

Software Project Management Success Factors in Pakistan

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ABSTRACT

Project management is the most important factor in the success of the project. Software Project management is the effective use of our required resources to complete a project within the defined schedule and cost. Like other countries Pakistan is also adopting software project management but most projects fails due to improper project management .So there is a need to define the factors that cause the failure and success of the projects that will help the software developers and managers to understand these factors and keep in mind while development and make products more and more reliable. After conducting a survey this paper will define major success and failure factors and propose a model. These factors will be helpful for different organizations, industries and Companies in developing the more efficient and effective software.

Index Term— Project management Success factors, project management failure factors, software challenges, project management in Pakistan.

1. INTRODUCTION

[2] Successful projects are those that meet the objectives and time, budget, cost of any project. In contrast the failed projects are projects that do not meet the objectives of the project. [1] [2] The failure percentage of projects is 50% to 80% because developers don't know what the user wants. [15] Risks vary from project to project and are too much severe for software. There are people, project and technology factors that are very important for the projects. According to chaos report 2015 [17] 29% are successful, 52% projects were challenged and 19% projects are failed. The failure rate in grand projects are 17% and in small projects failure rate is 11%. [11] There are four factors such as specific project, HR, organizational and environmental culture that define the success and failure of the software projects. [12] The success of any software depends on the successful implementation. All the factors that affect the performance of any project work collectively. [13] Developing a software of high quality requires a lot of effort and in large and projects it is also become complex. The software that is satisfied by the customer is also very complex and more effort

is required. [14] Many problems and challenges arise when we develop any software. The issues that researcher describe is the difference of culture and language. Projects also affected by these factors and also by the regional difference. [7] SPM tools and techniques are performing very important role in the success of a project within the scheduling, budget and scope. In 1997 a survey was conducted in which a company KPMG mentioned that above 75% projects were failed to meet the defined schedule and 50% are demanding more budget than estimated. [9] The study demonstrated that the companies that do hard work and use the required resources more efficiently and effectively are the more successful companies of any country .Project failure affects the reputation of an organization, its staff members, time, cost, effort, resources and motivation. This research paper will determine the previous research on the project success and conduct a survey through questionnaire to know the project success in Pakistan. After conducting the survey this study will define some success and failure factors that have significant influence on the project success. This will help project management to manage their projects effectively by adopting the model and influence of factors.

2. LITERATURE REVIEW

Many researcher investigate the project success and failure. They develop many theories, develop models and conduct survey. There has been conduct a vast study in this field.

2.1. Success Factors

Researcher are always interested to find the factors that determine software projects success. For knowing the success factors In Pakistan [1] Basharat, kamran and Shafi conduct a survey through interviews and questionnaire to gather information about individual and organization, Project management Practices and about Importance and effectiveness of the project management. They conclude that the most industries in Pakistan have no clear concepts about method and quality of the projects, formally plan their projects , use expert estimation for plans and they are aware about the importance of project management. But a draw back in there study was that project size and questions were small. Another survey was conducted in Pakistan using same Methodology to [2] determine the key factors such as, proper project start, should involve all stakeholders, selection right team, managers should maintain momentum. Author suggest that development models such as Waterfall, Spiral, and prototyping Model provide different factor on the project. More than one model should be integrated so that multiple modeling can provide better roadmap and can increase project manager performance. Authors conclude that requirement engineering is one of the most important factor. 70% people have full understanding of the objective, user involvement, programs can be reuse.40% people work happily in team.

[24] For knowing the critical success factors in software industries a survey method was used. Author said that Software development is very complex and challenging task. Different success factors have been described in this study as: better communication, knowledge of technology, better working environment and good coordination among workers. This study also demonstrated that there are two elements for successful projects as: project success and software project success. Researcher said that only those projects that meet its objective, customer satisfaction, quality of product, time and cost constraints are the successful and completed software. Then Authors in [3] Rank the success factors and state that

Requirement Engineering is at number first factor that have impact on success and failure of the project. The second factor is the involvement of the user. The factor at third rank is the support of the executive administration. The factor at fourth is objective of the project .The size and complexity is at number five. The factor at number six is the estimation of the project. The factor at number seven is the use of the procedure such as formal methodology. The factor at number eight is the proper infrastructure. The factor at number nine is the capability of the manager. The factors at number ten are improper planning, communication.

Further Xiangnan, Hong, Weijie contribute to [4] describe success factors. The five main factors that have impact on the project success and failure were customer, stakeholders, project managers, project Team, Process and Technology, and the product. They divide their paper in three parts. In first part they have describe five major failure factors. Secondly conduct interview and fill questionnaire. Thirdly use Equation model and define the summary. This research is conducted using partial least square model. The result shows that Team, Technology and process, and project have negative correlation. And other factors have positive and no correlation. Evelyn, Aske, Joos also [6] define the success factors through interviews. They present a model which describe the people success factors. Style of the leadership, informal communication, acceptability of agile development, complexity and size of the project are major success factors. Iman and Siew [25] conduct case study on student projects to determine causes of project success and failure. Firstly students were given projects of their own choice then they were required to fill the questionnaire. They compare the Standish report and case study result and determine three main factors that cause project success that are involvement of user, proper planning and estimation and “good leadership and team members and technical skills. M.Nasir and S.Sahibuddin [26] define success factors by comparing the studies of project management practices of different countries and of different project size. The chose 43 articles from year 1990-2010. After analyzing the articles they found 26 critical factors. The suggest that non changeable requirements, estimation of schedule ,estimation of budget; project management skills and methodologies that are invoked by manager are key factors

that determine the success of the projects. Another [29] survey through questionnaire was conducted for the identification of success factors for agile software development. Results were analyzed by using regression method. The result shows that proper delivery, practice of agile techniques and effective teams are the main critical factors.

2.2. Model for project success

Many [7] Studies reveals that Project Management includes some processes, methods and frameworks for developing any software. Although many factors have been describe to define the success of the project. So there is also a need for success model to describe project success. The maturity models have processes, strategies, tools and techniques. Some models are capability maturity model (CMM), capability maturity model integration (CMMI), "Project Management Process Maturity Model, Project Management Maturity Model", Organizational Project Management Maturity Model and PM Competence Model. Studies said that the IT Projects are related to the "CMM and CMMI Models". The survey was conducted in hospitals, IT industries, transport area, telecommunications and energy area. Most valid results were received from the energy area as (51.4%). Antonio, Joao, Joaquim, Emanuel also [5] proposed I-C-E (Influence, Characteristics, Evaluation) Model for project management. The Influence define the influence factors of software projects such as Objectives, Executive support, involving user and effective planning. The characteristics model describe the characteristics of the project such as objective, constraints and resources of the project. The Evaluation section describe the Evaluation of the project such as deadlines, budget and scope. The model is under progress. Further Evelyn, Aske, Joos [6] propose a model. The study is split into two sections. In first section the model is proposed and in second section the model is validated. The results were tested by regression. The result of this study shows that all factors have positive impact and project size do not have positive impact on the agile software development. But one main issue in this that it cover small scale and small amount of time.

2.3. Failure Factors:

[28] There are many types of failure which cause project failure such as project, system and user failures. Project failure are encounter when project did not meet the standards. System failure cause when it did not perform as it was expected, and user failure is when user is not able to use the system.

When we describe success factors there are some failure factors so Varner, Sampson, Cerpa [8] describe project failure factors. They said that [8] Developing any software is very challenging and expensive process because these are affected by the lack of management, lack of poor communication, lack of effort, due to the absence of non- technical persons and due to the low quality. Class reviewed 16 papers in which he described that there are not only the management failure factors but also there are technical factors that are related to the failure of any project. He argued that we estimate the cost very badly therefore, more projects lead to the failing side. The method that is used for the collection of data was survey. These questions were distributed in US finance institute and asked from managers, customers, development teams and senior management. Each person give answer twice one for the recent successful project and other for the failed project.

[9] There are also some other reasons of software failures such as unrealistic deadlines, undefined project's scope, project changes are unmanaged, changed requirements and inappropriate team management. For the success of any project keep in mind every perspective. Firstly define the scope of your project clearly. There is not a single activity that we can say that just it is important and others are not. These are all important and work together for the success of a project. Start your work from the right foot. Keep in mind your employees, their responsibilities and their rewards. Quality is a thing that can't be added in the last of any project. We should start our work by keep in mind the quality till start to end. Survey method was used through questionnaire. IT industry area was used in this survey. [10] Global Software Development (GSD) is a process in which a company contracts with another company which provide services in return. Now many organizations are using this for reducing cost and for increasing the quality of a software. Therefore many organizations are using GSD. The Systematic Literature Review (SLR) method is used for collecting data. The population that is used in this paper is the Global Software Development (GSD) Organizations. Case study, survey,

interviews, experience reports and literature reviews methods are used in this paper. This method is conducted in Australia, China, Saudi Arabia, Japan, India, Iran, Brazil, Pakistan, Norway, Turkey, Taiwan, USA and Malaysia. The result of this study was negative. The major reason for this negativity is (58%) that is the lack of communication. Synchronous and Asynchronous communication was used in this paper. 40% people argue the time zone, 39% mentioned the poor communication and 36% said lack of skill are the reasons of software failure.

[16] Many IT projects have been failed due to unrealistic deadlines. Many projects don't meet their time, scheduling, cost and quality. 83% projects failed due to the delay of delivery. The interviews were conducted to know the reasons of failed software projects. The interview questions were asked from senior managers, team leaders, design engineers and many other IT experts. The research questions were divided into two categories one for managers and other for technical persons. The researcher said that projects might be successful if we kept margin in the time of our project's delivery. Better environment, good salary package and better relationship are the success factors of any software project. [25] Poor planning and scheduling are the key factors of project failure. By adopting good project management practices can lead project toward success.

2.4. Software Project Risks

[20] As we know there are many factors that lead the project towards failure. Therefore, project risks are also considered the big failure factors of any software project. Many types of risks are defined in this study as the environmental risks, technological risks and performance risks. In CHOAS report 2011 there are only 37% projects that completed in scheduled time, according to specified cost, quality and functionality. A survey was conducted for collecting data about study. The senior IS executives and senior managers were selected as the population. 300 questionnaire were sent through e-mail to the selected population and 128 questionnaire were correctly responded. Risks are obvious in projects but their severity may vary from project to project Rabia, Abbas, and Hashim [15] Conduct a systematic review to identify the risks in software projects. They also conduct a survey through questionnaire distributed through email and online services.

The result shows that scope changing is crucial factor. If risk assessment tools, Risk avoidance, the policies of organization and risk mitigation activities are adopted than the chances of risks can be minimized and chances of project success can be maximized. Requirement, Planning, Communication and project schedule have greater impact on the success and failure of the project. They suggested that risk mitigation, risk prioritization and risk detection lead to software project success. Authors in [13] conduct a case study in a software industry of CMMI level 5 and also certified by ISO. The analysis of various projects shows that the most critical success factor is the efficient project management. After the study Software Level Index (SLI) was introduced that was quality metric. $SLI = \frac{\text{Achieved Success Level}}{\text{Expected Success Level}}$. The SLI would help project managers to identify the success level of the projects. The result of this study indicate that resources must be allocated wisely to make project successful.

The usability risk [18] is also a factor of software failure. Due to this the project has a low quality and many usability problems occur. These problems can be minimized by using the project risk management methods but can't be eliminated totally. A survey was organized in which questionnaire were designed in which usability risks were discussed. The questionnaire were categorized in different sections as efficiency, effectiveness, satisfaction and safety. Among 330 respondents 270(81%) people completely fill the questionnaire and only 19 persons don't give any response. Developing a complex software is very difficult and challenging for a developer. [22] Every project has different scope and objective therefore, all projects are different in their nature and have different types of risks. So the risks effect on cost, time and resources of a software. This study describe the "Risk Point" and two matrices Pure Risk Point (PRP) and Exponential Risk Point (ERP) are used that are related to risk point. PRP is more efficient than ERP for identifying the rate of risk in a project.

2.5. Project manager's impact on project success [21]

The success of the project is depend upon the personality of the project manager. To verify that authors analyze 116 projects range from small to large under the supervision of same project manager. They develop five hypothesis [H1, H2, H3, H4, and H5] on the basis of personality model. In hypothesis they describe that [H1], [H3], [H4], [H5] are

positively associated with the manager's leadership style in contrast [H2] is negatively associated. The personality of the Manager directly is negatively associated. The potential issue with this paper is that all the study is conducted in Shanghai, there is hope that it will help other countries with different settings but probability of surety is not high. The second issue is that the study is self-reported by the subjects of the projects and having no valid evidence for the assurity of the reports.

Author [19] develop three hypothesis, first reveals that correlation was found between teamwork and project success Secondly correlation was found between Manager's leadership style and teamwork . Third hypothesis reveals that project type is an important factor between teamwork and project success. They conduct a survey in Taiwan and divide the survey questions in sections according to hypothesis. The survey was tested through interviews with software project management experts. The result of the second hypothesis shows that Manager's leadership style and teamwork are highly correlated. The project type have greater effect on project success and teamwork. Complex projects become more successful with teamwork and communication. The project complexity pay key role between project success and teamwork.

2.6. Project success and failure perception Ramosa and Motaa [23] seeks to find the success and failure perception according to Information Technology. They conduct 10 Interview with project managers and questionnaire were send to 33 IT companies of Brazil. After calculating the results of interview author describe completing requirements, team and customer satisfaction as three main factors for project success. There is inverse relationship between success and failure factors. Every person involved in the projects have slightly different perception from others. Lack of communication is the main failure factor because it create perception conflicts of project success and failure between stakeholders. The main concept is that success and failure differ from organization to organization and conflicts should be managed. J.M verner and other authors [27] conduct research to determine whether motivation define project success or failure. They conduct research in three countries (Vietnam, Australia, and Chile) to determine whether the motivational factors are same for these three countries. The result shows that team motivation and

project success or failure are directly linked. The more motivation is a silver coin for successful project. The results are positive for Australia and Chile but negative for Vietnam. The main motivational factors were good project manager, project with controlled risks, trusted customer, good environment and team work and experience.

3. RESEARCH METHODOLOGY

A detailed questionnaire of 25 questions was prepared including both open ended and close ended questions. The questionnaires were sent to 314 peoples of IT Industry through Email and gathered 94 responses. Response rate was 30%. The Work is divided into 3 section. The first section include the information about organization. The second section include questions related to success factors and third section include questions related to failure factors.

4. RESULT AND ANALYSIS

The result is divided into three sections. First section describe the Organization Information, second describe major success and failure factors and third describe the ranking of the major success factors according to their frequency and percentage.

4.1. Organizational Information

All the respondents belongs to IT industries having a worthy experience in their organization. 36.1% of the respondents belongs organization having level1 of CMMI, 25% belongs to CMMI 2, 23.6% belongs to CMMI level 3, no respondents belongs to CMMI 4, 13.9% belongs to CMMI level5 and 1.4% respondents belongs to organization that are not CMMI recognized.

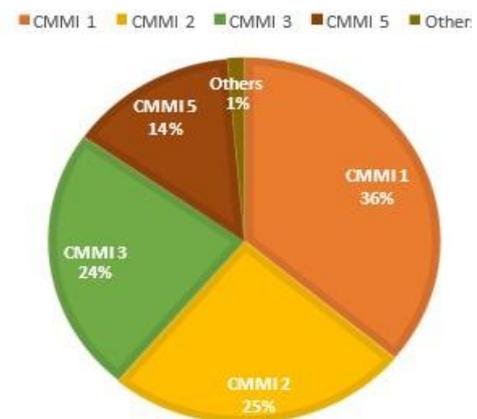


Fig-1: CMMI level of organization

The questionnaire were filled by the IT persons. Each Respondent have different experience from 2 years to 25 years.

The Results shows that 49.4% respondents were project managers, 37.6% were programmers including software engineers and web developers and 13% were from other area of experts such as HR, Database Administrator, CO Founders and SQ and others.

TABLE-I

Designation	Response	Percentage
Project Manager	38	49.4%
Programmer	29	37.6%
Others	10	13%

Table-1: Respondent’s designation

4.2. Success and Failure Factors

4.2.1. Frozen requirements

Change is a constant. By adopting changes project becomes more and more successful.55.3% people said that requirements are frozen in some projects, 30.9% people said that they never freeze the requirements during development while 13.8% people said that they always freeze their requirements.

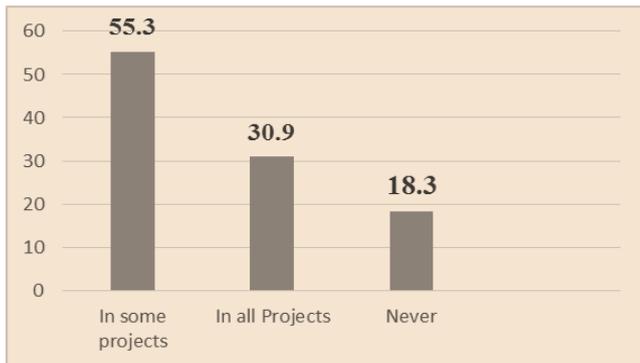


Fig-2: Frozen requirements

4.2.2. Motivational Factor

Motivation is the key to hard work. Motivation describe the success and failure of the project. 38.3% people said that the team is always motivated to do work. 36.2% respondents said that the employees are motivated and wants to work in a project in which they are interested and in which they have some benefit. 8.5% people said that most of the employee do work to avoid penalty. 8.5% respondent said that employees are never motivated they are forced to work. 8.5% people said that motivation and hard work is only adopted for some reward. The result also shows that projects have greater impact on the success of the projects. The employees are motivated only in some projects not in every project. So motivation depends upon nature of the project.

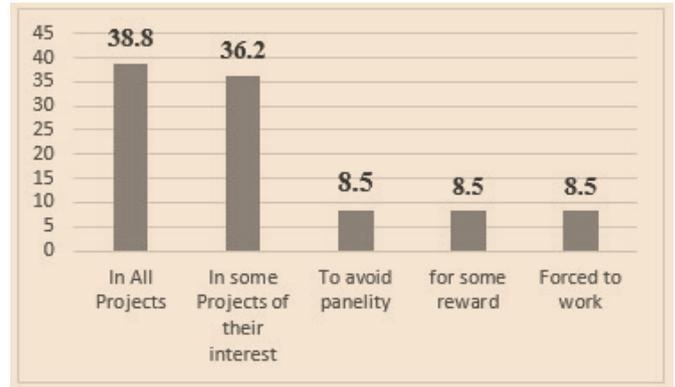


Fig-3: Motivational Factor

4.2.3. Project risks

Risks have greater impact on end result of the projects. If there is no strategy for risk mitigation then it may cause lack of success and produce more errors. Figure 4 shows responses. When we ask that whether there is any risk mitigation strategy to manage their projects. The result was very pleasant that most of the organization manage risks as well. 51.6% respondent said that they use risk mitigation strategy in “all projects”, 32.3% said that they manage risks in some projects but not in every project. 16.1% people said that there is no proper strategy to manage risk.

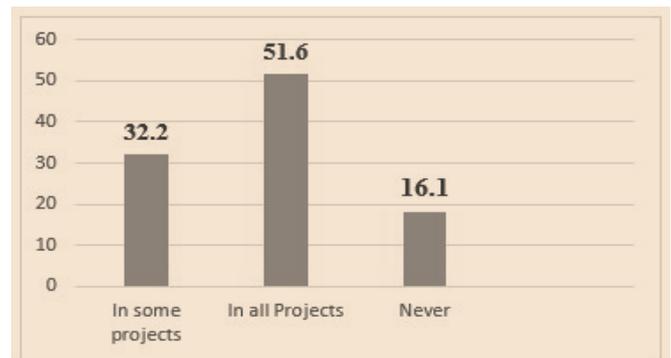


Fig-4: Project Risk

4.2.4. Project size and complexity

Majority of the Respondent said that they most of the project fails because of project size and complexity. 24.5% people think that the success and failure of project totally depends upon project size and complexity. 31.9% people thinks that it may affect project size and complexity.16% do not have any idea about it. 27.6% people thinks that project do not fail because of project size but because of improper project management.

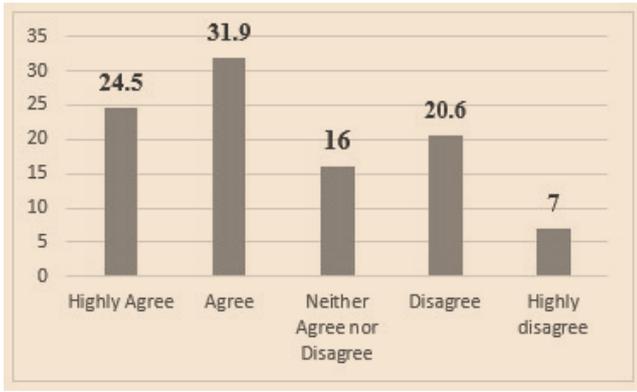


Fig-5: Project size and complexity

4.2.5. Cultural values

Culture is an important factor that have direct impact on our daily life. The cultural values also have impact on the success and breakdown of project. Cultural values vary from project to project and from culture to culture. 48.4% people said that cultural values have direct impact on success and failure of “some” the projects according to demand. 29.7% respondent thinks that it does not matter and have no impact on project success and failure. 22% respondent said that cultural values are so important that it have impact on all the projects.

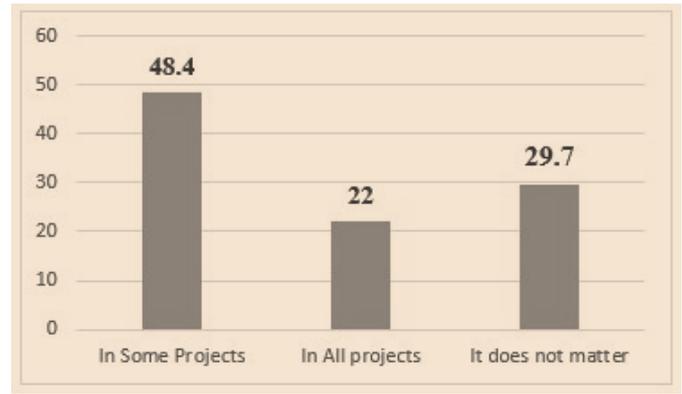


Fig-7: Documentation

4.2.7. Formal procedure

Changes should be managed through formal procedures. Otherwise changes create ambiguities and may cause project catastrophe.68.5% people thinks that changes are managed through formal procedures in some projects. 23.6% people said that there is a formal strategy to manage changes.7.9% people said that they do not adopt any formal strategy to manage changes. There is no formal procedures in all projects so it is failure factor.

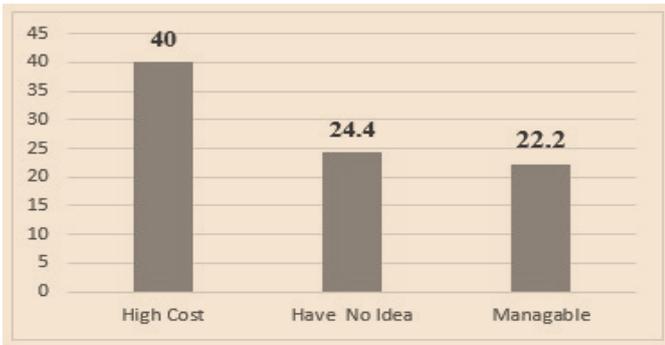


Fig-6: Cultural values

4.2.6. Documentation

Documentation of project is a good approach and in today world it is quite considered very necessary. 40% respondent said that the cost and effort of documentation is very high. 24.4% people thinks that it costs more to prepare a documentation and 22.2% thinks that cost and effort is manageable. But Documentation costs much for both effort and time that’s why most organizations in Pakistan still consider it failure factor.

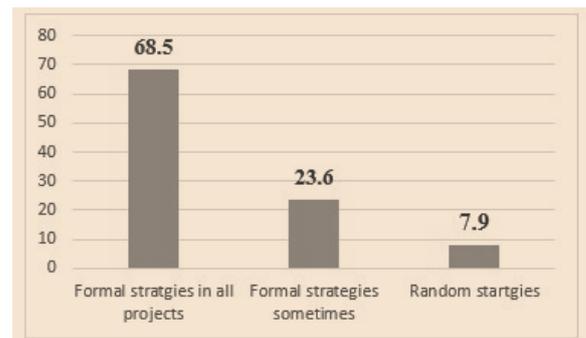


Fig-8: Formal procedures

4.2.8. Success/Failure perception

Most of people thinks that the perception of success and failure is different of supplier and user. Approximately 78% people thinks that the success and failure of any project is different from user or end user’s view and from developer or suppliers view. 12.1% people have no idea about the different perception. 9.9% people says that it does not matter.

4.3. Success Factors Ranking:

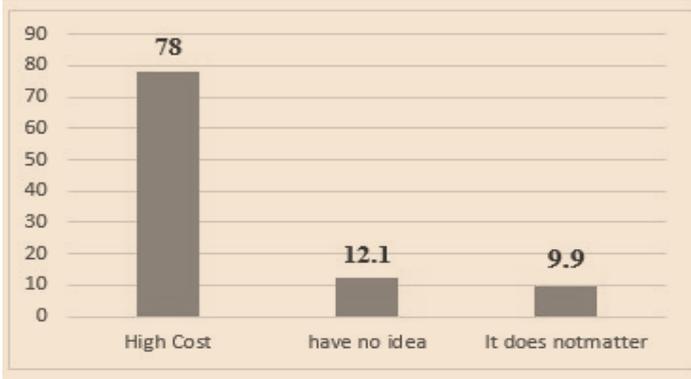


Fig-9: Success/ Failure Perception

There factors that have direct impact on the success and failure of the project. 92 responses were gathered and respondent were asked to describe more than one factors of success that they considered during their projects. 71.3% respondents said that Clear requirements is one of the most important factor for the success of the Project Success. 53.2% said the style of leadership leads a project towards success, 52.1% said involvement of users is important, 52.1% people said clear objectives and goals should be provided by the customers and users, 44.7% people replied that good relationships between manager and its staff members are good for project' success, 42.6% people said good working environment should be in all organizations, 42.6% respondents said that good cost and resource estimation leads to software towards success, 40.4% people said technical staff is plus point for the success of any project, 30.9% respondents said that desired quality of project is important from user's view and 28.7% respondents answered that the use of formal methodology is also a success factor of a project. Following table shows the success factors as well as their ranking.

TABLE-II

Factors	Frequency	Success Response
Clear Requirement	67	71.3%
Style of leadership	50	53.2%
Involvement of user	49	52.1%
Clear objectives and goals	49	52.1%
Manager, Employee Good Relationship	42	44.7%
Good working environment	40	42.6%
Cost and resource estimation	40	42.6%
Technical staff	38	40.4%
Desired quality of the project	29	30.9%

Use of formal methodology	27	28.7%
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Table-2: Success factor ranking

5. CONCLUSIONS

This paper tries to find most critical success and failure factors that must be considered during every project. A survey was conducted in IT industries and results of the survey shows that most of the organization in Pakistan have very clear concepts about success and failure factors that may vary from project to project. After conducting a successful survey this paper is able to define Clear Requirement, Style of leadership, Involvement of user, Clear objectives and goals, Manager and Employee Good Relationship as most critical success factors. Also cultural values, project size, different perception of project success, plays a vital role in any project success. Formal procedures for requirement changes is not adopted which is considered a biggest project flaw and directs project toward loss. Documentation cost is also a biggest challenge for project success.

ACKNOWLEDGMENT

We would like to thank all the people who helps us in the completion of this paper, the respondent who fill the questionnaire by giving us their precious time. A special thanks to our supervisor Respected Madam Samia rafique who help us and whose expertise greatly assist the research. We would also like to thanks our friends, collages who help us in the completion of this study.

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