THE PLANNING AND CONTROL PROCESS OF REFURBISHMENT PROJECTS

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The main issue in the planning and control process of refurbishment projects is to ensure that the activities of the key participants involved in the process are closely integrated. This requires refurbishment organisations to employ various integrative mechanisms such as meetings, formal and informal contacts. One of the main aims of employing the integrative mechanisms is to satisfy the planning performance criteria. This study examines the relationships between the integrative mechanisms and the planning performance of refurbishment projects. This study is connected to Laufer's (1991) and Boyd and Weaver's (1994) research. Semi-structured interviews with 15 planning and control managers of refurbishment contractors were conducted initially. Then a postal questionnaire, developed and refined from the interview data, was distributed to the planning and control managers of refurbishment contractors. The results from 67 completed questionnaires formed the database for the quantitative analysis. This study concludes that the planning performance of refurbishment projects could be improved by greater use of integrative mechanisms in the planning and control process. For example, increased involvement of estimators in decision-making during the construction stage reduces the cost variance of refurbishment projects.

Keywords: Complexity, uncertainty, integrative mechanisms, planning performance, refurbishment.

INTRODUCTION

Refurbishment projects are characterised by high degrees of complexity and uncertainty. In the majority of refurbishment projects, the work commenced on site with incomplete design. Complexity and uncertainty tend to create information and communication gaps between the key participants involved in the planning and control process. To narrow down the information and communication gaps, refurbishment project organisations have to increase their capacity for processing information. Integrative mechanisms are used for this purpose. The greater the complexity and uncertainty faced by refurbishment project organisations, the greater the need to provide integration in the planning and control process. The aims of this study were:

1. To establish the integrative mechanisms needed in the planning and control process of refurbishment projects.
2. To establish the relationships between the integrative mechanisms and planning performance.

Rahmat, I, Torrance, V B and Young, B A (1998) The planning and control process of refurbishment projects. *In:* Hughes, W (Ed.), *14th Annual ARCOM Conference*, 9-11 September 1998, University of Reading. Association of Researchers in Construction Management, Vol. 1, 137-45.

METHODOLOGY

Opinion and archival research methodology was adopted for this study. It was a combination of survey research, i.e. semi-structured interviews, postal questionnaire survey and archival documentation.

The main objectives of the semi-structured interviews and archive documents were to refine the research problems and to set the theoretical framework for the study. The selected interviews with firms' representatives provided a framework and in-depth discussions for assessing the scope of questions needed for the postal questionnaire survey and to help the author to gather relevant documents on the planning and control process.

Since the emphasis of this study was on medium and large refurbishment projects, only planning and control from refurbishment firms undertaking refurbishment projects with a contract value of more than £100,000 were interviewed. Fifteen construction firms with an annual turnover ranging from £3 to £200 million per annum were chosen. The interviews took place at the head offices of the refurbishment firms.

The main objectives of the postal questionnaire survey were to cover a wide spread of the sample population and to collect the primary data for statistical analysis. It provided the opportunity to analyse the quantitative data through a variety of statistical techniques.

In the postal questionnaire survey, the respondents were asked to select a completed refurbishment project carried out between December 1991 to October 1995 with a contract project value above £500,000.

For the postal questionnaire survey, 166 questionnaires were distributed to planning and control managers employed in medium/large construction firms listed in the Directory & Yearbook of the Building Employers' Confederation 1994-1995 for London, Southern and Eastern Regions. Sixty-seven (40%) returned questionnaires were considered to be useful for statistical analysis in this study. The size and type of refurbishment projects analysed are shown in Table 1 and Table 2 respectively.

Spearman's correlation coefficient technique was used to measure the relationships between two ordinal variables. The null hypotheses were rejected at the 5% significant level.

Table 1: The size of refurbishment projects

Size of project (in million pounds)	Refurbishment Projects (N=67) %
0.5- 1.0	22
1.1 - 1.5	24
£1.6 –2.0	15
£2.1 –2.5	6
£2.6 –3.0	3
More than £3.0	30

Table 2: The types of building in refurbishment projects

Types of project	Refurbishment Projects (N=67) %
Office	42
Residential	28
Shop	6
Hospital	6
School	4
Others	13

THE COMPLEXITY AND UNCERTAINTY OF REFURBISHMENT PROJECTS

The review of literature revealed that the complexity and uncertainty of refurbishment were derived mainly from five situational variables listed below:

- The degree of design completeness before construction work commenced on site.
- The value of services work as percentage of contract value.
- The value of provisional sums as a percentage of contract value.
- The number of subcontractors employed.
- The difficulty of access to project site.

Many refurbishment projects commenced on site with ill-defined design information. This study found that 50% of refurbishment projects commenced work on site with only 60% of design being complete. In the majority of refurbishment projects, a high proportion of design information could be obtained only during the construction stage. This implies that in order to ensure that information flows efficiently between the client, who provides most of the design information and the contractors, who implement the projects, the clients have to be actively involved in decision-making during this stage.

In 78.2% of the refurbishment projects surveyed, services work contributed more than 20% of project contract value. This implies the need to employ site managers who have specialised knowledge in services work. A refurbishment construction firm interviewed in this study created a special department to provide training for its site managers in managing services work. It also created a special 'task force' in services, especially for large refurbishment projects. This strategy has become more necessary since the documented quantities for services works in refurbishment projects are rarely listed in detail. Normally, services work is specified in general terms and provisional sums are inserted.

A high proportion of items measured under provisional sums makes it difficult for refurbishment project organisations to plan in advance. In 33.3% of refurbishment projects surveyed in this study, the percentage of provisional sums was more than 10% of the project contract value.

The majority of the refurbishment projects employ a large number of subcontractors specialising in different technologies. According to Laufer (1991), construction projects that employ more than 15 subcontractors are classified as 'complex'. This study found that in nearly 70% of refurbishment projects, more than 15 subcontractors were employed. Hence, co-ordination of subcontractors is a major problem in the planning and control of refurbishment projects.

In many refurbishment projects, the work has to be carried out in sensitive premises, for example, embassies and government offices. In such premises, the client may impose restrictions on access to certain parts of the building and thereby restrict the movement of labour within the building. Many refurbishment projects are also located in highly congested areas in city centres. This study found that in 42.8% of the refurbishment projects, access to the site was difficult/very difficult.

The difficulty of access means that the work has be carried out in small batches and fragments. Hence, effective channels of communication between the site, the head office, the subcontractors and the client are needed.

THE PLANNING PERFORMANCE OF REFURBISHMENT PROJECTS

Generally, a project that is ill defined will be relatively uncertain in its performance. The inherent complexity and uncertainty of refurbishment projects are among the factors attributed by many management writers to the difficulty in keeping the cost on target.

The respondents to the postal questionnaire survey were asked to indicate the cost variance of the refurbishment projects, measured in terms of the ratio of actual construction cost to target construction cost. A cost variance of less than 1 meant that the actual construction cost was less than the target construction cost. A cost variance of more than 1 meant that the actual construction cost was more than the target construction cost.

Table 3 shows that 51% of refurbishment projects were over the contractors' estimates. Thus, a systematic and efficient cost information flow is vital during the construction stage. Any deviations from the original budget prepared by the estimator need to be detected early. This implies that a higher involvement of the estimator in decision-making is required during construction stage.

Laufer and Tucker (1988) inform us that the greater the uncertainty, the lower the accuracy, and the less the extent to which plans materialise, hence the less likely the plans are used for decision-making. Laufer and Tucker (1988) observed that success in planning and control could also be measured by the extent to which the plans are used. This study found that in 79% of refurbishment projects, planning techniques were used extensively for monitoring (see Table 4). This success could be attributed to the active involvement of the planners in decision-making during the construction stage of the majority of refurbishment projects. In nearly 60% of refurbishment projects, the planners were moderately/highly involved in decision-making during this stage.

Table 3: The cost variance of refurbishment projects

Cost variance	Refurbishment projects (N=60) %
Less than 0.90	25.5
0.91 to 0.95	7.3
0.96 -1.00	16.4
1.01 -1.05	20.0
1.06 -1.10	20.0
More than 1.10	11.0

Table 4: The extent to which the planning techniques were used for monitoring

The extent of use.	Refurbishment Projects (N=67) %
Small extent	9.1
Neutral	12.4
Large extent	78.6

THE ASSOCIATIONS BETWEEN THE SITUATIONAL AND THE PLANNING PERFORMANCE VARIABLES

Spearman's correlation technique was used to detect the relationship between the complexity and uncertainty variables and the planning performance variables. The results are shown in Table 5. Positive correlation coefficients indicate that the greater

the complexity and uncertainty of the situational variables, the lower the planning performance.

Table 5: Associations between the situational and the planning performance variables

Situational variables	Cost variance	Extent of monitoring♣
The number of subcontractors	.04	-.10
The value of services work as percentage of contract value	-.05	.06
The value of provisional sums as percentage of contract value	.33*	.10
Design completeness before construction work commenced on site	.17	.02
Difficulty of access to site	.24	.05

*significant at 5% level ** significant at 1% level (two- tailed test)

♣ The extent to which the planning techniques were used for monitoring during construction.

Table 5 shows that the correlation coefficients are mostly positive. This was expected as the higher the degree of complexity and uncertainty of the situational variables, the more difficult it is to plan and control. However, only one significant correlation was found, i.e., the percentage of provisional sums to contract value is significantly associated with cost variance.

The provisional sum is the value allocated for work with insufficient information. The value can only be ascertained once the work had been completed during the construction stage. Increased value of provisional sum would increase the actual construction cost, and therefore increase the likelihood for the refurbishment projects to exceed the budget. This result gives credence to the argument that more information should be gathered at the early stage of refurbishment projects to narrow down uncertainty. A procurement system, such as design and build, which allows contractors to gather information and to be involved in decision-making during design stage should be used.

THE INTEGRATIVE MECHANISMS

Quah (1992) suggested that there is a need to develop techniques in organising and planning to cope with the fluid and unknown nature of refurbishment works. Walker (1989) suggested that the best way to manage the complexity and uncertainty of construction projects is by greater integration of decision-making among the key participants. Integration is a concept put forward by Lawrence and Lorsch (1967: p4) who defined it as ‘the extent to which the activities of individuals are closely co-ordinated in relation to the project objectives’. It is facilitated by effective formal channels of communications and through reliable and accessible information for staff about their jobs and their firms. One of way of achieving this is by integrating all the key participants in decision-making.

This study measured the relative degree of involvement of five key participants in decision-making during the construction stage. The key participants are the client, estimator, planner, site management and subcontractors. The involvement of the key participants is measured on a four-point scale, ranging from 1 (not involved) to 4 (highly involved). The results show that there is a tendency for refurbishment project organisations to differentiate the tasks of the key participants involved in the planning and control process. Not all the key participants were integrated in the decision-making process during construction stage. Site management and subcontractors were found to be highly involved. The client and planners were moderately involved. The

estimators, however, were not involved. The exclusion of the estimators from the decision-making process has a serious implication, as can be seen below.

Galbraith (1977) maintained that one way of increasing a project organisation's information processing capacity is to employ lateral relations, which include meetings and direct contacts. These are the modes by which the decision processes cut across lines of authority.

Two types of direct contacts were identified in the literature review, the direct formal contact and direct informal contact. The direct formal contact is the term used when the information is obtained either by correspondence, reports or memos. The information obtained is documented. The information obtained by direct informal contacts is obtained verbally, mostly ad-hoc on a one-to-one basis, such as outside the office corridor and not documented. Laufer and Tucker (1996) observed that there is a tendency for direct informal contacts to take place especially during the early stages of construction projects to reconcile differences. They help to remove obstacles and accelerate the pace of understanding.

Meetings as integrating mechanisms are generally regarded to be more flexible than direct formal contacts since they enable mutual adjustments and adaptation through personal discussion and communication.

Unscheduled meetings are often held when there is an urgent need to consult and decide on urgent issues. The unscheduled meetings are normally attended by the majority of the key participants to discuss a concern of one of the key participants.

The importance of the lateral relations in the planning and control process of refurbishment projects was sought in the present study. The response was recorded on a five point scale ranging from 1 least important to 5 very important. The results are shown in Table 6.

Table 6: The importance of the methods of obtaining information for refurbishment projects

Lateral relations	Average score N=67
Scheduled meetings	4.0
Unscheduled meetings	3.7
Direct informal contact	3.7
Direct formal contact	3.4

Table 6 shows that scheduled and unscheduled meetings and direct informal contacts are important methods of obtaining information. Only direct formal contact was found to be moderately important. This indicates that lateral relations are important integrative mechanisms in the planning and control process of refurbishment projects.

Among the four modes of lateral relations, scheduled meetings were found to be most important methods of obtaining information. There are plausible explanations for this. The uncertainty of refurbishment projects requires the information to be obtained more efficiently through meetings when the majority of the key participants are present. Meetings provide greater opportunity to integrate the decisions of all key participants, than direct contacts. Meetings also provide greater opportunity to handle the issues in planning and control holistically. Besides, the information disseminated in the meeting would be documented and therefore more structured and could be stored for reference. Hence, formal meetings should be encouraged, adhered to and project members should participate in the decision-making process.

Nevertheless, direct formal contact is an important/very important method of obtaining information in more than half of the refurbishment projects surveyed in this study. According to Boyd and Weaver (1994), inflexibility can force people to perform in an inappropriate way. However, there is justification for maintaining formalisation in the planning and control process. Formalisation is necessary to provide a framework from which the informal system can be built to accomplish the objectives of the project (Higgin and Jessop 1965). Furthermore, conflicts are more likely to occur in refurbishment projects which are noted by a high level of uncertainty. In order to fulfil contractual obligations, and to avoid conflict and litigation, direct formal contact becomes an indispensable mode of communication within refurbishment project organisation. The information obtained through direct formal contact could be used as evidence for the settlement of final accounts and in the event of litigation. This mode is most widely used between key participants employed in different organisations, such as between the main contractor and subcontractors.

One method of increasing information processing capacity in refurbishment projects is by employing planning and control procedures. Procedures are standards that specify actions in given situations. Procedures reduce the need for communication between the key participants. Though procedures tend to cause inflexibility, they are found to be important modes of integrating the key participants in refurbishment projects. In 75% of the refurbishment projects, planning and control procedures are used to a large/very large extent. However, in order to cope with the uncertainty of refurbishment projects the procedures tend to be simple, requiring only minimum paperwork and approval.

THE ASSOCIATIONS BETWEEN THE INTEGRATIVE MECHANISMS AND PLANNING PERFORMANCE

Galbraith (1977) maintained that a solution to which plans are worked out is a major determinant of construction planning effectiveness. Galbraith (1977) argued that increased use of co-ordination devices (integrative mechanisms) leads to improved communication within an organisation, which may lead to increased performance. Hence, it could be argued that the influence of the situational variables could be moderated by the use of integrative mechanisms used in the planning and control process of refurbishment projects.

Spearman's correlation coefficient technique was employed to establish the relationships between the involvement of the key participants in decision-making during the construction stage and the planning performance variables. The results are shown in Table 7.

Table 7 shows that the higher the involvement of the estimator during the construction stage, the lower the cost variance. This result called into question the policy of many refurbishment project organisations of excluding the estimator in decision-making during the construction stage. There is a strong argument for increased involvement of the estimators during the construction stage. Cost information is not only complex in nature but is also highly sensitive. It also tends to fluctuate throughout the construction stage as new and additional cost information is obtained. The flow of information relating to cost would be impaired if the estimator, who is the most knowledgeable about project estimated cost is excluded.

Table 8 shows the extent to which the planning techniques were used for monitoring could be significantly improved by two integrative mechanisms i.e. direct informal contacts and procedures. Procedures tend to increase formalisation, which in turn, encourages the key participants to use plans and instructions that are documented such as the planning techniques.

Table 7: The associations between involvement of key participants in decision-making during the construction stage and the planning performance variables

Key participants	Cost variance	Extent of monitoring[1]
Clients	.08	-.02
Estimators	-.27*	-.19
Planners	.07	-.26
Site management	.07	-.13
Subcontractor	.04	-.07

Table 8: The associations between the integrative mechanisms and the planning performance variables

Integrative mechanisms	Cost variance	Extent of monitoring[1]
Scheduled meetings	-.01	-.22
Unscheduled meetings	-.16	-.06
Direct formal contact	-.06	-.14
Direct informal contact	-.06	-.39**
Planning and control procedures	-.09	-.30**

* at 0.05 significant level ** at 0.01 significant level

[1]- the extent to which the planning techniques were used for monitoring during construction

Direct informal contacts, on the other hand, reduce formalisation, increased flexibility and speed up communication flow. Increased use of direct informal contacts would enable refurbishment project organisations to update the planning techniques regularly, thus increase the extent to which they are used for monitoring.

CONCLUSIONS

The majority of refurbishment projects are characterised by high degrees of complexity and uncertainty. Fifty percent of refurbishment projects commenced work on site with only 60% of design being complete. In nearly half of refurbishment projects, access to the site was difficult/very difficult.

To ensure that refurbishment projects do not exceed the contractor' budget, more information should be gathered and obtained by the contractors during the design and pre-bid stages. The aim is to reduce the value of provisional sums as a percentage of contract value as the significant contributor to increased cost variance in refurbishment projects.

To improve the planning performance, it is important to integrate all the key participants in decision-making in the planning and control process. However, in many refurbishment projects, the estimators were excluded from the decision-making during construction. This is a questionable strategy since there was a strong indication that increased involvement of estimators during the construction stage could reduce the cost variance.

Refurbishment projects require both formal and informal interactions. The key participants are required to interact and obtain information on a one to one basis and in groups. All forms of interactions are important and complement each other.

Planning and control procedures are used extensively in refurbishment projects. The complexity and uncertainty of refurbishment projects, however, require the procedures to be flexible.

In summary, there are conflicting features in the planning and control process of refurbishment projects. It requires formal, as well as informal interactions, rigid and yet inflexible procedures.

This paper recommends that a study of the application of information technology in the planning and control process of refurbishment projects should be conducted. The main objective would be to establish the potential of information technology to increase integration, with the view to more effectively integrating the key participants who are located on different sites, at different times and employed in different organisations.

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