# Effectiveness of Project Management Tools and Techniques in Sri Lankan Telecommunication Sector

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**Abstract**

The main focus of this research is to investigate the effectiveness of project management tools and techniques (PMTT) in Sri Lankan telecommunication sector. Also this research will further elaborate how Project Management Tools and Techniques effect on success of projects. Sample has been derived as a representation by covering main telecommunication providers in Sri Lanka. This sample consists of 178 employees who are responsible for projects in telecommunication sector. Linear regression and correlation analysis has been used to prove the model fitting. The finding suggests that project manager's competency, top management support and organisational commitment facilitate project success by active use of PMTT. Further Project manager's competency is the most important factor influencing the level of PMTT usage and thereby project success. Also, Top management support is the second most important factor determining the level of PMTT usage and project success. Further Organisational commitment influences the level of PMTT usage and project success. Finally, analysis proved there is no significant association between project complexity and PMTT usage or project success.

**Keywords:** Project management tools and techniques, project management, telecommunication sector, project success

## INTRODUCTION

The economic growth of Sri Lanka in the period of 2013 to 2015 has resulted in a boom in the implementation of development activities across the country after the ending of ethnical political conflict. The telecommunication sector plays an important role in this development drive by implementing development projects with varying magnitudes under various sectors. For such endeavors to be effective, it is essential that the telecommunication sector employs globally accepted, sound management practices. The Project Management body of knowledge becomes more prominent in this context, given the uniqueness of development projects, their magnitude and the relative importance to the national economy.

Project management helps an organization to reduce product development time to market, utilize limited resources, handle technological complexity, respond to stakeholder satisfaction and increase

global market competition (Cleland, 1998, as cited in Patanakul et al., 2010). Moreover, several empirical studies supported that correct use of project management tools and techniques (PMTT) lead to project success. Conversely inappropriate use of PMTT can lead to project delays, budget overruns and unsatisfied customers.

The telecommunication sector in Sri Lanka comprises of 39 communication service providers (TRC report, September 2014). Similar situation is widely followed by other countries and that has formed an oligopoly market all around the world. The telecommunication sector in Sri Lanka the market comprises with Sri Lanka Telecom, Mobitel, Dialog, Hutch, Etisalat and Airtel. Moreover, the main providers are Sri Lanka Telecom and Dialog.

In telecommunication sector there is profit maximizing focus, high potential for income generation and, generally speaking, survival most depend on the first over advantage technology and timing of entry to the market. Further, all telecommunication sector organisations generate most of their income from the individual customer. However, because of the market competition we can observe that telco providers now more focus on assured revenue through SME, Large corporates and Wholesale business ventures. Moreover, the need for project management expertise in telecommunication sector organizations has become fundamental in order to deal with the enormous responsibility of managing a number of projects.

**Statement of the Problem**

The Sri Lankan telecommunication sector is no different to the telecommunication sector of most of the developing countries in terms of its structure and operations. Therefore, the Sri Lankan telecommunication sector also faces various issues and challenges that are common among the developing countries which would ultimately affect its economic growth. Accordingly, the context in which the Sri Lankan telecommunication sector operates has a direct impact on the successful implementation of project management practices. As discussed above, certain factors could dampen the effective usage of project management practices, forbidding the telecommunication sector organizations of the country to reap the benefits of project management.

In recent years, telecommunication sector performance measurement and project management have attracted much attention in the literature. Also it depends on the how government sector give their support for telecommunication development activities. However, most papers that have been published in academic journals focus on the public sector in Europe, North America or Australia (Atif, 2010). There is little literature available about the project management in the public sector of

less developed countries. Few authors (Abbasi & Al-Mharmah, 2000; Kartam et al., 2000; Partington, 1996; Bryde, 2008; Sonuga et al., 2002 as cited in Atif, 2010) have identified different barriers which hinder the project success in less developed countries. Some of such barriers are: lengthy approval procedures, existing administrative system, change orders, lack of ownership, lack of authority, poor estimation of activity cost. However, those studies have emphasized on further research to investigate the limitations and potential for project management systems in different environments.

With the end of the 30 year long internal conflict in 2009, the Government of Sri Lanka intensified its mega development projects drive in strategic areas such as roads, ports, power and energy, aviation, railways, water supply and irrigation, with a view of facilitating a high economic growth momentum. In addition, a number of other rural/regional development initiatives such as "Gama Neguma", "Maga Neguma", "Uthuru Wasanthaya", "Neganahira Navodaya" are being implemented to improve the rural areas of the country. The success of such development projects depends largely on the effective application of project management practices, as any delay in implementation or/and any deviation from the projected quality/specification will negatively affect the realisation of expected economic benefits to the country.

## Objectives of the Study

The study aims at investigating two broad research questions.

How operative are the project management tools used in the telecommunication sector?

This aims at investigating the usage of PMTT in the telecommunication sector to understand the extent of their usage. At the same time project success is measured using various approaches given in literature to find whether there is a relationship between the application PMTT and project success.

Which aspects influence the effectiveness of project management tools in the telecommunication sector?

The second broad objective of the research is to identify, the factors that really affect the usage of PMTT in the Sri Lankan telecommunication sector in a way that ultimately contributes to project success among various factors discussed in literature.

## Significance of the Study

The amount of research work carried out on project management tools is relatively small compared to other areas of project management such as project planning, project control, success measurement and risk management. Even the limited number of research into the use of Project Management tools has concentrated on practices within the private sector. There has been a lack of investigation into project management tools used in the telecommunication sector.

Further, several studies have suggested that the proper use of project management tools and techniques impacts the success of a project (Might and Fischer, 1985; Pinto and Slevin, 1988; Cash and Fox, 1992; Hatfield, 1995; Thamhain, 1996; Coombs, McMeekin et al., 1998; Milosevic, Inman et al.,2001 as sited in Patanakul et al.,2010) Hence, the application of Project Management tools and techniques in the telecommunication sector is gradually becoming an important issue, especially at a stage of spending 6 per cent of GDP on public investments (Central Bank of Sri Lanka, 2009, 2010, 2011, 2012). On the other hand, infrastructure projects are expected to support the national economic growth, to increase the prosperity of the people and to make the quality of the local environment better. In this context, the proposed research aiming to examine the effectiveness in the use of Project Management tools and techniques in the telecommunication sector of Sri Lanka, which is a national need providing key inputs to government policymakers.

## LITERATURE REVIEW

### PMTT and project success

As citied by Patanakul et al. (2010), several studies have suggested that the proper use of project management tools and techniques impacts the success of a project (Might and Fischer, 1985; Pinto and Slevin, 1988; Cash and Fox, 1992; Hatfield, 1995; Thamhain, 1996; Coombs, McMeekin et al., 1998; Milosevic, Inman et al., 2001). In contrast, the inappropriate use of tools and techniques can also be counterproductive to project management outcomes (Nicholas, 1990; Cash and Fox, 1992; Hatfield, 1995; Thamhain, 1996; Kerzner, 2000). Patanakul et al. (2010) propose that by using appropriate tools and techniques in the right way (utilising the PMTT that match the characteristics of project phases) will have direct impact on the delivery of a successful project.

### Project Management Tools and Techniques

In the literature, some authors perceived Project management tools and techniques (PMTT) as software for project management (Fox, Murray et al., 2003, as cited in Patanakul et al., 2010), while others view them as systematic procedures or practices that project managers use for producing specific project management deliverables (Milosevic, 2003, as cited in Patanakul et al., 2010).

Project Management Institute (2008) has suggested nine knowledge areas in project management. Table 2 below illustrates some examples of PMTT present in the literature, organised using project management knowledge areas. Some PMTT, e.g. Return on Investment (ROI), payback period, cost-benefit analysis, Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis, flow charting, cause-and-effect diagram and risk management, are common to both project and general

management. However, other PMTT such as Work Breakdown Structures (WBS), Earned Value Management, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT) and Graphical Evaluation and Review Technique (GERT) are unique to project management.

**Project Manager's Competency**

Research that has examined the characteristics of successful project managers highlights that project managers must have or must develop a number of diverse qualifications and skills in order to perform their jobs. Posner (1987) as citied in Jeffrey & Kharbanda (1995) identifies several categories of project management skills important for their success. His list of tools necessary for successful project managers is far-ranging and again demonstrates that in order to be an effective project manager, it is necessary to be technically qualified a dynamic leader of the project team, sensitive to issues of subordinates, diversity and motivation, and so forth.

Project manager's competency is also addressed by the Project Manager Competency Development (PMCD) framework of the Project Management Institute. PMCD has two broad dimensions of which the first dimension covers project management knowledge or performance competencies whereas the second dimension covers personal competencies. The first broad dimension of project management knowledge or performance competencies is focused on the competency to use project management tools and techniques. Meanwhile, the second broad dimension of personal competencies takes into consideration those behaviors, attitudes and core personality characteristics that contribute to a person's ability to manage projects. These personal competencies are grouped into six dimensions by the Project Management Institute, namely, communication skills, leadership skills, management skills, cognitive ability, effectiveness and professionalism.

**Top Management support & Leadership**

Management support for projects or indeed for any implementation effort has been considered of great importance in distinguishing between their ultimate success or failure. Beck (1983) as citied in Jeffrey & Kharbanda (1995) observed that project management is not only dependent upon top management for authority, direction and support, but ultimately, projects serve as the conduit for implementing top management's plans, or goals for the organization. Further, the degree of management support for a project will lead to significant variations in the degree of acceptance or resistance to that project or product. Top management's support of the project may involve aspects such as allocation of sufficient resources (including financial, manpower, time etc.), as well as project management's confidence in its support in the event of crisis.

Kerzner (2001) and Tinnirello (2001) also appreciated that top and senior management support is one of the most important factors in project management. The lack of top management involvement

is the primary challenge project managers felt which was most deserving of their attention (Simonsen, 2007). Young & Jordan (2008) as cited in Stare (2011) provide the following definition of top management support: CEO and other senior managers devote time to review plans, follow up on results and facilitate management problems. The relationship between project management and senior management is equally important. A good relationship with executive management, specifically the executive sponsor, includes these factors (Kerzner, 2001)

**Organizational Commitment**

A state in which an employee identifies with a particular organization and its goals and wishes to maintain membership in the organization (Robbins et al., 2009). He discusses three separate dimensions to organizational commitment.

Affective Commitment: Emotional attachment to the organization and a belief in its values.

Continuance Commitment: Perceived economical value of remaining in the organization rather than leaving it.

Normative Commitment: Is an obligation to remain with the organization due to moral or ethical reasons.

Several studies have identified organizational commitment as a key factor to drive organizations to success (Allen & Meyer, 1997, Riketta, 2002). As noted in Addae and Parboteeah (2008), such strong interest is not surprising given organizational commitment's relationship with many critical organizational variables such as organizational performance (Riketta, 2002), attendance and staying with an organization.

To promote consistent application of formal project management processes requires organizational commitment and discipline. Affective organizational commitment (OAC) refers to the employee identification with, involvement in, and emotional attachment to the organization out of their volition (Allen & Meyer, 1997). Thus, project workers are characterized by a desire to follow a particular course of action (Meyer & Herscovitch, 2001). According to the study of Bredillet & Dwivedula (2010) to discover the relationship between organizational and professional commitment of project workers, it was evident a significant co-relationship between affective organizational and professional commitments of project workers.

**Project Complexity**

In the literature review of Baccarini (1996) on construction projects, found out project complexity as a key factor affecting project performance. He defined project complexity as 'consisting of many varied interrelated parts' and operationalized this concept in terms of differentiation and

interdependency using mostly referred two types of complexities viz. organisational and technological.

Boland and Fowler (2000) suggest management as a complex, dynamic system involving several nominally independent stakeholders, coupled with informational and resource material flows and behavior that is characterized by inertia and multiple feedback loops. Moreover, Furumo et al (2006) based on their research on project management tools and outcomes in organizations of varying size and sector found that projects carried out in public sector organizations were more likely to be delivered late. The main reasons for this delay were identified as increased oversight and numerous constituencies involved in these projects.

**Other factors affecting project management success**

The field survey done by Olateju et al (2011) states that provision of adequate training in project management to all the person in charge of project, recruitment of project management professionals, higher commitment from the government, establishment of Project Management Office (PMO) in each of the agency are some of the suggested solutions by the respondents. Further, Olateju et al (2011) in a research on project management practice in Nigerian public sector found that the crucial obstacle is lack of project management knowledge to apply PMTT followed by several other obstacles: change of authority, lack of leadership commitment, bribery and corruption, low level of professional training in PM, and rigid organizational structure.

**Methodology**

The approach to data gathering is predominantly quantitative. The primary data collection tool was questionnaires. However, the study was backed by several structured interviews.

Taking into consideration the limited time frame and human capacity, we identified the need to come up with a convenient and also a reliable methodology for data collection. Therefore, we analyzed various methodologies and finally concluded that conducting a paper based survey would be the most expedient.

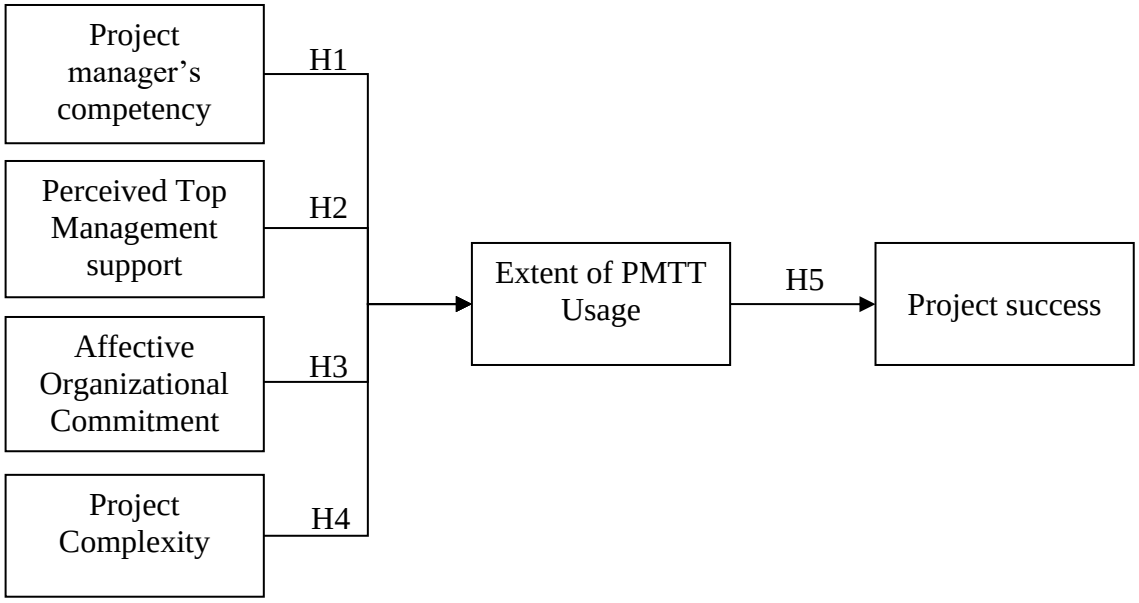
The key methods listed in the following table were employed to achieve set objectives.

*Table 1: Data collection techniques*

| Type of Data | Techniques/Instruments |
|---|---|
| Quantitative | Pilot Study<br>Main Survey (Questionnaire) |

| | |
|---|---|
| Qualitative | Literature Reviews<br>Structured Interviews |

## CONCEPTUAL FRAMEWORK




### Statement of Hypothesis

Hypothesis formulated under the aforementioned conceptual framework can be listed as follows.

Hypothesis 1 - Project manager's competency is positively related to the extent of PMTT usage.

Hypothesis 2 - Perceived top management support is positively related to the extent of PMTT usage.

Hypothesis 3 - Affective organizational commitment is positively related to the extent of PMTT usage.

Hypothesis 4 - Project complexity is negatively related to the extent of PMTT usage.

Hypothesis 5 - The extent of PMTT usage is positively related to project success.

Refer Jayasundara, Jayawickrema, and Sivagananathan (2013) for more details on the framework. They tested this framework on the public sector projects.

**Study Design**

This section presents the approach and how the methodology was developed for the research in detail. Since methodology is one of the most crucial aspects of the research, the researcher spent a considerable amount of time in developing appropriate methods and instruments to collect data and information for the analysis. Considering experts' ideas we planned a mixed approach in conducting the survey to achieve its objectives.

The study was originally designed to survey 250 telecommunication projects and subsequently triangulating the results by employing 10 structured interviews as shown in Table 3.4. However, due to the time bound nature of this research, the study was terminated with 178 survey responses followed by 7 structured interviews.

*Table 2: Study Methods*

| Type of Data | Method | Responses | | | | |
|---|---|---|---|---|---|---|
| | | Target No | Actual No | Incomplete | Partial | Full |
| Quantitative | Survey (Questionnaires) | 250 | 212 | 16 | 18 | 171 |
| Qualitative | Structured Interviews | 10 | 7 | - | - | 7 |

*Source: Survey data 2014*

The research was carried out as a broad-based study covering major telecommunication sector companies. Accordingly, the analysis includes the Sri Lanka Telecom, Dialog & Mobitel . Project team members were selected from the above broad-based population covering projects of varying durations, varying magnitudes in terms of costs, and projects with both foreign as well as domestic sources of funding.

Data analysis

Data collection has been done covering major telecommunication operators in Sri Lanka including Sri Lanka Telecom, Mobitel, Dialog. It was a tiresome effort since all project managers were actively engaged in ongoing projects.

By selecting the proper population, I could gather 212 feed backs and 34 were discarded due to incomplete responses. A sample of 178 has been used to do analysis. These 178 responses have been entered into an Excel sheet and by using SPSS 18.0 was employed to do the analysis.

*Table 3: Descriptive statistics of main variables*

| | N | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Project manager's competency | 178 | 3.8053 | .64469 | .329 | .182 | -.375 | .362 |
| Top management support | 178 | 3.6598 | .80330 | -.685 | .182 | .485 | .362 |
| Organizational Commitment | 178 | 3.4976 | .66993 | -.465 | .182 | .786 | .362 |
| Project complexity | 178 | 3.2892 | .60708 | .329 | .182 | -.375 | .362 |
| PMTT usage | 178 | 3.7390 | .72402 | -.691 | .182 | .700 | .362 |
| Project success | 178 | 3.7954 | .72031 | -1.007 | .182 | 1.595 | .362 |

The overall construct was calculated by averaging the values recoded for each individual measure. Accordingly, project manager's competency construct, recorded a mean of 3.81 and a standard deviation of .64. Also, top management support construct, recorded a mean of 3.66 and a standard deviation of .80.

Further organizational commitment construct recorded a mean of 3.50 and a standard deviation of .67. Moreover, project complexity construct recorded a mean of 3.29 and a standard deviation of .61. Then PMTT usage construct, recorded a mean of 3.74 and a standard deviation of .72. Lastly project success construct recorded a mean of 3.80 and a standard deviation of .72.

**Analysis of the Hypotheses**

**Relationship between Project Manager's Competency and PMTT Usage & Project Success:**

Partial correlation analysis is done to examine the influence of PMTT usage as an intervening variable on the relationship between project manager's competency (independent variable) and project success (dependent variable). Table 4.19 shows the Pearson (zero-order) correlation coefficient between project manager's competency, PMTT usage and project success. In addition, it provides the partial correlation coefficient between project manager's competency and project success when PMTT usage is controlled.

*Table 4: Partial Correlation Analysis for Project Manager's Competency*

**Correlations**

| Control Variables | | | Project success | PMs competency | PMTT usage |
|---|---|---|---|---|---|
| -none-[a] | Project success | Correlation | 1.000 | .650 | .730 |
| | | Significance (2-tailed) | . | .000 | .000 |
| | | df | 0 | 176 | 176 |
| | PMs competency | Correlation | .650 | 1.000 | .757 |
| | | Significance (2-tailed) | .000 | . | .000 |
| | | df | 176 | 0 | 176 |
| | PMTT usage | Correlation | .730 | .757 | 1.000 |
| | | Significance (2-tailed) | .000 | .000 | . |
| | | df | 176 | 176 | 0 |
| PMTT usage | Project success | Correlation | 1.000 | .218 | |
| | | Significance (2-tailed) | . | .004 | |
| | | df | 0 | 175 | |
| | PMs competency | Correlation | .218 | 1.000 | |
| | | Significance (2-tailed) | .004 | . | |
| | | df | 175 | 0 | |

a. Cells contain zero-order (Pearson) correlations.

*Source: Survey Data 2014*

There is a significant association (at 0.01 significance level) between project manager's competency and PMTT usage (0.757). Thus Hypothesis 1 - Project manager's competency is positively related to the extent of PMTT usage – can be **accepted**.

In addition, there is a significant association (at 0.01 significance level) between project manager's competency and project success (0.650). However, the value of partial correlation coefficient (when PMTT usage is controlled) between project manager's competency and project success (0.218) is small when compared with the values when PMTT usage is not controlled (0.650). Therefore, there is an indication of a mediating effect from PMTT usage on the relationship between project manager's competency and project success.

**Relationship between Top Management Support and PMTT Usage & Project Success:**

Table 4.20 shows the Pearson (zero-order) correlation coefficient between top management support, PMTT usage and project success. In addition, it provides the partial correlation coefficient between top management support and project success when PMTT usage is controlled.

*Table 5: Partial Correlation Analysis for Top Management Support*

**Correlations**

| Control Variables | | | Project success | Top management support | PMTT usage |
|---|---|---|---|---|---|
| -none-[a] | Project success | Correlation | 1.000 | .534 | .730 |
| | | Significance (2-tailed) | . | .000 | .000 |
| | | df | 0 | 176 | 176 |
| | Top management support | Correlation | .534 | 1.000 | .615 |
| | | Significance (2-tailed) | .000 | . | .000 |
| | | df | 176 | 0 | 176 |
| | PMTT usage | Correlation | .730 | .615 | 1.000 |
| | | Significance (2-tailed) | .000 | .000 | . |
| | | df | 176 | 176 | 0 |
| PMTT usage | Project success | Correlation | 1.000 | .157 | |
| | | Significance (2-tailed) | . | .037 | |
| | | df | 0 | 175 | |
| | Top management support | Correlation | .157 | 1.000 | |
| | | Significance (2-tailed) | .037 | . | |
| | | df | 175 | 0 | |

a. Cells contain zero-order (Pearson) correlations.

*Source: Survey Data 2014*

There is a significant association (at 0.01 level) between top management support and PMTT usage (0.615). Thus Hypothesis 2 - Perceived Top Management support is positively related to the extent of PMTT usage – can be **accepted**.

In addition, there is a significant association (at 0.01 level) between top management support and project success (0.534). However, the value of partial correlation coefficient (when PMTT usage is

controlled) between top management support and project success (0.157) is small when compared with the values when PMTT usage is not controlled (0.534). Further, it is only significant at 0.05 level. Therefore, there is an indication of a mediating effect from PMTT usage on the relationship between top management support and project success.

**Relationship between Organizational Commitment and PMTT Usage & Project Success:**

Table 4.21 shows the Pearson (zero-order) correlation coefficient between organizational commitment, PMTT usage and project success. In addition, it provides the partial correlation coefficient between organizational commitment and project success when PMTT usage is controlled.

*Table 6: Partial Correlation Analysis for Organizational Commitment Correlations*

| Control Variables | | | Project success | Organizational Commitment | PMTT usage |
|---|---|---|---|---|---|
| -none-[a] | Project success | Correlation | 1.000 | .368 | .730 |
| | | Significance (2-tailed) | . | .000 | .000 |
| | | df | 0 | 176 | 176 |
| | Organizational Commitment | Correlation | .368 | 1.000 | .390 |
| | | Significance (2-tailed) | .000 | . | .000 |
| | | df | 176 | 0 | 176 |
| | PMTT usage | Correlation | .730 | .390 | 1.000 |
| | | Significance (2-tailed) | .000 | .000 | . |
| | | df | 176 | 176 | 0 |
| PMTT usage | Project success | Correlation | 1.000 | .132 | |
| | | Significance (2-tailed) | . | .079 | |
| | | df | 0 | 175 | |
| | Organizational Commitment | Correlation | .132 | 1.000 | |
| | | Significance (2-tailed) | .079 | . | |
| | | df | 175 | 0 | |

a. Cells contain zero-order (Pearson) correlations. Source survey data 2014

There is a considerable association (at 0.01 level) between organizational commitment and PMTT usage (0.390). Thus Hypothesis 3 - Organizational Commitment is positively related to the extent of PMTT usage – can be **accepted**.

In addition, there is a considerable association (at 0.01 level) between organizational commitment and project success (0.368). However, the value of partial correlation coefficient (when PMTT usage

is controlled) between organizational commitment and project success (0.132) is small when compared with the values when PMTT usage is not controlled (0.368), and it is not significant at 0.05 level. Therefore, there is an indication of a mediating effect from PMTT usage on the relationship between organizational commitment and project success.

**Relationship between Project Complexity and PMTT Usage & Project Success:**

Table 4.22 shows the Pearson (zero-order) correlation coefficient between project complexity, PMTT usage and project success. In addition, it provides the partial correlation coefficient between project complexity and project success when PMTT usage is controlled.

*Table 7: Partial Correlation Analysis for Project Complexity*

**Correlations**

| Control Variables | | | Project success | Project complexity | PMTT usage |
|---|---|---|---|---|---|
| -none-[a] | Project success | Correlation | 1.000 | .054 | .730 |
| | | Significance (2-tailed) | . | .476 | .000 |
| | | df | 0 | 176 | 176 |
| | Project complexity | Correlation | .054 | 1.000 | .035 |
| | | Significance (2-tailed) | .476 | . | .639 |
| | | df | 176 | 0 | 176 |
| | PMTT usage | Correlation | .730 | .035 | 1.000 |
| | | Significance (2-tailed) | .000 | .639 | . |
| | | df | 176 | 176 | 0 |
| PMTT usage | Project success | Correlation | 1.000 | .041 | |
| | | Significance (2-tailed) | . | .589 | |
| | | df | 0 | 175 | |
| | Project complexity | Correlation | .041 | 1.000 | |
| | | Significance (2-tailed) | .589 | . | |
| | | df | 175 | 0 | |

a. Cells contain zero-order (Pearson) correlations.

*Source: Survey Data 2014*

There is no association between project complexity and PMTT usage as the Pearson correlation coefficient is small (0.035) and not significant at 0.05 level. Therefore, Hypothesis 4 - Project Complexity is negatively related to the extent of PMTT usage – is **rejected.**

In addition, there is no association between project complexity and project success as the Pearson correlation coefficient is small (0.054) and not significant at 0.05 level. Consequently, a mediating effect from PMTT usage on the relationship between project complexity and project success cannot be considered.

**Relationship between PMTT Usage and Project Success:**

There is a considerable association (at 0.01 level) between PMTT usage and project success (0.730). Further, an indication of a mediating effect from PMTT usage on the relationship between independent variables and project success was evident except for project complexity. Thus Hypothesis 5 - The extent of PMTT usage is positively related to project success – can be **accepted**.

**Linear Regression**

A linear regression was carried out to examine the extent to which the four variables - project manager's competency, top management support, organizational commitment and project complexity - explain the variation of PMTT usage.

*Table 8: Linear Regression - Model Summary*

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .784[a] | .615 | .606 | .45462 |

a. Predictors: (Constant), Project complexity, Top management support, Organizational Commitment, PMs competency

*Source: Survey Data 2014*

The Adjusted R Square of Table 4.23 indicates the degree of association between the dependent variable and the set of independent variables. Accordingly, 60.6 per cent of the variation of PMTT usage is explained by project manager's competency, top management support, organizational commitment and project complexity.

*Table 9: Linear Regression - ANOVA[a]*

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 57.029 | 4 | 14.257 | 68.981 | .000[b] |
| | Residual | 35.756 | 173 | .207 | | |
| | Total | 92.785 | 177 | | | |

a. Dependent Variable: PMTT usage
b. Predictors: (Constant), Project complexity, Top management support, Organizational Commitment, PMs competency

*Source: Survey Data 2014*

The above ANOVA table presents the results of the analysis of variance associated with the regression model. As the F value is greater than 10 with a P value (Sig.) of zero, the validity or the significance of the estimated regression line is established.

*Table 10: Linear Regression – Coefficients[a]*

| Model | | Unstandardized Coefficients | | Standardized Coefficients | Sig. |
|---|---|---|---|---|---|
| | | B | Std. Error | Beta | |
| 1 | (Constant) | .150 | .315 | | .633 |
| | PMs competency | .671 | .068 | .598 | *** |
| | Top management support | .190 | .057 | .211 | *** |
| | Organizational Commitment | .091 | .060 | .084 | .133 |
| | Project complexity | .007 | .059 | .006 | .903 |

*Source: Survey Data 2014*

According to Table 4.25, regression coefficients of project manager's competency, top management support, organizational commitment and project complexity amounts to .671, .190, .091 and .007, respectively. This indicates that the first two variables have a bigger impact on PMTT usage than the rest. It is also observed that project manager's competency and top management support are significant at 1% level, while both organizational commitment and project complexity are not significant even at 5% level.

## DISCUSSION AND RECOMMENDATION

Telecommunication sector organizations are differentiated in comparison with their commercial counterparts in the private sector as there is maximizing IT literacy focus. The Sri Lankan telecommunication sector also faces various issues and challenges that are common among the developing countries which would ultimately affect the country's economic growth. In this context, this research was aimed at investigating the usage of project management tools and techniques in the Sri Lankan telecommunication sector and to understand whether such usage actually contribute towards project success. In addition, the study intended to analyze the factors which affect the application of project management tools in telecommunication sector organizations. By this way, this research was aimed at filling out the empirical gap that existed due to the lack of field study on project management tools and techniques used in the Sri Lankan telecommunication sector.

A conceptual framework was devised based on the previous research work in the area of project management, which comprised of various factors that impact successful project implementation through the effective application of project management tools and techniques. Accordingly, project manager's competency, top management support, project complexity and organizational commitment were identified as factors affecting project success, while this relationship was expected to be mediated by project management practices. Based on this study framework, hypotheses for the analysis were defined and were operationalized by means of well-defined measures which have been used in previous research work.

The empirical analysis, which was predominantly of quantitative nature and was backed by structured interviews, gave rise to several interesting relationships that exist in the Sri Lankan telecommunication sector with regard to project management practices. Even though these findings were primarily based on hypotheses testing, analysis of descriptive statistics as well as structured interviews helped broadening the findings of the research.

Project manager's competency emerged as the most important factor determining the level of project management tools and techniques (PMTT) usage as well as project success. The statistical analysis of data revealed that among the independent variables, project manager's competency showed the largest correlation coefficient with PMTT usage as well as project success. In addition, even in the linear regression, project manager's competency had the largest regression coefficient, meaning that it is the most important item explaining the variation in PMTT usage. This signifies the importance of having competent project managers in the telecommunication sector organizations in the country.

Top management support emerged as the second most important factor determining the level of PMTT usage as well as project success. It recorded the second highest correlation coefficient among the independent variables of the analysis. Further, in the regression analysis, it surfaced as the second most important item explaining the variation in PMTT usage. Hence, it is noteworthy that top management support is another crucial factor that facilitates successful project completion through effective application of project management body knowledge.

Even though organizational commitment emerged as the third most important factor determining the level of PMTT usage as well as project success, its significance is not as high as that of project manager's competency and top management support. This was evident through the correlation analysis as well as the regression analysis. Therefore, in the context of Sri Lankan telecommunication sector, though organizational commitment surface as a positive factor, it should not be given a very high priority.

A reasonable explanation for this phenomenon is obtained through some of the interviews, where one interviewee stated that competent project managers are assigned to complex projects enabling better usage of PMTT, whereas another interviewee mentioned that the complex nature of projects make it difficult to apply certain project management tools, hindering the overall usage of PMTT.

In addition, several findings were made through the descriptive data analysis. Even though the majority of project managers in the telecommunication sector possess a master's degree, they are lacking in reputed project management qualifications such as PMP, CAPM, PRINCE etc. In line with this, it was also revealed that the project management tools employed by the telecommunication sector are still at a very basic level, where only a few participants indicated that they are making use of some of the advanced project management techniques. Further, the descriptive analysis showed that the extent of PMTT usage and project success were low in institutions with a functional project organization as against those with emotional project structures.

## KEY RECOMMENDATIONS

Project management has led a number of organizations to be more effective and efficient in delivery of their products and services, to have more accurate budgeting and scheduling and improved productivity (Schlichter, 1999 as cited in Atif, 2010).

In the above context, a set of recommendations are made in the proceeding section which will help the telecommunication sector organizations to become more effective in terms of the application of

project management tools and techniques and thereby assisting them to deliver a better project outcome. These recommendations mainly target the three critical success factors derived by the empirical findings, which are project manager's competency, top management support and organizational commitment.

**Encourage hiring of skilled qualified project managers**

Infusion of private sector project management knowledge to the telecommunication sector through the recruitment of competent, experienced project managers is another vital recommendation. Such an initiative would facilitate a quick transformation in the project culture of the telecommunication sector. However, the current setup in in the telecommunication sector does not encourage such activities. Hence, the necessary amendments should be made to facilitate direct recruitment to higher level telecommunication sector positions as well as to provide them with a performance based remuneration which is in par with the industry.

**Encourage public-private partnerships (PPPs)**

PPP is another common approach followed by both developed countries as well as developing countries to transfer certain competencies within the private and public sector organizations by way of joint implementation of projects. In addition to the transfer of project management of knowledge and competencies, such as endeavor would facilitate improved channeling of top management support.

**Increased project management related training for the project staff**

Any telecommunication sector organization would find it difficult to make all its' project staff acquire internationally recognized project management qualifications. In that case, the remaining staff should be encouraged to follows various other project management related training programs. Even though such programs are currently conducted in certain telecommunication sector organization, it should be further increased to meet the increasing demand.

Strict implementation of this recommendation coupled with the previous one would result in a marked difference the application of project management tools. It was evident that in most of the projects, PMTT usage was mostly confined to the initial stage. Further, different project management tools and techniques are adapted by different project managers based on their familiarity with the subject. However, knowledge enhancement programs would take the project management knowledge levels of all employees to an elevated level, enabling them to use advanced project management tools in a similar way throughout various stages of the project.

**Encouragement of general management skills and enhancement of soft skills**

It was highlighted in the previous chapters that the competencies of project manager should encompass a whole array of skills ranging from communicating skills to management skills to professionalism. The acquisition of project management qualifications alone will not make a competent project manager. Therefore, steps needs to be taken to facilitate acquisition of general management skills as well as other soft skills. Accordingly, emphasis should be placed to uplift skills such as interpersonal skills and communication skills of project managers by making them participate in appropriate training programs.

**Establishment of a central unit for project management knowledge enhancement**

Currently there is no central unit in the telecommunication sector that would enhance the competency levels of project teams. No action is being taken to channel project management knowledge to the project teams working in telecommunication sector. Hence, the scope of telecom regulatory commission can be extended to facilitate knowledge distribution. Under this setup, in addition to infusion of knowledge from the other private sector, public sector or abroad, knowledge transfer within different telecommunication sector project groups could also be accommodated.

**Encourage performance recognition and performance based incentives**

Lack of performance recognition and the absence of performance based incentives is a common drawback in telecommunication sector companies. However, this arrangement has a negative impact on organizational commitment of the employees. Particularly, the nonexistence of performance recognition could deteriorate the level of attachment that one would have with the project organization. Therefore, initiatives must be taken to introduce a performance recognition mechanism, while incorporating tangible rewards for such performance.

**Minimizing political involvements for internal project decisions**

It is imperative that it should be eliminated presence of political interference to the internal project decisions. Moreover, the results indicates that when the project organization moving from functional to emotional, in other words when project organization has higher authority, it increases the extent of PMTT usage and project success. Hence, this study demands an important policy decision to the telecommunication sector of Sri Lanka, to take required actions to avoid unnecessary political involvements to internal project decisions.

## AREAS OF FUTURE RESEARCH

Further research is needed to investigate the limitations and potential for project management systems in different environments. Undertaking this research has opened many avenues for further research initiatives which are presented below.

The questionnaire can be reused to replicate the same study in the Sri Lankan Banking , Small and Medium Enterprise sector, and such as endeavor would facilitate gathering a larger number of data points to proceed with advanced analyses.

Moreover, same source bias can be minimized by dividing the questionnaire into two parts. For instance, project managers can be used to obtain data for constructs of extent of PMTT usage, top management support and project complexity while employing project team members for the constructs of project manager's competency, organizational commitment and project success.

This research might have opened up new avenues for researchers to explore the project management practices in the telecommunication sector, by allowing them to replicate this specifically in another developing country.

The same study can be repeated by sector wise. For an instance study can be replicated only in infrastructure development projects or agricultural projects or services development projects etc.

The research can be redesigned with the same theorization as a predominant qualitative study. Then it will be able to conduct an in-depth analysis on causal factors affecting PMTT usage. The researchers can first conduct a qualitative study and identify issues or factors hindering PMTT usage and project success, and subsequently confirm the validity through a quantitative research.

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