agency and also for some of the tasks of the drywall package was completed by the freelance/self-employed labour. Even though there were some pre-established protocols to control the cost overruns, the package itself exceeded 20-30% of cost. This was identified through the interviews and the following causes of cost overruns were derived through the analysis of verbatim.

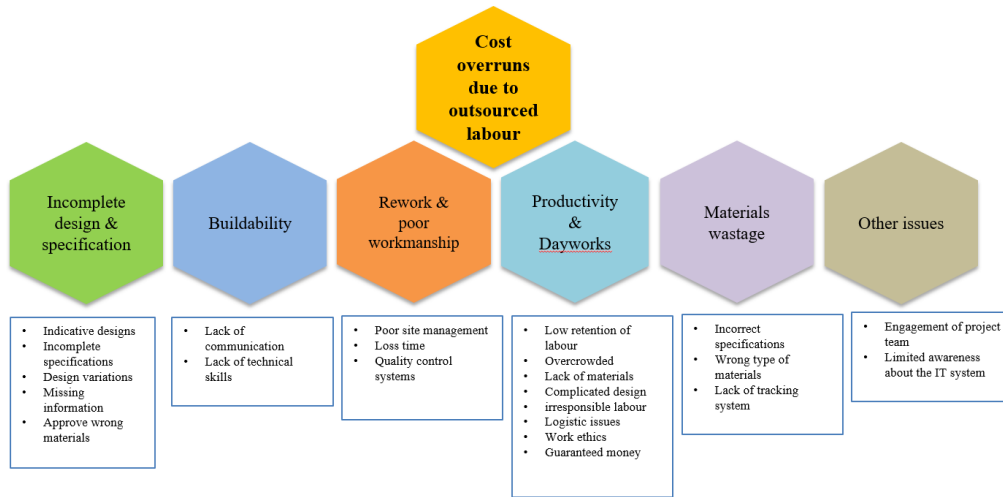


Figure 1. Causes of cost Overruns due to outsourced/externally hired labour for drywall construction

Altogether 6 themes (incomplete design and specifications; buildability, rework and workmanship; productivity and dayworks; materials wastage, and other) were identified as the main causes for subcontractors’ cost overruns due to outsourced labour. The detailed analysis identified the sub causes of the issue and listed under each main cause.

Incomplete Design and Specifications

Herrera, Sánchez, Castañeda and Porras (2020), Memon, Rahman and Aziz (2012) explained that incomplete design at the time of tender is one of common causes of cost overruns in construction projects. In the context of drywall construction the subcontractor involvement can occur at any point during the construction process, depending on when the tendering process begins. All the interviewees from the drywall subcontractor’s claimed that when a subcontractor enters in to the tendering stage, the drawings were not fully completed and it is relatively rare that the project is fully designed. One of Project managers (PM1) stated that “the drawings change all the time and you got to work with something to tender for the job” and operational director (OD) noted “normally it is more like a concept or an indicative design”. It is assumed that the experienced subcontractor will understand and visualize the job before detailed drawings and specifications are prepared. However PM2 said “we are normally aware of the size and type of building that we are going to tender but they will use that to start with”, and one of quantity surveyors (QS2) corroborates “so you would make an assumption, and qualifications list qualifying your tender basically so my price allows for this, it does not allow that, then there maybe request for information before you complete the tender in order, it’s all about qualified details if something’s missing or not there”.

In addition to design changes, the incomplete material specifications and/or approving a wrong material at the tender stage have created substantial cost overruns to drywall construction. PM2 stated “the tender stage is obviously if we go to build something that’s not quite right then we aren’t building to what we tendered for and then it’s up to the client to revalue it”. Supportively PM1 noted “it’s not identified at this instance, it’s a specific type of stuff that may be used in a specific instance at the wrong time or it’s the wrong type that’s identified, so that could happen”. Therefore it is evident

that most of the designs and specifications are at the developing stage when the drywall subcontractors are enter in to the contract which have been created a sequence of cost overruns.

Buildability/Constructability

Incorporation of buildability improves the construction project performance in terms of its cost, quality, productivity, safety, and results early completion (Wimalaratne, Kulathunga and Gajendran 2021). However if the design is limited in buildability aspects, cost overruns are highly likely. In drywall construction, the subcontractors face buildability issues more frequently. As per interviewee PM2, “well, that is a design issue so as a sub-contractor without design, that is not our reliability, our job is to drawings and to build as you are told”, buildability is a good example where it can potentially take longer to build than first anticipated. QS2 stated “if you can not do it as you are told then it is a change and there comes your delay, potentially”. Even though in such instances when buildability is not possible to achieve at first instances it does become a variation, as P3 explained “but we would probably press that to change and become a variation to the contract”. It is true that a subcontractor can recover costs in such processes. However, the decision-making process and correspondence between a principal contractor and a subcontractor take considerable time. A project manager who has to deal with poor decision-making places strain to allocate new work for skilled workers who came to work to make money and not sit and wait for it. PM1 explained, “I mean that’s what I don’t want to happen, so I try to avoid downsides. I always try to keep people busy”. Such lack of coordination between parties does result in cost overruns.

Rework and Poor Workmanship

Rework and poor workmanship also contributes to cost overruns in construction (Memon, Rahman and Azis, 2011; Shanmugapriya and Subramanian, 2013). Supportively, QS1 states, “I’m guessing we’ve probably spent half a million pounds (maybe more than that through)”, that’s the amount of the money that was spent last year on reworks in just one project. It is a major contributing factor to cost overrun. However, it is not always clear at first instance where it does originate from. Mansur, Zin and Linbo (2019) argue poor site management and supervision are another causative factors leading to construction cost overruns. During the interview process, QS2 outlines “there’s an element of design and management in there because you need a good site manager to issue drawings in a timely manner to explain details”. Throughout the literature, such poor workmanship is attributed to the shortage of skilled labour, which leads to cost overrun (Baloyi and Bekker, 2011; Memon, Rahman and Azis, 2012). Such poor workmanship happens despite the fact that quality control procedures are in place that allow for the identification of poor workmanship in the beginning. PM1 states, “certainly we use IT to help for our quality control systems,” and furthermore “we’re finding better ways of monitoring the work, documenting the work, documenting the issues, documenting the delays”. PM2 explains “you got all the quality control portals and evidence pictures, so such changes did not happen overnight and were slowly implemented”. In addition to QS1 noted “over 10 years our IT systems have changed dramatically, we have web-based and app-based software to do our quantity checks”. Literature argue that lack of appropriate software as a factor inhibiting effective project cost control (Olawale and Sun, 2010). In a probe question on how often poor workmanship happens, PM2 responded “If I was honest, probably every week because in the dry-lining world it’s classed as a semi-skilled job, not a skilled trade”. As a result of poor workmanship, there is a direct impact on the costs incurred by the subcontractor, as time and money must be spent to resolve the matter.

Productivity and Daywork

Most of the skilled workers involved with this subcontractor are self-employed or hired through a third party/agency. Certainly, it does provide some advantages as noted by QS2 “if quality still not there, replace the labour with someone different”. However, QS1 mentioned, “you have more control over your employee”, meaning self-employed today is here, but tomorrow might be gone to a different project where the pay is better, therefore leaving subcontractor without a workforce. According to PM3, productivity is measured against a program “we have a program that works, and the labour histogram, so we compare the two and measure it in time,” essentially by the amount of work done. Despite how much money skilled workers are getting paid, productivity can be affected by various reasons, such as lack of materials, poor quality of the workforce, complicated design and overcrowding due to other trades. PM2 outlines that in the current market, logistical problems with material delivery is a concern “so at the moment a lot of British gypsum and Siniat etc. are struggling to bring all materials out”.

Daywork was highlighted as another cause for low productivity. There are various reasons why daywork is authorised; something that has been overlooked or missed during a tender stage, where the principal contractor asks to supply skilled workers for some rectifications that they are liable for drywall. QS1 stated that “Probably, if I put a number on it, we would get 60% productivity on daywork instead of price”. On the other hand PM2 argued “day rate, productivity goes down mainly because the guys know that the money’s guaranteed. Therefore, it all comes down to the person and his attitude and work ethic that he is willing to bring to the site. QS2 mentioned that “you have people that stand around doing nothing as they’re on the day rates”. Low labour productivity is one of the influential factors for cost overruns (Mansur, Zin and Linbo, 2019).

Material wastage

Construction is identified as a high waste generating sector. Similarly within this case analysis QS1 stated “One of the biggest problems we have is waste”, within a span of few months from when the project was initiated, up to the date of the interview, hundred tons of just plasterboard waste been generated and PM2 contributed by stating that “we’ve had 24 skips, they weigh 4 tons each”. However, these numbers come from the skip supplier after they issue the certificate, but how much gets thrown away just by skilled workers of materials that can be used in the future is still unclear. Furthermore, there is no system to track how waste is generated on-site and by which work crew. In contrary PM3 said that we have a system in place for our pricing work, we will know how much material will be wasted so all that will be accounted for in the budgets”. As mentioned earlier, poor workmanship contributes to waste, not only material waste but also a lost time, thereby leading to cost overruns.

Other related Issues

The findings clearly explain that the project manager was not consulted during the bidding process but only offer advices when once the project has commenced. PM2 states, “because quantity surveyor knows what they need to get done but occasionally I might get a phone call about a certain material or a certain piece of plan”. Where QS2 states, “job of an estimator and a QS is quite different and in different detail, I would estimate a price change, variation, small works, I would never tender for a million-pound project”. This finding correlates with Akintoye and Fitzgerald (2000), who outlines that site management’s involvement in cost estimating is minimal. In addition, the findings of the case reveal that the subcontractor heavily invest in IT, including quality control software, web-based estimation software, as well as for tender and measurement purposes. However, at the same time, all

technical support is sourced from a third-party company. The participants did not mention any in-house software that was developed specifically for their organization. For example, to track the productivity of skilled workers on a daywork, or how much waste is generated by a specific task or a person, it would be possible to compare with other projects. Therefore, the level of the investment is inconclusive, especially when most of the labour is outsourced.

Conclusions

The UK construction industry has many inherent risks, even though the risks are well known, many companies are still engaging in the construction process and trying to minimise, share or transfer the risks to the appropriate parties. The paper identified the subcontractor’s perspectives on causes of cost overruns in construction due to outsourced labour. The findings reveal that poor tender documents issued by the subcontractor as a major cause for cost overruns, hence, they engage in a tendering process by relying on their knowledge and experience. The magnitude of the problem increase when the labour element has been added into the formula where they have ignored it at the first instance. Evidently, poor attitude and negligence of outsourced labour result in excessive material use on site. Incomplete drawings or complicated designs cause skilled workers to pack up their tools and leave the site, leaving the subcontractor with low productivity while new workers are introduced. Moreover, there is no guarantee that the new workforce will remain on-site, resulting in the subcontractor employing agency workers on a day-to-day basis. As a result the daytime productivity becomes significantly less and critical. Although some of the cost overruns have occurred due to inefficiencies of principal contractor or consultant where money could be recovered through contract mechanisms, however not all variations will result in the extension of time, therefore increasing the pressure on the subcontractor to complete the project. Construction waste occurs as a result of poor worker skills and excessive housekeeping requirements by the principal contractor when materials that may have been used are disposed. Despite such material waste, there is still a lack of appropriate software that could help minimize waste within the drywall business, and the outsourced labour does not seem to care how much waste they generate. Therefore, use of standard estimating procedures, which are found in most textbooks, are inadequate. Furthermore, the unknown nature of outsourced labour makes cost control against the specified budget unrealistic. Findings within the research suggest that the drywall industry lacks more rigid material waste control procedures, and developing suitable software would be beneficial not only for the industry but also for the environment. Developing material waste awareness training for the outsourced labour within the industry is also recommended. The study was limited to a single case study of drywall construction due to restrictions of the time and accessibility of data.

References

- Ahiaga-Dagbui, D.D and Smith, S.D (2014), Rethinking construction cost overruns: cognition, learning and estimation, *Journal of financial management of property and construction*, 19(1), 38-54.
- Akintoye, A. and Fitzgerald, E. (2000), A survey of current cost estimating practices in the UK. *Construction Management & Economics*, 18(2), 161-172.
- Aljohani, A. (2017). Construction Projects Cost Overrun: What Does the Literature Tell Us? *International journal of innovation, management and technology*, 137-143.
- Alshihri, S, Al-Gahtani, K, Almohsen, A (2022), Risk factors that lead to time and cost overruns of Building Projects in Saudi Arabia, *Buildings* 2022, 12(7), 902.

- Ammar, T; Abdel-Monem, M and El-Dash, K (2022), Risk factors causing cost overruns in road networks, *Ain Shams Engineering Journal*, 13(5).
- Arditi, D. and Chotibhongs, R (2005), Issues in subcontracting practice. *Journal of Construction Engineering and Management*, 131(8), 866-876.
- Baloyi, L. and Bekker, M. (2011) Causes of construction cost and time overruns: The 2010 FIFA World Cup stadia in South Africa. *Acta Structilia: Journal for the Physical and Development Sciences*, 18(1), 51-67.
- Behling, F. and Harvey, M (2015), The evolution of false self-employment in the British construction industry: a neo-Polanyian account of labour market formation. *Work, Employment and Society*, 29(6), 969-988.
- Department of Business, Innovation and Skills (2013), Supply Chain Analysis in to the construction industry, BIS Research Paper No 145, London, UK.
- Herrera, R.F.; Sánchez, O.; Castañeda, K and Porras, H (2020), Cost Overrun Causative Factors in Road Infrastructure Projects: A Frequency and Importance Analysis. *Applied Science*, 10, 5506. <https://doi.org/10.3390/app10165506>
- Hinze, J and Tracey, A (1994), The contractor-subcontractor relationship: the subcontractor's view. *Journal of Construction Engineering and Management*, 120 (2), 274-287.
- Hsieh, T.-Y. (1998) Impact of subcontracting on site productivity: lessons learned in Taiwan. *Journal of Construction Engineering and Management*, 12 (2), 91-100.
- Keng, T.C., Mansor, N. and Ching, Y.K (2018), An Exploration of Cost Overrun in Building Construction Projects. *Global Business & Management Research*, 10(3).
- Love, P.E and Li, H. (2000), Quantifying the causes and costs of rework in construction. *Construction Management & Economics*, 18(4), 479-490.
- Mahamid, I (2017), Analysis of common factors leading to conflicts between contractors and their subcontractors in building construction projects. *Australian Journal of Multi-Disciplinary Engineering*, 13(1), 18-28.
- Mansur, S.A., Zin, R.M. and Linbo, L (2019), Components of Cost Overrun in China Construction Projects. *IOP Conference Series: Materials Science and Engineering Conference*.
- Memon, A.H., Rahman, I.A. and Azis, A.A.A. (2011), Preliminary study on causative factors leading to construction cost overrun. *International Journal of Sustainable Construction Engineering and Technology*, 2(1).
- Memon, A.H., Rahman, I.A. and Aziz, A.A.A (2012), The cause factors of large project's cost overrun: a survey in the southern part of Peninsular Malaysia. *International Journal of Real Estate Studies*, 7(2), 1-15.
- Nisbet, P (2007), Human capital vs social capital: Employment security and self-employment in the UK construction industry. *International Journal of Social Economics*, 34(8), 525-537.

Odeyinka, H.A., Lowe, J. and Kaka, A. (2008), An evaluation of risk factors impacting construction cash flow forecast. *Journal of financial management of property and construction*, 13(1), 5-17.

Olawale, Y.A. and Sun, M. (2010) Cost and time control of construction projects: inhibiting factors and mitigating measures in practice. *Construction Management and Economics*, 28(5), 509-526.

Park, Y.I. and Papadopoulou, T.C (2012), Causes of cost overruns in transport infrastructure projects in Asia: their significance and relationship with project size. *Built Environment Project and Asset Management*, 2(2), 196-216.

Philips-Ryder, M., Zuo, J. and Jin, X.H. (2013) Evaluating document quality in construction projects–Subcontractors’ perspective. *International Journal of Construction Management*, 13 (3), 77-94.

Shanmugapriya, S. and Subramanian, K. (2013) Investigation of significant factors influencing time and cost overruns in Indian construction projects. *International Journal of Emerging Technology and Advanced Engineering*, 3(10), 734-740.

Tejale, D.S., Khandekar, S. and Patil, J (2015), Analysis of construction project cost overrun by statistical method. *International Journal*, 3(5), 349-355.

Wanjari, S.P. and Dobariya, G (2016), Identifying factors causing cost overrun of the construction projects in India. *Sādhanā*, 41(6), 679-693.

Williams, G.H. and Anderson, T.R (2016) Impacts to productivity in metal stud framing, and the hanging and finishing of gypsum drywall. 2016 Portland International Conference on Management of Engineering and Technology (PICMET) Conference.

Wimalaratne, P.L.I., Kulathunga, U. and Gajendran, T (2021) Comparison between the terms constructability and buildability: A systematic literature review. In: Sandanayake, Y.G., Gunatilake, S. and Waidyasekara, K.G.A.S. (eds). *Proceedings of the 9th World Construction Symposium*, 9-10 July 2021, Sri Lanka. 196-207. DOI: <https://doi.org/10.31705/WCS.2021.17>.

Winch, G (1998) The growth of self-employment in British construction. *Construction Management & Economics*, 16(5), 531-542.