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DISCRETE COSTING VERSUS COLLABORATIVE COSTING

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Abstract: The UK construction industry has witnessed a recent shift towards integrated and collaborative approaches. Such collaborative efforts include the use of integrated systems like BIM, lean and innovative procurement options which are now reshaping project delivery systems. However, in the UK, most efforts have focused primarily on the conventional project management system, which is coherent and contract-based and has brought the separation in the processes of costing/design and production. In fact, cost and design processes are still treated as independent and separate functions which are carried out discretely within the current project delivery system. This neglect, and the lack of a holistic and collaborative approach in costing, arguably accounts for much of the cost overrun that is still prevalent in the UK industry. Traditionally, cost management has been the chief duty of Quantity Surveyors (QSs) in the UK. Recently, Target Value Design (TVD) has emerged as a management approach under the lean philosophy that aims to deliver exactly what the customer needs in terms of value within stipulated project constraints. The technique is aimed at making the budget become an input in the design and decision making process rather than an outcome of a design. The growth of collaborative approaches such as TVD opens new opportunities for project participants to deliver more value for clients and work collaboratively. This paper reports on the literature review that aimed at developing a framework to improve the current cost management practice towards a more collaborative system against the existing discrete form of costing that inhibits collaboration.

Keywords: Discrete Costing, Collaborative Costing, Target Value Design, Cost Management, Quantity Surveying.

1. INTRODUCTION

For many years now, UK construction industry has had several reports and recommendations by industry practitioners and government, stressing on collaborative working, value addition and the use of collaborative approaches to streamline design and construction processes (Egan, 1998, 2002; Latham, 1994). Among other targets set by the industry in the (Construction 2025 report HM Government, 2013) were cost reduction in the initial cost of construction and the whole life cost of built assets. In view of that, the UK government are now advocating for more collaborative approaches where project actors and processes are fully integrated (Sunil et al, 2013).

Lean construction as a collaborative system has been proposed to the industry as an antidote to many of the challenges faced, that aimed at transforming construction model

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and delivery approach (Mossman, 2009). But, the lack of collaboration has proved to be a major challenge for the industry which has dominated the processes of design, planning and execution (Daniel et al, 2015). It worsens in the areas of cost management where cost target are still set by the client's advisors in isolation who take sole ownership of cost advice.

Although, in 2012 there were efforts to improve collaboration in terms of costing that led to the introduction of new procurement models like cost-led procurement, integrated project insurance and two stage open book (cabinet office, 2014). Yet, they are still not patronised within the industry.

The alternative view is illustrated in the target value design (TVD) approach, which is derived from target costing as a management approach that allows cost to act as an input to design where the design process itself constantly updates the cost to align with client needs and constraints (Kaushik et al, 2014). Despite that, research has indicated no evidence of its implementation in the UK construction. Moreover, clients are still dissatisfied with project performances repeatedly exceeding the agreed budget and time parameters. (HM Government 2013). These consequences were also marched in Zimina et al (2012) who confirmed that the costing process (cost planning) in the UK, is still based on market driven estimates instead of the business case, which overturns the essence of value creation and encourages the use of contingencies.

Taking inspiration from the research above, this study aims to explore the idea of collaborative costing in contrast with the traditional cost management system using TVD as an exampler. Therefore, the study will focus on the costing and design interfaces. The next sections will present the methods adopted, review the current forms of costing and propose two distinct approaches (discrete and collaborative). This will be followed with analysis on how budgets are set from the two models, and a discussion of the differences and benefits.

2. METHODOLOGY

The study reviews literature including published case studies of collaborative costing using TVD. This approach enables the current theory to be established in order to identify the ways costing processes are managed, understood and delivered. To achieve this, the study compares and contrasts the conventional cost management process in the UK, which is more discrete, and lean costing approaches using TVD as an exampler of a collaborative costing approach.

3. LITERATURE REVIEW

3.1 COLLABORATIVE COSTING WITHIN TVD

TVD was adopted from target costing which originates from the manufacturing industry in the 1930's (Feil et al, 2004). The process was used by manufacturers and customers to manage product profitability (Cooper & Slagmulder, 1997). The main logic behind the process was to allow cost and value to anchor the design process instead of calculating cost after the design is complete (Tommelein & Ballard, 2016). The term was first used by Hal Macomber, Greg Howell and Jack Barberio in 2007 after the adoption of target costing into the construction environment (Macomber, et al, 2007). But it was first spotted in the Tostrud Fieldhouse project at St Olaf College, USA by the Boldt Company in 2002.

TVD as a management approach flourish under collaborative environment where the client and project participants are all involved in a discussion to generate the values required (time, cost, features etc.) within the project constraint

According to Macomber et al (2007) TVD has five certain principles that allow collaborative approaches to flourish during project delivery. These principles are:- (a) *target costing setting* – This is where instead of estimating based on detailed design, the concept focuses more on detailed estimate; (b) *collaboration* – Instead of designing and then converging later for a group reviews and decisions, the concept emphasize on working together to define the issues and produce decisions then design to those decisions; (c) *colocation* – Instead of working in silos and separate rooms as prevailed traditionally, the method advocates for working in pairs or large groups and face to face; (d) *Set based design* – Rather than narrow choices to proceed with design, it allows several alternative solutions set far into the design process, where choosing by advantages is asserted, which allow the selection of different alternatives when multiple factors and criteria are being considered; (e) *Work Structuring* – Instead of evaluating the constructability of a design, it allows for designing what is constructible.

These succinct arrangements have created a common understanding, teamwork that allows a clear path to waste elimination in the processes of costing and design (Rubrich, 2012). These elements embedded with the method has clearly illustrate TVD as an example of collaborative costing. Therefore, it can be argued that collaborative costing (CC) is a relational system that stems from commitments and transparency, where trust is drastically improved and teams collaborate to effectively deliver projects. It is based on an open and honest interaction around cost between supply chain members working together with the production team to set the target cost and the allowable profit. This system is increasingly being used in the US construction industry aimed at achieving the maximum value while setting costs target lower than the market benchmark price (Ballard, 2012).

The TVD models as depicted in figure 1, 2 & 3 below shows a clear definition of CC approach and how it begins under a TVD setting. The process start with team assembly researching on the product and the money available as per the business case which is called allowable cost (AC). It then proceeds on to determine the market cost (MC) which is identified through a detailed collaborative benchmarking, where the selected team work extensively on the feasibility study to revealed the estimated maximum price for the project.

Based on that, the target cost is set and a common risk and profit pool is used to derive innovation through pain-gain share commercial mechanism (Ballard, 2012). At this stage, the cost and value are extended from assets level to the system level and managed concurrently by the cross-functional teams (Zimina et al, 2012). Values created within the process are totally in line with cost information provided using (over the shoulder costing approach) which is conducted in close collaboration with the team members to avoid running beyond the target cost. Hereafter, the method stresses on process and team collaboration that sees the inclusion of key supply chain member right from the outset.

This is clearly highlighted in the model figure 2 below, which illustrates the integrated team formation early on, that validates the cost target in relation to what the client is willing to build within (AC) using set base design alternative to steer the target below the (AC) and the stakeholders work within market constraints. Notably, in this model, the costing pressure is always downward working back to the design which allow excess savings to be reinvested. Designs are then created to meet the detail estimate rather than creating a detail estimate around a preliminary design. Significantly, the customer is not

the only client to the project as all information are shared early and the cross functional teams manage the costs with the inclusion of the supply chain during the product design.

Figure 1. Setting the Target Cost (Adapted from Kaushik et al, 2016).

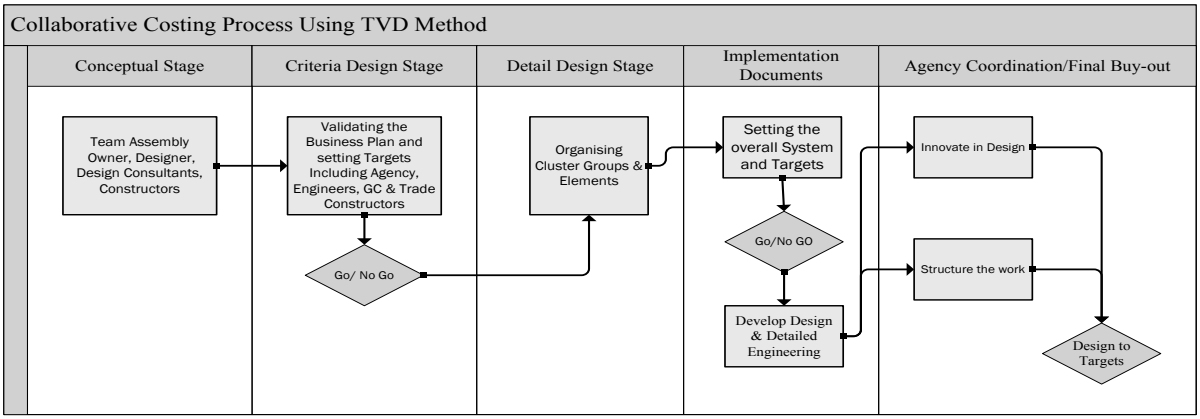

Figure 2. Collaborative Costing Model Using TVD as an Example.

Beyond its transparency and collaboration, TVD has illustrated several benefits in projects, where costs worked are contained within the market price which makes the product competitive. Other advantages are; easier to design to target, easier to link design options to business objectives, more credible financial feasibility can be calculated, wastes are reduced and innovation (value creation) is promoted, life cycle costs impacts are considered at the design stage as well and owners get what they need within their affordability while service providers earn more when they increase value or decrease cost (Ballard, 2011). Thus, TVD is a cohesive approach in its entirety, that forester collaboration by increasing the level of shared understanding and communication among stakeholders (Russell-Smith et al, 2015).

3.2 DISCRETE COSTING WITHIN THE UK COST MANAGEMENT SYSTEM

Cost management has always been a primary function of the QSs in the UK. Its evolution began from the 17th century and was established as a practice by the royal institute of chartered surveyors (RICS) in the 1864 (Seeley and Winfield, 1999; Ashworth et al, 2014). Traditionally, the QSs offers cost advice and assist with alternative design solutions as well as on cost implications of design and procurement using the techniques of elemental cost planning and cost checking (Kirkham, 2007). Other duties include post contract cost management activities such as valuation, change management and valuing variation to final account (Ashworth, 2014).

However, both seminal reports of Latham (1994) and Egan (2002) have stressed on the absence of collaboration within projects and among participants which they believed has dented the industry's image through several adversaries. Consequently, these adversaries and lack of collaboration has brought a divorce between the phases of design and production. Evidently now, project actors such as designers, consultants and the supply

chain continued to work in silos and isolation focusing more on profit ahead of the overall project benefit that eventually reduces project value (Hanid et al, 2011). This separation has continued even in the current cost planning process, where the norm has always been design-estimate-redesign, with gaps and disconnects that leads to project delays, conflicts, ambiguities and value loss (Doloi, 2011; Kashiwagi & Savicky, 2000). It is even more prominent with cost consultants acting on behalf of clients (QSs) providing cost advice almost in total isolation without any input from the supply chain making project estimates mostly unrealistic. In fact, it is a commonplace now within this process that clients exert most project risks on contractors and designers in order to have more control (Osipova & Eriksson, 2011) which has compounds more wastes to production and encourage opportunistic behaviours (Sarhan et al, 2014).

Consequently, the lack of collaboration caused by these separations has now constitute more pressure from both sides that encouraged the attitude of mining for more profit from both the client & contactors to safe guard their interests (Pasquire et al, 2015). A typical example can be seen using D&B project, where client QSs are responsible for the cost planning in the briefing stage, and at the concept stages the contractor's QSs are responsible for developing their cost plans internally and separately from the client side. This arrangement contributes to their separation and hampers their integration that often see risks transferred disproportionately where every team is trying to safe guard their team interest (Sarhan et al, 2014). Hence, this has also brought a mentality on both sides focusing more on what the product design will be that revert more pressure on the costing process.

The model for cost management process is presented in figure 3 below. It follows the RIBA plan of work 2013, and conforms with the new rules of measurement (NRM) suite of documents (RICS, 2014). It traditionally starts with business case development at the strategic level through feasibility study. The concepts of cost planning, cost checks and the Bill of quantities are introduced to exercise the development of approximate estimate that are later feed into the design formation.

After the estimation, detailed designs are produced at the concept and developed stages, which is followed with an iterative process of cost planning and cost checking that is done discretely with no involvement of any member of the supply chain. As illustrated in fig 4 below, the process leading to budget setting and the eventual production stages is still based on competitive tendering i.e. design-estimate-redesign. This is where the practice focuses more on costing the design drawings (Kirkham, 2007) through cost planning and cost checks. If the design hit snag, then the process of redesign is activated through the iterative cycle to balance the project costs.

Although, the model indicates contractor's inclusion in the costing process, but their involvement was very late and deep into the technical design. The procedure is almost run by the client's team in total isolation without any supply chain involvement, the design is passed on to the cost consultants with little or no team interaction (Zimina et al, 2012). So, the targeted cost is rolled down to the constructors to work without all parties having a clear picture and certainty of what should be delivered and at what cost.

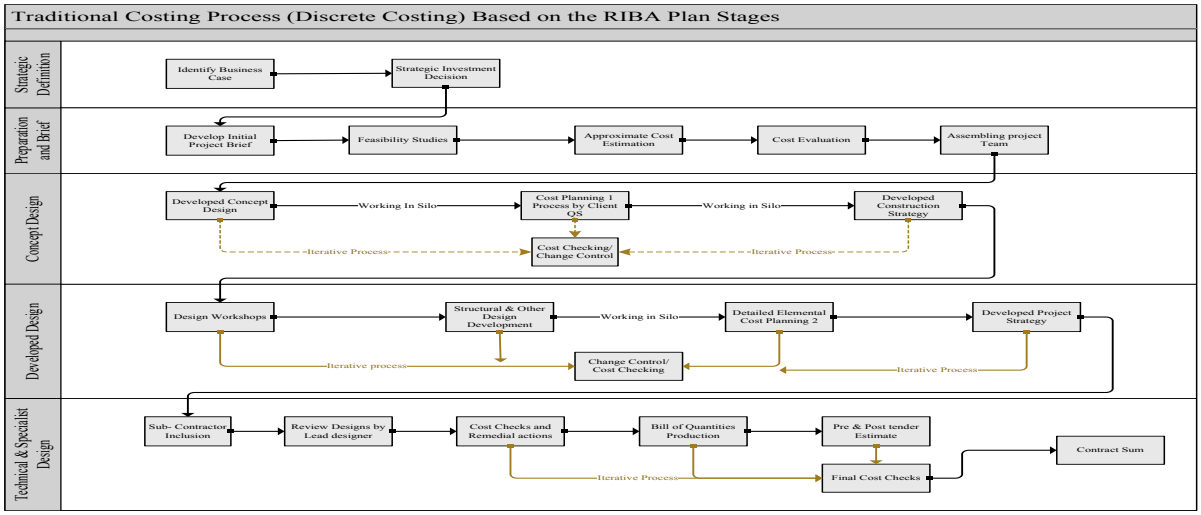

Figure 3. Cost Management Process UK Model Adapted from the RIBA Plan of work 2013.

4. DISCUSSION

It is a prerequisite and vital in the lean philosophy for project stakeholders to collaborate early especially when embarking on TVD. The logic is to be able to manage the product and design process concurrently and share the risk and rewards equally (Tommelein & Ballard, 2016). The fundamental difference between CC in relation to the common/dominant UK practice, is that collaborative costing ensures that design process is waste free using the TVD method to steer design, collaborate fully down to production as well as defined the customers' requirements and value streams to accomplished the objectives and constraints of the project. It is further attributed with stakeholders and supply chain involvement right at the outset sharing a common goal and a desired objective. This is a distinctive component that is lacking from the traditional process where the separation between stakeholders and the commercial friction that leads to eventual value loss and cost overruns. Besides, most cost estimates in traditional projects increases as the design becomes more apparent. Significantly, the lack of transparency and collaboration, heavily conceals several information that could add value to the client in the costing process.

The collaborative costing model has reveal some benefits and opportunities that can be drawn to have an impact on the UK costing model. But, because of the divorce in the commercial setup in design/costing up to production stages, it has mounted a challenge on the teams that even wants to collaborate at these stages. However, some inspirations could still be drawn from the UK perspective on collaborative costing agenda, as there are models such as Cost-led Procurement that was introduce in the UK in 2012. Although the model is currently not patronised within the industry, but it certainly has the right framework that would allow the industry to use and develop innovative solutions in the current costing model. It could further drive out waste in all parts of the process while maintaining the key targets of cost, time and quality in customer terms.

However, TVD is not the only approach that is moving towards collaborative costing. There are other approaches such as the IPD in the US that integrates people, systems, business structures and practices into a more collaborative process to optimize project results and increase value, reduce waste and maximize efficiency throughout the phases of design, fabrication and construction. Others are the Cost-led Procurement that was

introduce in the UK in 2012 as a procurement method that allows industry to use and develop innovative solutions. Nonetheless, TVD is the most matured approach to collaborative costing ahead of the Cos-led Procurement that is still in its infancy stages. The idea of collaborative costing is well integrated within the lean philosophy and processes such as lean project delivery system, building information modelling, big rooms, pull planning among others. Significantly, the TVD model has been used as a matured approach in collaborative costing that continue to strive and change cultural behaviours and identify values and waste during cost management processes.

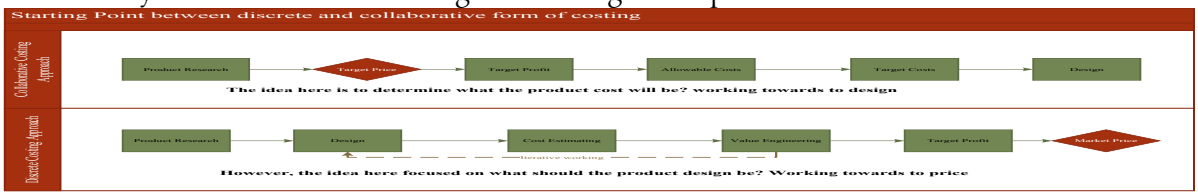

Figure. 4 Starting Point Between Discrete and Collaborative Form of Costing.

5. CONCLUSION

Managing cost is a fundamental principle in any construction activity. It ensures that the main objectives of a project (cost, quality and time) are achieved as planned while commercial processes are satisfied. However, there are differences in the way the UK costing systems delivered these services compared to the TVD approach. This paper considered mainstream cost management process within UK and TVD as an exampler of CC, and presented a process models that portray the practices within the two approaches. Although, the two models share few similarities, but there were significant difference and disconnects in the depth of services delivered from the UK model.

A major distinction is that the traditional UK costing system is discrete which reveals a separation between design/costing and production stages and therefore requires different approach of delivery in CC. The TVD approach was found based on collaboration that incorporate the use of relational contracts which promotes the collaboration of stakeholders in a project. Henceforward, this study has broadened our understanding on the intricacies of TVD as a collaborative costing approach which differs from the dominant practices in the UK. However, the limitation of the present study was based on literature review but urges future empirical studies in this area, potentially probing on the issues earlier highlighted in this paper. In stark comparison to the TVD cost model, the UK cost management practice is yet to adopt the essential ingredients that incorporate collaboration in its costing approach despite the introduction of Cos-led Procurement by the government in 2012. Indeed, TVD is a key component that allow effective collaboration and better project delivery.

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