

Designer's Attributes in Refurbishment Projects: Case Study in Malaysia

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Abstract: Building refurbishment is expected to become more important in the next five years. This is, in part due to largest government allocations for refurbishment works featuring in the ninth Malaysia Plan and the resultant high demand for refurbishment works. Refurbishment works are mainly contributed to by an increase in the number of building renovation projects, extensions and projects featuring extensive repair works. However, refurbishment designs are difficult to manage compared to new-build projects. In refurbishment design, the individual designer is the one who ultimately determines the quality and performance of a project, not his or her organization. Hence, various specific attributes are essential in designers undertaking refurbishment projects; these directly influence the refurbishment project's performance. The main objectives of this paper are to identify these important attributes in designers of refurbishment works and to show how they affect overall performance of projects. This study employed quantitative approaches to data collection. The study started with the identification of important designer attributes through literature reviews followed by a questionnaire survey. A set of questionnaires was distributed to 100 selected designers of refurbishment projects in Malaysia. Descriptive and inferential statistics are used in the data analysis. In conclusion, the study identified six key attributes for designers in refurbishment projects. The associative test shows that to improve performance of refurbishment projects, the designers need to have knowledge, enthusiasm, commitment and coordination skills.

Keywords: refurbishment, designer's attribute, Malaysia.

1. INTRODUCTION

Designers play an important role in achieving superior design constructability and in producing good quality design. This relies, mostly, on the experience and knowledge of the designer, which could, potentially reduce the amount of design information needed (Schaub and Franzenberger 1999). Some of the documents used by the designers in refurbishment design are not reliable because they are often not updated, nor linked to the site conditions. Hence, the personal attributes of designers are of considerable importance in the refurbishment projects. Since refurbishment projects are unique and uncertain, it is vital to investigate what are the important attributes that designers need to have in handling refurbishment designs. Individual designers have different ways to approach design work, this can affect the outcome of refurbishment projects. In Ling's view, the outcome of the design produced, relies on the ability of the architects involved (Ling 2002).

By identifying the important attributes displayed by designers greater recognition of the key characteristics of the designers is elaborated. This assists clients in understanding the degree of risk and uncertainty that must be mitigated in the future. In literature reviews, there is no empirical study of designers' attributes that affect the performance of refurbishment projects. Therefore, the main objective of this paper is to identify the dominant designers' attributes and to show their relationship to the refurbishment project performance.

2. DESIGNERS' ATTRIBUTES

The attributes of the designers in a refurbishment project could influence the performance of the project. The World Bank guideline (1997), for example, pointed out that an individual designer is the person who ultimately determines the quality of

performance of a project, not his or her organization. Ling (2003) listed the important attributes of designers as the following: Job experience, Job knowledge, Enthusiasm in design work, Commitment to the project, Initiative to improve design and Coordination skill.

2.1 Job Experience

Young et al. (1996) mentioned that job experience is measured in terms of length of experience in the construction industry, length of time in refurbishment sectors, number of similar type of projects and age of refurbishment personnel. Their study found that the majority of personnel involved in refurbishment projects were experienced. Furthermore, Ling (2003) noted that job experience is used in evaluating performance of the designers. In their study, job experience of the designers was measured by the adequate number of years of practice in the construction industry and the designers experience with similar types of projects. Gray and Hughes (1994), Kincaid (2003) maintained that selection of designers should be based on experience of designing similar projects. This would help the designers to be able to provide creative solutions in solving the design problems.

In addition, job experience is vital in refurbishment projects. This is different from new-build projects because designs are based on existing conditions of a building. Egbu (1997) emphasized that unlike new-build work that is primarily client-driven, refurbishment work is mainly site-driven, which requires site management to make most of the vital decisions. Meanwhile, Friedman and Oppenheimer (1998) maintained that most designers learn renovation design technique on the job and not in school. On the job might see as collecting of tricks rather than consolidation of basic ideas. Thus, experience is important to determine the success of refurbishment projects.

2.2 Design Knowledge

Ling (2003) and Lee et al. (2003) in their empirical studies highlighted the importance of design knowledge among the designers who

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provide services to clients, since it is believed that the designers could bring the knowledge of acceptable practices and customs. Knowledge on such matters as material specifications, legislation, constructability in design and contract management were found to be important for designers in the design process. This view was supported by Spiegelman (1989) and Graves (1993) who mentioned that one of the factors in selecting the right designers was their qualification and their knowledge of the codes and special expertise in their area. Furthermore, Cooper and Press (1995) highlighted the need for having design knowledge and education. This could encourage significantly more inspiration, experimentation with ideas, solutions to design and construction problems and concern with creative thinking, which could lead to significant design resolutions. Meanwhile, Boyle (2003) emphasized that the nature of design requires that the design personnel have sufficient design knowledge, education and creativity in their work. Without proper knowledge, it is difficult for the designers to mitigate error in their design propositions.

Many design errors occur due to lack of design skill and knowledge on the part of the designers. Josephson et al. (2002) said that the insufficient design knowledge of the designers was a factor contributing to rework and design changes. Furthermore, Rounce (1998) and Curtis et al. (1998) said some causes of design fault, such as misinterpretation of client's needs, poor communication between designers, using incorrect or out-of-date information, producing inadequate specifications and misinterpretation of design standards were due to the designers' lack of knowledge. Designers with insufficient knowledge would tend to put more assumptions in the design. This influences the amount of the provisional sum allocated in the contract. Okoroh and Torrance (1999) said that estimators (an important part of a design team), often make decisions based on incomplete and imprecise information during tender preparation. This increases the risk in refurbishment projects.

2.3 Enthusiasm in Design Works

Scotter and Motowildlo (1996), Ling (2002), who conducted studies concerning the degree of enthusiasm, found that a high level of enthusiasm in tackling a difficult assignment is likely to produce better individual performance. Therefore, this could improve refurbishment design performance.

The designers should have a sense of enthusiasm when performing their work. Ling (2003) cited the importance of having enthusiastic architects, so that they will be more likely to put a lot of effort into their work, pay attention to important design, tackle a difficult assignment thoroughly and ensure constructed work is in line with the approved specification. The study also revealed that level of enthusiasm was one of three important attributes that was used in a model predicting the performance of architects and engineers.

2.4 Commitment Given to the Project

Ling (2003) pointed out that committed architects would perform better and could fulfil the client needs. In her article, "Model for predicting performance of architects and engineers" she cited that committed designers found to be loyal to their client, revised their design as requested to achieve project objectives and because they were interested in their job assignment. CABE (2003) maintained the importance of commitment and participation of the designers in projects. The article emphasized that job commitment is equally important to decision-making, which needs to be made in a timely

manner. Thamhain (2004) discovered that commitment was a significant driver to high project performance. Committed personnel would make an effort to ensure the project was completed within the approved budgeted cost.

2.5 Initiative to Improve Design

Ling (2003) found that initiative by the designers is regarded as an important criterion in decision making for the selection of a designer. Her study found that it was important to have a designer who was willing to give suggestions for the improvement of the design. To produce a good design, it is the designers' responsibility to provide necessary advice to the client, since the clients have relatively limited understanding knowledge or experience in handling a construction project (Wallace 1987).

2.6 Coordination Skill of the Designers

Hill (1983) discovered that the most important role of the design team leaders was the management of the uncertainty of a project. One of the design team leader's tasks in projects was to coordinate design tasks (Chiu 2002, Tatum 1987). The weakness of the leader in the project team would cause an uncontrolled situation and the leader's role could be taken over by other design team personnel. The leader should be able to control the situation. Hence, the designers as design team leaders are involved in coordination, preparation and control of design to achieve the project objectives.

Ling (2003) included the factor of coordination skill for designers in her conceptual model of selection of a designer as design team leader by a project manager in Singapore. In the study, the measurement of coordination level of a designer used the ability to lead and coordinate the contractor and other consultants in a project. This is because coordination is one of the important tasks that need to be performed by a designer. The view is supported by Hegazy et al. (2001) and Crawshaw (1979) who mentioned the importance of coordination in construction projects. The study found that lack of coordination among building designers and inadequacies of design change management were significant problems in the construction industry. The design process of refurbishment projects could not run smoothly without a skilled coordinator.

3. RESEARCH METHODOLOGY

The main research method involved the distribution of questionnaires and engaging in interviews with building occupants. Data collection and analysis were carried out by quantitative techniques. A total of 100 questionnaires was distributed, mainly to architects involved in refurbishment projects. From those questionnaires distributed, 81 were found to be appropriate to form a database for data analysis. The collected data were analysed using Statistical Package for Social Science (SPSS) computer software. Descriptive and inferential statistics such as frequency table and associative test were used to analyse the data.

4. DATA ANALYSIS AND DISCUSSION

Six characteristics for designers were found to be dominant in the literature review. The results of the questionnaire survey are discussed in-depth below.

4.1 Refurbishment Job Experience

In the present study, the designers' job experience was measured by the number of refurbishment projects handled. The results are shown in Table 1.

The result obtained suggests that more than 80 percent of the respondents in the survey had experience in handling at least 5 refurbishment projects, with a mode of more than 15 projects. Experience of refurbishment projects had been accumulated over a number of projects handled previously. This implies that the architects who took parts in the survey had sufficient experience before handling the selected refurbishment projects. The results indicate that a majority of the architects who were involved in the refurbishment projects had appropriate experience in handling such projects. The findings reconfirmed the position of Hughes, Gray and Ling (2003) who pointed out the importance of having experience in design works before designers could handle any projects independently.

4.2 Refurbishment Job Knowledge

The second attribute investigated was the job knowledge of the architects. For that purpose, the respondents were asked three questions. The questions were the record of formal training attended measured on a dichotomous "yes" or "no" scale and a question on the architects' knowledge of assessing the condition of a building, which was measured using a five-point scale. Formal training refers to training that is given by the authorised training bodies such as CIBD, CIOB, ISM, universities and colleges. The results of the questionnaire about respondents level of formal training related to refurbishment are shown in Table 2.

Table 2 indicates that the majority of the respondents had not attended any formal training concerning refurbishment projects. Only about 15 percent claimed that they had attended formal training. The training came, primarily, from a post-graduate programme. This shows that the majority of designers who were involved in refurbishment projects had minimum formal knowledge about such projects. The result obtained contrasts with statement of Ling (2003) and Lee et al. (2003) who said that job knowledge is important in design works. The result suggests that the designers believed the knowledge of refurbishment projects is more appropriate to be gained through on-the-job training rather than formal training. Second, it could be that few opportunities were available to attend courses conducted on refurbishment, since more emphasis is given to new-build projects. As a result, most of them had used their knowledge about new-build projects to obtain experience on refurbishment projects. However, the designers could be mistaken in thinking that the approach to managing refurbishment is the same as managing new-build projects. It is generally agreed that refurbishment projects differ in

Table 1: Designers' Job Experience

No. of projects	Percentage (N=81)
<5 projects	18.1
5 to 10 projects	20.8
11 to 15 projects	22.2
More than 15 projects	38.9
Total	100.0

Table 2: Attended Formal Training on Refurbishment

Scale	Percentage (N=81)
No	85.4
Yes	14.6
Total	100.0

many significant ways compared with new build projects (Quah 1988, Egbu 1997, Daoud 1997). Every refurbishment projects is different in the way its problems and difficulties are processed. The failure to differentiate between these two types of projects could end up with lack in clarity in the approach used, which could influence the performance of refurbishment projects.

Table 3 shows that the majority of designers claimed they had high or very high level of knowledge (62 percent) in assessing the condition of a building before handling the selected refurbishment project. Designers need to have appropriate skills and knowledge before refurbishment could be done, since the work is unique in many significant ways (Daoud 1997, Friedman and Oppenheimer 1998). A possible implication of the result is that the syllabi of courses in institutions of higher education may need to be revised in order to fulfil the market's needs. As known, survey on the market's need pertaining to job knowledge for refurbishment projects is required so that the training attended be most beneficial to the designers.

4.3 Enthusiasm in Design Work

The designers were asked to rate their enthusiasm in refurbishment design work using a five point scale from very low to very high enthusiasm. The result is shown in Table 4.

The results indicate that about 65 percent of the respondents rated themselves as having high and very high enthusiasm, while the mode recorded very high enthusiasm about refurbishment design works. Almost 10 percent rated low and very low enthusiasm for this type of project. This indicates that some of the designers were not enthusiastic about design work for refurbishment projects, and the lack of enthusiasm may be due to several reasons.

Firstly, refurbishment projects are more challenging, especially when dealing with historical buildings. In such projects, the availability of design information is limited due to in absence of an as-built document. Furthermore, in some projects, the designers face problems in matching up the old and new materials because many materials are no longer in production. This contributes to complexity and uncertainty in refurbishment projects. Secondly, the fragmented nature of refurbishment projects requires more of an integrated and flexible approach (Rahmat 1997). This needs the architects to allow more time for coordination with many parties, even though the quantity of work may be small. The small size of projects reflects the small amount of fees received by the architects in refurbishment projects. Although the percentage of the fees paid from the total contract value is higher, the amount is still considered by many to be unattractive.

Table 3: Knowledge on Assessing the Condition of a Building

Scale	Percentage (N=81)
Very low	1.4
Low	7.0
Neutral	29.6
High	45.1
Very high	16.9
Total	100.0

Table 4: Enthusiasm for Refurbishment Design Work

Scale	Percentage (N=81)
Very low	3.4
Low	6.1
Neutral	24.6
High	26.8
Very high	39.0
Total	100.0

4.4 Commitment to the Refurbishment Project

In the present study, the commitment of the designers was measured by obtaining data on the average time spent daily on design work and the average response time taken by the designers to take action on the client's instruction in a project. Both questions were asked using a five-point of scale. The results of the survey show in Table 5.

For the question about response time taken by the designers, almost 45% of the respondents claimed response time was long or very long. The median reading for this variable also recorded fair. The result complements the above result on the average time spent daily, which also had a median recorded as only fair. According to Ling, committed designers should respond faster when the client instructs them. The statement implies a lack of commitment on the part of the architects who were handling refurbishment projects (Ling 2003). The results may be because the majority of designers had many jobs in hand, so that they had to segregate the working time based on the priority or the size of the projects. The designers tended to allocate more time to larger projects that could give more income to them. If the size of refurbishment project handled is small, probably less time would be allocated.

4.5 Initiative to Improve Design

Initiative taken by the designers was measured using suggestions made to improve client's brief (Ling 2003). The results obtained from a five-point scale are presented in Table 6.

The results show that 75 percent of the respondents claimed that they had high amount of initiative to improve client's brief. The mode and median for the finding recorded 'high'. This indicated that the majority of designers had performed their job as thoroughly as possible to achieve a design that complied to regulations was accurate and complete. However, it must be noted that, many architects would not admit that they had low initiative. The possibility of bias in this case, could not be discounted.

The result implies the importance of the need for designers' to show initiative to convince the clients about the aspects of design. This is to ensure that decisions made would not influence the project outcome. The client often has limited understanding, knowledge and experience in handling construction projects (Wallace 1987). Thus, it becomes the designers' obligation to demonstrate their initiative to improve the situation.

4.6 Coordination Skill

The degree of coordination with key design participants was measured on a five-point scale (Ling 2003). The results are shown in Table 7.

Table 5: Response Time to the Client's Instruction

Scale	Percentage (N=81)
Very short	25.4
Short	29.6
Fair	19.7
Long	12.7
Very long	12.7
Total	100.0

Table 6: Suggestions Made to Improve Client's Brief

Scale	Percentage (N=81)
Very low	1.4
Low	1.4
Neutral	21.4
High	48.6
Very high	27.1
Total	100.0

The results show that almost 75% of the respondents claimed that they had a high degree of coordination in the design process. It indicates that the designers showed some coordination skill in handling the design team. The results supported arguments by Cheung et al. (2001), Ling (2003) and Thamhain (2004), who emphasized the importance of coordination skills in the design process and Hill (1983) on the designers' role in the management of the uncertainty of a project.

The result implies that considerable teamwork occurred among the design team's members. Valkenburg (1998) highlighted the advantage of having teamwork in interdisciplinary design work and that a high quality of leadership was critically needed to achieve it. Probably, the designers realized that refurbishment projects need more communication among the key design participants. The management of uncertainty became an important consideration in all refurbishment projects. The contractual and pricing considerations for refurbishment projects were more difficult compared to those applicable for new-build projects. The design team's leader must make an effort to identify potential risks and to make preparations in the early stages of projects. It is essential that various programmes be properly coordinated, with some kind of workshop, design review exercise and all key participants implementing change management.

4.7 The Effect of Designer's Attributes to Design Performance

Five significant correlations were detected between designers' attributes and refurbishment project performance as shown in Table 8. They are:

- (1) Knowledge through formal training not improve amount of provisional sum;
- (2) Knowledge in building condition survey could improve design compatibility to existing site;
- (3) The designers' enthusiasm improves the design compatibility to site;
- (4) Committed architects response faster to design changes;
- (5) Designers coordination skill reduce the occurrence of design changes.

It is important that designers have knowledge and understanding about the existing building condition. This helps them to produce an accurate design by having a better understanding of the building systems, material and method of construction used. The significant correlation supports the findings of Andi and Minato who all highlighted the need for having design knowledge that could significantly contribute towards the design solution and minimize discrepancies in the design outcome (Andi and Minato 2003). The result implies that designers may need to attend training in building assessment. Knowledge in this area can help designers to achieve high accuracy in design for refurbishment projects. Alternatively, the designers could also use qualified building surveyor services to ensure the building condition report is complete with all information required.

Time spent by the designers significantly correlated with the compatibility of design to existing site. This is expected in that more time spent in preparation of design would be likely to enable more site information could be obtained and therefore the higher compatibility of design to existing site to be achieved. The result supports Ling and CABE statements on the need to spend design

Table 7: The Degree of Coordination with Key Participants

Degree of coordination	Percentage (N=81)
Very low	1.4
Low	5.6
Fair	18.3
High	31.0
Very high	43.7
Total	100.0

Table 8: The Correlation Matrix between Coordination Devices and Design Performance

Designer's attributes	Changes of design during the construction stage	Provisional Sum to contract value	Compatibility of design to existing site
Job experience	0.051	0.101	0.034
Job knowledge			
- Formal training	0.142	0.263*	-0.116
- Assess bldg. condition	-0.095	0.111	-0.290**
Enthusiasm	-0.092	-0.057	-0.342**
Commitment			
- Response time	-0.302**	0.060	0.100
Initiative	0.029	-0.055	0.072
Coordination skill	-0.057	0.029	-0.293**

Correlation at 5% significance level; ** Correlation at 1% significance level

to complete design work (Ling 2003, CABE 2003). A significant correlation was detected between designers' commitment and faster response time to reduce changes during construction stage. The designers responded quickly to any instruction given by the client or to update design when new information was discovered from the site. Hence, change in design during the construction stage could be avoided.

The result implies that designers need to increase their effort in design preparation during the pre-bid period. Even though refurbishment design is sensitive to changes, more time needs to be allocated to collect design information, coordinate among design team members and respond faster by updating the design with any new information discovered. This requires the designers to commit more resources to the projects. Moreover, in refurbishment projects that use a traditional procurement method, design needs to be as complete as possible before work started on site. Otherwise, many changes during the construction that lead to cost variations could occur. Many clients would not be happy when this happens.

The coordination skill of the designer refers to their ability to coordinate with other key design participants in the design process. Coordination helps to increase efficiency of the flow and exchange design information among the key participants. It was expected that coordination skill could improve the completeness of refurbishment design. An efficient flow of design information is achieved by greater coordination of key participants in the design process. The results support Hegazy and Ling who referred to the importance of coordination in project performance. The higher coordination achieved by interfacing and cross checking of design among the interdisciplinary design team helps designers to obtain accurate information and produce highly compatible design in refurbishment projects (Hegazy 2001, Ling 2003).

The result implies that coordination skill is important for designers to enhance integration among the key participants. The designers who demonstrated a high level of coordination skill acted as an integrator who could assist the other designers in performing their work. Second, good coordination skills among the designers help to induce team spirit in a design team. Teamwork can contribute to more effective work. Greater teamwork in design could influence the compatibility of design. The design produced could not only be completed but also accurate and compatible with existing building. Third, designers with good coordination skills were more likely to be able foreseeing potential design problems in refurbishment projects. The designers would be able to closely monitor the progress of design work, identify potential problems and meticulously interface the interdisciplinary design with the condition of the existing building to ensure the design produced free from error during the construction stage.

CONCLUSIONS

Refurbishment design process is one of the most challenging faced by the designers. Refurbishment design is restricted by existing condition of the building, which makes the task more

complex and tedious. From review of literature, six designers' attributes were found dominant and important in managing the refurbishment projects. Of those attributes, four found to be significantly correlated with refurbishment project performance. They are designer's knowledge, commitment, enthusiasm and coordination skill. The identification of important designers' attributes in the design process of refurbishment projects should be able to help clients and designers to formulate strategies in their design process.

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