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EXAMINING IMPACT OF RISK MANAGEMENT PROCESS ON PROJECT SUCCESSION RATE

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ABSTRACT
The general consensus in the construction industry and academia alike is that good risk management is pivotal to project success. However, quantitative evidence supporting this conjecture is lacking. The SCIRT alliance, formed after the 2011 earthquakes in Christchurch, provided the opportunity to compare projects with different risk management strategies and analyses the effects of changes in scope and forecasted final cost on project success. Data from more than 200 projects was used in statistical and qualitative analysis. It showed that early contractor involvement and risk workshops in the design stages significantly improved the financial performance of projects. Project managers changed their forecasted final project cost more frequently and the changes led to improved cost certainty. Changes in project scope were linked to poor financial performance. Enhanced risk management techniques employed in the design stages of a project provided project managers with a better platform from which to manage project risks. The results of this study quantitatively support the intuitive notion that proactive risk management has favorable effects on the financial performance of projects. The general consensus in the construction industry and academia alike is that good risk management is pivotal to project success. However, quantitative evidence supporting this conjecture is lacking. The SCIRT alliance, formed after the 2011 earthquakes in Christchurch, provided the opportunity to compare projects with different risk management strategies and analyses the effects of changes in scope and forecasted final cost on project success. Data from more than 200 projects was used in statistical and qualitative analysis. It showed that early contractor involvement and risk workshops in the design stages significantly improved the financial performance of projects. Project managers changed their forecasted final project cost more frequently and the changes led to improved cost certainty. Changes in project scope were linked to poor financial performance. Enhanced risk management techniques employed in the design stages of a project provided project managers with a better platform from which to manage project risks. The results of this study quantitatively support the intuitive notion that proactive risk management has favorable effects on the financial performance of projects.

Keywords:- Risk Management, Financial, Performance, Industry.

I. INTRODUCTION

Risk management has become an important part of the management process for any project. In fact, Risk management came into the foreground of business literature during the last two decades of the 20th century. Actually, believes that the circumstances within the construction industry had led to adopting risk management and analysis into practice. Risk is one of key factors that can positively affect working effectively inside the firm if it was practiced in the proper way. By doing such organization can achieve capital value of rareness and capital value of limitability via which the firm can build stronger competitive advantage by developing maintaining and retaining core competencies; which can in its turn maximize the organization's market share, reputation maximize shareholder equity and stake holder goals and maintaining the maturity stage of the firm's life cycle in which it can maintain the peak stage for all of its activities by recognizing, encouraging and retaining the peak performance.

An effective use of project management techniques such as risk and value management are considered as key supporting processes and to add to them quality, cost, time and change control all together generate an integrated approach to the project success. While, project risk management is a scalable activity and should be commensurate with the size and complexity of the project under consideration. Yet, simpler projects means utilizing simple qualitative analysis such as Project Management Online Guide in the Risk Management Plan spreadsheet, in similar vein, Larger more complex projects may wish to use more robust analysis techniques via Monte-Carlo simulation models. Risk management requires top-level management support, acknowledgment that risks are realities, and a commitment to identify and manage them. One discriminator of a successful organization or project is the use of risk management to anticipate potential negative conditions, problems, and realities. Ineffective projects are forced to react to problems; effective projects anticipate those.

II. PROJECT SUCCESS

Success Factors Based on the researches of various authors (APM, 2006; Turner, 2002; Turner & Simister, 2001; among others), it was determined that the conventional view of project success based on cost, time and quality objectives were not sufficient. The various stakeholders involved in a project may each have a different view of what determines the successful project. Kerzner (2001) added two more criteria to determine the successful project. First, the project would effectively and efficiently utilise the resources. Secondly, it should be accepted by the customer. Turner (2002) discredits this conventional view of the project success based on time, cost and quality objectives as being a perspective from the point of view of the project team. He identified a wide range of success criteria, reflecting various stakeholders' interest and judged over different time scales. These views though differing need to be aligned in order to achieve a successful project (Turner & Simister, 2001).

Critical Success Factors Critical Success Factors are elements within the project context/ environment which should be controlled to increase the probability of a successful project outcome. The presence of these factors in a project does not guarantee a success but their absence may contribute to failure. Many authors (e.g. Rozenes et al., 2006; Dooley et al., 2005; Maylor, 2003; Turner, 2002; Kerzner, 2001) have identified the following as critical factors to the success of a project:

- Definition of clear goals.
- Management support.
- Detailed project plan.
- A defined control mechanism.
- Communication- client consultation and acceptance throughout the project lifecycle.
- Competent and technically able project team.
- Flexibility of the Project Manager to deal with uncertainty.
- The project owner should take an interest in the performance.

Appropriate planning of the project determines a baseline which outlines a course to steer in the execution of the project. In project execution, actual progress usually deviates from the baseline plan. Rozenes et al. (2006) stated that the deviations can be due to the following:

- Owner Interference/ Scope creep.
- Inadequate constructor experience.
- Financing and payments.
- Labour Productivity due to learning curve, sickness, absenteeism.
- Slow decision-making.
- Improper planning.
- Subcontractor's late deliveries.

III. PROJECT BENEFITS

Benefits management on the other hand is the identification of the benefits at an organisational level, monitoring and achievement of those benefits (APM, 2006). Project benefits can be measured either qualitatively, e.g. in terms of customer satisfaction, or quantitatively e.g. in terms of profit or increase in market share. The achievement of the project success criteria can be measured at the project closeout and handover phase of the life cycle while the benefits can only be derived after this phase. This therefore means that the ownership of the benefit realisation rests with the project sponsor rather than the project manager. Key Performance Indicators (KPIs) are quantitative measures of success criteria and tracking of the KPIs would ensure the project is aligned towards success.

IV. RISK MANAGEMENT AND PROJECT SUCCESS

To increase the chances of a proposed project succeeding, it is necessary for the organisation to have an understanding of potential risks, to systematically and quantitatively assess these risks, anticipating possible causes and effects, and then choose appropriate methods of dealing with them (Mobey & Parker, 2002). To ensure that any potential risks are managed effectively, the risk process needs to be explicitly built into the decision-making process. Risk management is thus an important tool to cope with such substantial risks in projects by: (a) assessing and ascertaining project viability; (b) analyzing and controlling the risks in order to minimize loss; (c) alleviating risks by proper planning; and (d) avoiding dissatisfactory projects and thus enhancing profit margins (Lam et al., 2007).

V. METHODOLOGY

The objectives of this study were achieved by using both statistical and Qualitative Comparative Analysis (QCA) of a sample of project data released by SCIRT. This data set comprised of the risk registers, financial estimates and actual costs of 246 finalized projects; 146 projects for the statistical analysis and 100 projects for the QCA. These projects included storm water, wastewater and roading infrastructure repairs ranging in final cost from $40,000 to $22,000,000. Any assumptions made during the analysis were verified by members of SCIRT. The results of the study were discussed with representatives from SCIRT and others in the construction industry to confirm the appropriateness of the practical interpretation of results.

Statistical Data Analysis

In this study, project performance was considered from a financial perspective. Cost overruns is defined as the difference between the final actual cost of a project and the target cost agreed upon by all parties. This target cost is known as the target outturn cost (TOC). The risk level of each project was determined using its risk register. Each risk item identified in the risk register is assigned a ranking for consequence and likelihood using a standardized scale. The product of consequence and likelihood rankings of all identified risk items were summed to give the total level of project risk.

At SCIRT, changes in TOC occur due to client or design initiated scope changes. The number of scope changes incurred over the duration of each project was determined by counting the number of TOC changes. Over the project duration, the project manager has the opportunity to re-evaluate the project and adjust the forecasted final cost (FFC). This FFC is the project manager's estimate only and has no ' official' status or influence. Of interest were the changes in FFC that were not directly related to scope changes. The frequency of non-scope related FFC changes was determined by subtracting the total number of TOC changes from the total number of FFC changes in a project and dividing this value by the project duration in months. Project size has been defined as the total actual cost of a project. The initial data set provided by SCIRT for this study was prepared to allow for appropriate analysis. This involved ensuring that all the projects had a complete set of financial data and a corresponding risk register.

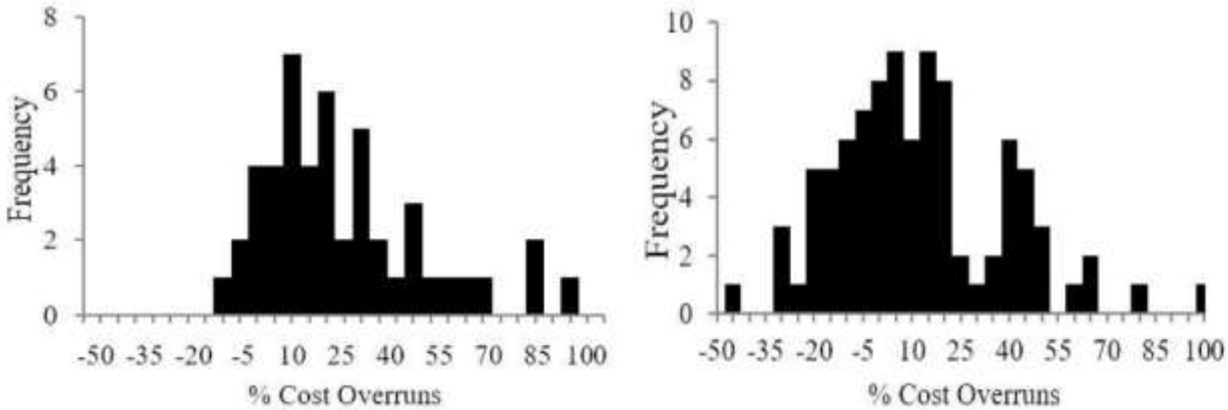

Figure 1. Frequency plot of project cost overruns in the different phases of the program; ramp up phase on the left and steady state on right.

Kendall's Tau correlations were used to examine whether there is association (1) between the number of scope changes and cost overruns, (2) between the number of scope changes and project size, and (3) between the number of FFC changes and cost overruns. Kendall's Tau correlations were adopted because they provide a non-parametric alternative to Pearson's Linear Regression correlations. This was necessary because the variables in question are not normally distributed, an important assumption underlying Pearson's correlations. Kendall's Tau was preferred to Spearman's Rho as it is less sensitive to errors and discrepancies in the data and is more suitable when dealing with small sample sizes. The only assumption required for Kendal's Tau correlations is that the variables are monotonic, which was verified upon examination of the scatter plots.

VI. RESULTS AND DISCUSSION

The distribution of percentage cost overruns of projects delivered in the two phases of the SCIRT program is shown in Figure 1. The mean project performance in the Ramp-Up was a cost overrun of 22.8%, while in the Steady-State the mean cost overrun was 9.3%. Kruskal-Wallis and Mood' s Median tests were performed on the two data sets to confirm that there was a statistically significant difference in their financial performance. The significance levels found using the Kruskal-Wallis and Mood' s Median were 0.002 and 0.038 respectively. This signifies that projects in the Ramp-Up and Steady State phases fall into two significantly different populations based on their cost overrun distributions. The relationship between project risk level, scope changes and project size has been investigated in these 2 groups of projects. The results show that there were no significant correlations, 2- tailed at 0.05 level in the ramp up phase. However in the following steady state phase, the correlation between the project risk level and umber of scope changes, respectively the project size was found to be 0.163 and 0.181 at the 0.05 level (2- tailed). From prior research, it was known that projects in the Steady State phase of the SCIRT program had much greater levels of ECI than those in the Ramp-Up phase (Botha & Scheepbouwer, 2015b). A scatter plot of this relationship can be seen in Figure 2. Vertical axis labels have been excluded for confidentiality purposes.

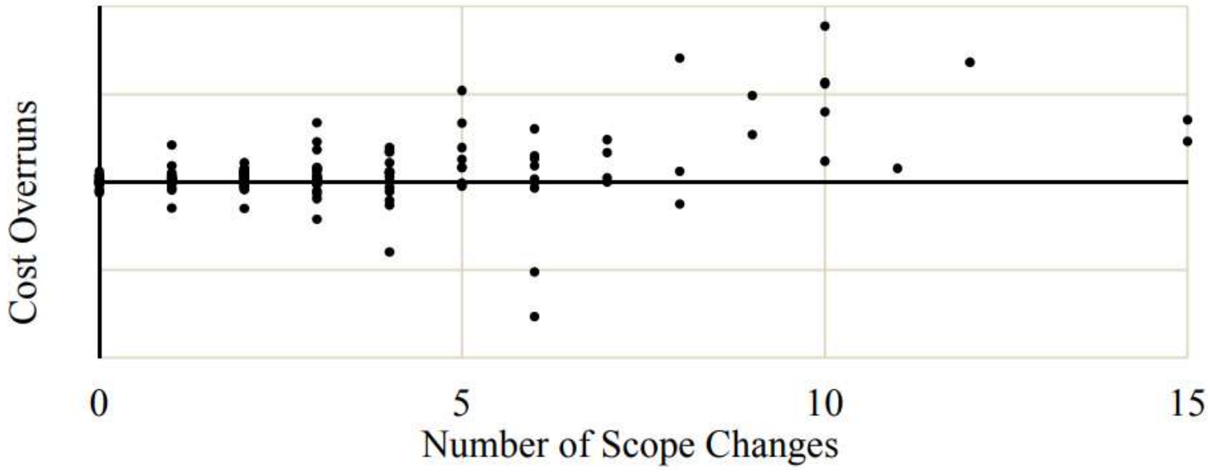

Figure 2. Relationship between the number of scope changes and cost overruns.

A positive correlation between the number of scope changes of a project and the projects financial outcome suggests that the financial compensation corresponding to changes in scope was insufficient. The change in TOC associated with the change in scope may account for the additional work, but it does not compensate fully for the effects on project planning and scheduling.

VII. CONCLUSIONS

Analysis of a large sample of completed projects (146) in the SCIRT rebuild program showed a significant improvement of 13.5% in financial performance of projects that had incorporated the involvement of the contractor early. The mean project cost overrun was 22.8% in the Ramp-Up phase and 9.3% in the Steady State phase and the key distinction between the two phases was the incorporation of early contractor involvement and risk workshops in the design stages of projects. This suggests that ECI and risk workshopping have a direct favorable effect on the financial success of a project. This finding was supported by the results of the QCA which showed the effective contribution of risk maturity improvement into the cost performance gains.

Also, highlighted by QCA were the positive correlation between clear scope, safety and schedule performances with the financial performance of the projects.

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