CONTRIBUTIONS OF EXISTING PRACTICES TO PURSUING VALUE IN CONSTRUCTION PROJECTS

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ABSTRACT

This research was motivated by the identification of a practical problem with theoretical relevance. Empirical observation of a large infrastructure programme pointed out managerial difficulties to achieve the expected outcomes of that construction project. The observed problem is related to the challenge of collectively defining and pursuing a project's value proposition throughout its entire implementation. In order to better understand the nature of this problem and search for potential solutions, this research focused on evaluating the contributions of existing practices to solve the problem in hand. For that, a design science research methodology was adopted and with emphasis on the evaluative aspect of such method. Two existing practices were evaluated: the BeReal model, being developed and tested in healthcare infrastructure projects in the UK; and the Lean Project Delivery System (LPDS), being developed and tested in different construction projects in the US. While the BeReal model was specifically designed to support project teams to collectively define and pursue outcomes throughout project implementation, the LPDS brings critical elements for establishing the desired conditions that allow teams to collectively pursue value. The findings of this research indicate that it is necessary to combine the different underlying rationale of the analysed approaches to improve value generation in the construction industry: engagement of key players in a value definition and value pursuit effort; the establishment of favorable conditions for them to work together and the formulation and specification of goals, which are aligned with business strategy and reviewed and refined by key players.

KEYWORDS

Value Generation, Project Management, Value Management, Evaluation Research.

INTRODUCTION

This research was motivated by the identification of a practical problem with theoretical relevance. The problem was identified during the evaluation of a urban regeneration programme being implemented in Porto Alegre, Brazil. The programme was conceived in the late 1990s, with the major goal to improve the quality of life of families living in a

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segregated area near the city entrance. In order to achieve that, the programme was divided into five projects that should be implemented simultaneously: housing, income generation, road infrastructure, landscaping and community development.

However, empirical observation pointed out managerial difficulties that were affecting the achievement of expected outcomes, or in other words, value generation. The observed problem was identified as a knowledge gap in the literature: the complex relationship between project implementation and value generation represents a challenge for project teams using traditional management practices, as they generally focus on specification, time and cost, overlooking an entire system of elements that is necessary to generate a desired change (Zwikael and Smyrk, 2009). As a consequence, projects are frequently delivered on time and budget but do not generate the expected benefits of their implementation (Thorp, 2007).

Ward and Daniel (2006) explain that one of the reasons for that is poor understanding of the means to generate value, and little awareness of interdependent changes that are necessary for expected outcomes to be achieved. The role of individuals in contributing for value generation is also poorly considered (Thorp, 2007), as well as how the different stakeholders may influence the achievement of projects' expected outcomes (Ward and Daniel, 2006).

In construction, the difficulty to engage teams on pursuing value generation has been associated to the way our industry traditionally operates. It is hard to manage interdependent actions (e.g. design of physical spaces together with the modernisation of services that will be provided in the new building) in an industry that is traditionally organised in a fragmented and sequential manner. Traditional project delivery approaches do not provide the structure or incentives for supply chain members to collaborate with each other (Koskela et al., 2006). Maximising value at the project level is difficult when the type of contract inhibits coordination, stifles cooperation and innovation, and rewards individual contractors for both reserving good ideas, and optimising their performance at the expense of others (Matthews and Howell, 2005). If it is already a challenge to deal with the interdependency among systems within a building, let alone combine those with the required services and other changes necessary to enable the desired benefits to be achieved.

The understanding that alternative approaches are necessary to deal with the difficulties to pursue value in construction projects led to the investigation of potential solutions in practices that are currently being developed and tested in our industry. The first potential solution identified was the BeReal model, being tested in the construction of healthcare facilities in the UK. The BeReal model was specifically designed to support project teams to collectively define and pursue outcomes throughout project implementation (Sapountzis et al. 2010). The BeReal Model is based on the Benefits Realisation Approach, an alternative approach to project management initially developed in the Information Systems and Technology (IS/IT) sector. The approach was motivated by the low success of technology implementation on generating the expected business benefits to organisations (Thorp, 2007). It focuses on engaging stakeholders to understand how the construction asset will contribute for the change expected from the project implementation, plan for enabling such change to happen and tracking results throughout project implementation, reviewing the need for adjustments in the initial plan.

Another potential solution identified was a set of managerial practices combined together under the name of Lean Project Delivery System (LPDS), being implemented in

different construction projects mainly in the U.S. LPDS prescribes a set of core production management concepts and principles, in addition to computer modelling and relational forms of contracts (Ballard, 2008). The use of relational contracts provides a legal support for the collaboration among architects, general contractors, building owners and other key members of the supply chain, which enables early engagement, alignment of commercial interests, and the establishment of an integrated decision-making body (Lichtig, 2006). Also, the managerial practices suggested in LPDS support teamwork, help considering the iterative nature of design, and incentivise teams to pursue continuous improvement (Ballard, 2011).

Thus, the main objective of this research was to understand the contributions of these two selected managerial approaches to support the pursuit of value in construction projects.

This paper is structured as follows. Firstly a literature review is presented to clarify the conceptual understanding of value adopted in this research and to explain some challenges of pursuing value in construction projects. Then, the adopted research method is described. Finally, the results of three empirical cases are discussed followed by the conclusions of this research.

PURSUING VALUE IN CONSTRUCTION PROJECTS

The concept of value has been discussed for a long time. More than 2300 years ago, Plato and later Aristotle were already debating the meaning of *true value*. Hanemann (2006) explain that for Aristotle, *true value is intrinsic to the natural end the item serves*. The intrinsic value of an item arises from its inherent usefulness and ability to please man according to rules of reason. Such definition establishes a connection between value generation and the real purpose of existing things.

In construction, such definition can be understood in terms of achieving a project purpose, or meeting the real reason that motivated its implementation. Such interpretation of value generation can be found mainly on literature focusing on the evaluation of governmental programmes (e.g. Pearce, 2006). Pearce (2006) alert that along with purpose fulfilment, the impact of projects on other stakeholder groups, including the society and future generations should also be taken into consideration. This author alert for the social and economic value of projects, as well as their impact on a nation's wealth and well-being. Good design can play an important role on improving human health and increasing quality of life, whereas a construction process can bring negative impacts to society, such as carbon emissions and depreciation of human wealth due to large number of accidents.

For Winter and Szcespaneck (2010) this broader view of how projects impact their environment should lay in the core of value generation. The same authors call for the addition of a value generation dimension in project management, along with the traditional dimensions of quality, cost and time.

For more complex types of projects, such as infrastructure ones, focusing on value generation poses some challenges to project management. Understanding the route to fulfil a project's purpose is not always straightforward. Some projects intent to solve complex problems, in which the understanding of the problem being tackled and the solution for it might change along time (Simon, 1981). Rittel and Webber (1973) call these *wicked* problems, or problems for which there is no right and wrong solutions, only

good and bad ones. Thus, it is difficult to know whether the problem actually has been solved, as there is no stopping rule or ultimate test for the solution.

Simon (1981) explains that humans have a limited cognitive capacity for reasoning when searching for a solution within a problem space at a given period of time. March and Simon (1958) use the term *bounded rationality* to explain that in decision-making, rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make a decision. Thus, decisions are generally based on satisfying solutions rather than the optimum solutions. The challenge for project management is then to established and agreed understanding of project purpose and make sure that purpose and the means to achieve it are constantly questioned and refined (Simon, 1981).

Another important aspect of value generation that affects project management is the subjectivity of value perception, a discussion brought as early as 1588, by the Italian humanist Bernardo Davanzati. Bernardo stressed the subjective of human preference as the basis of true value: *men seek happiness by satisfying their wants and desires, and they value items as these contribute to this end* (Hanemann, 2006). This means that the perspectives of value may be contradictory among the different actors in a construction project coalition and between the project team and external stakeholders (Winch, 2006), which poses another challenge to project management.

For Koskela and Ballard (2006), the role of project teams in construction should be to help clients to clarify their needs and purposes and fulfill them within project constraints, e.g. time, costs. When different perspectives of value are presented, value management techniques have been used to engage stakeholders in agreeing and specifying the expectations regarding the construction project (e.g. Emmit and Christoffersen, 2009).

According to Simon (1997), a primary way in which organisations simplify decisions is to restrict the ends towards which activity is directed by specifying the goals to be achieved. An organisational framework limits individual options to a certain solution space, supporting rational behaviour towards the achievement of specified goals (Simon, 1997). According to the same author, this should be the starting point for defining an ends-means chain that makes it explicit the route from project activities to expected outcomes. Such ends-means chain needs then to be not only understood by relevant project stakeholders but constantly revised and refined if needed.

However, another pertinent discussion in the literature is weather only the establishment of a clear vision is enough to make teams pursuit such vision. Johnson (2002) argues that while some managerial models conceive management as consisting primarily of goal setting, other managerial approaches focus on structuring the environment to support purposeful action (Koskela and Howell, 2002). Thus, pursuing value should not only depend on how clearly defined the value proposition for the project is, but also if the right conditions are set in place for the team to get there.

RESEARCH METHOD

A Design Science Research method was adopted in this research. Holmstrom and Ketokivi (2009) suggest a research process with four stages: (a) framing the problem and developing the rudiments of a potential solution design; (b) implementing and evaluating the solution to confirm intended consequences; (c) demonstrating the theoretical contributions of the solution by analysing it from a theoretical perspective; and (d)

developing a formal theory which is applicable beyond the limits of the empirical context under study.

This research followed some of the stages proposed by Holmstrom and Ketokivi (2009). However, the focus of this research was not on devising new artefacts. Rather, the research focused on identifying artefacts that have already been devised and used in practice and evaluate their contributions to solve the problem in hand.

To realise this research, three empirical cases were carried out. The first case focused on the evaluation of the urban regeneration programme, where the problem was identified. Data was gathered in that case study to better understand the problem in hand. The case study lasted for 6 months. Ten interviews were realised with project team members to understand managerial difficulties. The periodic progress reports sent to the funding agencies were also analysed along with other relevant documents describing the overall goal and means to achieve it.

The second case was realised on a healthcare infrastructure programme in the UK. The objective of this case study was to understand the contributions of BeReal to improve value generation. The case study lasted for nine months and included participant observation in the development of the BeReal model, realisation of interviews with eight different team members and analysis of relevant documents describing the programme vision and how the team intended to achieve it.

The third case study was carried out in a healthcare infrastructure project in the US. The objective of this case study was to understand the contributions of the LPDS to improve value generation. The case study was carried out during nine months and data gathering techniques included mainly participant observation on 34 project meetings and the realization of interviews with 15 project team members.

RESEARCH FINDINGS

CASE 1: A URBAN REGENERATION PROGRAMME IN BRAZIL

The City Entrance Integrated Programme was a large urban regeneration programme that comprised 870 km² around the main entrance of Porto Alegre, Brazil. The Programme was an initiative of the City Council and received resources from different funding agencies throughout its implementation. Expected to be delivered in 2008, changes in the government and an economic downturn affected the programme implementation. The programme scope changed throughout the years and completion date was extended for 2010. The programme was managed by an integrated execution unit (UEP) formed by different City Council departments and used an approach for programme design and evaluation called the logical framework approach. The five projects were design-bid-build. Designed in-house and executed by different companies. The UEP was responsible for monitoring projects implementation and keeping the funding agencies informed of progress.

Key managerial aspects that <u>did not</u> support the pursuit of value

1) ***Lack of updated value proposition and means to achieve it*:** the programme was designed using a framework that brakes down programme's overall goal to intermediate results expected from projects, to project's components and to activities within those components. Key performance indicators were established to track results from activities to goal achievement. However, such framework was not update throughout project

implementation and did not reflect changes in scope and strategic decisions. Therefore it did not provide adequate support for decision-making, progress tracking or programme evaluation.

2) ***Lack of adequate means for tracking the generation of value:*** the framework created should indicate how the team plans to measure the achievement of outcomes, however difficulties were found to come up with metrics for tracking change. Defined metrics were mainly used to track physical progress (e.g. meters of roads built per month), not providing opportunities to learn and refine project end-means chain.

3) ***Interdependency among projects were poorly considered:*** each project was managed individually, i.e. by different teams, having different delivery methods – bidding processes; and monitoring systems that are set in an individual manner. The different delivery methods set a different pace for each particular project, having a significant negative impact on the capability to generate change.

4) ***Lack of support to deal with changes and need for adaptation:*** the bidding processes did not allow the project team to get the support needed from companies in case of change after they have delivered the specific scope of work they were hired to accomplish. This resulted in rework for the project team and need to hire extra workforce to support the realisation of changes and adaptations.

5) ***Lack of adequate mechanisms to support collaboration:*** although there was an integrated managerial unit, difficulties for collaboration among the different project teams were reported. Team members explained that collaboration was difficult mainly due to a highly bureaucratic process internal to the project. The teams worked in silos separated by a request and approval process that inhibited the team to solve problems in a collaborative manner.

CASE 2: A HEALTHCARE PROGRAMME IN BRIGHTON - UK

The Brighton and Sussex University Hospitals NHS Trust (BSUH) was investing £420.1m through public funding in the development of the Regional Centre for Teaching, Trauma and Tertiary Care. Program completion was expected for 2019. The programme definition began with developing the strategy for health delivery. This definition process started in 2007 and was rooted on a myriad of policies (local, regional, national) for health delivery in UK. Such definitions are carried out prior to the design phase, but that does not mean that further definitions to services could not be done during the design phase. This strategic planning phase is documented on the Strategic Outline Case (SOC). As part of developing the SOC, the Office of Government Commerce (OGC) recommends that the expected benefits from the investments should be stated. Throughout the program implementation the OGC assesses its progress and after completion, it should be provided evidence that the expected benefits were achieved.

Key aspects of BeReal supporting the pursuit of value

1) ***Method for agreeing and specifying expected benefits*:** a series of workshops with relevant stakeholders enabled them to discuss their expectations and specify a list of benefits expected from the project. In those workshops, benefits were described in detail; responsibilities for their realisation were identified, as well as means for tracking their achievement.

2) ***Support to consider public and end-user's input***: the model also provided means for considering the input of external stakeholders. Some workshops included the

participation of members of the hospital's clinical and non-clinical staff, as well as representatives of patient groups. These were combined with input gathered through public hearings, which allowed the community to express their expectations regarding the hospital campus.

3) ***Establishing means for tracking the realisation of benefits:*** the list of specified benefits was kept by a benefits realisation committee, who was responsible for updating the list in case of changes, refining ways of measuring and assigning responsibilities for gathering data. The committee compiled input from the different workshops and public hearings. Such data was used to create a baseline that would enable the team to compare changes after the programme has been delivered.

4) ***Decision making driven by specified benefits:*** the list of expected benefits was used to support the selection of building design options. The design process prescribed by OGC requires the development of various alternatives that are evaluated and gradually excluded throughout programme development. The team developed 13 design options, from which three design options were selected and then a final option was maintained. Such selection was supported by a rating system based on the list of specified benefits.

Other managerial mechanisms that were found to play an important role in supporting the team to pursue value are worth mentioning:

- Presence of a strong leader that would search for approaches and partnerships to support deploying value proposition (e.g. strategies for sustainability and flexibility, design quality assessments, 3D visualisation);
- Upfront engagement of key stakeholders in a relational type of contract and a regime for sharing risks and rewards;
- Adoption of set-based design principles;
- Emphasis on learning from similar projects;
- Organisation of project activities by multidisciplinary teams; and
- Companies selected based on their performance.

CASE 3 - A HEALTHCARE PROJECT IN SAN CARLOS - US

San Carlos project was initiated in 2006 with the first contract signed. However, the project definition process starts earlier on in a pre-project stage. The project feasibility study, which contains the first conceptual drawings, was the first document found about this project. Such study was the beginning of the negotiation with the city for approving the project in early 2003. The project passed through the suspension period and in June 2012, when this empirical case was being concluded, the project was again passing through a re-evaluation of scope. Along its implementation, changes occurred in the scope, in costs, in the expected time for delivery, in personnel and in the contract.

Key aspects of LPDS supporting the pursuit of value

1) ***Integrated governance that deploys and reviews project value proposition:*** a core group, composed by leaders from the different organisations, allow responsibility for project success to be shared among the different parties. Strategic concerns are discussed and decisions made by consensus by key players. Such group participate in meetings both

at senior management level and at the project level (e.g. design meetings), what allow them to make sure decisions in the project level are aligned with strategic intent.

2) ***Close relationship between clients and suppliers bounded through a relational contract:*** while passing through changes, the project structure enabled clients and suppliers to work collectively towards revising the project's scope and budget; making sure strategic intent was kept after the adjustments and enabling flexibility in case of changes in the business plan. Such configuration enabled by a relational contract also allowed the team to review the contract when the project restarted and make the necessary amendments based on most current understanding.

3) ***Regime for sharing risks and rewards:*** the type of contract used in this project included a regime for sharing risks and rewards that supports the environment described so far: decisions made by consensus, shared responsibility over project success and a continuous improvement mentality. Along with other aspects, such as establishing rules for collaboration through well-defined processes, such regime helps setting the adequate conditions for teams to collectively pursue value generation.

4) ***Relevant project stakeholders engaged upfront in a collaborative environment:*** engaging the project team in advance allows a multidisciplinary, co-located technical team to contribute for defining the means to achieving strategic intents. The co-location of such team in a common area was reported to be a mean to improve interpersonal relationships and willingness to collaborate. Moreover, some team members also find it very positive the effects of co-location on increasing the communication with clients and enabling better clarification of issues.

5***) Support for defining and setting the environment for collaboration***: the contract used in this project also prescribed managerial methods and principles to be adopted. It was up to the team to figure out the best way to adopt them. This created an environment in which the team had to collectively define and agree on how the activities would be performed and what would be the roles of participants. The level of freedom allowed to establish the processes had positive and negative effects: while it increased stress in the team, it increased team effort to define how certain methods and techniques would be adopted.

6) ***Project team is incentivised to pursue continuous improvement:*** continuous improvement was incentivised not only to develop better technical solutions for the project but also to define better means and improve team's performance. Technical solutions were in constant improvement through value engineering workshops and the adoption of computer modelling to anticipate construction problems. Team's performance was also evaluated by periodic surveys and review of metrics related to design progress. The benefits of measuring team's overall performance was not fully utilised, as data gathered was not fully discussed by the team.

DISCUSSION

In the first case, there was a lack of a clear means-ends chain that reflected current project strategy to deliver value. Nonetheless, the project was structured in a way that teamwork was inhibited, making it difficult to pursue value in a collaborative manner. The second and third cases brought managerial practices that offered different contributions to solve the problem in hand. Three important dimensions for pursuing value were identified: engage key stakeholders that are responsible for defining and pursuing value (people); establishing the adequate conditions for them to work together towards achieving the

project's value proposition (process- purposeful acting); and allowing the project team to review value proposition and adjust their actions accordingly (goal) (Figure 1). While BeReal model supports teams to collectively pursue value by specifying and measuring value and the means to achieve it; LPDS provides favourable conditions that play an important role in enabling teams to pursue value.

The BeReal model supported the discussion and agreement of a value proposition for the project and the establishment of a tracking system that allows learning to happen throughout project implementation. Keeping an updated value proposition for the project allowed the team to drive decision-making based on expected benefits and sets the basis for accountability. Establishing a clear value proposition for the project was a mean of directing activities towards agreed goals (Simon, 1981), and that was observed to be the main contribution of the BeReal model for teams to collectively pursue value in projects.

Conversely, LPDS supported establishing favourable conditions for the different participants to collectively pursue value. The organisational framework defined by contract helped to bridge the gap between decision making in the project level and adjustments on strategic intent. The engagement of project parties upfront in a collaborative environment supported by financial incentives also was found to provide adequate conditions for value generation. The use of prescribed managerial methods and techniques helped the team to establish rules for collaboration and focusing on continuous improving project's results.

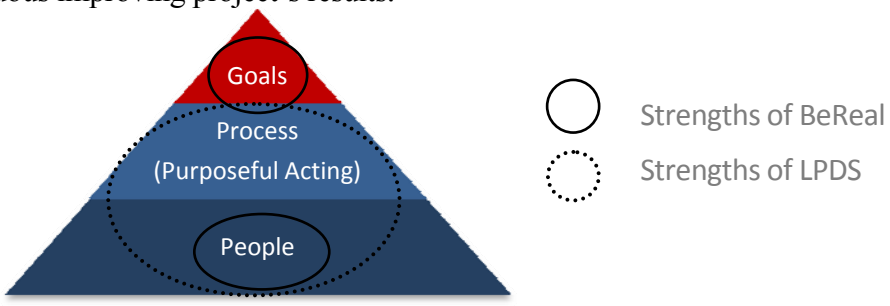

Figure 1: Contributions of analysed practices to support value generation

CONCLUSIONS

The objective of this research was to understand the contributions of two selected managerial approaches to support the pursuit of value in construction projects. While the primary focus of the construction industry is still on the delivery of physical products within quality, budget and time; this study identified important components that can help our industry moving towards broader solutions to effect desired change through project implementation. Those components relate to the engagement of key players in a value definition and value pursuit effort; the establishment of favorable conditions for them to work together and the formulation and specification of goals, which are aligned with business strategy and reviewed and refined by key players.

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