AN EMPIRICAL STUDY OF CURRENT PRACTICES OF PROJECT MANAGEMENT IN PAKISTAN

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Abstract
The current research documents existent project management practices adopted by the project personnel in Pakistan. This study empirically ranks the various project success criteria to determine the most reported ones in order to judge the project success. In addition, inter-relationship of success criteria variables is also measured. Side effects, both desirable and undesirable, which happen during the project, are analyzed to identify the ones that are mostly faced by the project personnel. Method, methodology, tools and techniques are also documented which are frequently used in different project management knowledge areas. Limitations faced when applying these tools and techniques to a particular real world scenario are also examined. Analysis and conclusions are based on findings of primary data collected from 90 project management personnel working in various industries and types of projects in Pakistan. Results demonstrate that one success criterion alone cannot contribute to project success. There are number of success criteria which altogether contribute to project success. Findings of this survey have significant implications in developing project evaluation and monitoring criteria for project personnel in Pakistan.
Key words: *Project Success Criteria, Side effects, Tools and Techniques*

Introduction

Large numbers of companies adopt project approach as the medium to pursuit organizational goals (Pinto and Prescott, 1988; Andersen et al., 2006; Hyvari, 2006). *"Project management is now well developed and well accepted domain for the exercise of professional expertise and as an area for academic research and discourse"* (White and Fortune, 2002, p.1). The rising demand for project management solutions, trainings and development indicates its maturity and importance in managing projects (Rozenes et al., 2006; Crawford and Pollack 2007).

Several authors and professional bodies had developed tools, techniques, methods and methodologies for initiation, planning, execution, monitoring and controlling. These tools, techniques, methods and methodologies are widely available in books and journals for the personnel who are engaged in managing projects and are being taught by the professional bodies and universities (White and Fortune, 2002). Jessen (2008) has hypothesized that when project managers

know what project triumph and dynamics under their command could impact on outcome, project performance would perk up. However, there is a difference between project management and project. Munns & Bjeirmi (1996, p. 81) define project as

" *A project can be considered to be the achivement of a specfic objective, which involves a series of activitites and task which consume rescources. It has to be completed within a set specification, having definite start and end deadlines*"

And project management as
"The process of controlling the achievement of the project objectives. Utilizing the existing organizational structures and resources, it seeks to manage the project by applying a collection of tools and techniques, without adversely disturbing the routine operation of the company"

Since there is a difference between project management and project. Thus there ought to be a differnce between how to measure the successs of both. Wit (1988) explains project success "measure against the overall objectives of the project". With the advancement of literature, number of variables have been proposed and added to the criteria to judge the success of project.

In the present research, a broader set of project success criteria is identified as well as their interrelationship is measured to determine project success in Pakistan. In this research, in addition to traditional iron triangle project success measure (within budget, within schedule and intended quality), other criteria are empirically checked and ranked. Side effects including both, desirable and undesirable effects of project on the organization and project personnel are identified. Methods, methodologies, tools and techniques used by project manager/personnel and the limitations faced when applying as a real world application are also documented. The major contribution of this research is that it presents the real work experience of project personnel practices in Pakistan.

Purpose of the Study
The focus of this research study is to empirically study the practices of project managers in Pakistan. The present research addresses the following questions:
- To empirically identify common criteria used for defining project success.
- To check interrelation between the success criteria variables.
- To identify the methods, methodologies, tools and techniques in current use of Pakistani project personnel.
- To examine limitation faced by Pakistani project personnel while using particular methods, methodologies, tools and techniques.

Examination of the aforementioned questions would help us understanding project management practices with respect to project success in Pakistan. The limitations, unexpected side effects faced by project personnel would help us develop success criteria application in a developing economy where the project personnel face uncertainty on regular basis.

Literature Review

The literature review was conducted to first identify success criteria factors. Secondly desirable and undesirable effects faced by the project personnel while working on the project and lastly methods, methodologies, tools and techniques are identified which were used by various authors/researchers in their intended field of study. The literature review is broadly divided into three sub parts. In the first and second part, project success criteria and side effects on projects are identified. In the third part, project management tools, techniques, methods and methodologies are discussed.

1. *Project Success Criteria*

Several studies Shenhar et al*.,* (1997); Atkinson, (1999); Lim and Mohamed, (1999); White and Fortune, (2002); Weterveld, (2003); Khan and Sheikh, (2006); Warchol and Amadi-Echendu, (2007); Khang and Moe, (2008); Toor and Ogunlana, (2010) have identified success criteria in their intended field of study and empirically have agreed upon the general criteria of iron triangle to judge project success i.e. within budget, within scheduled time and intended quality. However, the ranking of these factors differs from study to study.

The triumph of project was considered barely on the accomplishment of general criteria of iron triangle. This commonly considered criterion was appropriately found in the project management literature. However, the circumstances have changed because of expanded strategic understanding required by the project stakeholders and now it is important to identify broader set of factors to judge project triumph (Andersen et al., 2006*)*.

Atkinson (1999) propose a square route model to judge the project success. In broader terms, the model is divided into four categories namely, iron triangle, the information system, organizational benefits and stake holder benefits. In these categories he propose number of variables to judge the success of the project.

White and Fortune (2002) in an emperical study mention eight criteria to judge the project success. Besides iron triangle, it includes: meet client requirments, meet organizational requirments, yeild business/other benefits and cause minimal disruption.

In an emperical investigation study of large scale public development project,

Toor and Ogunlana (2010) reveals nine key performance measure (KPI) or success criteria to judge the project success. They identify variables through review of literature and checkup interviews. These variables are: iron triangle, efficiently use of rescources, safety, free from defects (high quality of workmanship) conforms to stakeholder's expectations, doing the right thing (effectiveness) and minimized construction aggravation, disputes and conflict. They also run correlation test in order to check the association of KPI's with each other. The findings reveal that all the KPI's are positively and "moderatly to strongly" corelated with other KPI's. From correlation, they conclude that these KPI's are logically interconnected and they are inseperable. Therefore, the KPI's should be taken as a set in order to measure the project success. Following these findings, the current research takes a broader set of success criteria variables for measuring project success.

2. Side Effects of Projects

Every project has an outcome, besides actual outcome; there are desirable and undesirable effects on the project and client organization. Five desirable side effects on the organization and nine undesirable side effects are identified from the study of White and Fortune (2002). Following White and Fortune (2002), the current research checks whether both of these side effects are the same here in Pakistan. This would help us in understanding how project personnel fails to understand the micro and macro environment while planning and working on the project.

3. Project Management Tools, Techniques, Methods and Methodologies

Project management tools, techniques, methods and methodologies help project developers and personnel for effective planning, development , monitoring, evaulating and for the achievment of the desired results in the project activites as they unfold. Desirable results can be more efficient scheduling, identifying, eliminating or mitigating risks, removing multiple activities to reduce cost, estimating the effect of running and crushing on project activities, developing parameters for inspecting quality etc.

Number of tools and techniques are available for project managers but the usability vary from industry to industry and availability of organizational resources (Besner & Hobbs, 2008). The most frequently used tools are Gantt charts and Work breakdown structure (WBS) because of their easiness to use as well as no extra requirement of organization resources (White & Fortune, 2002; Besner & Hobbs, 2006).

White and Fortune (2002) provide respondents with 44 methods, tools, techniques and methodologies which they extract from the standard text books on project management and from literature. They asked respondents to mention

those methods, tools, techniques and methodologies which they have used in their recent projects. Project management software, in house project management methods and Gantt bar charts have the highest count of usage. Besner and Hobbs (2006) give a list of 70 tools and techniques which are specific to project management. The select tools and techniques which are more specific to day to day practice, closer to the things project mangers regularly do.

The study of Khan and Sheikh (2006) explain the project management working in Pakistan government. They found that WBS has been used in the prepartion and improvement of the scope of the project. They state that with the help of Earned Value Analysis (EVA), defects can be identified earlier and the important performance indexes like cost and schedule are prepared to review the performance by the higher dicision makers.

Method

1. *Measures*

Conceptual frame work of the study is taken from the study of Toor & Ogunlana (2010) and White and Fortune (2002). Following Toor & Ogunlana (2010) the present research measures the effect of individual success criteria variables on one another. Side effects of projects, method, methodolgies, tools and techniques currently used by the project personnel and limitation they face while using them is measured following White and Fortune (2002).

Project personnel characteristics and organization background variables are taken from Hyvari (2006) and White & Fortune (2002) which includes gender, total work experience, project work experience, position held in the organization, project type, project classification, organization turn over quarterly, project size in terms of rupees, type of organizational structure, number of activities in last project, duration of last project, outcome of the project and number of people employed in the respondents organization.

In the current research, project success criteria variables are taken from the studies of White and Fortune (2002) and Atkinson (1999). To measure the importance of project success criteria factors, likert scale is used, where 1= not important and 5 = very important.

Five desirable and nine undesirable side effects faced during and after the project completion are taken from the study of White and Fortune (2002). Five methods and methodologies from White & Fortune (2002), seventy-one tools and techniques specific to PMBOK (2004) are taken from the project scope, time, cost, quality and risk knowledge areas. These methods, methodologies, tools and techniques are provided to respondents in order to identify the ones mostly used in projects by the organizations and project personnel in Pakistan. Respondents

are asked to indicate method, methodology, tool or technique which they feel contains limitation, when they apply them in the real world scenario. It is to be noted here, only limitation is indicated, description of the limitation is beyond the scope of this research.

Data collected is primary in nature and is collected by contacting project managers or project personnel who are involved in any recent project. The data collection instrument used is a close ended questionnaire. Expert judgment and a pilot survey are conducted to check the content validity of the questionnaire.

In this study, project personnel perception about project critical success factors and success criteria are used rather than the critical success factors and success criteria of the project provided by the organization.

2. Sample

Since the total population of project personnel and the number of projects presently running in Pakistan are not known, therefore "All sample you can afford" technique is used. The qualifying condition for the survey participation was that the respondent had worked in any project which was concluded, whatever the outcome of the project was, a complete failure or a complete success. Data were collected over the internet and physically. Overall, above 1000 questionnaires were sent and only 94 were received. Out of 94, 90 were selected for further analysis.

The questionnaire was sent to a number of non-governmental organizations (NGO's), private and public sector organizations, PMI Lahore, Karachi and Islamabad Chapter groups on internet, two project management test preparation sessions in Islamabad and Lahore, in which participants were from various cities of Pakistan, in the project management institute (PMI) session where project management office (PMO) case study was presented in Islamabad and students of two universities doing Master in Project Management.

Participants of the survey are project management personnel working on different projects in Pakistan. The characteristics of the respondents are shown in the Table 1.

Out of 90 respondents almost 90% of respondents are male and 10% are female. Thirty seven percent (34) of the respondents are either project managers or managers. Team leader and staff personnel are 13.3% (12) and 11.1% (10) respectively.

Table 1: Respondents Profile

	Frequency	Percent			Frequency	Percent
Gender				**Work Experience**		
Male	80	88.9		0-4	41	45.6
Female	10	11.1		5-10	28	31.1
Position Held in the organization				11-15	10	11.1
VP	2	2.2		16-20	3	3.3
Director	4	4.4		21-25	2	2.2
Project Manager	17	18.9		26-30	3	3.3
Senior Manager	8	8.9		36 or more	3	3.3
Consultant	6	6.7		**Project Work Experience**		
Manager	17	18.9		0-4	54	60
Team Leader	12	13.3		5-10	27	30
Staff	10	11.1		11-15	5	5.6
Supervisor	5	5.6		16-20	2	2.2
Other	9	10		26-30	1	1.1
Project Classification				36 or more	1	1.1
Automotive	2	2.2		**Project Type**		
Banking/Financial	2	2.2		New product development	11	12.2
Chemicals	2	2.2		Process re-design	5	5.6
Computer/IS	10	11.1		New system/tech installation	7	7.8
Telecommunication	13	14.4		System re-engineering	7	7.8
Government/Civil service	16	17.8		Research and development	22	24.4
Health Care	3	3.3		IT	8	8.9
Manufacturing	6	6.7		Business Relocation	1	1.1
Defense	4	4.4		Risk Management	1	1.1
Electronics	1	1.1		Staff Training	5	5.6
Environmental	5	5.6		Other	23	25.6
Construction	5	5.6				
Transportation	2	2.2				
Education	9	10				
Other	10	11.1				

Respondents have classified their industry in which most of their projects fall: government/civil services are 17.8% (16), the second highest is telecommunication having 14.4% (13), computer/IS and other are ranked the third highest having 11.1% (10) each. Project type shows which type of project our respondents are mostly involved. Almost 25% (22) of the project are from research and development, 12.2% (11) are from new product development and other counted for 25.6% (23).

Most of the respondents 45.6% (41) have total working experience of 0-4 years, whereas 5-10 years of working is mentioned by 31.1% (28) of the respondents. Ninety percent (81) of the respondents have project experience of 0- 10 years. Out of the 90%, 60% (54) have project experience of 0-4 years and rest 30% (27) has project experience of 5-10 years.

Results

1. Analysis Method

The data analysis is done with SPSS version 17 and Microsoft Excel 2007. In order to rank the variables, the sum of combined ranking given by each respondent to a particular variable is used. Mean and standard deviation is used to rank the success criteria. In order to reduce the variables, we want to apply the factor analysis on success criteria variables. However, taking the argument of Toor and Ogunlana (2010) and Cox et al., (2003) who suggest that factor analysis will not produce the required purpose considering the qualitative and quantitative nature of variables, when used in combination, factor analysis is not used to reduce variables in this research. Cronbach's alpha is run to check the reliability of the data. Correlation analysis of success criteria variables is run to check whether success criteria used by the organizations are interrelated or dependent. By this we determine how much they affect each other.

The sum of each desirable and undesirable effect of projects on the organization is used to rank them and to see which one is mostly reported in organizations. Similarly, the sum of mentioned method, methodology, tools and techniques is used to rank them, according to their use in the organization.

*2. **Cronbach's Alpha***

To check the internal reliability of the variables, cronbach's alpha is run. Cronbach's alpha of success criteria is 0.783. The high value of Cronbach's alpha indicates high internal construct consistency and reliability.

3. Respondents Organizational Profile

The size of the organization is mostly determined by the turn over of the organization and the number of people employed by that organization. Table 2 shows the organization profile of the respondents.

3.1. Organization Turn over Quarterly

Total of 84.4% (76) respondents mention their quarterly turn over, rest 15.6% (14) do not mention their quarterly turn over as they belong to NGO's or public organizations where the turnovers are not made public. 26.7% (24) have turnover of above 200 million or above quarterly.

Table 2: Organizational Profile of Respondents

Turn Over Quarterly	Frequency	Percent		Organization Type	Frequency	Percent
0-10 million	15	16.7		Functional Organization	29	32.2
11-40 million	11	12.2		Functional Matrix	5	5.6
41-80 million	12	13.3		Project Organization	40	44.4
81-120 million	5	5.6		Composite Organization	4	4.4
121-160 million	3	3.3		Balanced Matrix	3	3.3
161-200 million	6	6.7		Project Team	6	6.7
200 million or above	24	26.7		Project Matrix	3	3.3
Missing	14	15.6				
				No of People employed		
Project Size in Rs				1-100	31	34.4
0-10 million	19	21.1		101-500	19	21.1
11-20 million	9	10.0		501-1000	11	12.2
21-40 million	15	16.7		1001-1500	7	7.8
41-60 million	3	3.3		1501-2000	1	1.1
61-80 million	4	4.4		2001 or more	21	23.3
80-100 million	12	13.3		Total	90	100.0
100 million or above	28	31.1				
				Duration of Project		
Number of Activities				0-6 months	14	15.6
0-100	58	64.4		6-12 months	27	30.0
101-200	14	15.6		13-24 months	9	10.0
201 or more	18	20.0		25-30 months	3	3.3
				31-36 months	10	11.1
				37-42 months	5	5.6
				43-49 months	5	5.6
				more than 49 months	17	18.9

3.2. Project Size

Thirty one percent of the respondents have worked on projects size in rupees of 100 million or above. Whereas quite contrasting the second highest 21.1% (19) report that they are involved in project of Rs 0-10 million.

3.3. Organization Type

From the responses received, 44.4% (44) mention project organization while second highest 32.2% (29) work in the functional organization structure.

3.4. Size of Organization

Personnel working in the organization determine the size of the organization. 34.4% (31) of the respondents work in the organization where they have 1-100

people which are normally solution provider to large organizations. 23.3% (21) of the respondents belong to large organizations where the organization employs more than 2000 employees.

Numbers of activities define the size of projects and complexity of the project. Majority 64.4% (58) of the projects mentioned by the respondents have 0-100 activities, 20 % (18) projects have activities ranging from 201 or above and lastly only 15.6% (14) have worked on projects which have 101-200 activities.

3.5. Duration of Project
Duration of the project was divided into eight categories. Six to twelve months projects rank the highest as 30% (27) of the respondents fall in this category. The second highest 18.9% (17) of the respondents mention they are involved in projects of more than 49 months.

4. Project Outcome
The most interesting finding in this study is the project outcome as shown in figure 1. This finding is in accordance with the findings of White and Fortune (2002) where more than 85% of the respondents mention their projects as complete success or partial success. In the current surveys, 79.8% (71) of the respondents mention their projects as partial or complete success. However, White and Fortune (2006, pp. 3) also mention in their study, "This success rate is far higher than that reported in the literature". The reason behind this may be the perception of the project personnel.

Figure 1: Project Outcome
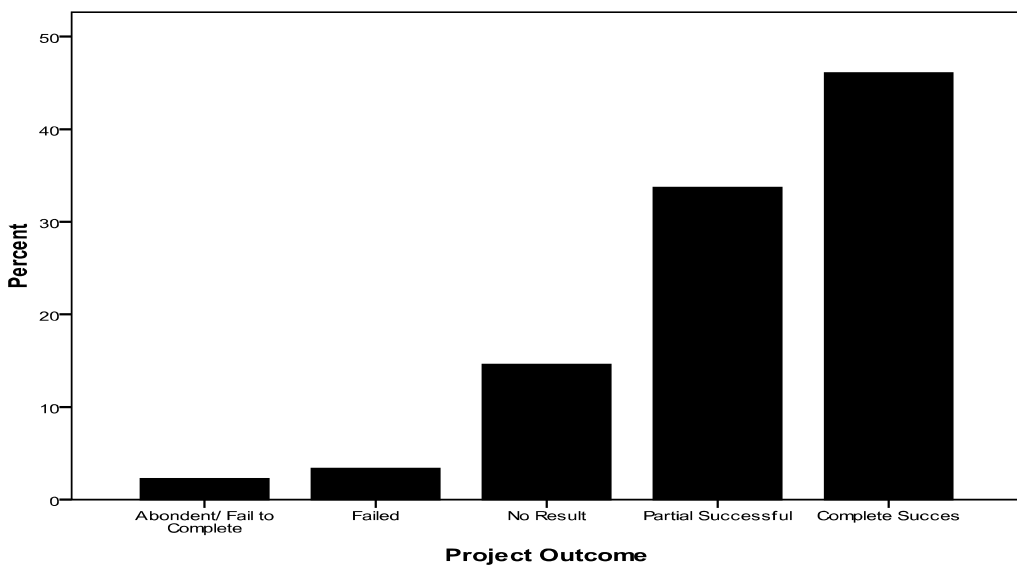
5. *Success Criteria*

Atkinson (1999) propose model of "The Square Route" as shown in figure 2. The square route model has four categories namely: the stakeholder benefit, organizational benefits, information system and iron triangle. The examples provided in each category by the Atkinson (1999) to judge success were provided to the respondents and the findings are shown in table 3 and table 4.

Figure 2: The Square Route Model
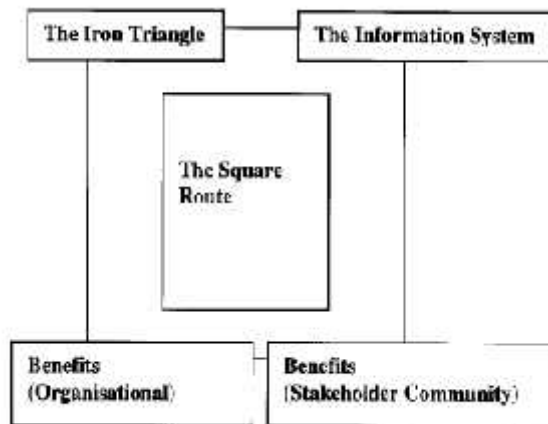
The findings show that the top five highest ranked success criteria according to sum of recorded ranks in descending order are: meet organizational objective, personal development, completed with schedule, strategic goal achieved and improved intended effectiveness as mentioned in table 3. Comparing the findings of the top six ranked success criteria of this survey to the rankings done by the White and Fortune (2002), variables which are similar in both the studies are: meets organization objective ranked four, completed with schedule ranked two and completed within budget ranked sixth.

Our findings with respect to Atkinson (1999) model are shown in table 4. Findings suggest that personal development which is stake holder benefits rank second in the list. Appreciation by stakeholder and user are ranked seventh and eighth respectively by the respondents. The iron triangle category variables including within budget, within schedule time and within intended quality are ranked third, sixth and thirteen respectively.

Maintainability of the project which is the part of the information system category is ranked ninth. Strategic goal achieved, improve intended effectiveness, improved intended efficiency, organizational learning and increased profits for the organization rank fourth, fifth, twelfth, seventeen and

twenty third respectively and they fall under the category of organizational benefits.

Table 3: Success Criteria Used for Judging Projects

Sr#	Success Criteria	Sum	Mean	Std. Deviation
1	Meets Organizational Objectives	371.00	4.1685	.86912
2	Personal Development	362.00	4.1609	3.28093
3	Completed Within Schedule	355.00	3.9888	1.09227
4	Strategic Goals Achieved	348.00	4.0000	.96449
5	Improved Intended Effectiveness	346.00	3.9770	.88891
6	Completed Within Budget	343.00	3.8539	1.09285
7	Appreciation By Stakeholders	341.00	3.9651	.86020
8	Appreciation By User	340.00	3.9080	.85769
9	Maintainability Of The Project	339.00	3.8523	.85150
10	Reliability Of The Project	336.00	3.8621	.89146
11	Appreciation By Project Personnel	336.00	3.8621	.91718
12	Improved Intended Efficiency	336.00	3.9070	.88952
13	Meets Quality/Safety Standards	335.00	3.9881	.95051
14	Professional Learning	333.00	3.9176	.94127
15	Appreciation By Client	332.00	3.8605	1.14956
16	Validity Of The Project	332.00	3.8605	.93510
17	Organizational-Learning	308.00	3.5402	1.10816
18	Social And Environmental Impact	308.00	3.5402	1.15944
19	Yields Business And Other Benefits	308.00	3.7108	.89074
20	Risk Managed	295.00	3.5119	1.05846
21	Appreciation By Contracting Partners	286.00	3.6203	1.00389
22	Minimum Repeat Work	281.00	3.3059	1.08038
23	Increased Profits Of The Organization	266.00	3.5000	1.08934
24	Causes Minimal Business Disruption	265.00	3.3544	.87761
25	Other Criteria	139.00	3.5641	1.09532

Project Excellence Model proposed by Westerveld (2003) is designed around appreciation by different personnel involved directly or indirectly in the project. Other than traditional iron triangle, Project Excellence Model measures the project success by: appreciation by the client, project personnel, users, contracting partners and stakeholder, which are ranked fifteenth, eleventh, eighth, twenty first and seventh respectively in the current research.

Table 4: The Square Route Model

Rank	The iron triangle	Rank	Organizational benefits
3	Completed within schedule	4	Strategic goals achieved
6	Completed within budget	5	Improved intended effectiveness
13	Meets quality/safety standards	12	Improved intended efficiency
	Stakeholder benefit	17	Organizational-learning
2	Personal development	23	Increased profits of the organization
7	Appreciation by stakeholders		**The information system**
8	Appreciation by user	9	Maintainability of the project
11	Appreciation by project personnel	10	Reliability of the project
14	Professional learning	16	Validity of the project
18	Social and Environmental impact		

Toor & Ogunlana (2010) derived nine success criteria variables which also include the iron triangle from the perception of stakeholders. When comparing the ranking of this survey with their study, it is found that other than iron triangle variables, appriciation by the user is ranked same i.e. seventh, improved intended efficiency is ranked eighth and in this survey twelveth. The main contrasting factors from their study is the ranking of minimum repeat work and causes minimal business disruption as sixth and nineth respectively whereas in this survey they rank 22nd and 24th respectively. This may be due to reason that the succuss criteria variables used by Toor & Ogunlana (2010) are total nine in number whereas a broad set of success criteria variables is used in this study.

6. Correlation between the Success Criteria Variables

In order to examine the success criteria association with other success criteria used by the organization Pearson Correlation Analysis was run. Table 5 shows that majority of the success criteria are significantly and positively correlated with other success criteria variables.

Meet organizational objectives, moderate to strongly correlate with iron triangle variables except meets quality/safety standard. Second in the ranking, personal development is slightly to moderately correlate with only professional learning.

Next we take a look on correlation of the iron triangle variables with its own variables. Within schedule and within budget has weak to moderate relationship with intended quality/safety standard 0.235 and 0.233 strengths respectively. However, within schedule and within budget has moderate to strongly relationship with each other. Within schedule and budget relationship strength is 0.584. This finding supports the fact that delay in schedule leads to increase in the budget of the project.

Within schedule has significant correlation relationship with 12 other success criteria variables. Relationships strength is weak to moderate and ranges 0.209 to

0.597. Within budget has significant relationship with twelve other variables. Relationship's strength is weak to moderate and strength ranges 0.220 to 0.584. Meets quality/safety standard which is also an iron triangle variable has ten relationships with other variables. However, all relationships strengths are weak to moderate, ranging 0.233 to 0.427. Strategic goal achieved has also weak to moderate relationship with within schedule and budget.

Appreciation by stakeholders has number of relationships having strength of weak to moderate with other success criteria variables. Similarly appreciation by the user of the project has number of relationship with other success criteria variables. However, they are all weak to moderately correlate with appreciation by the user. Appreciation by client has significant relationships with number of other variables ranging from 0.230 to 0.576 having weak to moderate relationships. The strongest relationship of appreciation by client is with organizational learning with relationship strength of 0.576.

Moreover, from the table 5, we may conclude that every success criteria cannot be used independently as they are related with number of other success criteria variables. They have to be used in a set of combined variables in order to judge the success of the project. The findings of this study support the research conducted by Toor & Ogunlana (2010).

7. *Unexpected Side Effects Faced During the Project*
No matter how much time and recourses taken by project planners, there are always unexpected side effects. They can be desirable side effects which affects the project in the positive way, sometimes provide a new opportunity and understanding which helps the organization to prosper more than the intended outcome of the project. Also, side effects can be, undesirable which affect the project in the negative way and affect the performance of the project by causing delays and extra usage of recourses.

84.44% (76) of the respondents mention that they face side effects in the project which are not planned as mentioned in table 6. Here, the findings are supporting the reasoning provided by White & Fortune (2002). White & Fortune (2002) report that lack of awareness of the envirnoment and tools and techniques used are poor at real world modeling.

Table 5: Correlations

Project Success Criteria	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1- Appreciation By Client	1																							
2- Appreciation By Correcting	.220	1																						
3- Appreciation By Project Personal	.230*	.452**	1																					
4- Appreciation By Stakeholders	.366*	.140	.258*	1																				
5- Appreciation By User	.208	-.010	.065	.339**	1																			
6- Causes Minimal E-ausiness Description	.099	.095	.038	.190	.147	1																		
7- Completed Within Budget	.059	.211	.209	.287**	.105	.130	1																	
8- Completed Within Schedule	.331**	.169	.149	.280**	.252*	.110*	.584**	1																
9- Improved Intended Effectiveness	.141	.203	.111	.325**	.292**	.206	.472**	.597**	1															
10- Improved Intended Efficiency	.174	.153	.040	.345**	.367**	.375**	.298**	.302**	.525**	1														
11- Increased Profits Of The	.120*	-.277**	.092	.112	.198	.163	.140	.245	.008	.357**	1													
12- Maintainability Of The Project	-.023	.123	.193	.154	.243	.299**	.398**	.209	.272	.215**	.256**	1												
13- Meets Organizational Objectives	.091	-.012	.003	.225*	.238*	.245*	.428**	.421**	.340**	.131	.122	.282**	1											
14- Meets Quality/Safety Standards	.002	-.015	.064	.213	.414**	.353**	.233**	.255**	.301**	.427**	.216	.328**	.215	1										
15- Minimum Repeat Work	-.076	.287**	.016	.094	.028	.254**	.330**	.139	.201	.160	-.021	.297**	.264*	.096	1									
16- Organizational Learning	.104	.366**	.154	.138	.034	.029	.302**	.024	.167	.057	.146	.245*	.197	.096	-.224*	1								
17- Personal Development	.108	.068	.199	.056	.098	-.031	.102	.053	-.067	-.034	.022	.108	.201	.073	-.010	.199	1							
18- Professional Learning	.263*	.081	.059	.015	.186	-.023	.192	.059	.119	.000	.201	.212	.222*	.056	.217	.576**	.279*	1						
19- Reliability Of The Project	.225*	-.032	.162	.250*	.230*	.171	.220**	.270*	.309**	.357**	.208	.142	.315*	.331**	.331**	.213	.129	.159	1					
20- Risk Managed	-.010	.168	.165	.086	.153	.205	.211	.097	.267*	.193	.142	.176	.147	.030	.333**	.278**	.160	.160	.386**	1				
21- Social And Environmental Impact	.078	.295**	.142	-.058	.143	-.100	.355**	-.100	.046	-.015	-.041	.176	.147	.079	.129	.469**	.155	.455**	.207	.433	1			
22- Strategic Goals Accieved	.112	-.008	.119	.252*	.252*	.165	.273*	.273*	.454**	.265*	.121	.522**	.402**	.078	.081	.125	.055	.202	.328**	.207	.105	1		
23- Validity Of The Project	.134	.121	.295**	.232*	.207	.199	.273*	.091	.244**	.417**	.246*	.523**	.322**	.079	.081	.203	.110	.151	.367**	.269*	.221*	.604**	1	
24- Yields Business And Other Benefits	-.060	-.003	-.002	-.099	.224	.185	.033	.042	.206	.131	.302*	.177	.311**	.122	.165	.114	.075	.093	.361*	.340**	.260*	.385**	.404**	1

* . Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

Table 6: Side Effects Faced During Project

Side effects	Frequency	Percent
yes (desirable)	11	14.5
yes (undesirable)	8	10.5
yes (both)	50	65.8
No	1	1.3
Don't Know	6	7.9
Total	76	100.0

Table 7: Desirable Side Effects Faced During Projects

Desirable Side Effects	N
Knowledge gain/New understanding	47
Increased sale/business/opportunities	29
Improved Business/ Staff relations	23
Greater consistency of working	22
Other	3
Total	124

In this study, 14.5% (11) report that they face desirable side effects and 10.5% (8) face undesirable side effects. Huge number 65.8% (50) of the respondents mention that they face both desirable and undesirable side effects. 7.9% (6) respondents mention that they don't know what type of side effects they face. Only 1.3% (1) respondents state that they don't face any kind of side effect in the project which means that the project actual outcome was achieved.

Desirable side effect with their respective number of counts can be seen in the table 7. Knowledge gain/new understanding is the highest counted (47) desirable side effect.

Overall 154 number of times undesirable side effects are reported by the respondents as shown in table 8. Problem with staff/client/contractors/suppliers is reported the highest number of time (30) by the respondents. Underestimation of cost/time is the second most reported (25) undesirable side effect. The reason may be that the tools and techniques which are used in preparing the estimates are not according to real world application. The technical limitation got the third highest count (24) and the reason behind this undesirable side effect is that the product specification or working requirements has to be changed due to which under estimation of time and cost occur.

Change of goals/objectives which is considered to be the major contributor to the delays in the project has got only 16 counts in this survey. Also, the lack of awareness has low ranking i.e. ranked seventh with the count of ten thus negating the argument suggested by White & Fortune (2002) study that lack of awareness of the envirnoment and tools and techniques used are poor at real world modeling.

Table 8: Undesirable Side Effects Faced During Projects

Sr#	Undesirable side effects	N
1	Problems with staff/client/contractors/suppliers	30
2	Under Estimation of Cost/time	25
3	Technical limitations came to light	24
4	Conflicting Priorities	19
5	Organizational impact/conflict	18
6	Change of goals/objectives	16
7	Lack of awareness of environment	10
8	Poor IT awareness/Knowledge	9
9	Others	3
	Total	154

8. *Project Management Methods, Methodologies, Tools and Techniques*

The highest number of times counted (N) tool is expert judgment (49) in project scope as eleven times respondents' state that this technique contains limitations which are not applicable to certain cases/scenarios as shown in the table 9. MS project (48) and In-house (43) methodology are mostly used in the organization for the development of projects and to monitor its performance with 15 and 18 number of times reported limitation (LC) when applying to a certain scenario.

The interesting phenomena to be noted here is that critical path method (CPM), program evaluation and review technique (PERT) and primavera which are extensively taught in the class rooms are not practically widely used by the organizations.

In-house project management methodology (43) which is customized according to organization requirement, still face limitations (18) thus showing the limitation of its applicability to real world applications.

Table 9: PM Methods, Methodologies, Tools and Techniques

Sr#	Method, Tool &Technique	N	LC
1	Expert Judgment (Scope)	49	11
2	Budgeting	49	11
3	MS Project	48	15
4	In-house PM	43	18
5	WBS (Scope)	40	3
6	Expert Judgment (Time)	40	11
7	Planning meeting (Risk)	40	9
8	Documentation reviews (Risk)	39	9
9	Check list (Risk)	39	12
10	Product Analysis (Scope)	38	15

Several studies (White & Fortune, 2002; Besner & Hobbs, 2006; Khan & Sheikh, 2006) report Work Breakdown Structure (WBS) as extensively used

tool, which is also supported by the findings of this research (40) with limitation of only three.

Among complete solution providing project management methodologies software, MS project got the highest count (48) with reported limitations of 15 followed by in-house project management software (43) with reported limitations of (18), which is customized according to requirements of the organizations as shown in Table 10.

Table 10: PM Method & Methodology

PM Methods & Methodology	N	LC
MS Project	48	15
In-house PM	43	18
SSADM	14	9
Prince 2	12	9
Risk Man	11	11

Table 11: PM Scope Tools and Techniques

PM Scope Tools and Techniques	N	LC
Expert Judgment (Scope)	49	11
WBS (Scope)	40	3
Product Analysis (Scope)	38	15
Inspection (Scope)	37	8
Change control System (Scope)	36	10
Stakeholder Analysis (Scope)	34	14
Variance Analysis (Scope)	28	9
Alternative Identification	26	11

Scope of project defines what is included in the project and in which frame of time, cost and quality it should be completed. It is to be noted here that expert judgment (49) with limitation count of (11) is the mostly used tool in developing scope of the projects as it does not require additional/extra resources form the organization. All findings of expert judgment are based on the project manager/developer's past experience, knowledge and intuition as shown in the table 11.

WBS (40) with limitation (3) is the second highest counted tool in the preparation of the scope statement. The reason for its popularity lies in its nearness to real life work. Moreover, it helps in defining milestones, deliverables and time line for the project personnel.

One of the main components to judge the success of the project in iron triangle is the time. Additional time means project is running behind schedule thus having delays in the completion of project. This would incur additional cost to the project. The extensively used tool to judge the time required to complete the

milestones/project is expert judgment (40) with counted limitation of 11 as shown in the table 12. The second highest counted tool is the Gantt bar chart (34) with counted limitation of 8. Tools and technique used with their respective limitations in project management knowledge areas of time, quality, cost, and risk can be seen in table 12, 13, 14 and 15 respectively.

Table 12: PM Time Tools and Techniques

PM Time Tools and Techniques	N	LC
Expert Judgment (Time)	40	11
Gantt Bar chart	34	8
PERT	29	11
What-if scenario	25	12
Variance analysis	23	8
Critical chain	21	8
Integrated Change Control	21	7
PM Software time	20	10
Resource leveling	20	10
schedule comparison	19	8
Reserve Analysis	18	8
RBS	17	3
ADM	16	11
Rolling Wave Planning	15	8
GERT	15	10
Primavera	15	10
Alternative Analysis	15	8
Parametric estimating	15	12
PDM	12	11

Table 13: PM Quality Tools and Techniques

PM Quality Tools and Techniques	N	LC
Quality audits	35	11
Benchmarking	31	8
Inspection	30	14
Process analysis	28	11
Flow charting	26	12
Cost of quality	23	9
Design of experiments	22	11
Cause and effect diagram	19	10
Defect repair review	19	11
Quality planning tools	18	12
Quality Planning tools and techniques	18	10
Histogram	17	10
Quality control	16	12

Table 14: PM Cost Tools and Techniques

PM Cost Tools and Techniques	N	LC
Budgeting	49	11
Cash flow analysis	36	13
Forecasting	35	10
Bottom-up estimating	33	8
Analogous estimating	30	11
Vendor bid	28	10

Table 15: PM Risk Tools and Technique

PM Risk Tools and Technique	N	LC
Planning meeting	40	9
Documentation reviews	39	9
Check list	39	12
Impact assessment	30	12
Risk categorization	30	10
Status Meeting	29	12
Life cycle cost analysis	25	9
Technical performance measurement	24	10
Assumption	23	11
Risk data quality assessment	21	10
Risk urgency assessment	21	10
Risk audit	20	12

Project performance	26	11	Variance & trend analysis	20	12
Performance measurement	25	9	Quantitative risk analysis	19	9
Resource cost rates	24	10	Contingent response strategy	19	9
Cost change control system	24	8	Strategies for both risk or threats	17	10
PM Software Cost	23	8	Reserve analysis	17	8
Cost of Quality	22	10	Strategies for negative risk	15	8
Reserve analysis	18	7	Strategies for positive risk	15	9

Limitations of the Study

The results of the study are based on self reports of the project personnel. This has allowed the researchers to include project personnel from various organizations and different industries. However, at the same time, results presented here may be biased as the use of every variable is not applicable to all industries. Second limitation is the sample size which is not large reason being the working professionals are time constrained to fill the questionnaires. Third limitation of study is that most of the questionnaires are not self administered.

Conclusion

The findings in the present study have empirically ranked the real world criteria used by project personnel to judge the project success. From this study, it may be concluded that besides the traditional measure of iron triangle, other criteria may be used by organization and project personnel to judge project success. The findings suggest that project success criteria variables do not act independently rather they are dependent upon one another and should be treated as one set to measure project success thus supporting the findings of Toor & Ogunlana (2010). Project personnel regularly face desirable and undesirable effects. The findings further propose that every method, methodology, tools or technique used in project management has some kind of limitation associated with it.

The noteworthy contribution of this research is that it may help project personnel and organizations to judge project success and further facilitate learning as how individual success criteria variables are related and dependent on each other. Since the relationship has been identified among success criteria variables, project personnel and organizations can prioritize criteria for a wider and significant impact. Furthermore, the research also identifies what sorts of problems desired or undesired are faced by the organizations while doing projects. This would help project personnel to address such issues in project planning so that projects do not get delayed and consequently require additional resources from the organizations.

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