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KEY PROJECT PLANNING PROCESSES AFFECTING PROJECT SUCCESS

Abstract: *This paper examines the relationship between project planning processes and project success. Four planning input factors (human, management, technical and organizational factors) are considered which is believed to affect the quality of planning.*
The study is based on data obtained from different construction projects performed in Ethiopia and includes an analysis on statistical correlation between planning input factors and planning processes, and between planning processes and project success. The study used Confirmatory Factor Analysis (CFA) to identify the key determining factors of project planning on success. The finding suggest that planning processes are insensitive to human factor. Moreover, only three project planning processes (time, cost and risk) are positively associated with the project success.

Keywords: *Planning input factor, Project planning activities, Project success*

1. Introduction

Projects play a major role in the economic development of a country. They are the building blocks for generating additional capital and for ensuring a flow of goods and services. The objective of the project management is to realize the planned project objectives (economic development, generation of additional capital, etc). These project management has different phases and processes within it. Each phase contains rigorous and comprehensive activities to be performed.

The success of any project is measured by its completion time, within the budget cost and meet the planned performance based on the initial plan. Therefore, planning has an important role on the project success. In order to accomplish all these projects successfully, each of them have to undergo different phases where the level of efforts and impacts to the project success depends on the phases.

Among these different phases of the project, project planning is one of the important phases. Although earlier studies have considered many factors that influence project outcome, planning was mentioned as an important factor for project success. Previous researches have indicated poor project planning is one of the reasons for project failure. Moreover researches discovered that there is positive interaction between project planning and project success (Aladwani, 2002; Dvir et al., 2003).

Adeyemi and Idoko (2008) showed that project failure in developing countries is significant and involves considerable time and cost overrun. Despite the fact that, in

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general most projects have a significant contribution to the economy, the success of the project still remains generally low/poor/ in a developing country. The success and failure of projects are very serious for the so-called capital-starved countries. Therefore, a thorough attention has to be given for planning activities in order to have successful projects.

There are different activities to be executed to accomplish the planning stages fully and each of these activities have different contributions to make for the project's success. These activities require considerable time and effort of the project manager. However, it is evident that the project manager has limited time scheduled for numerous responsibilities. Therefore, he needs to give attention to those activities which yield greater results for project success.

Hence, the purpose of this study is to identify the key determining factors that influence project success in the planning phase.

This paper examines the relationship between different planning input factors and planning processes, and planning processes with project success. The objective of this research is to differentiate key factors of the planning input factors and planning processes that yields better impact on the project success. The analysis is based on data collected from different industrial projects performed in Ethiopia and includes four planning input factors (human, managerial, technical and organizational) and the nine project planning processes (time, cost, risk, scope, quality, procurement, human resource, integration and communication). The paper is organized as follows: a review of pertinent literature on project planning, input factors of planning and project success is presented, followed by a description of research model and methodology. This research uses confirmatory factor analysis to identify the relationship between planning input factors and project planning processes, and project planning processes with project success. Finally, the discussion of the findings and their limitation are presented.

2. Literature review

2.1. Project and project management

There is a clear distinction between project and project management. Project is defined by Munns and Bjeirmi (1996) as the collection of unique and complex activities/processes that requires resources to achieve the desired objective. On the other hand, PMI (2008) defines Project Management the application of tools, techniques, knowledges and skills to the project these activities/processes to achieve the objectives. Therefore, the achievement is subjected to time, cost and quality constraint. The use of these tools and techniques depends on the activities/processes based on the phases/lifecycle of the project (Atkinson, 1999).

The Objectives of the project can be achieved by utilising existing or dedicated organisational structures, different resources, applying a collection of tools and techniques (Kerzner, 2013).

2.2. Project and project management

Researches indicated that project success is influenced by project planning (Aladwani, 2002; Dvir et al., 2003; Ubani et al., 2010; Whittaker, 1999). Project planning involves the process of preparing for the commitment of resources in the most economical manner. It defines the activities and events of the project together with the required resources, cost, time, and success milestones for achievement of project objectives. The plan must indicate the materials, equipment, facilities, human and other resources that are necessary to complete the project.

Project execution was launched to start without proper development of a project

plan, which often causes delays, high costs and general execution problems in the project (Antvik and Sjöholm, 2007).

Various studies demonstrated that a well set project plan plays a vital role in project success (Baker et al., 2008; Dvir et al., 2003; Keider, 1984; Milis and Mercken, 2002). Research works indicate that lack of good project planning is ranked as the most likely the single cause of project failure. Effective planning is more than just setting up an elaborate plan at the start of a project. Planning allows the project team to address different factors of success parameters and supportability that determine project success or failure (Akinsola et al., 1997).

The research by Kerzner (2013) clearly demonstrated that the primary motive of project planning is uncertainty reduction, an idea which was also supported by (Zwikael and Sadeh, 2007). The studies by Gibson et al. (2006) show a positive relation on the efforts of project planning with project success and inversely related to the risks.

However, according to the Project Management Institute (PMI), 48% of the project management processes is taken by project planning activities and considered to be time consuming by project managers (PMI, 2008). Accordingly, Zwikael (2009) identified the relative importance of the project management activities used during the planning phases and their impact on project success in Israel, Japan and New Zealand. However, he fails to consider the planning input factors which were proved to have an impact on the project planning activities.

2.3. Project planning input factors

Project planning processes can be affected by different factors. Researches of Chatzoglou (1997); Whittaker (1999); Yeo (2002) identified that the management factors have a direct impact on project planning processes. Moreover, Chatzoglou (1997); Verner et al. (1999) identified that the techniques used for project planning influences the planning. On the other hand, Yeo (2002) identified that the organization of the project is a valuable instrument for project planning activities. Furthermore, researchers discovered that the personal/Human Factor has a great importance in the planning stage of the project (Aladwani, 2002; Chatzoglou and Macaulay, 1998; Dvir et al., 2003; Verner et al., 1999).

Although different researches showed that the quality of the planning processes are determined by different factors, there is no single research conducted to measure the vital project planning activities considering the input factors of project planning on the project success.

2.4. Project success

Project success is widely discussed in the literature. These researches deal with the determinants of project success worldwide (de Wit, 1988; Pinto and Slevin, 1987; Toor & Ogunlana, 2010). Thus, studies discovered causes of project success and standards for measuring project success (Baccarini, 1999; De Wit, 1988; Dvir et al., 2003; Zwikael, 2009). Success criteria need to be separated from success factors, as both appear often in literature. The measures of projects judged in terms of failure or success are criteria.

Many researches support and suggested cost, time and quality as the success criteria for project (De Wit, 1988; Olsen, 1971; Pinto and Slevin, 1987; Turner, 1999). Projects measured against cost, time and quality are measuring the delivery stage, doing something right.

Historically the understanding of project success criteria has evolved from triple constraint concept, known as the iron triangle (time, cost and quality) to something that encompasses many additional success criteria such as quality, stakeholder satisfaction, and knowledge management (Atkinson, 1999). Projects are said to be

successful if the iron triangle criteria are met: delivered on time, within budget and meeting the predetermined quality measures (Atkinson, 1999).

A variety of models for measuring project success were developed for measuring success with different underlying assumptions (Dvir et al., 2003; Pinto and Prescott, 1988; Zwikael, 2009). However, researches in the field of project success agree that it depends on the dimensions considered for the measurement of success perspective (Koops et al., 2016).

This research tries to measure the project success using the iron triangle with the perspective of the project management processes. However, these processes are tedious and cumbersome taking substantial time and efforts of the project manager.
Different researches have shown that the project success depends on project management processes (Dvir et al., 2003; Zwikael, 2009; Zwikael and Sadeh, 2007). These researches tried to point out the important processes that affect the project success. However, no research has been conducted for construction projects.

3. Research methodology

3.1. Research model

In order to investigate the vital planning activities from the whole on project success, this study considers Human, Managerial, Technical and Organizational Factors of as an input factor for planning activities. The researchers followed the conceptual framework shown in Figure 1.

In this research, the project success is represented by two constructs, namely planning input factors and project planning activities. The planning input factors are Human, Managerial, Technical and Organizational Factors while, project planning activities are Time, Cost, Risk, Scope, Quality, Human Resource, Communication, Integration and Procurement.

This research is based on the analysis of the correlation between planning input factors and planning processes, and between planning processes and project success. The success of the project is perceived through the iron triangle (time, cost and quality).

Each variables of the planning input factors, planning processes and project success was measured using several questionnaire items.
The information obtained from this study will improve the quality of planning process and project success. The research model shows that input factors of planning are assumed to have direct impact on planning activities which, subsequently, influence project success also. Based on the literature and the model that was developed, the following research hypotheses were drawn.

- Hypothesis 1: There is a positive relationship between input factor and project planning activities.
- Hypothesis 2: There is a positive relationship between project planning activities and project success.

3.2. Data collection

A quantitative survey with a semi-pre-coded standardized questionnaire was used to collect data for the research. For the purposes of this study, 120 contractors which are registered for building construction with grade 1, 2 and 3 were purposely selected from a list obtained from the Ministry of Works and Urban Development of Ethiopia. This is because most of the projects are building construction project, and the contractors' grade from grade 1 to grade 3 which represents as a high-level contractor. The questionnaires were filled in by project manager, site manager, technical office manager and quality control manager with at least three years of experience. The items in the questionnaire were measured using a 5-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5).

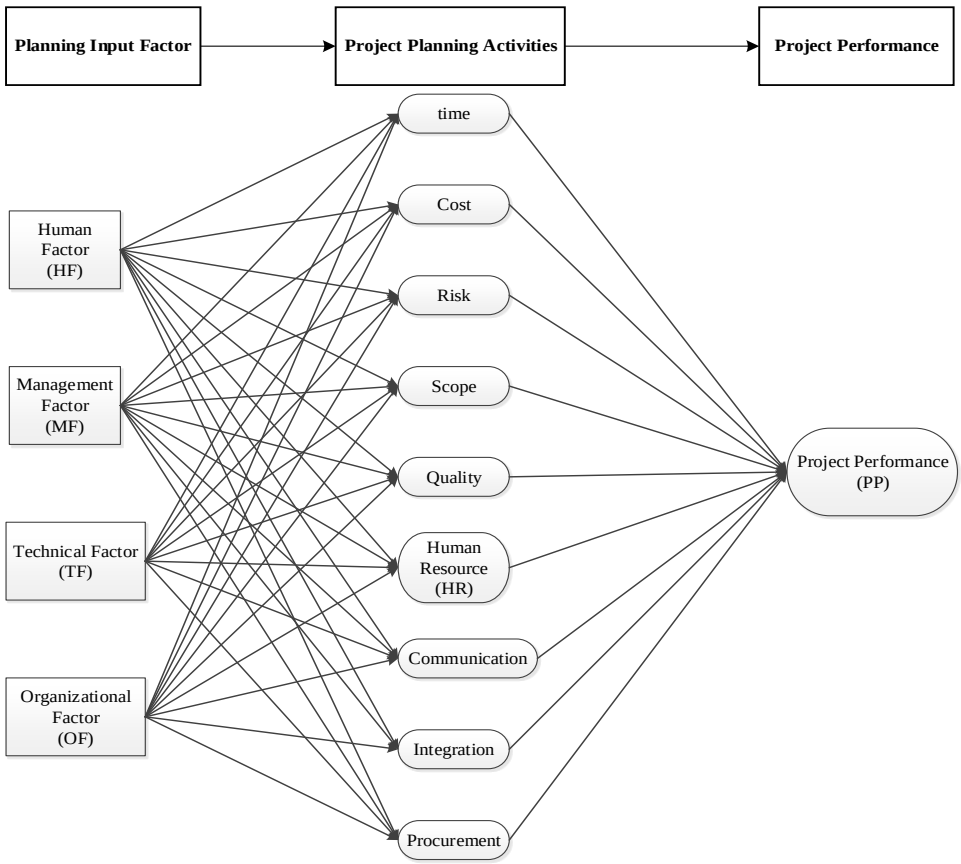

Figure 1. Research model

After conducting a pre-questionnaire test on ten respondents, the questionnaire was distributed to 67 respondents that were randomly selected from the three grades above. The representative sample size (67 respondents) accounts for 55.8% of the total population of 120 contractors. Of these 67 respondents, 40 respondents filled in and returned the questionnaire successfully with a respondent rate of 60%. The quantitative data was purified and analysed using Statistical Package for Social Science (SPSS) version 22 and Analysis of Moments Structures (AMOS) version 22 were used to analyse the confirmatory factor analysis, reliability test, descriptive statistics, Pearson Correlation, and path analysis.

4. Results and discussions

The main part of the data analysis consists of examining the correlations between the planning input factors (human, managerial, technical, organizational factors) and planning processes (time, cost, risk, scope, quality, human resource, integration, communication), and between planning processes and project success (cost, time and quality).

There are 36 correlation coefficients between project planning factor and planning processes. Likewise, there are nine correlation coefficient between project planning processes and project success. Consequently, the commonly applied threshold significant value of 0.05 was

chosen. It is possible that some variables will have strong correlation than the others. The strong correlation between variables enables the researcher to determine the critical project success factors among the others. However, before conducting the correlation coefficient analysis, it is necessary to check the reliability of the questions.

The reliability of the new and modified items was tested carefully before evaluating the research model. In order to have a valid construct in the model, each of the items comprising the model was checked to see if it was uni-dimensional, since this will help to produce a consistent result. Each factor was then evaluated using a separate Factor Analysis (FA).

From the analysis, Cronbach's Alpha (coefficient of reliability) based on the average inter-item correlations is evaluated for each parameter. Except integration, each item under each constructs have correlated-item-total correlation of ≥ 0.30. In addition, the Cronbach Alpha value for Management Factor, Human Resource, Communication and Integration are exceptionally less than 0.60.

Though several varying opinions exist for selecting the model fit statistics, Kline (2011) recommends the use of Chi-squared test (χ^2), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Root Mean Square Residual (RMR) for model fit statistics.

The model fit for each FA for this research was evaluated using χ^2 test, the RMSEA, CFI, RMR and Tucker-Lewis index (TLI) and reported in Table 1. The FA for Human and Organizational Factors have total measured variables of 5 and retained 4 items with the corresponding FA of (χ^2= 2.225, RMSEA = 0.054, CFI = 0.996, RMR=0.021, TLI = 0.989), (χ^2= 0.012, RMSEA = 0.000, CFI = 1.00, TLI = 1.526).

The model fit for Human Factor is good tough χ^2 test has higher value than the expected. It is dependent on the sample size and is not enough to by itself to reject. However, the values for rest of the variables (RMSEA, CFI, RMR, TLI and RMSEA) are acceptable.

Likewise, the results of the Organizational Factors are found to be plausible for all tests (χ^2, RMSEA, CFI, RMR, TLI and RMSEA).

Whereas, the Management Factor retained a total of 3 out of 4 items and the finding indicates that the data fits the model well (χ^2= 0.203, RMSEA = 0.000, CFI = 1.00, TLI = 1.496) respectively. Nevertheless, the FA for the Technical Factor indicates a bad fit for the model.

On the other hand, five of the project planning process, i.e. Time, Cost, Risk, Quality and Procurement retained the total number of the respective items and the data fits the model reasonably well (χ^2= 0.001, RMSEA = 0.000, CFI = 1.00, RMR =0.000, TLI = 1.049), (χ^2= 0.000, RMSEA = 0.649, CFI = 1.00, RMR = 0.000), (χ^2= 0.618, RMSEA = 0.000, CFI = 1.00, RMR = 0.018, TLI = 1.496), (χ^2= 0.000, RMSEA = 1.110, CFI = 1.00, RMR = 0.000, TLI = 0.000) and (χ^2= 0.000, RMSEA = 1.375, CFI = 1.00, RMR = 0.000) respectively. Like that of the technical factor, the FA for the Scope indicates a bad fit for the model.

The descriptive analysis of Human, Management, Technical and Organization Factor was conducted before the path analysis of the model. Thus, the highest mean and lowest standard deviation for Human Factor was project manager's experience to be the most important data collection point and the second most important data collection point for Human Factor was team member experiences. On the other hand, most of the project organization do not involve their customers in planning stages which is found to be below the median (3).

Table 1. Summary Statistics of the FA for the Constructs

	# of items *	Mean	Std. Dev.**	Alpha	χ^2	df	RMSEA	CFI	RMR	TLI
HF	4(5)	3.68	0.68	0.83	2.225	2	0.054	0.996	0.021	0.989
TF	5(7)	3.86	0.28	0.79	61.172	9	0.386	0.495	0.122	0.158
OF	3(5)	3.74	0.47	0.737	0.000	0	0.309	1.00	-	-
MF	3(4)	3.46	0.47	0.656	0.000	0	0.341	1.00	-	-
Time	3(3)	4.35	0.55	0.79	0.001	1	0.000	1.00	0.000	1.049
Scope	4(4)	3.96	0.57	0.79	15.345	2	0.414	0.827	-	0.135
Cost	3(3)	4.08	0.59	0.856	0.000	0	0.649	1.00	0.000	-
Risk	4(4)	2.36	0.75	0.83	0.618	2	0.000	1.00	0.018	1.028
Quality	2(2)	2.76	1.12	0.917	0.000	0	1.110	1.00	0.000	0.000
HR	2(2)	3.66	0.49	0.46	0.000	0	0.257	1.00	0.000	-
Procurement	2(2)	3.54	0.83	0.96	0.000	0	1.375	1.00	0.000	-
Communication	2(3)	3.53		0.647	0.000	0	0.289	1.00	0.000	-
Integration	2(2)			0.265						
PP	2(4)	3.47		0.924	0.000	0	0.659	1.00	-	-

* Number of final items (initial items) ** Std. Dev. = Standard Deviation

The involvement of functional departments of both the organizations and parent organizations are found to be equally important with the highest mean and lowest standard deviation for management factor whereas, the involvement of functional departments of the client organization is found below the median (3) as shown in Table 2.

The allocation of all the required resources and the use of Gantt chart in the Technical Factor are found to be the most important data collection point with the highest mean and lowest standards deviation. The most important data collection point for Organizational Factor was the involvement of project managers in the planning stage and it was found to have the highest mean and the lowest standard deviation as shown in Table 3.

The research model is tested using path analysis and the result is shown in Table 4. The findings indicated that the data fits the model except lower value of TLI (CFI 0.936, TLI 0.853 and RMSEA 0.093).

To improve the model fitness, it is recommended to modify the model and create a covariance relation between scope and Time, and Scope and Cost and the data fits the model reasonably well (CFI=0.974, TLI=0.938, RMR=0.054 and RMSEA=0.060).

The result of the study shows that there is strong relation between Human Factor with Procurement and Integration. According to the result, there is strong relative correspondence between Human Factors and Integration.

Table 2. Statistical Summary of Human and Management Factor

	Human Factor					Management Factor			
	PM experience	Planning effort	Team member experience	Team member commitment	Customer involvement	involvement of Functional Departments the Parent organization in planning	Client involvement in planning	Authority of PM	Involvement of Functional Departments of the organization in planning
Valid	40	40	40	40	40	40	40	40	40
Mean	4.15	3.5	3.68	3.40	2.43	3.93	2.35	3.65	3.88
Std. Dev.	.802	.847	.917	.744	.903	.917	.975	.893	.648
Min	2	2	2	2	1	2	1	2	2
Max	5	5	5	5	4	5	4	5	5
Sum	166	140	147	136	97	157	94	146	155

Table 3. Statistical Summary of Technical and Organizational Factors

	Technical Factor							Organizational Factor				
	Scope well defined	All resources were allocated	WBS was used	Gant Chart was used	CPM was used	PERT was used	Project Management software was used	Priorities of team leader for project	Trainings for team leader	Appropriate Assignment of Project Manager	Involvement of PM in planning stage	Communication between PM and Organizations
Valid	40	40	40	40	40	40	40	40	40	40	40	40
Mean	3.73	4.30	4.33	4.38	3.28	3.08	3.93	3.55	3.23	4.18	4.18	3.60
Std. Dev.	.960	.608	.971	.774	1.062	.997	.829	1.061	1.00	.874	.644	.871
Min	2	3	1	2	1	1	1	1	1	5	3	2
Max	5	5	5	5	5	5	5	5	5	5	5	5
Sum	149	172	173	175	131	123	157	142	129	167	163	144

Likewise, among the 9 project planning activities; Time, Scope, Risk, Communication and Integration can be explained by Technical Factor. This means that the use of WBS, Gantt Chart, CPM, PERT, project management software; the definition of work scope and resource allocation has positive impact on five of the project planning activities mentioned above. Among these, Technical Factor is highly related with Risk, Communication and Integration.

The Organizational Factor directly affects Time, Scope and Procurement. However, Time can be more predicted by Organizational Factor than Procurement and scope.

On the other hand, the Management Factor can only describe Scope, Cost and Communication. However, management factor is strongly correlated to Communication as compared to the others.

Table 4. The result of Structural Equation Model testing

Path			Estimate	S.E.	C.R.
Time	<---	HF	-.047 (.676)	.113	-.417
Scope	<---	HF	.153 (.237)	.129	1.181
Cost	<---	HF	.233 (.069)	.128	1.821
Risk	<---	HF	.043 (.755)	.136	.312
Quality	<---	HF	-.224 (.444)	.292	-.765
HR	<---	HF	-.033 (.792)	.126	-.263
Procurement	<---	HF	.449 (.014)	.184	2.447
Communication	<---	HF	-.091 (.472)	.127	-.719
Integration	<---	HF	.334 (.007)	.124	2.687
Time	<---	TF	.233 (.029)	.106	2.188
Scope	<---	TF	.278 (.022)	.122	2.282
Cost	<---	TF	.038 (.751)	.121	.317
Risk	<---	TF	.448 (***)	.128	3.492
Quality	<---	TF	.276 (.316)	.276	1.003
HR	<---	TF	.231 (.052)	.119	1.947
Procurement	<---	TF	.213 (.219)	.173	1.229
Communication	<---	TF	.397 (***)	.119	3.324
Integration	<---	TF	.388 (***)	.117	3.321
Time	<---	OF	.407 (.002)	.132	3.083
Scope	<---	OF	.328 (.030)	.151	2.169
Cost	<---	OF	.079 (.598)	.150	.527
Risk	<---	OF	.305 (.056)	.159	1.912
Quality	<---	OF	.218 (.524)	.342	.637
HR	<---	OF	-.081 (.583)	.147	-.549
Procurement	<---	OF	.423 (.049)	.215	1.972
Communication	<---	OF	.049 (.743)	.148	.328
Integration	<---	OF	-.054 (.708)	.145	-.375
Time	<---	MF	.043 (.753)	.136	.315
Scope	<---	MF	-.360 (.021)	.156	-2.309
Cost	<---	MF	.339 (.028)	.154	2.199
Risk	<---	MF	.263 (.109)	.164	1.604
Quality	<---	MF	.371 (.292)	.352	1.054
HR	<---	MF	.230 (.130)	.152	1.515
Procurement	<---	MF	-.246 (.266)	.221	-1.113
Communication	<---	MF	.610 (***)	.153	3.993
Integration	<---	MF	.014 (.927)	.149	.092
PP	<---	Time	-1.090 (.003)	.361	-3.019
PP	<---	Scope	-.287 (.368)	.318	-.900
PP	<---	Cost	.948 (***)	.285	3.326
PP	<---	Risk	1.017 (***)	.262	3.879
PP	<---	Quality	.156 (.254)	.136	1.142
PP	<---	HR	.217 (.487)	.312	.695
PP	<---	Procurement	-.165 (.411)	.200	-.822
PP	<---	Communication	-.277 (.302)	.268	-1.033
PP	<---	Integration	-.396 (.165)	.285	-1.389

The result indicates that, from the nine-project planning process, Cost and Risk can explain project success better than the rest of the activities.

In general, among the different project planning activities conducted, only three activities (Time, Cost and Risk) has a strong relationship with the project success. The three planning activities can be explained by the planning input factors. Accordingly, Time can be explained by Technical Factor and Organizational Factor. Whereas, Cost can only be explained by Management Factor. Likewise, Risk can only be explained by Technical Factor.

According to the results obtained, the more effort on the organizational and technical factor will result is a better outcome on the plan for risk, and time. This plan has will intern results in a better project success according to the structural equation model result. Moreover, the management factor has an impact on a better cost planning and an effective plan on cost will results on better project success.

However, the study shows that the Human Factor has a negative relationship with Time, Quality, HR and Communication. This may be due to quality of data and sample size of the research. Moreover, unexpected negative results are observed between the Organizational Factor with HR and Integration. Moreover, the Management Factor is strongly related to the scope, but the relationship is inverse. Likewise, the relationship between some of the planning activities (Time, Scope, Procurement, Communication and Integration) has also a negative relationship with project success. These may be due to quality of data and sample size of the research.

5. Conclusions

This study is conducted to identify vital few project planning activities which has more impact on the project success. The research uses questionnaires to assess different projects from different sectors such as construction, infrastructure, IT, manufacturing and research and development projects in Ethiopia.

From the literature, four different input factors (human, technical, management and Organizational Factors) were identified that affect the planning activities of a project and used to study the effects of different input factors on the planning activities. Afterward, the relationship between each of the project activities and project success were studied.

The result obtained from the research indicates that the Human Factors have nothing to do with the vital project activities. That means, the project manager and team experiences, the planning effort and the commitment does not affect the vital activities (Time, Cost and Risk). Therefore, it can be concluded that the project manager must give due attention to the input factors such as Technical Factor, Management Factor and Organizational Factor which is different from the previous research result and this might be due to the fact that the effects of human factor is more on procurement and integration than the other planning processes. However, the effects of procurement and integration on project success is insignificant as compared to the other planning processes.

On the other hand, among the nine different activities of project planning, only three of them are vital for project success. Hence, for a project manager with time constraints, it is very important to give emphasis to Time, Cost and Risk among the nine planning activities to achieve better project success.

However, the result may vary for specific industries. Therefore, it is recommended that key determining factors of project success in planning phases for the specific industry be studied.

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