

ASSESSING TOTAL VALUE REQUIREMENTS ON LOW INCOME HOUSES IN BRAZIL

Aguinaldo dos Santos¹, Virginia Borges Kistmann² & Suzana Fischer³

ABSTRACT

The present paper explores the implications of the various value dimensions on the design of low-income houses using Holbrook's value typology. The case study involved an in-depth investigation on 40 houses chosen through a non-probabilistic approach within a single building project in Brazil. The study has brought insights on other dimensions of value that are often neglected on the construction literature. The researchers concluded that houses have to be considered as a comprehensive product that cannot be divided in separated parts during the design briefing. Similar to what happens in the car industry, value requirements for furniture, curtains, carpets, and all other products that take part on the building, need to be evaluated all together in order to obtain a briefing that best describe the customer value. That should be the case even if the construction company does not deliver the other products of the building. In the case of low-income housing projects, this approach can enable an increase the perceived value without necessarily an increase in cost.

KEYWORDS

briefing, design process, developing countries

¹ Professor, Head of the Design Department, Federal University of Paraná, Ed. D. Pedro I, Rua General Carneiro, 460, Curitiba, Paraná, Brazil. Phone/Fax: +55 41 3605360, asantos@cesec.ufpr.br

² Professor, Mechanical Engineering Postgraduate Program, Federal University of Paraná, CESEC, Centro Politécnico, Curitiba, Paraná, Brazil. Phone/Fax: +55 41 3615360, vkistmann@ufpr.br

³ Researcher, Civil Construction Postgraduate Program, Federal University of Paraná, Centro Politécnico, Curitiba, Paraná, Brazil. Phone/Fax: +55 41 3605360, pescador@bbs2.sul.com.br

INTRODUCTION

Value is a central concept in many modern theories of design and production management. Indeed, nowadays there is an increasing need to expand the customer's perception of a product's worth vis-à-vis its price. This increase of value is obtained through a systematic analysis of customer wishes and subsequent transformation of this information into product and service specifications.

Value can only be defined by the customer and it is only meaningful when expressed in terms of a specific product or service, at a specific price and at a specific delivery time (Womack & Jones, 1996). The definition of value should affect all aspects of the way the entire organization is run and customer's perception of value should be one of the main inputs to define strategic priorities. Holbrook's (1999) proposes a typology of attributes that includes three dimensions of value, which combine eight types of value: convenience, quality, success, reputation, fun, beauty, virtue, and faith (see Table 1). In a variety of degrees customers desire to attain this set values in every product consumed. They are implicit in the customers' minds and need to be satisfied in order to be fully satisfied.

Table 1 – A Typology of Consumer Value (Holbrook, 1999)

<i>Self-oriented</i>	Active	<i>Extrinsic</i> Efficiency (convenience)	<i>Intrinsic</i> Play (fun)
	Reactive	Excellence (quality)	Aesthetics (Beauty)
<i>Other-oriented</i>	Active	Status (success)	Ethics (virtue)
	Reactive	Esteem (reputation)	Spirituality (faith)

One of the first known uses of value as a clear central managerial concept is claimed to be at the General Electric Company, in the USA, during the World War II. At that time, with a shortage of materials caused by the war effort, General Electric was forced to use substitute materials in many of their products. Over a period of time, it became evident that this forced substitution was resulting in cheaper products, as well as products with better performance. This has been the idea of developing systematic studies in product and processes in order to increase value. This idea evolved into Value Planning, Value Analysis, Value Engineering and, in the blanket term that covers all value techniques, Value Management (Norton, 1995).

From a lean thinking point of view the value model can also be interpreted as the reduction of the difference between the achieved value against to the best possible – value loss (Koskela, 1995). Quite often, deficient tracking of decisions and actions throughout a business process leads to poor consideration of value attributes that have been detected at the briefing stage. Within this view, production efforts should try to guarantee customer requirements are really understood and to ensure that this understanding is embedded into the processes throughout all design and production phases.

Tools and techniques are already available to implement the value concept. Most of them were developed within the field of Value Management. Quality Function Deployment - QFD - for example, is a technique created to ensure that each step of the production process is linked to the fulfillment of a specific customer's requirement. It involves constructing one or more matrices linking attributes of value to characteristics of the products and processes. These matrices help translating the customer needs into information that can be managed by the design and production team, and facilitates the use of benchmarking (Akao, 1990; Zairi, 1996). Nowadays, this and other techniques have become increasingly more sophisticated, mainly with the incorporation of Information Technology as a supporting tool.

In Brazil, despite the availability of techniques for value management in the literature, the observation of construction practice reveals a generalized lack of value management practices. The current paper evaluates the impact of such situation in terms of value loss for low-income housing projects. A low-income family is characterized in Brazil as those with a total income reaching less than US\$ 300,00. It is important to mention that these families represent the vast majority of the Brazilian population (>85%) and that the housing shortage in the country is estimated at around 6 million. Only a small fraction of the population is able to afford current housing costs. Thus, the occurrence of value loss on the design of houses aimed at this population is economically and socially unacceptable.

CONTENT AND CHARACTERISTICS OF A BRIEFING

An initial hypothesis in our work was that a major source of value loss on low-income housing projects was poor briefing. A brief is the most important part of the entire design process. However, often the role of briefing in design is both underestimated and insufficiently researched, and that is particularly true with regards to low-income consumers in the Third World. The absence of an appropriate briefing method for low-income people can affect the achievement of the main strategic goals of a company intending to enter in this particular market. A practical problem here is the fact that most studies in this subject are in general focused on products and methods aiming other economical classes.

Cooper and Press (1995) suggest that a design brief should contain a) background of the company; b) the design problem; c) design specifications and product attributes; d) consumer and market information; e) costs and budgets; and f) timescales. A designer know that he/she has written a sufficiently detailed description that conveys the intentions of the consumer, and can form the basis for designing a product without using too many resources and being too costly, when he/she achieves a balance between system thinking, that includes value concepts, and detailed knowledge without too much restriction on the final solution.

Luck, Haenlein & Bright (2001) include “empowering the client”; “managing the project dynamics”; “appropriate user involvement”; “team building” and “using appropriate visualization techniques” among the main characteristics of a successful briefing. User involvement is perhaps the most sensitive issue. Gathering information with consumers may raise their expectations, which may turn into frustration and resentment if they are not be realized, ultimately leading to user dissatisfaction, nullifying the benefit of user involvement.

In Swedish, the end result of a briefing is called program. The term programme comes from the Latin word *programma*, which means “written statement”. A “written statement” is quite far from the reality of low-income people in developing countries. However, a

convergent view today understands that briefing involves more than the production of a document or a questionnaire at a single point in time. Brief development is an ongoing process that should be carried out throughout the entire project management, defined as a communication of instruction about intentions and objectives, where the result can be regarded both as a product (the brief) and as a process (the briefing). Thus, an ideal briefing process must create a platform for a clear understanding of user needs and ensure that the final product meets these wishes (Ryd, 2004).

The current trend is to look upon the briefing as an integrated part of the entire project management, and not just as a part of an early stage. From this point of view the design can no longer be seen to be solely as a technical problem-solving task, but as a social process based on iteration and learning (Luck & Haenlein, 2001). In this sense, the same authors argue that clients that are not able of producing their own brief need extensive collaboration with designers over a period of time.

When people do not have the opportunity or the knowledge in order to make appropriate choices for themselves their decision differs significantly from those made on their behalf, as the present study shows. In contrast, experienced clients can develop their own standard briefs, which can be refined and improved as lessons are learnt from successive projects. Indeed, observations in Ryd (2004)'s study show a number of occasions where the expert and aggressive attitude of a client have determined the direction of the project.

In the literature briefing has been the focus of much research over the past thirty years and numerous best practice guides have been published, including those directed towards construction. Despite this activity there has been no initial brief immune from alteration. As a project develops previous goals are challenged, sometimes abandoned and often developed. An useful perspective on developing a briefing is that of the debate over rationality in decision-making. Much of the previous work on briefing has assumed a model of rational decision-making (Barret, Hudson & Stanley, 1999).

SOURCES OF FAILURE ON THE BRIEFING PROCESS

Human nature itself is often at the root of the failures on the briefing process. Although people may report a desire to follow best practice ideas their actual practice is often distant from it. This, in turn, results in a large amount of brief failures and, consequently, affects all subsequently phases of product development, production, use and discharge, and so on. Barret, Hudson & Stanley (1999) presents some of typical sources of failure on the briefing process:

- **Rule strength**: if a particular approach has been used often in the past with success, there is an increased chance that it will be used again;
- **Rigidity**: if a rule has been applied successfully in the past there is an overwhelming tendency to apply it again even though a simpler solution may be more appropriate;
- **Redundancy**: repeated encounters with a similar problem configuration allow the experienced troubleshooter to identify certain sequences that tend to co-occur. The problem solver learns that truly diagnostic information is contained in certain key signs, the remainder being redundant;

- Information overload: information overload may occur when a problem solver is dealing with a complex situation and so it may be difficult to identify exceptions to the traditionally implemented rules;
- Not knowing which are the important factors: an excessive attention could be given to the wrong features or not given to the right ones;
- Out of sight, out of mind: undue weight may be given to facts that come readily to mind, while those facts that are not immediately obvious may be ignored;
- Confirmation bias: once a hypothesis has been formed, even if it is based on early, impoverished data, a problem solver may be loathed to part with it even if contradictory evidence comes to light;
- Overconfidence: problem solvers are likely to be overconfident in evaluating the correctness of their knowledge. They will tend to justify their chosen course of action by focusing on evidence that favors it and by disregarding contradictory signs.

The sources of failure mentioned above are related mainly to the design process and the competence of the professional in charge of the design process. There are also those failures related directly to the cultural aspects related to designers, architects, organizations as well as the consumer's themselves. In this respect, Ryd (2004) presents a group of factors that have direct effect on the final outcome of a project, related to the organizational aspects of the enterprise:

- the authority and areas of responsibility of the parties involved;
- the communication channels, both official and unofficial;
- the organizational proximity between those responsible for the briefing.

Another failures pointed in the literature include the difficulties of the brief manager to remain objective about the brief he had written and therefore to allow proposed solutions to be reconsidered. Certain brief requirements may be interpreted in different ways, which might lead to disharmony rather than a creative collaboration. The study of Bruce, Cooper and Vazquez (1999) shows that lack of senior management commitment to design; insufficient funds to cover cost; incomplete design brief and inappropriate sourcing of design competencies are also roots of failure on the design brief.

Finally, a common view today is that the sequential 'over the wall' syndrome is not an ideal course of events in the product development process because large amounts of information are lost at each new phase. One of the consequences of such syndrome is the loss of briefing information and, as a result, the loss of value in the end product. This introduces the risk that the final product is not what was required by the user.

RESEARCH METHOD

The present study adopted the case study as the main research strategy. The field study was carried out on two five year's old building projects (Riacho Doce and Rio Pequeno) in the Metropolitan Area of Curitiba, Brazil. These projects reached the low-income families and the families themselves carried out their construction, always under the assistance of the city council housing developer (COHAB). Materials, training and equipment were also supplied

by the same organisation. The area per house varied between 20m² and 70 m² and the plot of land measure 7m x 20m.

Together these two projects involved 406 houses as part of a larger project that intended to move these people from protected areas that supply most of the water for the city of Curitiba. The data collection was carried out in 10% of the houses, using non-probabilistic criteria. These criteria included: the family had to be the original buyer of the house; the family total monthly revenue had to be below 3 minimum salaries (around 240 dollars); the family carried out (or it was planning) a refurbishment in their house.

The first stage of this research involved the characterisation of the briefing process adopted by the housing developer. This was carried out by document analysis, direct observation and interviews. The second stage aimed at evaluated the value perceived by each family in relation to their house and, also, the implication of their perception on the refurbishment process throughout the building life cycle. This stage used a combination of different techniques:

- Design game: they received a set of cards and have to progressively chose what they thought was the best one that described what they want for their bedroom. Through successive selections they have to finalize the game one or two cards that best describe their wishes and, also, explain why;
- Photos: each room was photographed in order to allow the search for patterns in their tastes and behavior towards the built environment;
- Characterization of layout: it consisted of designing in a paper the distribution of furniture, position of windows, doors, etc;
- Structured interview: this interview used lessons learned from the post-occupancy evaluation studies carried out in Brazil. That was used to confirm existing knowledge and to point out differences on their requirements. Throughout this interview the family was stimulated to talk using photos and design plans related to their own house.

Finally, the analysis was carried out comparing the perceived value of each room against their aspirations of the families. A detailed analysis investigated their pattern of actions in order to adapt their houses to their wishes throughout the five years since they came to live in those houses.

RESULTS

BRIEFING PROCESS AT THE CITY COUNCIL HOUSING DEVELOPMENT AGENCY

The housing developer in this case study adopted a traditional approach for briefing, using semi-structured interviews as the main data collection technique. Ideally, a semi-structured interview has to be concerned with the ease with which people use built environment and, also, encourage people to illustrate their responses with examples of buildings or environments and to describe these settings. In the case study the briefing process was carried out by social workers and the questions they use include:

- How many people live with you today?
- How long do you live here?

- Where do you work? What is your profession?
- What is the total amount of money your family earns each month?
- How many children do you have?
- How many children do you plan to have?
-

As it shows the main aim of the briefing process was solely to capture the actual social and economical need of the family for a house. The entire briefing usually did not last more than one hour and included site visits. The end result was a decision regarding the position of the family in terms of a ranking of those in need. COHAB's officials informed that in the city of Curitiba alone there were around 60.000 families in this waiting list in 2004. Higher priority was given to those living closer to water springs since most of the bank funding at the time of the building project was directed to protect sources of water for the city.

According to the interviews the architectural solution was already defined prior to the briefing with the families based on the amount of money available for each house. The definition of the production system, the specification of building materials and components, the selection of suppliers, and all other decisions of the building process were all derived from the target cost. Other customer value requirements were assessed solely using the construction professional's prior experiences in similar housing projects.

VALUES REQUIREMENTS

Following Holbrook (1999) structure the research team evaluated the actual value requirements of a all forty families that fit in the criteria of a "low-income" family. The analyses of this data enabled the identification of a set of requirements for each room of the building. It is important to note that their requirements for the built environment were not limited to construction itself and involved the entire product called "built environment".

Table 2 exemplifies the end result of this analysis by presenting five most important requirements identified for the main "bedroom". Note that the attributes of "ethics" and "spirituality" related to the entire house since it was not possible to identify specific needs for the bedroom.

Table 2 – Sample of Bedroom Requirements

<i>Value Attributes</i>	<i>Design Requirements Identified on the Briefing</i>	<i>No</i>
Efficiency	<ul style="list-style-type: none"> • Windows have to enable ventilation through 100% of its area • Width > 2.6 m • Area > 8 m² • Bedroom cannot be seen from the kitchen • It has to receive early morning sun 	5
Excellence	<ul style="list-style-type: none"> • Floor has to be made of ceramic tiles • Painted walls • The presence of wooden furniture instead of metal ones • Use of aluminium on the window • The existence of a proper wooden roof 	5
Status	<ul style="list-style-type: none"> • A good brand on the windows (they mentioned Sazaki) • The use of a chandelier instead of a simple bulb • The existence of a television and a sound equipment • The use of a blanket for covering their beds during the day 	5

	<ul style="list-style-type: none"> • A carpet on the corridor 	
Esteem	<ul style="list-style-type: none"> • Link of design/arquitectural features to their birthplace • Possibility for fixing a poster of their football team • A place to fix a photo of the family • A place to keep their life long belongings/souvenirs (a trunk) • The possibility of bringing furniture from their previous house 	5
Play	<ul style="list-style-type: none"> • Bedroom with sufficient electrical points for connecting a sound equipment and television • The existence of a television in the bedroom • The existence of a sound equipment in the bedroom • Possibility of transforming the bed on an extra sofa • A bed large and safe enough to use as a playground for their kids 	5
Aesthetics	<ul style="list-style-type: none"> • A different bedroom from his/her neighbour • Wooden features and accessories • The presence of a curtain • A blanket with the same colour pattern as the pillows • A carpet in the corridor 	5
Ethics*	<ul style="list-style-type: none"> • A fair distribution of the housing among fellow homeless • The name of the road associated with someone they know • The existence of a tree in front of their house • The actual ownership of their house and the fact that they have now an address (often they lived in a chantey town prior to their new home) • The knowledge that they are not affecting anymore a water spring 	5
Spirituality*	<ul style="list-style-type: none"> • The presence of a nearby church • A garden in front of their house • The existence of place for family meetings • A low level of violence on their neighbourhood • A long distance to bars and nightclubs 	5

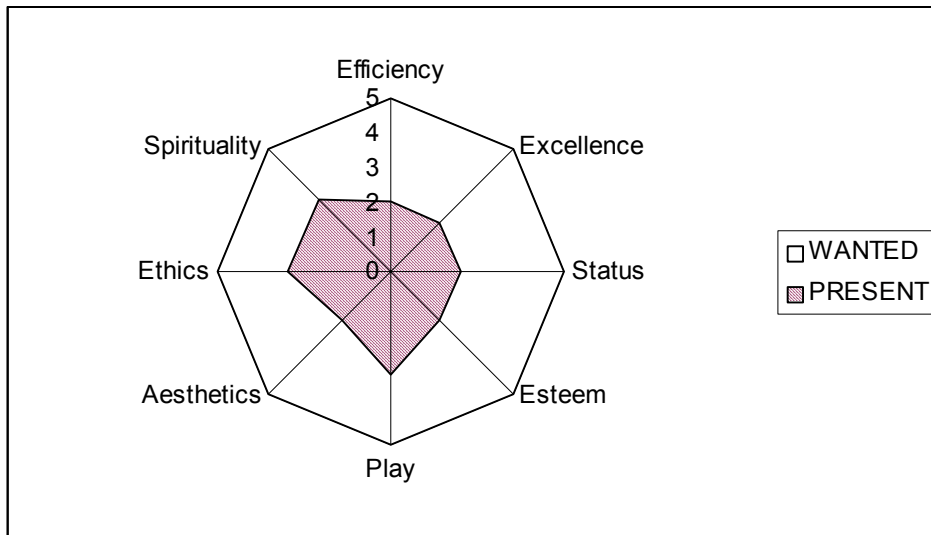
* Attribute applicable to the entire house

VALUE PERCEIVED ON THE EXISTING HOUSES AND ITS IMPLICATIONS

The data collection revealed that between 1998 and 2003 there has been no significant change on the economic situation on the families living on the 40 houses investigated in this research project. Also, there have been no significant changes in their education profile. The majority of families have increased one more person in comparison to their original structure at the time of occupying the new houses. The average family presented 4,25 individuals whilst the average in the region is 3,5 individuals per family.

Comparing the design requirements presented on Table 5 for the average bedroom against their actual bedroom illustrates the low level of perceived value. The same situation was identified in all other rooms of each house. In some cases this gap created a drive for improvement but, also, in most cases the impact of a poor built-environment value was low self-esteem.

Figure 1 – Value Attributes Perceived by the Families (Bedroom)



The low level of satisfaction with their houses have driven these families on promoting continuous refurbishments, often without any technical assistance. Table 3 shows the main changes carried out in the buildings in terms of area expansion and layout alteration. As it shows in more than half of the houses there had been an increase in the area and number of rooms without any actual change on the main body of the original house. Despite their full involvement on the definition of the changes carried out in their own homes the interviews have shown their dissatisfaction with the end result. Their complaints were directed mainly to the finishing and to the urgent need of additional rooms.

Table 3 – Main Changes in Five Year’s Old Residential Buildings

Characteristics of the Refurbishment	Number of Houses	%
No changes in the original layout. Increase in area and number of rooms	23	57,5
Changes in the original layout without increase in area	9	22,5
Changes in the original layout followed by an increase in the area and number of rooms	8	20
TOTAL	40	100

The field study revealed that 25% of the buildings expanded towards the back of their land whilst 22,5% expanded sideways. Around 24% of the families have chosen the kitchen as their main priority for implementing changes. Also, comparison between the original

architectural design with the observed building layout have shown that in 29% of the houses the expansion occurred towards the back of the houses and on 24% it occurred sideways.

The families have revealed the kitchen as their main priority for implementing building changes mainly because of their area (5,88 m² in average). Adding to this problem was the regular addition of new equipment by the families as they improved their quality of life. Furthermore, the original design of these houses did not consider a cultural issue: 90% of the investigated families confirm that they have all their meals mainly on the kitchen. Since all kitchens did not have enough space for a table, they found themselves often eating in uncomfortable positions.

The original design of these houses did not include an area for laundry activities. The space left available for implementing these activities were too small and outside of the building, without a roof and without proper installations to place furniture. As a consequence, all families have to carry out extra construction work already in the first days of occupation of their houses.

The issue of theft was a major worry among the families particularly on laundry area since there they did not have a wall to protect their belongings. In order to cope with this problem 50% of the families have built their laundry area in the same room as the garage. This situation offered little privacy and safety for those family members involved on washing clothes. All families that have not yet expanded the roof over the laundry area have expressed a desire on implementing such improvement in the near future.

ANALYSIS

A major issue for design management regarding low-income people is the quality of the briefing process, since traditional approaches often does not fully capture their requirements. The main focus of prior research about briefing has basically been on developing prescriptive methods for writing a clear statement on specifications at the beginning of a project. However, studies have rarely considered questions such as the brief document's capacity to form the basis of design, planning, production and management and, also, its potential for enable control of a project, dealing not only with physical solutions but also with administrative, financial, social and technical solutions. Besides this, very few studies have looked at the client's choice of a briefing method and few comparisons have been made on the suitability of the briefing methods.

Considering the low-income consumers in the Third World, social and cultural barriers represent the key aspects that affect a briefing. The models proposed in the literature so far do not consider the fact that communication within the briefing process suffers from these barriers when, for instance, a middle class graduate designer meets an illiterate and poor person. Such barriers affect the level of understanding on both sides of the design process, designer and consumer, and that was the main focus of the present study.

The study showed that the use of semi-structured interviews alone did not enable a full capture of the family building requirements and that reflected on the fact that none of the houses was prepared for expansion. Building the ideal house, adequate for the entire family cycle, is economically impossible for these people since funds are often scarce. Therefore, the construction of an initial core building that enables future expansion as the family evolves economically seems to be a viable strategy.

The study shows that poor briefing can lead to costly construction work that is unacceptable and unviable for these poor families. ISO 6241 already includes upgradability as a key performance measure for the built environment. Thus, the authors suggest that the World Bank and other funding agencies that finance low-income houses in the Third World should include these measures as a key requirement for new projects.

It is important to point out that the lack of experience on living in a proper house was also a key weakness on the briefing process since the families could not express their requirements because they simply did not know what could they expect. More creative briefing techniques have to be developed by researchers and practitioners in order to increase the efficacy of briefing practices among low-income families in the Third World.

Foremost, the study has revealed that the construction literature is quite poor on exploring other avenues of value for the built environment. That demands a multidisciplinary approach since competencies of other professionals such as designers, biologists, doctors, artists, and so on. It is important to emphasize that contemplating this other value dimensions does not necessarily implies adding cost to the building since creative solutions can be developed using value analysis techniques.

CONCLUSION

The results of this research helps to corroborate the argument that briefing is essentially a communicative process that can be considered as a cultural representation from both sides of the design process: consumers and designers. This communicative process can be more comprehensive on its end result if adopted wider typologies of value such as the one proposed by Holbrook. All his value dimensions (excellence, status, esteem, play, aesthetics, ethics, spirituality) imply a wider understanding on what constitute the product of the building industry and that can be a source of drive for improvement.

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REFERENCES

- AKAO, Y. An introduction to Quality Function Deployment. Quality Function Deployment (QFD): integrating customer requirements into product design, Y. Akao, ed., Productivity Press, Cambridge, Massachusetts, 1-24.
- COOPER, R. and PRESS, M. The Design Agenda. A Guide to Successful Design Management., Wiley and Sons: Chichester. (1995)
- Holbrook, M. B. (1999). Introduction to Consumer Value. In M. B. Holbrook (Ed.), Consumer value: A framework for analysis and research (pp. 1-29). New York, NY: Routledge.
- KOSKELA, L. 1992. *Application of the New Production Philosophy to Construction*. Technical Report # 72. Center for Integrated Facility Engineering. Department of Civil Engineering. Stanford University. 75 p.
- LUCK, R.; HAENLEIN, H.; and BRIGHT, K. Project briefing for accessible design., *Design Studies* Vol 22 No. 3 May (2001), pp. XXX.

- BRUCE, M. & COOPER, R. and VAZQUEZ, D. Effective design management for small businesses., *Design Studies* Vol 20 No 3 May (1999).
- NORTON, B. "Value management in construction : a practical guide / Brian R. Norton and W. - Basingstoke : *Macmillan*, (Macmillan building and surveying series), 1995.
- RYD, N. The design brief as carrier of client information during the construction process., *Design Studies* Vol 25 No. 3 May (2004).
- WOMACK, J. P. & JONES, D. T. *Lean thinking*. Simon & Schuster, 1996.
- ZAIRI, M. *Benchmarking for best practice: continuous learning through sustainable innovation*. Butterworth-Heinemann, 1996.