AN INVESTIGATION INTO COLLABORATIVE PRACTICES IN SOCIAL HOUSING PROJECTS AS A PRECONDITION FOR TARGET VALUE DESIGN ADOPTION

Carolina Asensio Oliva[1] and Ariovaldo Denis Granja[2]

ABSTRACT

Social housing deficit in Brazil is roughly 5.6 million homes. Furthermore, the highly fragmented product development process and the existence of budget constraints and adversarial relationships between stakeholders in this context often represents obstacles to high quality product delivery to end users. Cost cutting requirements often mean quality sufferings and material substandardization, when otherwise they should be seen as a trigger for creativity and innovation along the design process. As collaborative environments are important drivers for target value design applications, we aim to investigate the level of collaboration observed in the design process management on social housing projects of the Brazilian Government program "My House, My Life" (MHML). What common sense suggests is that conventional, non-collaborative design environments are common features of MHML projects, thus it is necessary to investigate how more collaborative approaches such as Target Value Design (TVD) need to be adapted for the use in such contexts. The research formulates the hypothesis that in MHML there is no full awareness of the application of IPD (Integrated Project Delivery) or IFoA (Integrated for of agreement) for achieving collaboration, but some of its features seem indeed to be used, though unconsciously. A case study has been carried out for providing evidences. This is an ongoing research effort that seeks to find potential application of TVD approach to MHML in Brazil.

KEYWORDS:

Target cost; target value design; design process management.

INTRODUCTION

Social housing deficit in Brazil is about 5.5 million homes (2008 data)[3]. In 2009, the Government launched a program called "My House, My Life" (MHML), which aims to encourage low-income people to buy their own houses. Private and public

1 Masters´ Degree Student, Construction Management Research Laboratory (LAGERCON). Department of Architecture and Construction, School of Civil Engineering, Architecture and Urban Design, University of Campinas, Campinas, SP, Brazil.

2 Professor, Construction Management Research Laboratory (LAGERCON), Department of Architecture and Construction, School of Civil Engineering, Architecture and Urban Design, University of Campinas, Campinas, SP, Brazil., adgranja@fec.unicamp.br.

3 Available at : http://www.fjp.mg.gov.br/index.php/indicadores-sociais/deficit-habitacional-no-brasil

companies have joined this action, representing a huge challenge for the government, builders and architectural offices.

The process of product development in MHML is highly fragmented, non-collaborative, where individual interests often hinder the interactions between all actors involved in the project. Furthermore, budget constraints in MHML often represent quality loss. Conversely, budget constraints could be used as a trigger to creativity and innovation earlier in the first design concepts, in order to better meet cost targets. The end user of these products is rarely involved along the product development process; sometimes only provides feedback to the company of the product after its use.

Thus, the Target Value Design (TVD) approach could be of high potential use in such a context, to deliver greater value to the end user without sacrificing the interests of any stakeholder. The aim of this paper is to investigate whether there is evidence of use of the concepts of TVD in the product development process of MHML. We carried out an exploratory case study in a design office in charge of developing such product for a construction firm for gathering evidences. We also sought first opportunities to adapt TVD for MHML.

In Brazil, some studies (Jacomit and Granja 2009; Guadanhim et al. 2010) have investigated the possibility of the use of traditional Target Costing (TC) in social housing provided by public companies. However, some obstacles were found, such as conventional, non-collaborative environments, a law system that fosters adversarial relationships between agents, etc. In MHML, though, it is believed that some factors may create a more favorable environment for TVD/TC application. This is an ongoing research study, so the results presented in this article are partial. In this research, TVD approach is used as the main theoretical basis.

TARGET COSTING AND TARGET VALUE DESIGN

Target Costing (TC) is a profit management and planning approach, and first appeared in early 1930´s on the manufacturing industry (Zimina et al. 2012). It has mainly been used for product development to guarantee the interests of all stakeholders and to deliver greater value for the client.

Possibilities for an adoption of TC into the construction industry have been taking place; and TVD come as an adaptation of the TC to the construction industry, a far more complex process than the manufacturing industry, with several stages, like design, project definition and construction (Zimina et al. 2012). TVD seeks for true collaboration between the teams, but collaboration itself is not enough for a full application. Another important tool is the Integrated Project Delivery (IPD), where all the actors involved on the product development process work to achieve true collaboration as one, representing a challenge for all the participants.

TC/TVD IN CONSTRUCTION

Oliva and Granja (2012) literature review analyzed similarities and differences with a more critical look, between construction products with public and private clients.Then, they pointed out initial guidelines in contexts with more collaborative environment for a TC/TVD adoption and also raised possible obstacles for implementation.

The research observed two cases in Brazil for social housing program with a public client (Granja et al, 2011). The other cases considered the St Olaf Fieldhouse´s

case (Ballard and Riser, 2004), Cathedral Hill Hospital and Fairfield Medical Office Building (Zimina et al, 2012), where the clients are private. The research considered the main principles of TC.

The evidences established some considerations about the cases analyzed:

1. Cost constraints and user´s value perception should serve as a trigger to induce creativity in the design process, as a way of seeking innovative solutions that bring more quality for the product delivered, and taking into account the interests of all stakeholders;
2. All stakeholders should participate actively and collaboratively from the early stages of the design process;
3. It would be desirable that key suppliers participate in all phases of the design process, collaboratively developing creative solutions to achieve the project's objectives;
4. It is important to establish one cardinal rule: target cost cannot be exceeded. However, in the pursuit of this objective, the quality of the final product also cannot be sacrificed. Therefore, it is necessary greater collaborative efforts, so that the attributes that do not represent value for the customer can be replaced or that creative solutions are achieved without sacrifices for any actors involved in the process;
5. Workshops with all stakeholders should be carried out to establish, clearly, the principles of the TC/TVD and the perceptions of value and quality, as product targets.
6. The research concluded that, when the client is public, there isn´t a true collaborative environment for TC adoption, and a successful application requires an intense effort to change both the traditional approach in the management of the design process and the way the process takes place, where individual interests overlap one another, and a law system that intensifies a high competition for the lower price, trading-off quality issues. When the client is private, the research shows that a more benefic environment can be achieved, so a TC/TVD adoption can be more effective. With these considerations, the present work sought a private client to investigate possible collaborative practices for a TVD approach in social housing projects.

RESEARCH METHOD

An exploratory case study was carried out with two major agents involved in the product development design process for MHML, specifically for people with salary range between U$1000,00 – U$3300,00. One of the agents is the architectural office, which develops product design for MHML. The other one is the construction company, which provides financial investments and builds the MHML products.

According to Yin (1994), a case study is used to answer questions like "why" and "how", and also when the investigator has a little/no possibility to control the events or when the general circumstances of the phenomenon to be studied are contemporary phenomenon in a real-life context. Documental analysis and semi-structured interviews provided triangulation effectiveness.

The seventeen principles to better adoption of TVD were the basis for designing the data collection instrument and to identify opportunities of TVD adoption in MHML (Ballard 2011).

- With the help of key service providers, the customer develops and evaluates the project business case and decides whether to fund a feasibility study; in part based on the gap between the project's allowable and market cost;
- The business case is based on a forecast of facility life cycle costs and benefits, preferably derived from an operations model; and includes specification of an allowable cost—what the customer is able and willing to pay to get life cycle benefits. Financing constraints are specified in the business case; limitations on the customer's ability to fund the investment required to obtain life cycle benefits;
- The feasibility study involves all key members (designers, contractors, and customer stakeholders) of the team that will deliver the project if the study findings are positive;
- Feasibility is assessed through aligning ends (what's wanted), means (conceptual design), and constraints (cost, time, location, etc.). The project proceeds to funding only if alignment is achieved, or is judged achievable during the course of the project;
- The feasibility study produces a detailed budget and schedule aligned with scope and quality requirements;
- The customer is an active and permanent member of the project delivery team;
- All team members understand the business case and stakeholder values;
- Some form of relational contract is used to align the interests of project team members with project's objectives;
- A cardinal rule is agreed upon by project team members – cost and schedule targets cannot be exceeded, and only the customer can change target scope, quality, cost or schedule;
- The cost, schedule and quality implications of design alternatives are discussed by team members (and external stakeholders when appropriate) prior to major investments of design time;
- Cost estimating and budgeting is done continuously through intimate collaboration between members of the project team—'over the shoulder estimating';
- The Last Planner® system is used to coordinate the actions of team members;
- Targets are set as stretch goals to spur innovation;
- Target scope and cost are allocated to cross-functional TVD teams, typically by facility system; e.g., structural, mechanical, electrical, exterior, interiors, etc.;

- TVD teams update their cost estimates and basis of estimate (scope) frequently. Example from a major hospital project during the period when TVD teams were heavily in design: estimate updates at most every three weeks;
- The project cost estimate is updated frequently to reflect TVD team updates. This could be a plus/minus report with consolidated reports at greater intervals. Often project cost estimates are updated and reviewed in weekly meetings of TVD team coordinators and discipline leads, open to all project team members;
- Co-location is strongly advised, at least when teams are newly formed. Co-location need not be permanent; team meetings can be held weekly or more frequently.

RESEARCH RESULTS AND DISCUSSION

Table 1 summarizes the seventeen TVD principles and evidence show whether these principles are not applied or has a partial or non-systematic application. The investigation was based on questionnaires[4] for the construction company and the architectural office, also based on theoretical basis of TVD principles. Furthermore, the company´s design process framework was observed to collect data about how the product development process is carried out.

Results show that most of the TVD principles are not applied. Only few of them are applied systematically by the company, what may suggest little collaborative environment and commitment of the participants, representing obstacles for an effective full-fledged adoption of TVD in the context.

Table 1 figures combined with questionnaires' and the design process framework's analysis provided an overview for the product development process, which can help to suggest the very first adaptions needed in the process to a full-fledged TVD application in MHML.

[4] In case of interest, the authors can kindly provide the full questionnaires.

Table 1: Analyzed Data and Comparison with the Theoretical Framework (Ballard 2011)
Q = Information from the questionnaires. DPF = Information from the Design Process Framework from the company.

TVD Principles (Ballard, 2011)	Not Applied	Non Systematic or Partial Application	Applied, but some changes are needed	Systematically Applied	Evidence
1	X				The key service providers don´t participate in the project business case, The decisions about a a feasibility study belongs to the client. (Q)
2		X			The variables considered are cost, selling price and selling speed. But the constraints are not cleiar in this phase. (Q)
3		X			The feasibility study doesn´t involve all key service teams; but only the building company, architects, engineering and business sector. (Q)
4	X				The feasibility study only seeks for financial goals for the building company (Q)
5			X		The budget is partial. Scope and schedule are aligned during a more advanced design process phase. (Q/DPF).
6			X		The client (building company) is a active member, but a greater participation of the final user could be considered. (Q/DPF).
7	X				The client has a standard project already defined. Project teams have full understanding about these patterns and follow it with local adjustments. (Q).
8		X			The client presents a table with the payed price for each work for the design teams. It is not a real partnership. The only incentive is a continous work flow. (Q)
9				X	Scope and cost are pre-defined according to product type, and only the client can make changes. (Q)

TVD Principles (Ballard, 2011)	Not Applied	Non Systematic or Partial Application	Applied, but some changes are needed	Systematically Applied	Evidence
10			X		Only the internal company teams discuss these implcations. More "outside" involvement could bring new insights and ideas for the product. (Q).
11	X				Except from initial cost estimate, the detailed budget is performed after the design proces is finished. A continous update could avoid quality "cuts". (Q/DPF)
12		X			The schedule is done through tasks to be concluded by design teams, but not in a systematic way. (Q)
13	X				Because of the product standardization, all design teams should follow the defined model. New solutions could be encouraged in order to launch differentiated products. (Q)
14	X				The building company doesn´t share target scope/costs. A more open policy beteween the participants and incentives for a more collaborative environment, could bring better design solutions. (Q)
15	X				Not applied by the building company.(Q)
16	X				Not applied by the building company.(Q)
17				X	Teams mettings occurs, but with no regular frequency. (Q)

CONCLUSIONS

TC/TVD assumes collaborative environments for product development and one of the important tools for this is IPD. In MHML, detailed budgeting is performed only after the conclusion of the design process, and the ideal approach for a TC/TVD is the discussion and establishment of cost targets in the early stages of design phase, which must be updated frequently during the process, in order to provide feedback to design teams.

Key suppliers do not actively participate along the product development process. Participation in the design process, together with target costs defined at the outset, could trigger innovative solutions in order to maintain or improve the quality of the product, without exceeding cost targets.

The end user does not take part in the product development process and the determination of value perception is in charge of the contractor/builder, which defines the product´s scope, starting from the minimum standards set by the funding agency. End users' value perceptions could have a more active role during the design process, for example through feedback of design ideas, enabling a process of continuous product improvement.

The construction company has a standard product that is only local adapted. Design solutions could be more flexible and open so that the final product could deliver greater value to the end user.

The main contractor does not share objectives, scope and cost with the other agents involved in the process. A more open policy could bring a more collaborative environment, with a better understanding of product goals for all teams.

These initial propositions bring us very useful thoughts regarding the adaptions that may be included in the design process for product development in MHML. The next steps of this research will involve gathering more data to support the development of a TC/TVD based product development process for this context.

ACKNOWLEDGEMENTS

The authors would like to thank the construction company and the architecture office, for the information, time and attention for the data collection. They are also glad to thank CAPES and FAPESP for the financial support dedicated to this research.

REFERENCES

Ballard, Glenn. (2011). "Target Value Design: Current Benchmark." Lean Construction Journal 2011, pp 79-84.

Camargo, D. and Granja, A. D. (2009). "O Custeio-Meta em Empreendimentos de Incorporação Imobiliária: Evidências de Uso Não-Consciente e Oportunidades para Sistematização" ("A Critical Analysis of the Application of Target Costing in the Development of Social Housing Projects" available only in Portuguese). IV Sibragec: Simpósio Brasileiro de Gestão e Economia da Construção.

Guadanhim, S.D, Hirota, E.H and Leal, J.G. (2010). "Análise da aplicabilidade do custeio-meta na etapa de concepção de empreendimentos habitacionais de interesse social" ("An Analysis of the Applicability of Target Costing in the Conceptual Design Phase of Low-Income Housing Projects" – Available only in Portuguese). Ambiente Construído, Porto Alegre, v.11, n. 2, pp 39-56.

Jacomit, A. M.; Granja, A. D. An investigation into de adoption of target costing on Brazilian public social housing projects. Architectural Engineering and Design Management, v. 7, p. 113-127, 2011.

Nauom, S.G. "Dissertation research and writing for construction students." – 2nd ed. Elsevier, UK. 2007.

Oliva, C. and Granja, A.D.. "O Custeio-Meta (Target Costing) na Gestão do Processo De Projeto: Uma Análise entre Agentes Públicos e Privados." (" Target Costing on Design Process Management: an Analysis of Public and Private Agents" – Available only in Portuguese). XIV Entac: Encontro Nacional de Tecnologia do Ambiente Construído. Juiz de Fora, MG, Brazil, 2012.

Rybkowski, Z. et al. Impact of Cost Constraints on Aesthetic Ranking Following Target Value Design Exercises. Proceedings IGLC Peru, 2011.

Zimina, D.; Ballard, G.; Pasquire, C.. Target value design: using collaboration and a lean approach to reduce construction cost. Construction Management and Economics, n.30, p. 383-398, May 2012.

Yin, R.K. (1994). "Case Study Research. Design and Methods". – 2nd ed. Thousand Oaks: Sage.