A Quantitative Study on Success Factors of Software Project Development in Pakistan

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Abstract- Recent literatures and research have been shown that successful software projects are based on many factors. These factors make a project successful or unsuccessful depending upon the nature of the environment where it was built. Efficacious software projects are those who completed on time, within scope and budget, meeting all requirements, management and customer supports and many more. However, different countries have a distinct perspective regarding factors evaluation that leads to a successful project. The research found that there have been limited studies of the Pakistani software environment consequently; this research study was a survey study concentrate on the success factors of Pakistan's software projects using quantitative research analysis approach. 40 software houses were targeted, and data has been collected through questionnaires and interviews from related personnel's of less experienced and most experienced software houses, in the Karachi, Lahore, Quetta, and Peshawar which has clearly shown the main waves of success aspects of software projects and management. This research also provides a comprehensive look at software projects through the eyes of the Pakistani's software personals as well as the relationship and outcomes of practices with the help of literature study. The importance of this research is to cover both theoretical and practical dimensions of the factor's association and hypothetical investigations through different statistical methods such as, Chi-Square, regression analysis and One-Way Anova. For these techniques, a statistical software environment is using the R language which is the first time in the research of Pakistani environment.

Index Terms- One-Way Anova, Chi-Square, Multiple logistic regression, Pakistan's software success factors, Software project management

I. INTRODUCTION

No doubt, information technology in Pakistan and internationally is a very growing industry, which provides economic benefits to their countries. Pakistani government took many advantages from software industries in the financial crises age. Due to that, ministry of IT and broadcasting is providing many incentives to the software industries during the last decades, thus it's a big achievement in the field of IT sector in Pakistan. For development and implementation of a national policy framework for software related services in Pakistani industries, the government has established Pakistan Software Export Board (PSEB) [37]. Since the policies and regulations that govern by The IT Ministry of Pakistan with little changes, Pakistan economy has been improving very vastly. Due to the software industry's economic power many other sectors are influencing along with country economic development. In the era of the 90s, software industry in Pakistan is very undersized but as other developing countries got success and taking on economic benefits by improving their IT and software product need, Pakistan also becomes in action. The Pakistan IT industry has played a foremost part in placing its name on the international map and in global markets is successfully building a very valuable brand. Mushroom like growth of Pakistan software industries gives 1.5billion dollar annual revenue over 2000, out of which only one/fourth of the revenue ($370 million) was repatriated back to Pakistan through banking channels as per the research report of the international IT consulting Firm [36]. Despite all above, 66% software projects are becoming unsuccessful or failed due to mainly exceeded budget, time, quality according to quoted "Chaos Chronicles", but project management efforts continuously increasing in this manner and project managers are working so hard to overcome the percentage of unsuccessful rate [38]. Equally, we know software and its application is so important in our creation, not in this era also in an upcoming future. Software development is very easy process if it follows correct modeling and management strategies otherwise it can create many risks and critical problems at its early phase of the development process. Despite the efforts to use software development methodology; software and its development process have not been consistently successful and software delays, failed, abandoned, freeze, reject like negative factors arise, which causes the downfalls in the market of Pakistan software industries [40]. We have researched many factors that are followed in Pakistan and other developed countries, but no one perfects at all.

In this paper, we used a questionnaire-based survey and informal online interviews to characterize and analyze common factors and their correlation with project success through different statistical methods. To attain this goal, we have selected Chi-Square goodness of fit test, regression and Anova techniques. Our research is based on large scale of literature reviews as baselines [1]. We circulated the survey to a network of our Pakistani industry contacts and gathered responses from 40 software projects of the current month 2022. The results of the survey are the basis for a detailed discussion of the relations between factors and perceptions of project success. Important findings from this research include PM's contribution, motivating and controlling, the team's experiences, methodologies, risk factors etc. are discussed and explained. The managers and developer, we contacted were asked to describe

related to a recent or older projects, small or big, randomly respond upon asking queries. According to recent research in different countries having same subject the questionnaire was organized into eight sections. Project management, Software development methodology, Scheduling, Staff related Scope, User/customer, Requirement and Risks. The research found that the development methodology and project management perspective is most important factors in the success of any project [2]. Furthermore, much research concerned same subject matter used qualitative methods, but there has been a deficiency of quantitative survey-based research regarding software development in Pakistan. The impetus of this work is to identify success factors of software projects in Pakistan also give general guidance for both project managers and developers to help in certify that the projects they are responsible for succeed.

II. Related Work

Successful software projects as well as failure project and its management based on iron triangle, which is comprised of cost, time, and performance. It provides the project quality that is surety of acceptance of the project. Cost includes any material, personnel, external; requirement cost etc., Time refers to project schedule or duration of the task that must be done before deadlines. However, performance refers to the quality, scope, specifications for not only product, but whole process in the life cycle of development. Research have been proven that this triple constraint is not enough to define the definition of the project's success or failure, nowadays different theories and perceptions of stakeholders have been raising. Project management problems are related to the performance of the software development processes or enabling technologies. Perfect process models, methodologies, and tools which we called process framework activities [26] make a project successful, but manager often less focus on the development framework activities and complained about the dissatisfaction of using technological tools [27]. Different surveys identified the major problem occur in software project managements are poor estimate, poor planning, lack of quality, incorrect success criteria and so on but all are related to project management [49]. Although this kind of study was conducted more than 20 years ago, the problems found still exist in software projects today. According to the consideration of the Software Engineering Institute (SEI) in 1991, ninety-three (93%) of industries worldwide did not have well defined software process model and eighty-one (81%) did not have good management system. Definition of success and failure of any software project is difficult to define, as project stakeholder viewpoints according to their countries may differ based on their culture, organization, job, and system of political and professional organization in which they are working [29]. Stats of the Standish Group survey (2014), around 20% projects were cancelled, and more than 50% projects have cost overrun and scheduling problems. According to their survey PM experience does matter in the project running [33]. Rubin and Seelig were prior researchers who concluded that PM's experience does not have a definite effect on project success. Company support and higher placing on critical projects can make them successful rather than PM's experience [34]. Verner found one important factor for the project's succession that is a motivational factor [40], motivation is the software engineering factor reported to have the single largest impact on practitioner productivity and software quality management [13]. This paper showed that team motivation is positively correlated with project outcome and that the higher the team motivation the more likely a project is to be a success [41].

Literature has been proven that software industry that follows agile software process model scrum or lean in their development process, faces less problems or less than 10% difficulties [35]. Also [42] indicated six core process elements which are applicable in any kind of business strategy related to management or any IT industry. It is light weight process models which incorporate into organization for success improvement. Its aim to provide detailed management guidelines in a software firm and enhance the capabilities of different factors [43][44]. According to Kurt [45], software project main failure factors are cost, and schedule overrun, previous studies have been proven that project cancellation and many opportunities have been disturbed in the organization due to exceeding the cost of software and slippery schedule. Kurt analyzes these factors by using qualitative techniques to gather data through interviews and surveys. The Chaos report [46] is one that analyzed largest data every year, which impressed failure rate. Procaccino [47] did a structured interview with 21 different IT professionals and summarized that poor or ill-defined requirement, management support deficiency and less user/customer involvement in project development causes project failures [48]. Better management support in which all stakeholders specially committed sponsors, user and manager regular communication is very essential. Requirements should be complete in terms of data and report else misunderstood requirements and features can results late delivery and exceeded the monetary cost. His findings suggest most important factors are mainly two: personal acceptation of the work and user involvement. Sulayman's et al research is of about SPI success factor for small and medium software web companies' quality improvement in all aspects of industry [49][50]. Automated tool support and client support factors enhance capability of work in an environment that results software completed on time [51]. He also revealed strong communication among team member and other stakeholders is a key success factor. Employee involvement is another vital factor for successful project and cost-benefit analysis, in which cut down extra cost and increase overall benefits are very mandatory. Higher management support is very important in which company owner, manager and directors and their role of leadership should be very strong. Research of this literature emphasized consultancy factor contributes to SPI success by guiding industries in new process model adaptation. Butt et al identifies limited successful software project factors in which Strong leadership, requirement engineering, right team, good decision making, and track progress and quality of each phase are essential. Poor planning and scheduling main failure factors, quality and spirit of team member, user involvement, good planning and estimation, good leadership and strong skill are highly motivated the successful project environment [52]. Verner is a renowned researcher of software industry, in his one article paper there are 57 failure factors investigated, but commonly whose appearance makes project failures those are delivery date issues, underestimated, staff were not rewarded, inadequate

requirements for delivering decision, staff has unpleasant experience [53]. According to his survey on Sydney software house complete and consistent requirements are necessitates of successful projects that would provide a better chance of developing good requirements in developing industry [31] along with effectively handling of that requirement. Agerwall and Rathod define three members (developers, managers, and customer account managers), without their support software project scope and quality of project outcome have not been possible [54]. Regarding the role of project manager, including all the software architects, through interviews with the software managers, found that the capability of project managers plays an important role in project performance, especially project failure. Prior studies had shown that there are three types of risk mitigation in software projects, namely, quantitative, qualitative, and mining approaches. In quantitative approach where risks based on statistical methods and inputs to form a regression model to inspect risk factors influence on success factors. Moreover, qualitative risks methods are PM self-judgment and opinions that subjectively mitigate risks. Elzamly and Hussin [26] stated in their research paper that quality of the project is improved by understanding technical and non-technical hazards. For this purpose, they used chi-square ($\chi 2$) and regression test to control the risks and see the relationship of project success and risk factors. Identifying, analyzing, and handling of risks in the lifecycle of the project are the art of Project risk management [22]. The dimensions of this research finds and understand not only latent problems that occur in project development, but also provide solutions that might impede project success. However, many previous studies globally confirmed that poor risk handling can lead to a project failure. "Risk management is an indispensable process for the successful delivery of software projects"[23][24]. Research history showed the subjective performance of the project in terms of reliability, quality and flexibility which was not influenced by risk identification and planning, neither risk management methods can completely handle objective performance of the project in terms of cost, schedule, and effort [25].

III. Research Framework and Methodology

A. *Proposed Research Model*

In our research model, the first step is to investigate many success and failure factors of software projects all over the countries and identify some basic questions that will be asked by project manager or developers. In the second step we made a questionnaire consist of 35 questions on google form and distribute among different software houses of each province of Pakistan. We received 40 responses all over in which majority responses were from Karachi based software houses. In our research some facts or answers were unclear and unjustified. For this purpose, we conducted online interviews from related personnel. Most of our respondents were developers and the rest were others? The aim of this research work is to investigate success and failure factors that have significant impact on Pakistan's software industry. To investigate these factors, we choose a quantitative research technique due to the nature of data, as we are much focused on limited and common factors.

Table1. Survey Questions

ID	Questions
P1	Did the project have a PM?
P2	How many years of experience project manager have?
P3	Was the project manager changed during the project?
P4	How much project manager's vision is clear for the project?
P5	Did PM control the projects?
P6	Did PM appreciate team members for a long working hour?
M1	What is the meaning of success/failure of the project?
M2	Which development methodology did follow?
M3	How many years you followed that model?
M4	Now, which one do you follow and why?
M5	How many times processes are reviewed during the project?
S1	How much delivery date affected by the development process?
S2	Did the project have a schedule?
S3	How much estimation of the project is budgeted?
S4	Was staff being promoted or rewarded after a long period of time?
S5	How much tough schedule does affect team motivation?
S6	Did the project have proper and complete staff to meet schedule?
S7	How much staff has working experience of the project?
S8	How is team members motivated in the project?
S9	How much team was working like a jelled team?
S10	How much project had a well-defined scope?
S11	Was the project scope changed in mid of development?
S12	Was scope increased during the project?
C1	How much users/customer is involved in the project?
C2	How much expectation users/customer had towards the project?
R1	Which method is used for requirements gathering?
R2	Were requirements, complete and accurate at starting of the project?
R3	Was there a central repository for requirements?
R4	How much time did customers/users give for requirements gathering?
R5	Is the delivery date depended on requirements information?
R6	Did the size of the project depend on requirements?
R7	How much risk project planning is assessed?
R8	Was risk table built?
R9	When were risks incorporated into the project plan?
R10	How much the risks were managed throughout the project?

B. Goal and Research Questions

The goal of pragmatic research in this paper is to illustrate and analyze the relationship of project factors with the success level through PM perspective of different software houses. This research also contains a collection of current and previous literature also elaborates quantitative research techniques. The goal of this research is to do deep analysis of study problem. Findings obtained by including recent studies on a particular subject in literature reviews are presented under various concepts or themes [55]. The survey questionnaires are 35 from eight different sections listed in Table.1 which was mostly close ended. However, open ended and weighted questions were also included in the questionnaire.

C. Quantitative Techniques

Quantitative technique is the way of systematic investigation or analysis socially which uses numerical or statistical data. It has a variety of technical methods that are used according to problem domain. Though, quantitative research contains assumptions and measurements that are helpful to find relationship and trends of numerical data. Most researchers use this technique because of its numerical nature and 100%correct prediction and estimation. Although, some choose qualitative or mixed techniques corresponding to their work [57]. A unique feature of quantitative research is its ability to test theories formally by formulating hypotheses and applying statistical analyses [56]. We have used three quantitative techniques in our analysis Chi-Square, One-Way Anova, and multiple logistic regressions with respect to variable nature and requirements.

IV. Analysis and Results

A. Cronbach's Alpha

For Checking the Reliability of measures in our research where the Cronbach's Alpha reliability coefficients of the eight independent variables Project management, Software development methodology, Scheduling, Staff, Scope, User/customer, Requirement and Risks and one dependent variable project success were obtained [39]. The results in Table 2 indicate that the Cronbach's Alpha for the 8-item measure is 0.802. The closer the reliability coefficient to ά 1.0 the better the results are. It shows that the data collected through questionnaire is reliable as value is above 0.7 and if the value of Cronbach's Alpha is above 0.7 then it means that the data is consistent, and we can rely on collected data and the data can be used for further analysis.

Table 2. Cronbach's Alpha reliability measure

Cronbach's Alpha	Alpha based on standardized item	No of variables
1>Value>0.7	0.802	35

B. Sample data

Our sample size is quite small but enough to get useful information related to our problem for finding success factors in the Pakistani software project environment and to identify favourable area for further research. The survey questions listed in Table1 and Chi-Square, multiple logistic regression and Anova techniques applied where appropriately showed the correlation relationship among variables. Eight aspects identified in our research covering questions as variables labelled with "P" for Project Management, "M" for Methodology," S1-S3" related to Scheduling where "S4-S9" related to Staff, "S10-S12" related to project Scope, "C1&C2"for Customer," R1-R6" Requirement and "R7-R10" for Risk related questions**.**

C. Implementation of Chi-Square test

Project management is a specialize form of management studies that encompasses the skills of planning, controlling, motivating, leading, staffing etc. The advent of software project management defined the first time in 1960 by Futrell [3], and then it came into being in action with the software engineering field. Basically, it defines the practices of managing projects in successive order in which team, plan, phases, and resources are executed in a very strategic manner [4][5]. This is the reason, project success and failures depends not only defined constraints, but also management views also considered as the success key points for projects [6]. In our analysis, (P1) variable's response showed 100 percent "yes" which represent each software development projects either successful or failed were with assigned project manager. Other research [7] has stated that some software development projects have ensued without assigned project manager and tasks divided equally among functional group members but at the end the result was not good enough. Reports and previous research are not in the favor of this type of projects. However, project management and project manager are essential tools in the success or failure of a project [26]. We did Chi-Square test of independence for both P1 & P3 showed in Table 3 and Table 4.

Table 3. Chi-Square test outcome for P1 variable

H_0: Hypothesis	Result
P1: Having PM & project's succession is independent.	"The chi-square test of independence statistic for having PM was statistically significant (x2=0.87054; df =1; p < 0.03508)"

Result: Survey and test results showed the rejection of H_0 that means the success of the project is dependent on having PM.

Table 4. Chi-Square test outcome for P2 variable

H_0: Hypothesis	Result
P3: Project manager changing is not significant for project success.	"Pearson chi-square value is found $x^2 = 0$. According to the values p, the value p> 0.05 is obtained.so, it is found that there is no significant correlation between PM changing and project success."

Result: The percentage of 'Yes' in changing of project manager (P3) during software development was 31% and 68% respond to 'No'. Research theory stated that larger projects were more likely

to have PM changed; but small projects did not need to change at all [7]. The PM experience matters, but changing the PM was not significantly associated with project success.

Table 5. Chi-Square test outcome for R2 variable

H_0: Hypothesis	Result
R2: Are complete and accurate requirements for starting of the project dependent on project success.	"The chi-square test of independence statistic for the complete requirement in starting of project (x2=2.267, df = 1, p-value = 0.1322)"

Result: The greater p-value of test results showed in Table 5 is that half of the projects began with incomplete requirements (R2). It's not much astonishing that Project scope (S12) was changed or increased during projects. Changing scope is dependent on requirements for the project development. Though (R2) with (S12) significantly correlated, these results suggest that Pakistani software houses are having some problems with their software requirements.

The delivery date is substantially dependent on requirement information (R5). Poor estimated and unscheduled projects are completely reliant on PM input participation, it is not surprising that only about half the projects had a delivery date made with appropriate requirements information. Throughout the development and evolution of the project, the requirements obtained may be changed or added, which may affect the success of the project due to the schedule. As a result, the size of the project is dependent on the requirements (R6).

In this research, the significance of project success and failure is dependent on the respondent's perspective. Respondents gave an answer to the question (M1) and their success and failure rate is presented in Table 6.

Table.6. Total outcomes and frequencies of success and failure projects

M1	Total	Success	Failure
All above	76%	55	21
On Time	12%	6	6
With Scope	3%	3	0
With Scope, On Time	6%	3	3
Well budgeted	3%	0	3

On behalf of the requested suitability factors, 76% of the projects had success criteria that were met on time, a well-defined scope, and a well-established budget. But 21% failed with all three factors, the reason behind this failure other management lacking. 12% projects were targeted at a time in which half were successful and the rest failed. Normally, smaller projects are completed on time and significantly associated with project success. The overall success of the project depends on all aspects of the iron triangle. According to (M2), 56% of software development houses have used Agile methodology and continue to use the same [1,4]. Because the success rate of the projects in those days and now was almost the same. 44% of respondents responded that they used the traditional methodology in which small projects were successful, but that these techniques had failed for larger projects. Because of this problem, most houses have moved towards agile models where they use different types depending on the scenario like Scrum, XP and so on.

D. Implementation of Anova Technique

In my research there are many independent variables are presented with different levels or variations that have a measurable effect on a dependent variable. For this reason, one-way Anova is appropriate where there is a categorical independent factor and a dependent binary or quantitative factor. Variables (M4, S8, R1, R4, R9) were measured with one-way Anova technique with the Tukey HSD test where the H_0 hypothesis is rejected.

In our analysis, (M4) independent variable has three responding values Agile model, Traditional model, and others. The research hypothesis was tested by the most widely used statistical method known as "one-way" Anova. The null and alternative hypothesis to be used is given as:

H_0 : All methodologies are equal for making a project successful.

H_0: $\mu_{Agile} = \mu_{Traditional} = \mu_{others}$

H_1: At least two methodologies are not equal for making a project successful.

Table 7. Anova test results for M4 variable

	DF	Sum.sq	Mean.sq	F.value	Pr(>F)
M4	2	1.620	0.8102	4.362	0.0201*
Residuals	36	6.687	0.1858		

In Table 7 the p value (0.0201) is smaller than 0.05, which means we reject the null hypothesis that not all methodologies are equal. Hence, when we reject H_0 and accept H_1 ,we did "post-hoc" test called the Tukey's test result showed in Table.6 for proving at least one group is different.

Table 8. The Tukey's test result for M4

	Diff	Lwr	Upr	P adj
Others-Agile Model	-0.08359133	-0.4352962	0.26811351	0.8311195
Traditional-Agile Model	-0.78947368	-1.4439626	-0.13498481	0.0150441
Traditional-Others	-0.70588235	-1.3656003	-0.04616446	0.0337928

This test has given over variable (M4) means values difference, confidence level and adjusted p-values for all three responsive pairs. The confidence levels and p-values showed a significant difference between groups is for Traditional-Agile and Traditional-others.

H_0: The means of different motivational methods in the project are the same.

H_0: $\mu_{Annual\ Bonus} = \mu_{Promotion} = \mu_{others\ incentives}$

H_1: At least two population means are unequal.

Table 9. Anova test results for M4 variable

	DF	Sum.sq	Mean.sq	F.value	Pr(>F)
S8	2	0.602	0.3013	1.407	0.258
Residuals	36	7.705	0.2140		

In the Table 9 above, p-value is greater than $\alpha = 0.05$, so we reject the alternate hypothesis of the Anova and conclude that there is a statistically significant no difference among the means of the three groups of motivational methods in different software projects.

Recent studies have shown that all methods of gathering requirements have the same impact on the success of the project, whereas others have shown that they are very different. In our survey research question, I asked what method of gathering requirements (interview, document analysis (DA), questionnaire and survey (Q&A) or online contact) was appropriate. A software project's success is dependent on the complete and consistent requirement [8]. Recent research proved that gathering requirement using a specified methodology (R1) is very important in any development environment. A good and better requirement henceforth a greater chance of successful project. In our research (R1) requirements gathering methods got different numbers of values from responses in which Document analysis occupies 35%, Interview contained 26%, Online contact had 6% and Questionnaire or survey 32%. This estimation stated that document and related analysis and questionnaire were most important in research, but this achievement is not significantly associated with success factor, because major respondents did not concern with (R1) or project's system analyst.

H_0: Are requirement gathering techniques have the same impact on the success of software development.

H_0 : $\mu_{Interview} = \mu_{DA} = \mu_{Q\&S} = \mu_{OnlineContact}$

H_1: At least two requirement gathering techniques have different impact on the success of the software development.

Table 10. Anova test results for R1 variable

	DF	Sum.sq	Mean.sq	F.value	Pr(>F)
R1	3	0.281	0.09377	0.409	0.748
Residuals	35	8.026	0.22932		

The calculated value of Anova test is 0.748 which is greater than 0.05 showed in Table 10, so we accepted H_0 and rejected the alternative hypothesis. The result concluded that any type of requirement technique had the same impact on project success.

H_0 : All group means are equal in Customers/user involvement in requirements gathering

H_0 : $\mu_{monthly} = \mu_{Daily} = \mu_{weekly}$

H_1: At least two groups mean are different from others in Customers/user involvement in requirements gathering.

Table 11: Anova test results for R4 variable

	DF	Sum.sq	Mean.sq	F.value	Pr(>F)
R4	2	1.954	0.9768	5.534	0.00802**
Residuals	36	6.354	0.1765		

As in our analysis mostly software houses using Agile methods where Scrum, XP and lean are incorporated, and priority of this methodology is customer involvement and meeting on daily and weekly basis are considered. Thus, the output of (R4) in Table 11 indicated 0.00802 p-value which is the most meaningful in this scenario. Therefore, we rejected H_0 and accept H_1 and did the Tukey HSD test for further identification that which group is more significant over three responses.

Table 12: The Tukey's test result for R4

	Diff	Lwr	Upr	P adj
Monthly-Daily	-0.2363636	-0.7902365	0.3175093	0.5550202
Weekly-Daily	0.2695652	-0.2371472	0.7762777	0.0062248
Weekly-Monthly	0.5059289	0.1294759	0.8823818	0.0462931

The results in Table 12 show that the adjusted p-value of the two-group means is totally different and significant. The confidence levels and p-values showed a significant difference between groups is for Traditional-Agile and Traditional-others.

H_0: The means of the outcome are the same across all risk incorporations in the project plan.

H_0 : $\mu_{start} = \mu_{mid} = \mu_{end}$

H_1: At least two population means are different from each other.

Table 13. Anova test results for R9 variable

	DF	Sum.sq	Mean.sq	F.value	Pr(>F)
R9	2	1.287	0.6436	3.3	0.0483*
Residuals	36	7.021	0.1950		

Table 14. The Tukey's test result for R9

	Diff	Lwr	Upr	P adj
Mid-End	0.8235294	0.01661618	1.6304426	0.0446357
Start-End	0.6500000	-0.15051751	1.4505175	0.1305609
Start-Mid	-0.1735294	-0.52961213	0.1825533	0.4660194

According to Table 13 statistics, we rejected H_0 and accepted H_1 because p value is less than 0.05 and means of groups are statistically different, the HSD Tukey test showed in Table 14 Middle-End are significantly different at the 95 % confidence level.

Inappropriately, project developers and PM remark that project risk planning, management, and assessment as extra expenses on scheduling [20]. The size of the project does not matter whether the risks were integrated into the planning (R9), so risk management during the project was tied to the success of the project [21].

E. Implementation of Multiple Logistic Regression Techniques

In this research 17 variables found that have continuous numerical values that we observed have an impact on project success or failure. In multiple logistic regression the outcome

variable (dependent variable) is dichotomous and independent variables are called covariates. Generally, all modelling techniques aim is to derive best fitting model to describe the relationship between an outcome and a set of more than one predictor. Here, in our research project success or failure is dependent variable which is determined by some set of variables with continuous values. In our further analysis, the main goal is to create a tool to predict project outcome (success or failure) and correlate it with the remaining variables of the research as well as decrease the dimensionality of these variables. For this analysis, we focus our attention on prediction using multivariable logistic regression model.

Table 15. Regression test Statistics

Coefficients				
	Estimate Std	**Error**	**z-value**	**Pr(>|z|)**
(Intercept)	-24.239	9.595	-2.526	0.0115*
P2	2.0867	1.677	2.198	0.0512·
P4	2.437	1.235	1.974	0.0484*
P5	2.905	1.311	2.216	0.0267*
P6	2.006	1.246	1.610	0.1074
M5	-2.527	1.699	-1.488	0.1368
S1	1.44436	0.59836	2.414	0.00717 **
S3	1.55429	0.62309	2.494	0.0126*
S5	-0.88581	0.77309	-1.146	0.0251*
S6	0.88424	0.77079	1.147	0.2513
S7	-0.05724	0.46966	-0.122	0.9030
S9	2.0461	0.9011	2.271	0.0232*
S10	2.1760	1.1336	1.920	0.0252*
S12	-0.4936	1.1585	-0.426	0.6700
C1	1.0525	1.3036	0.807	0.0419*
C2	0.6876	0.7413	0.928	0.0275*
R7	-0.1725	0.2426	-0.711	0.4769
R10	0.2347	0.2379	0.987	0.3239

Table 15 statistics showed, the outcome is successful or failed of software projects depending upon many factors. In our Survey, the Project manager's experience (P2) in a Pakistani software development environment ranged from 12 months to 10 years. The PM who had either 10 years' experience or 1 years' experience both were affected on project success because if newly PM has the capability and all management qualities to handle a project, then ultimately project flowed in a right direction but somewhere lack of experience will matter. It means (P2) variable was softly correlated with project success with an evaluation model p value which is 0.0512.

Logistic regression analysis stated that Project manager's vision and controlling power is correlate with project success. The P-values of (P4) and (P5) were 0.0115 & 0.0484 are less than 0.05 which means they are statistically significant in the model.

Visualization of our data strengthens that motivation and appreciation of team members regarding long working hours (P6) of development projects is essential towards project success. Amusingly, rewards and other incentives for staff who worked long hours (S4), was not correlated with project success. According to my research these responses were quite surprising because other country's project's success is highly correlated with both reward and motivation of development teams for long working hours [1]. Pakistani's developers undaunted with financial or other rewards, but instead expect acknowledgment from their PM. A logistic regression technique that predicted (P6) is significantly not associated with project success. The level of significance in our model is greater than 5% for predictor variable.

Delivery date always affected by many factors specially when processes are reviewed many times. In this model, process review time (M5) is not significant for project success, but delivery date affects by process review (S1) indicate p-value 0.00717 which is much lesser than 0.05 and more significant in this model. It means process are reviewed many times than ultimately it increased the project delivery date. Raising delivery time may cause towards project failure, but if the project is delivered on time than project success rate becomes increase, so it concludes (S1) is correlated with success factor. Budgeted project estimation, jelled team working environment and well-defined scope are also statistically significant for project success. If the project scope is not well defined, then chances of success dropped could be increased (82% to 70%). 65% of the projects had a well-defined scope and of these 82% were considered a success by management and 65% were considered a success by developers. 56% project's scope changed during development and 44% were not changed. The perception of the PM and developer's regarding the success of project relatively constant either scope is changed or not during project development.

Evaluation of Cost and perfect scheduling is one of the greatest success factors of projects [9]. Through many literatures reviews wisdom suggested that projects have skewed because of inappropriate time and cost scheduling rather than other management factors [10] Sanguine assessment of cost and scheduling is still the main cause for runaway projects [11]. Though, having a schedule (S2) was correlated with project success. Every success or failure projects has an equal percentage of (S2), it means having a schedule lighter the problem of project development. Mostly, Project manager is involved in estimating delivery-date and budget decision because they have the complete knowledge and experience regarding management and development practices. But PM was able to oversee the schedule of one third project and was not included in the starting decisions [11]. The most estimation process is planned at the start of the lifecycle before the requirement phase [18]. 54% of projects were underrated, 41%were absolutely estimated and 5% overrated.

Team motivation factor plays an important part and use as accelerator for any kind of project [12]. It's a driving force that will help a project goes in right direction [13]. There are many classical theories available on motivation in a development process worldwide, but one important saying of McConnell suggests that it's an essential factor for any organization and

quantifiable by leaving other factors back side [14]. We evaluate our motivation variable (S5) with project success with the help of logistic regression technique, which concluded that significant value is 0.0251 less than the fitted value 0.05. The Project did not have proper and complete staff to meet schedule neither their working experience matters in our Pakistani environment.

Question related to the staff motivation stated mix reactions from respondents. Mostly rely on promotions and rest related to other factors. Proper and complete staff for the project and their experience is significant for project success, but (S7) is not associated because data showing staff experience is countable in larger projects but in smaller successful projects there is no need of experience. So, it means that independent variables which have been proposed in this paper are necessary to increase the motivation of employees. In previous stanza of this paper and research proved that Agile methodology is quite appropriate for project feat. So, the main criterion for this method is that teams should be responsive and jelled not be concrete or copious. The jell team members work together to lead high performance. The key concept of agile development is 'project chemistry' or 'positive team climate' that leads to high performance due to jell team [15].

There are many projects where customer /user involvement and expectation are important. Mostly financial and secret service industries consider this factor as apparent since they are kept private from customers. In Pakistani software industries customer involvement and expectation are higher significantly towards success. Because if the customer/user is involved, it is better to understand problem throughout the lifecycle of development [32].

Software project risk or hazards are not uncontrollable [9]; hence we examine hypothesis by asking a research question how much risk project planning is assessed (R7) and makes planning relate to with project success or not. The results displayed estimated effect of risk planning and managing for success is insignificant [19].

V. Conclusion

This study demonstrated the factors affecting the Pakistani software development projects. Some factors have a constant effect on the progress of the project, though many factors have grown over time. The factors play vital role in the project success and spin around having certain, discernible, and realistic goal and intensions with management support. In this research firstly used stepwise multivariable logistic regression on 17 variables in which 10 critical factors influence overall projects. For remaining 5 factors we have applied one-way Anova and for 2 we used Chi-Square test. The finding suggested that project manager presence with management capabilities and experience leads project towards its objectives. Following risk management practices, customer involvement, agile methodology, project planning, timely delivery, reward and motivation of the team, and jelled team strengthen is essential for project success.

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