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Software Projects Crest and Trough in Pakistan: A Management Spectrum

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Abstract:

Software industry has become a popular factor in the progress triumph of every country. Software project management techniques are significantly applicable in the development cycle of software projects. Despite those techniques, software projects still facing problems in terms of schedule, budget, quality, and other correlated factors.The purpose of this paper is to explore the success and failure factors in the Pakistani software environment using Qualitative research analysis approach. For this purpose, almost thirty software houses were targeted and collected perception-based data through questionnaires and interviews. We further elaborated and compared some critical factors from past literatures, further the outcomes and findings showed better management and development aspects for a healthy software project growth in the domain of Pakistan. The importance of this research is to cover both theoretical and practical dimensions of software project management.

Keywords: Pakistani software houses, Software project management, Project success and failure factors

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Introduction

1.1. Pakistani Software Industries

Globally software project development is becoming popular due to IT rapid growth in generation era. In any application system like business, political environment, education, manufacturing products, etc. information system abundantly spread in the development systems of the country. As a matter of fact, the software industry has become a popular factor in the progress of every country's economy. Generally, software houses are generating handsome revenue for their countries which making them progressive in the map of the world.

Software projects that completed on time, budgeted, satisfy customer requirements are known to be a successful and imposed positive influenced on software exports [1]. Geographically, Pakistan is in Asian continent where it shares borders with Iran, China, India, and Afghanistan. These countries are nearest exporter of Pakistan, not for goods but also for software projects. Online Software projects trade is expanding just like mushroom growth, which is a big achievement and contribution towards the country's progress [2]. Especially in COVID period, China has cooperated in this sector [3]. In spite of all, Pakistan faced many problems and revenue loss during software development in industry as compared to India in that period and still it continues. Software management and controlling aspects in development environment are also very important. However, software project management is becoming a concern for both software personals and researchers due to its poor performance in terms of schedule, over budget, quality, and many other management related factors. This research study highlighted certain critical factors identification that can reduce the failure falls in Pakistani software houses [4].

This study focuses software development projects or products which are used by commercial, professional sectors. The study targets the software developers' perceptions about software projects or management perspectives of 30 Pakistani software houses which are in Karachi, Quetta, Peshawar and Lahore. These efforts also identify the factors that effect on software project development for the domestic environment and propose the solution to overcome it. The important thing is that this research would cover all aspects of management knowledge areas, where different studies focus maximum three constraints of success and failure factors with the help of software practicing approach. The importance of this study is to cover both theoretical and practical dimensions of software project management. By analysis and reviews of different literatures on software project and management's success and failure factors and help to understand planning performances regarding the project's cost, schedule, and other constraints and to know how to achieve them.

1.2. Government IT-Sector involvement in Software Industry

Pakistani government took many advantages from software industries in the financial crises age. Due to that, ministry of IT and broadcasting has provided many incentives to the software industries during the last decades, thus it's a big achievement in the field of IT sector in Pakistan. The World Economic Forum ranked Pakistan at 111th among 144 countries in the global IT report of 2014 as biggest software producer. The government of Pakistan has attached a lot with software and its related sector as they understand it's an age of information age. In this regard, software, IT policy in different sectors has been formulated and those systems of Pakistan taking benefit from them. To the purpose of development and implementation of a national policy framework for software related services in Pakistani industries, the Government has established Pakistan Software Export Board (PSEB) [5]. Minister of Government has drafted many tax proposals with relaxation on software equipment and products [6]. Policies which are considered in software sectors related to HR development, IT training, new advance technological embedded system,

education, outsource and in source software project promotion with experts, and lots all.

1.3. Government IT-Sector involvement in Software Industry

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 software industry economic power many other sectors influencing with country economic development [7]. In the era of the 90s, software industry in Pakistan is very undersized but as other developing countries got success and economic benefits by improving their IT and software product need, Pakistan has become in action. The Pakistan IT industry has played a foremost part in placing Pakistan on the international map and in global markets successfully [8].

2. Literature Review

2.1. Software Project Management

A Software project is a project which starts with a scope of work which defined by user or customer's specification and need that must be completed on a customer's given time at a particular cost. According to Katarina Pažur, and Zlatko [9], software is a logical system element which is based on instructions, when executed, perform a desired function and performances, it must develop not manufactured in a classical sense. Any project's success is beneficial for its environment where it has to be used. Software world proudly stated that the main project practitioner is the customer who is responsible for giving authentication of delivered systems and developer who is responsible for making system that is used by the customer. Software Project management is a specialized 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 [10], 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, planning phases and resources are executed in a very strategic manner [11]. This is the reason, project success and failures depend on defined constraints, as well as management views that must be considered, which becomes the success base for projects [12].

2.2. Iron triangle of Software Project Management

Successful software projects as well as failure project and its management based on iron triangle show in Fig.1, which is comprised of cost, time, and product performance. It gives the project or product quality that is the surety of acceptance of the projects. Cost includes any material, personnel, external and internal; requirement cost etc., whereas Time implies scheduling and duration of development and last Performance refers to the quality, scope and specifications [13].

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 have been raised [14].

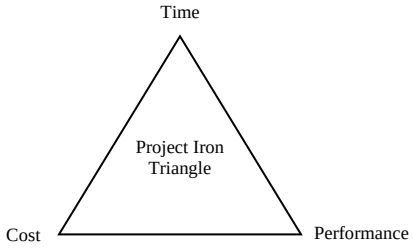


FIG.1. IRON TRIANGLE

2.3. Project Performance Assessment Criteria

The criteria for assessing success or failure of projects have a wide literature so this section will summarize the results of different studies on specifying criteria for project evaluation.

Software engineering projects are completely different from software projects due to the intangible nature of software that

makes non stable perspectives in execution. This is the reason that project failure curve is decreasing day by day all over the world. "CHAOS Summery 2009" is Standish Report of 2009, in which clear rating of the project is mentioned in which thirty-two percent (32%) projects being successful, forty-four (44%) are facing challenges, and twenty-four percent (24%) failed. These are 2009 report of a decade which represents the trough success rate of software projects [15].

According to numerous researches successful projects are those who have been completed under iron triangle management, which is comprised of time, cost, and business objectives [16]. Those projects that completed late, over budgeted and fail to meet requirements considered to be failing projects [17]. The causes of project failures are not limited to triple constraint, but many management and motivational factors are also incorporated to projects crest and troughs. Definition of success and failure of any software project is difficult to define because project practitioner's viewpoint is according to their countries, which may be based on their culture, organization, job, and political and professional environment in which they are working [18].

Era of 1960's defines as project success was measured entirely from the technical viewpoint, then in 1980's project success dependent on triple constraint. But then quality factor introduced in the market, then the definition of successful project added one more constraint with the internal measures and that is accepted by the customer and the customer's satisfaction [19]. The related studies of the project are presented in Table.1 in which assessment criteria could be categorized as customer satisfaction and project criteria in terms of cost, time, and quality [20].

2.4. Project Success and Failure Factors

According to Kurt [21], 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. The Chaos report [22] is one that analyzed largest data every year which impressed failure rate of projects.

Procaccino [23] stated in his literatures by conducting interviews with twenty one professionals of software development projects that poor management, less requirements, lacking of customer invlovement throughoutly can cause project failure [24][25]. Regardless of costing, planning and performance of software projects, management factors are very essential. Committed sponsors, users and manager bonding and communication accroding to Agile methodolgy criteria should be perceived. Requirement gathering and functioning them properly under supervision of a project manager can lead to a healthy project. Automated tool and client support factors enhance capability of work in an environment that results software completed on time [26][27].

Butt et al. [28] identifies limited successful software project factors in which Strong leadership, requirement engineering, right experienced team, good decision making and quality of each phase are essential [29]. There is no discrimination between project success and project management success. Both words compliment each other [14] that specifies managing success is a part of a project [30].

Verner is a renown researcher in the field of software project management, in his one article there were 57 failure factors investigated [31] in which delivery date, measure requirements, inexperienced staff , unmotivated staff are included. According to his survey of Sydney software house, a successful project is one who has completed and accordant requirements that would provide a better chance of developing good developing industry [32] along with effectively handling of that requirement [33].

Verner found one important factor for the project's succession that is a motivational factor [34] motivation is the software

engineering factor reported to have the single largest impact on practitioner productivity and software quality management [35]. 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 [36]. Agile software development environment seems to be very useful as respect to other strategies. Project Manager and its team members rapidly adapt to requirements modification without harming delivery date that leads a higher quality product [37][38].

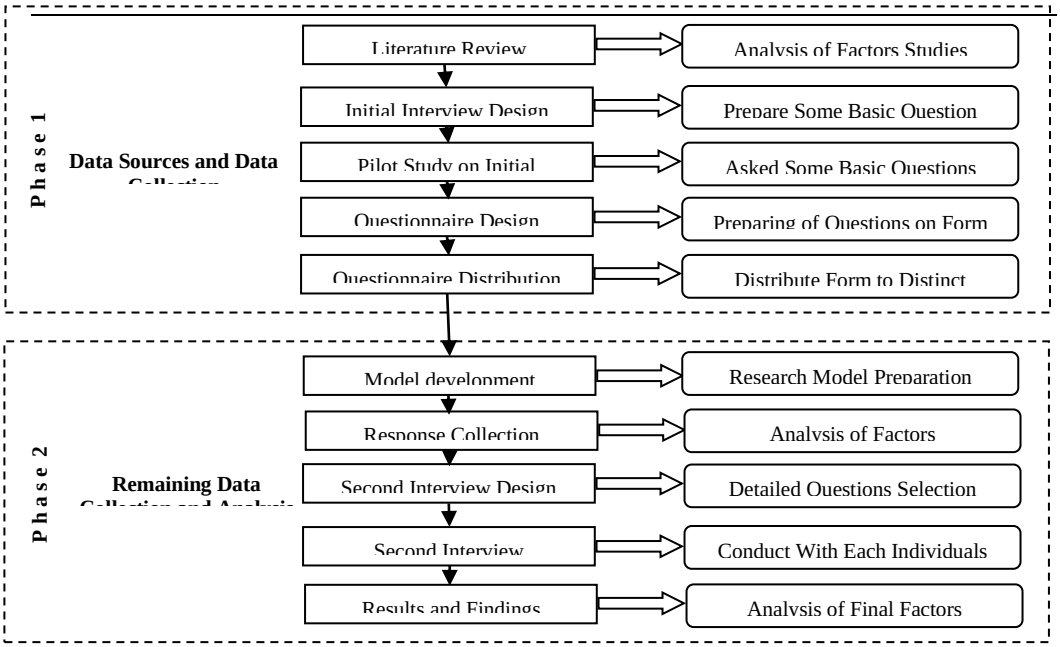
Agerwall & Rathod [39] defined three members (developers, managers and customer) are very important, without their support software scope and quality of the project have not been possible [40].

TABLE 1. Project Assesment Criteria: Summery of Previous Studies

Author	Aim	Methodology	Findings Factors for Success/Failure
Kurt et al, 1999[21]	To identify large gap between how software team defined project success.	* Structured interview * Project documentation review * Survey	* Cost and schedule overrun * Project cancellation and loss opportunities in organization
Paul et al, 2012[41]	Introduce comprehensive reference framework of situational factors that affect s/w development process	Rigorous technique from GT * Analysis technique: 1.Coding 2. Memo 3.Constant comparison	* Improving factors
Proccino et al,1991[23]	Investigate some of early factors and their effect on success and failure of s/w projects	Questionnaire based survey	* User /Customer involvement * Well defined scope
Sulayman et al, 2012[42]	Success factors (SPI) for web companies	* Qualitative technique * Glaserian technique of GT * Semi-structured interview * Open-ended interview from 21 participants in 11 companies in Pakistan	* Automated tool support and client support * Higher management support * SPI consultancy * User /Customer involvement and communication
Butt et al, 2013 [28]	To identify a range of measures used to assess the success of the common factors in projects of Pakistani s/w industry	* Survey questionnaire * Interview	* Ill-defined requirement engineering * Lacking leadership
Atterzadeih et al, 2008[29]	* A case study based on 3 s/w projects among students of IT in Malaya University. * Investigate success, issues, challenges, and failure factors	* Case study investigate through questionnaire	* Quality and spirit of team members * User involvement * Good planning and estimation * Good leadership and strong skill
Verner et al, 2010[43]	To identify factors behind the failure of projects.	Questionnaires and survey	Find 57 failure factors
Verner et al, 2014[34]	Software project management practices lead to successful software project	Questionnaires based survey of 42 Sydney software houses	* Requirements, cost, schedule estimation * Risk assessment and postmortem review
Verner et al, 2005[32]	A US survey on requirement engineering and software success	Three sets of questions directly related to requirements issues	* Requirements good and effectively handled * User/customer involvement
Verner et al, 2012[44]	Identify motivational factor for software team	* Questionnaire * Survey data collected from software engineering practitioners based in Australia, Chile, USA and Vietnam	* Low motivation

Maurizio et al,2007[45]	To present empirical study on factors that cause success or failure of s/w projects (Italian companies)	* Questionnaire * Personal interview * Telephonic conversation and then quantitative technique	* User involvement * Risk analysis * Experience PM * Tools and requirements * Well defined objective and scope
Pino et al, 2010[37]	Propose light weight process to incorporate improvement that is agile Scrum method which will provide detailed guidelines for support management and improvement in processes and then put in small organization.	Case study research method	* Scrum Agile method is suggested
Verner et al, 1999[46]	Project management criteria in software development	Quantitative &Qualitative analysis	* Customer and user involvement * Project manager skills
Arif et al, 2013[47]	The role of the software architect is taken into consideration in the context of Pakistani software industry.	Quantitative methodology	*Project's personnel professionals or external involvement
Muhammad Hamid et al, 2021[48]	The effect of critical elements on the success of software projects in underdeveloped countries(Pakistan)	Structural Equation Modeling (SEM)	*Improper planning *Inadequate human resources *Wrong estimation of time and cost
Venczel et al 2021[14]	Project success literature and understand the differences and similarities between project success	Literature Survey	*Focused on(Budget, Schedule, Quality) *Appreciate every project practitioner
Amjad Hussain et al,2018[1]	A critical analysis of software failure causes from project management perspective	Questionnaires and survey	*Incomplete requirements *Ambiguous goals *Time shortage *Cost management *Lack of user involvement
Dr Md. Mahfuzul Islam Shmim,2022 [49]	Determined aspects of project management	Literature investigation	*Project management techniques
Naveed Saeed Rana et al, 2019[50]	Critical success factors in implementing enterprise resource planning system in Pakistani organizations	Mixed method approach	* Top management support
Rudi Pleteš et al, 2022[40]	project manager's ability to deliver a software engineering project	Literature findings	* High level of project management factors

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 in complex project development [46][47]. Management support from top to bottom, it's guidance and promise, software system can never deliver satisfactory projects. As lacking top management support can increase costing of a project that may lead to a failure system [50].



M. Hammid et al observed that improper planning, lacking human resource and incorrect estimation of cost and timelines have negative impact on software project success. They used hypothesis analysis in their empirical findings in which monitoring and understanding of these aspects are very essential during development [48][51]. The main hurdles that could harm software project house's reputation can explain by Amjad et al [1] in his article. They provided feedback of different employees in which incomplete requirements, ambiguous goals, time shortage, cost management and lack of user involvement were listed [52].

3. Research Framework and Methodology

3.1. Proposed Reaserch Model

In our proposed research model, two phases are defined. In the first phase, we reviewed continuously literature to investigate some common factors of software projects all over the world that helped us to find out relevant questions which we asked to software architects from 30 different software houses of Pakistan. Previous related study helped to identify main issues concerning with the management or development of a project. Initial interview designing based on some basic 14 questions in which firm's name, year of development, their old and existing model etc. were included. After taking initial answers as a pilot study of individuals we decided to make a brief questionnaire form which comprised of 43 questions. The questions which showed in Table.1 categorized under schedule, scope, requirement gathering, risk, project management, customer based, staff related factors [53].

In Second phase, we choose a research model shown in Fig. 2 in which we embedded my research work activities, meanwhile we got responses from respondents, but some questionnaires are unclear and unjustified. Building second interview design, in which we took a face-to-face informal interview to clear my vision and queries from software personnel. Afterward critical analysis based on answers is elaborated, in which most leading successful factors and comparison of their reviews were defined. 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 Qualitative research technique due to the nature of data, as we are much focused on limited and common factors.

3.2. Qualitative Methods

Qualitative research methods are perceived as subjective strategy due to the active involvement of analyst to explore the respondent's view. In our research, we used open ended questions, so the answers completely depend upon the respondent's personal experiences and opinions. The research is explorative in nature, but we still used the existing theories to understand the data and extract the best results. The investigation focused on the statements and categorization of responses into conceptual data which produce the significant results. In our research study, we initially did a pilot study in the fields, which gave us further directions to identify the problems and understand the actual situation [54].

Qualitative methods are used to investigate the social behaviors and factors related to human performance, especially in software development environment the numbers cannot significantly define the experiences and opinions. The analyst has to participate actively in data collection activity as compared to quantitative data analysis and focus on the words of the respondents and understand their views in depth.

3.1.1 Data source

In this research, we did a pilot study by asking few basic questions related to software development and then prepared the questionnaires which are open ended in nature that led to take interview. It seems to be a good method as in the small samples where every individual's response is based on their personal experience and opinion. According to the guidelines of Bryman, the study design must be based on the well-structured questionnaire to get reliability and validity [55]. But as we stated earlier that our research study is exploratory, so we follow less structured rather than confirmatory study [56]. As Pole & Lampard [57] stated that semi structured questions permit an individual to describe his/her experiences and opinion freely.

3.1.2 Preparing of Questionnaire and Interview Guide

The intensive literature review has been done to prepare the questionnaire and interview guide as the core of this research. The most inspirational work has been done by Verner [31][34][46] in the software project management field to analyze failure and success factors of foreign software industries. We were developing an interview guide and then interviewed to project manager, analyst, and developer of 30 different software houses from Pakistan.

The totals of 57 questions were divided into 7 different categories that can be seen in the Table.2. The orders of questions were followed because the questions are dependent on one another and the answers of the few questions depend upon the previous question. The majority questions are not leading and open so, respondents were free to give an answer according to their experiences.

TABLE 2. List of Research Questions

S. No.	Research questions
Q1	What is your name?
Q2	What is the name of your software house?
Q3	Is your house developing project and product or both?
Q4	What are your role and responsibilities?
Q5	In your opinion, what is the meaning of success/failure of the project?

Q6	Which development methodology did follow in starting a job in this software house?
Q7	How many years you followed that model?
Q8	Now, which one do you follow and why?
Q9	How did you have a working experience on this project?
Q10	From your perspective did YOU consider the project a success?
Management Support	
Q11	How many years of experience project manager have?
Q12	Was the project manager changed during the project?
Q13	Was project manager having complete authority to manage projects?
Q14	What was the project manager's vision for the project?
Q15	How often did project manager communicate with staff members?
Q16	What was the sponsorship criterion for the project?
Q17	Was the last project a maintenance or development project?
Q18	What was the working environment like?
Q19	What is the relationship between team motivation, and project outcome; is this the same for the Pakistani environment?
Schedule	
Q20	Did the project have a schedule?
Q21	Did the developers involve in making estimation?
Q22	How do the estimation of effort and schedule do in the project?
Q23	How do delivery date affect by the development process?
Q24	How much estimation of the project is budgeted?
Q25	How many times the processes are reviewed during the project?
Scope	
Q26	How strong or ill the project scope is defined?
Q27	Was the project scope changed in mid of development?
Q28	Was scope increased during the project?
Requirement Gathering	
Q29	Were requirements, complete and accurate at starting of the project?
Q30	If not, complete at the start, were requirements completed later?
Q31	Which method is used for requirements gathering?
Q32	Overall, how did you estimate the requirements?
Q33	Was there a central repository for requirements?
Q34	How did the size of the project have an impact on requirements?
Q35	How did the delivery date depend on requirements information?

Q36	How much time did customers/users give for requirements gathering?
Q37	Did the requirements result in well-defined software deliverables?
Risk	
Q38	How were the risks managed throughout the project?
Q39	When were risks incorporated into the project plan?
Q40	When was the risk table built?
Q41	How is risk project planning assessed?
Q42	How was the post-mortem review held?
The Customer / User	
Q43	How many customers/users were involved in making schedule estimates?
Q44	How much the users/customers be involved in the project?
Q45	How much expectation users/customer had towards the project?
Staff Related	
Q46	Did the project have proper and complete staff to meet schedule?
Q47	Did staff have sufficient working experience of the project?
Q48	How serious was staff turnover during the project?
Q49	Did all the key personnel stay right throughout the project?
Q50	If not, what effect did the project have?
Q51	How much team was working like a jelled team?
Q52	How are team members motivated in the project?
Q53	How is staff promoted or rewarded after a long period of time or project completion?
Q54	How tough schedule does affect team motivation?
Q55	How is team member's professional life affected by tough schedule?
Q56	How is team member's personal life affected by tough schedule?
Q57	How new team member is trained and guide for the project?

3.1.3 Data Analysis

Interpretation of the data is the most important step in Qualitative methods. The most reliable method in our research is content analysis [58]. Content analysis provides the basic structure for making conceptual framework and provides the meaningful information for the data. At the initial stage, when we were designing the interview guide, we considered the six basic questions (Q1-Q6) by Klaus [59] because these are the key questions to be addressed in Qualitative content analysis.

To ensure the accurate results from the data, content analysis was used to transfer the existing data into meaningful and analyzable contents. Each individual respondent, defined as a case, so we have 30 different cases with 57 variables (questions). Afterward, the statements were analyzed according to the rules and then interpreted.

4. Analysis of Responses

The first tenth questions (Q1 to Q10 pilot study questionnaire) are based on the interviewer's personal information regarding

their experience about the projects and organization shown in Table.2.

What is the meaning of success/failure of theproject?

Most responses were highlighted the definition of a successful project as it is one that completed on time and within a given budget. Thus, some of them said, time and budget are not the indicator for a successful project. Customer requirements and quality of a product are the primary focus.

Which development models you follow and why?

According to the respondents 20% are using prototyping in which RAD model is pursuing, 10% are still on waterfall and 70% are using Agile methodology (SCRUM) because they know the reason of using Agile technique which involve the customer/user involvementweekly throughout the life cycle of project development and also consider the motivationand personal management factors of each software personals [60].

What was the working environment like?

Every respondent agrees that they have a good environment, and all team members are working like a jelled team. So, team bonding is the key factor for any successful project [61].

What is the relationship between team motivation, and project outcome; is this the same for the Pakistani environment?

All responses are in favor of a motivational factor that shows the strong relationship of Project manager with team members. Motivational factors are like a booster for every successful project. Project manager's good way of communication with team members leads to motivate them for better development. Another factor is customer confidence and working environment which should be high and pleasant as well as staff experience is mandatory.

What is the Project manager role?

Project manager plays pivotal role for any project, either successful or failure. All the 30 respondents stated that it is important for successful project development that project manager should not change. The ability of a good project manager is to have full authority, vision, control, and communication skills with project attendance. Just one interviewer said that a project manager can be changed if it would die or in case of longer project.

Which method is used for requirements gathering?

A requirement gathering process achieved through brainstorming, story boarding or sometime previous project consultancy. So, interviewees said that customers should be fully committed to give requirements whenever the project manager demands. Most scrum or agile followers are directly gathered data or requirement from users/customers.

Were requirements, complete and accurate at starting of the project? If not, complete at the start, were requirements completed later?

Good requirements are the necessities of project management practices where responses are clearly saying if it is not completed at the staring of the project then it will complete later during development.

Was there a central repository for requirements?

100% "yes" in the favor of, that there should be a central repository for requirements. The repository is like data dictionary and a middle place of storage where specifications and features of the projects, needed previous requirements, reports, diagrams and useful information involving management is stored.

Did the project have a schedule and did the developers involve in making estimation?

Pakistani projects have a calculated schedule and did not face any problem regarding timelines. Further nineteen houses out of thirty responses in favor of "yes" concerning developers involve in making estimation of scheduling. Before starting any project proper and complete staff is required to meet schedules. For this purpose, mostly houses give incentives to them for their long

working and dedicated hours. Promotion, salary increment, dinner, leave and reward etc. are different kind of incentives those are given to them depends upon the nature and expertise of staff.

How many times the processes are reviewed during the project?

There are different views that can be seen from distinct respondents, some stated that two to three times processes are reviewed where some said twice a week. Those projects who are using agile methodology like scrum obviously they follow the scrum strategy with sprint review process. Ongoing sprint's objective is to continuously review and updated development process to make a quality wise project.

How much time did customers / users give for requirements gathering?

Those who follow scrum, as they stated earlier, one time in a day. As sprint requirements, customer /user give appropriate time for requirement gathering.

How were the risks managed throughout the project?

Responses highlighted that risk managed according to planning strategy or follow RMMM technique to handle them. Some said when the risk occurs, we tackled at the time, but some respondents said when risk identifies we handle it at the time when needed, because experience software houses face less risk occurrence due to their past experienced projects. Two of them stated that risk factors can determine project failure tend to become evident only in the later stages of the software development life cycle.

Was the project scope changed in mid of development and scope increased during the project?

According to the last developed project, scope did not change in the middle of the project and it's due to the well-defined plan and scheduling. The remaining responses told us that its normal activity that scope increased a little bit during the project.

How much the users/customer is involved& expectation in the project?

All respondents agree that the customer/user's involvement & expectation is very necessary that is the reason they are using agile software development manifesto, in which customer/user collaboration and communication is valuable over contract negotiation and without it project treated as a failure. Stakeholders whose participation in software management is most important and their significant affection towards software, make it successful. Physically and psychologically involvement both are essential in the field of any project development. Otherwise, there is a bit time to take in making project failure. "Customer/user involvement throughout the development phases is important", as project manager and software developer stated.

5. Finding and Discussion

5.1. Scrum and Agile Methodology

Most of the software houses prefer the scrum agile methodology, is a best modeling method for professionals and practitioners. According to a survey [62] they switched from traditional methods to agile due to incremental and iterative approach. The best part of scrum principle is a sprint that is a short duration of meeting between client/customer or software development in making decisions over software project or product. This meeting held on every end of a single cycle of sprint that is fruitful for project success. A specific principle of scrum is for identification during processes, customers can change their minds about what they want and need [63].

5.2. Successful Projects based on iron Triangle

It can suggest a project called successful when it completes on time, required budget, project or product quality and last but not least management performances. These are constraints that are helpful in making a software project successful. Iron triangle as well as many factors is very necessary for software development lifecycle. Over fifty-year iron triangle is used in many projects

management for measuring project success. Simply completing the project within the due date and within budget is very normal, but it must also be of acceptable quality. It can suggest project management diamond: cost, time, scope, and quality preferable rather than triangle [64].

5.3. Jell team

For the software development, the team must be responsive and flexible rather than concrete or thick goo. In agile methodologies we want team as firm not concrete. The jell team is more adaptive and less bit jiggle, when we want a team to work for a longer time than the team must be jelling (flexible) not gel (concrete). Jelled team members reconsider their tasks on a regular basis and 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 [65].

Before starting agile methodology, we should be careful that our software team is jelled, means team members are internally bound together, work together, research proved that jelled team is more productive in a software development environment rather than work as a part. For this purpose, technology is best to incorporate every member to near at work. Absolute essential which I saw in my survey is trust, respect, and responsibility. If the team is not jelled, it can guarantee that Agile Development will make the situation worse than before [28].

5.4. Motivation in Management

Agile methodology not only defines the process framework properly, but it's also encompassed management and motivational factors, which relates to human interaction. There are many theories related to motivation which can be observed in my research area that is playing an important role in software project management. Almost every software house in Pakistan enlightened motivational factors such as pay, status, personal life, job satisfaction, personal professional growth and so on. So, there should be one management professional in every house who keeps all knowledge about the theories related to human motivational factors [24].

5.5. Requirement Gathering By Communication

Any software project starts by getting well defined requirements from users/customers. Poor requirements and wrong way to gather inconsistent information requirements make a project fail or incomplete and customer faces unrealistic expectation from the project. Research has proven that requirements related issues are occurring during the development process mostly in the planning phase and software engineer recognizes that available requirements are not consistent and stable. Incomplete and inconsistent data, reports and information are resulting incomplete or failed projects. There can be many possibilities for getting poor requirements, most importantly miscommunication and misunderstanding among stakeholders at the first stage of the development process [66].

5.6. RMMM approach

Risk management, mitigation and monitoring plan is the best way to capture risk occurs during software project development. RMMM strategy highlighted some issues and planning to overcome the risks. For this purpose, risk table is made where risk table consist of risk avoid, monitor or managed framework related to the required problem. According to interviews with different practitioners, RMMM plan increases both cost and scheduling time, but this plan could decrease hardness of project that leads to a successful project. Every stakeholder who is associated with software project must follow the RMMM plan and also have to monitor each activity and follow a strategic pattern [67].

5.7. Stakeholder Involvment

Stakeholders whose participation in software management is most important and their significant affection towards software, make it successful. Physically and

psychologically involvement both are essential in the field of any project development [34]. Otherwise, there is a bit time to take in making project failure. Customer/user involvement throughout the development phases is important as project manager and software developer [24].

Stakeholder expectations: expectation of stakeholder is also very important in terms of success or failure of software projects. The primary expectation of customer/user is associated with the end product, that it could satisfy all needs and goals of problems. Second expectation is related to a software developer who is completely responsible for 100% successful software project. Manager software has high expectation of team members and people who are allied with the project. Stakeholders of small or large software houses have different kinds of expectations and goals regarding projects that if satisfy project is going up else down.

5.8. Staff Incentives

In any working environment especially tough schedule of software developer's rewards and different kind of incentives are very important for both employees and employers. It increased not only human morale also job satisfaction and involvement in software houses. As my research on the Pakistani environment, It can be seen, this is the best factor of success criteria after using the technically method of agile process. It effects as well on the economic growth of country and stakeholders are enjoyed in a positive and healthy working place.

5.9. Project manager Characterstics

The PM is primary stakeholder or scrum master who is responsible for everything from initiation of the project to end. He should have technical or managerial skills as well as leading, guiding, and conflict resolution capabilities [68]. Well, all the characteristics that we have read in our research or seen in the survey all must be in a good PM. Best factor which all houses agreed that is a communication skill with every stakeholder other sponsor, client, customer, and team members etc. [69].

6. Conclusion

• Scrum and Agile methodology is best for software development.

• A project called successful which is completing on time, budget, and quality and management performance.

• Team should be jelled in working environment.

• Motivational factor should consider in Pakistani environment.

• Requirement gatherings can be achieved through proper communication with user/customers.

• Review each process daily, thus could not harm project.

• Schedule should be completely defined before project start.

• Budget is defined, estimate and confirm with sponsor or customer before project start.

• Proper risk management, assessed and controlled should plan.

• Stakeholders physically and psychologically involvement both are essential in the field of any project development.

• Staff should be promoted regularly.

• Project manager should have leading, motivating and controlling experience.

• Scope should be well defined and can be changed during project life.

• Product or project must meet the complete requirements of customer.

7. Limitation of this study

There are few limitations that we would like to highlight. Firstly, the basic limitation of this research is that we have captured 30 software houses, in which 19 belong to

Karachi city, 6 houses are in Lahore, 3 from Quetta and 2 from Peshawar. Secondly, we have applied qualitative technique because of rich, diverse data of interpreting results. The scope of the success factors is inherently limited to data sources in the development. Finally, limitation is the absence of broad community involvement in the investigation of this research.

8. Suggestion for Further study

The future work entails the application of find factors in small or large software houses of Pakistan for the better improvement in the development process. Specifically, the Scrum modeling and lots of management factors, along with iron triangle of suggested factors. For further investigation we can also use quantitative techniques in 30 software houses of Pakistan. This research and survey must be extended in more software houses of Punjab, KPK and Baluchistan provinces of the country, also an extension of this research would be a better comparison among internationally located software houses. Hence, there is a need for further study of the influence of different techniques on project outcomes.

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