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Case Study (Subcontractors)

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1.0 Introduction

It is of the writer's opinion that in a construction project, the main goal is to deliver a high quality finished piece of work that will satisfy the client/end user. It is important that the contractor delivers the work to a high standard, so that their reputation is not diminished and so that they can be considered for future works. The contractor will look to employ a subcontractor to undertake specialised works or works that demand a higher number of workforce than the contractor has available. There is an element of risk in doing this, as quality is not always guaranteed when out sourcing works.

This report is designed to demonstrate how quality of construction can be affected by using a subcontractor, how this can be overcome and how the main contractor and subcontractor can build a relationship based on trust.

The aim of this report is to provide a better understanding and a critical evaluation of the methods used to control and co-ordinate subcontractors on large construction projects. This will be supported with a reference to previous Case Studies where subcontractors have been pivotal in the delivery of a construction project. Public journals, newspaper articles and web-based documents will be used in the research and referenced in the body of text to help support points.

The report will briefly discuss how a subcontractor behaves based on the use of 'Cost-reimbursable' and 'Fixed Price' contracts and make comparisons between each contract type. The Public Contracts Regulations 2015 will not be defined, however will be considered throughout.

2.0 How can quality of construction be affected by subcontracting and how can it be avoided?

As a main contractor, the most important aspect in construction procurement is subcontractor selection, specifically, hiring subcontractors that perform well. When hiring a subcontractor, the objective should be to reduce project risk, increase the overall value to the client and attempt to develop long lasting relationships between the members of the project.

Occasionally, contractors put construction projects out to tender when specialised works are required, which is why subcontractor selection constitutes a critical decision for clients/contractors. The selection process should embrace investigation of subcontractors' potential to deliver a service of acceptable standard, on time, and within budget.

Prior to the subcontractor selection process, it is beneficial to have an understanding of how quality is defined. Arguably the most well-known way of measuring quality is 'The Iron Triangle' or the 'Triangle of objectives'. This theory was created by Dr. Martin Barnes during the 1980's as a means to show how contributing factors of Time, Cost and Quality are interrelated. According to K.N. Jha, K.C. Iyer (2007), 'The Iron Triangle' has been accepted as the most widely used criteria to measure performance success. What the writer believes this demonstrates is that if, for example, a main contractor employs a subcontractor to undertake works on their behalf and the main contractor wishes for the works to be carried out quickly, cost and quality are affected. The subcontractor may charge a higher rate for their services as they are aware that the project is governed by a tight deadline and that subcontractor selection may have its limitations as a result. Similarly, if the sub-contractor is required to undertake works quickly, the quality of the work will be affected by the cutting of corners.

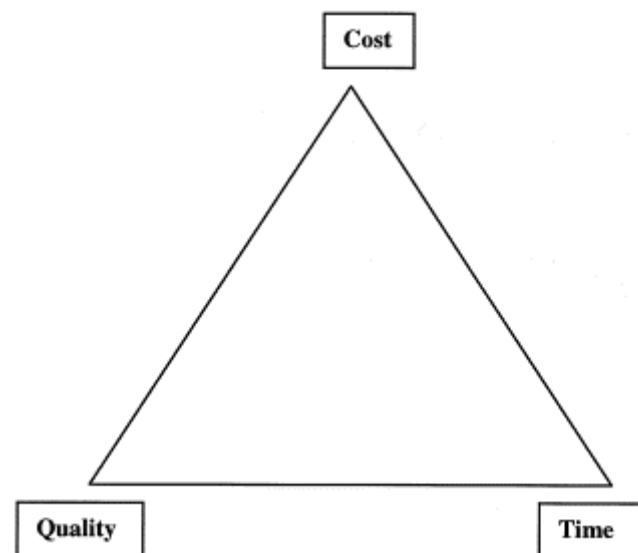


Fig 1: The Iron Triangle

K.N. Jha, K.C. Iyer (2007) evaluates success as perceived performance; client satisfaction; contractor satisfaction; project management team satisfaction; technical performance; technical innovativeness; efficiency of project execution; managerial and organisational expectations; personal growth; project termination; functionality; and manufacturability and

business performance. Therefore, if they are all harmonious at the end of a project, the project can be deemed successful.

Fisher, C.M., Elrod, C.C. and Metha, R., (2011) theorises that a successful project can be achieved every time if a particular point system is followed, the points are known as 'The Deming Points'.

The 14 Deming Points and brief explanations on how they relate to subcontracting are as follows:	
Creating constancy of purpose	The subcontractor will work towards improving their service with the aim to become competitive and be considered for future works Deming, W (2000).
Adopting the new philosophy	The implication is that management should actually adopt his philosophy, rather than merely expect the workforce to do so states DeHart (2018), therefore the subcontractor must also buy into the new philosophy for consistency throughout the project.
Ceasing reliance on mass inspections	Eliminate the need for inspection on a mass basis by building quality into the product in the first place. Deming, W (2000). That way the contractor can develop a trust in the subcontractor to deliver, and it instils a sense of encouragement in the subcontractor that the main contractor has the trust in them not to constantly supervise what they are doing.
Ending the practice of awarding business based on price tag alone	Subcontractors will feel that working with a main contractor based on previous experiences and acknowledgment of their quality, rather than because they were the lowest tender bid, will make them want to deliver high quality work as they feel appreciated.
Improving constantly the system of production or service	Constantly strive to deliver high quality and ultimately constantly bring the cost down. This will make the main contractor want to use the services of the subcontractor regularly.
Instituting training	If subcontractors are inadequately trained, they will not all work the same way as the main contractor, and this will introduce variation in workmanship Deming, W (2000).
Instituting leadership	Deming, W (2000) makes a distinction between leadership and mere supervision. "A boss has the title, a leader has the people".
Driving out fear	Management by fear is counter-productive in the long term, because it prevents subcontractors from acting in the organization's best interests. Therefore, it is better for a main contractor to introduce collaborative working rather than a "finger pointing" exercise/blame culture.
Breaking down barriers among departments	Not necessarily relative to subcontracting

Eliminating slogans and targets	Another central TQM idea is that it's not people who make most mistakes - it's the process they are working within. Harassing the workforce without improving the processes they use is counter-productive. DeHart (2018)
Eliminating numerical quotas	Deming saw production targets as encouraging the delivery of poor-quality goods.
Removing barriers to pride in workmanship	Many of the other problems outlined reduce worker satisfaction.
Instituting education and self-improvement.	Not necessarily relative to subcontracting
Taking action to accomplish the transformation.	Not necessarily relative to subcontracting

Fig 2: Deming Points DeHart (2018)

On line inspection and quality control is necessary although should always be there to improve the overall process. Product and process quality should be built in at the design and development stages through proactive quality assurance. To ensure thorough quality throughout the product, subcontractors and suppliers need to adopt the same quality practices as [the main contractor], 100% inspection of every parameter will only screen out bad parts, it will do nothing to the spread and variability. AEW (2003/04),

Deming believed well-trained employees have a natural inclination to do their best and will do so in an encouraging environment. Deming expressed his conviction in the goodness of human toil in his 14 points. The essence of the points can be condensed in three notions: employee skill, empowerment and the absence of fear. Fisher, C.M., Elrod, C.C. and Metha, R., (2011)

Skill is achieved by training and education and provides employees with pride of performance and the confidence to make decisions about their tasks. Empowerment gives them the authority to do so. Fear takes it all away.

Skill

Stimson, W.A., (2005) suggests that skill is developed through training. The more a person is trained or educated, the potential to increase the skill level is increased. Naturally, if 2 different people are trained for the same duration, one is likely to be better than the other, however this is more to do with a competitive nature. Nevertheless, a company will benefit by providing sufficient and relative training to the particular job the employee is required to do. That being said, an adequate level of skill does not guarantee high quality, however it cannot be achieved without it. The person's own pride must take over to ensure that delivery of high quality is achieved/maintained.

Empowerment

An employer should recognise what their employee is capable of delivering with regards to competency. By recognising that an employee is competent, the employer is more likely to allow the employee to get on with their work unsupervised, this give the employee a sense of worth and confidence to micro-manage their task without feeling constantly scrutinised.

Fear

Deming's eighth point, drive out fear, seems somewhat out of place-archaic and inappropriate to modern quality. In his great wisdom, Deming knew better. He understood fear is and continues to be a management tool. It is manifested in many ways, principally by exhortations to meet production targets and quotas or find another job.

In summary, the basis of a standard of ethical behaviour in business is defined in three notions: skill, empowerment and absence of fear. Deming's points two and six stress the need for training to increase skill, permitting empowerment. Points seven, nine and 12 encourage sufficient empowerment of the employees, enabling them to make decisions about their jobs. Points eight and 11 relieve fear, permitting the employees to devote their efforts and imaginations to their tasks, Stimson, W.A., (2005).

There are a variety of factors that can compromise or have a negative impact on the quality of the construction works, when employing sub-contractors to undertake particular tasks. Many contractors utilise the specialties and capabilities of subcontractors in particular trades, so that they do not have to employ high numbers of direct labour, and therefore be responsible for paying the employee a salary. Ng and Tang (2010) suggest that in order to reduce the risk of hiring excessive direct labours, many main contractors would subcontract the work to those specialist traders who have the required manpower and expertise to complete the task. It is not uncommon to see further levels of subcontracting in the construction industry whereby the middle or lower tier sub-contractors would sublet the work to a gang of workers at the bare minimal costs. This would inevitably affect the quality of work and undermine the original intention of subcontracting which is to capitalise on the skills and specialism of subcontractors to produce good quality works.

In the construction industry, it is widely appreciated that as the main contractor or principle contractor, it is their responsibility to liaise directly with the client and/or the developer, however Dossick and Schunk (2007) pointed out that miscommunications and conflicts between the main contractors, subcontractors, clients and other project participants could lead to claims and dissatisfaction. Although it is usually the main contractor's responsibility to coordinate with various parties, subcontractors should take a more proactive role in improving the relationship with other stakeholders by keeping the others informed of their construction method/sequence and programme so that any potential problems can be resolved in a cooperative manner. A good relationship with other project participants can also help improve the morale of subcontractors' staff. With extensive specialised labours on site, their spirit/morale would be a direct determinant of project success. In general, workers' performance can be enhanced if they are willing to work closely together to complete the works in the best possible way.

The risk that comes with a contractor tendering the work out to subcontractors on each project, is that the subcontractor team gets reassembled or differs each time. With that it becomes an arduous task to build a lasting relationship with the subcontractor. This could result in subcontractors not having the desired respect for the contractor or mutual end goal as the contractor. The subcontractor may, therefore, choose to cut corners in an attempt to recuperate their profits, under fierce competition, and move swiftly on to their next job with little consideration for their end product. It will be the contractor, the client and the end user that suffers as a result of this. Das and Teng (1998) write that main contractors need to have the confidence that subcontracting firms are able and willing to deliver their services according to project specifications and agreements made and do not exploit any exchange uncertainties.

With the above in mind, it is safe to derive that repeated interaction between a contractor and a specific subcontractor is beneficial to in order for them to learn about each other and

become more confident in their judgment of the other. An assumption would be that two companies that have worked together previously or with prior contact are more likely to have trust each other than two parties who never have had a relationship before. Consequently, higher levels of trust naturally develop with the recurrence of interactions as well as professional relationships.

In circumstances where the main contractor requires the services of a previously unutilised subcontractor, Ganesan, Liu et al., (1994) suggests that the main contractor would need to rely on short-term available information on the past actions of potential subcontractors that demonstrates their ability, integrity and previous performance. Besides certification and references, reputation in particular represents such source of trust.

How to avoid it:

- Meetings - Flynn, C. (2018) suggests that the parties involved should hold regular meetings to discuss issues arising. Keep information brief and to the point so that there is no confusion with what is expected of them. For see problems/identify and implement solutions.
- Record any verbal discussions and/or agreements. That way, if there are any misunderstandings further into the construction programme, the information will be readily available to go back to and review what was agreed.
- Promote rewards and incentives to increase the motivation in the subcontractor. For example, should the need arise that the works need to be completed ahead of schedule, a pay bonus arrangement could be promised, providing the quality of work is not jeopardised as a result. Flynn, C. (2018).
- Draw up detailed contracts and method statements so that the subcontractor is aware of their duties and it is documented and understood pre-construction.
- Introduce a bond or surety in place so that the obligation of surety cannot be released until the works are satisfactorily complete to contract specifications and a defects liability period has passed. The subcontractor will be liable to remediate any defects during the defects liability period.
- Provide site specific training to the relevant subcontractor to ensure they comply from a health and safety perspective and that they are competent to carry out the job. This can help to improve the team spirit/morale by ensuring that there is sufficient qualified staff to complete a highly specialised task (Munro and Wheeler, 1980). It is widely accepted and perhaps self-evident that the quality of completed works in a project is directly related to the skill level of the workers involved a labour-intensive subcontracting assignment. Flynn, C. (2018).
- A subcontractor will likely favour contractors/clients that pay them on time, therefore will be likely to want to do a job well in an attempt to secure future subcontracts. Any delay in subcontract payment will create a cash flow bottleneck to labour-intensive subcontractors knowing that the wage must be released to their labours promptly irrespectively. It is not surprising that many labour-intensive subcontractors are confronted with cash flow difficulties (Russell and Radtke, 1991), and some might even have to wind up when they are short of cash. Subcontractors should, therefore, maintain a positive cash flow and a good track record of settling liabilities.

3.0 Contract Types

Fixed-Price Contracts

The fixed-price contract is a legal agreement between the main contractor and the subcontractor, to provide goods or services to the project at an agreed price. The contract usually details the quality of the goods or services, the timing needed to support the project, and the price for delivering goods or services. There are several variations of the fixed price contract. Cox, D. (2009). For commodities and goods and services where the scope of work is very clear and not likely to change, the fixed price contract offers a predictable cost. The main contractor monitors the quality and schedule progress to assure the subcontractors will meet the project needs. The risks associated with fixed price contracts are the costs associated with project change. If a change occurs on the project that requires a change order from the subcontractor, the price of the change is typically very high. Even when the price for changes is included in the original contract, changes on a fixed-price contract will create higher total project costs than other forms of contracts because the majority of the cost risk is transferred to the subcontractor, and most subcontractors will add a contingency to the contract to cover their additional risk. Cox, D. (2009).

Cost-Reimbursable Contracts

In a cost-reimbursable contract, the main contractor agrees to pay the subcontractor for the cost of performing the service or providing the goods. Cost-reimbursable contracts are most often used when the scope of work or the costs for performing the work are not well known. The project uses a reimbursable contract to pay the subcontractor for allowable expenses related to performing the work. Cox, D. (2009). Since the cost of the project is reimbursable, the subcontractor has much less risk associated with cost increases. When the costs of the work are not well known, a cost-reimbursable contract reduces the amount of money the bidders place in the bid to account for the risk associated with potential increases in costs. The subcontractor is also less motivated to find ways to reduce the cost of the project unless there are incentives for supporting the accomplishment of project goals. Cox, D. (2009).

4.0 Case Study

Terminal 5 Heathrow

The main purpose of constructing a 5th terminal at Heathrow airport was to increase passenger capacity due to growing demand for air travel. The main focus was to deliver the project on time and in budget. The construction period was between 2002 and 2007. The pioneering use of sub-divided risk contract and just in time material delivery was pivotal in making the project a successful one and it was eventually delivered on time and to budget. British Airways offered to pay the contractors what it costs to build T5 rather than a set price. BAA developed an innovative delivery model. It created a unique contract between itself as client and its delivery partners (The T5 Agreement) which articulated a different approach to transparency and collaboration in managing risk and underpinned this with an alternative, holistic “all parties” approach to project insurance, Basu, R. (2017).

The sub-divided risk contract was affectionately called the T5 Handbook and the T5 agreement. This worked better than the traditional contract that was used during the construction of Wembley Stadium which failed to deliver on time and promoted a blame culture rather than collaborative working. Basu, R. (2017) suggests that the use of social engineering, which attempted to change the behaviours from preceding years of construction ensured that all parties from customer, contractors down to subcontractor wanted to work together to make sure the project went ahead without a hitch and more importantly that they would get paid their bonus, Vanderlande Industries (2010). From a construction perspective, off-site preassembly and testing was undertaken in consolidation areas and then steel and concrete cages were delivered to site partly manufactured, already tested and therefore ready to install on site so that mistakes would be identified offsite. Just in time logistics were implemented so that all parts/materials would be delivered to site on the day of the job due to lack of storage facilitated and due to the fact that there was only one entrance. This meant that contractors and subcontractors knew what was required of them on that particular day, Basu, R. (2017).

Summary

BAA realised there was no book on the shelf that addressed how to successfully deliver the scale of programme it contemplated in the late 90's. It took a brave decision to adopt a contract strategy that enabled suppliers to focus on delivery – the T5 Agreement and commercial policy being the enabler. It now represents a serious alternative procurement route for major programmes of work. Vanderlande Industries (2010).

5.0 Conclusion

In collusion it is correlative that when there is a balance between time, cost and quality, a subcontractor can deliver a project to satisfy the needs of the customer and build a trust with the main contractor, which will in turn give them a better chance of being considered/utilised again on future projects.

What is apparent from the research carried out, is, both price and trust are important mechanisms in the selection of subcontractors. Once the main contractor has developed a good rapport or working relationship with the subcontractor, it is that subcontractor who is most likely to secure the work either by direct allocation or winning the competitive process even if their performance has varied previously. However, the tender submission price offer must conform to the prices in the current market if it is to be accepted by the main contractor.

As a main contractor, it should be, at the very least, expected that known or unknown subcontractors should offer competitive bids in an attempt to build up main contractors' trust in their integrity and their determination to provide the performance required for the current project. As a new subcontractor, it is in their best interest to offer favourable bids. They will be more likely to be selected via the tender process if the main contractor is selecting based on cost. The experience they will gain by winning these contracts, will give them the potential to or open up the possibility to transform their reputation-based performance into an experience-based performance. This will increase their chance of being considered when a main contractor wants to select a subcontractor based on familiarity/preference in future projects.

Furthermore, main contractors are likely to be lenient on the requirement for technical knowhow and the subcontractor's ability to work in a team so long as the quality of work is sufficient. Main contractors must be confident that sub-contractors intent to deliver the specifications of a project through the delivery of products and services. Hartman, A (2010).

Hartman, A (2010) teaches that in a construction environment, quality may suffer amid heavy demands for production, and the customer is short changed, often quite legally. Equally often, the employees suffer, too, if Deming is correct in his belief employees want to do their best.

A Deming derived management code of ethics based on issues of skill, empowerment and freedom from fear that is invoked in a contract can provide great assurance to customers and management that "profit is our goal; integrity is our means." Deming, W. (2000).

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Figures

Figure 1: The Iron Triangle.

Figure 2: The Deming Points and their relevance to subcontracting.