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An empirical study, analysis and investigation about impact of schedule management plan in project management effectiveness using structural equation modeling

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ABSTRACT
Schedule management plan is an important time management tool which not only enables timely completion of a project but also helps in maintenance of quality, better allocation of resources, and providing guidance to regulate the functioning of an organization. With increased digitalisation there has been increased burden on Information Technology (IT) companies for superior product delivery process, meeting consumer expectations and facing competition. This study aims to examine the role of SMP in software team project management effectiveness. A survey of 189 employees from different IT companies in India shows that SMP is a medium of allocating resources, guideline, and time management tool, thus it help improve the effectiveness of project management and reduce the influence of issues like interdependency of tasks, funds availability, and multiple and complex requirements. It is also a source of documenting plan, chronological task performance, providing guidance, resource allocation, damage reduction, coordination and communication, reduction in wastage of resources, conflicts reduction, task completion, controlling management issues, regular monitoring, better experience provider, problem identifier, standard maintenance, and policies and procedure statement. Thus, SMP helps to effectively and successfully deliver an IT project but there is a need for organizations to improve their internal communication, create flexible environment, and develop recommendation systems in the company.

Keywords: Schedule management plan, project management, software project, time management.

I. INTRODUCTION
In the existing competitive environment, the development of a project needs to be time-bound, with activities aimed at optimisingquality, scope, and time. Complex projects involve a large number of activities at different departments and sub-organizations spread at multiple geographical locations with specified targets and duties. A slight delay in any critical activity will not only affect the delivery time of the project but also hamper the relationship between the organization and its customers, affecting the goodwill of the company(Sharanyasreenivas et al., 2017). For avoiding these situations, there is a need that organizations should plan the working of projects effectively through scheduling and planning. In this regard, schedule management planning is an important tool.

1.1. Schedule Management planning and its importance
Scheduling refers to the process of arrangement, control, and optimization of activities in a project. Through effective allocation of equipment, resources, workforce, materials, and production plan; scheduling enables the preparation of tasks as per the sequence of events (Ronald, 2013).Hildreth & Munoz(2005) defines scheduling process as a part of planning wherein the timing of activities is determined in the planning process and accordingly the schedule for the project is decided. Typically schedule represents the sequencing and phasing of activities required in a project to complete the work. Schedule management is an important time management tool, helping predict project completion time so that resources and

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activities can be allocated optimally. A properly designed SMP acts as a map or a guideline of project. It also helps develop organizational structure guided by a well-thought-out process. It helps reduce time related costs, smoothen change management, build coordination and control, enhance resource and budget control, documentation, and accurate projections and predictions(C. W. Carson, 2011).

Schedule management is an important part of project management today. Organizations today aim toprovidemaximum satisfaction to consumers, enrich their product/service experience, and minimize the cost involved in the project (Levin, 2018).SMP reduces the risk of delay in delivery and provides organisations with a competitive edge of loyal consumers and shareholders (Duggan, 2018).Yaghootkar and Gil (2012)assert that SMP enables cost-effective production as it helps avoid last minute expenses and expenses occurring due to mismanagement. Moreover, clear specification and documentation of the plan provides employees with information of working mechanism, preventing the wastage of time and deliver quality product. Thus, SMP is an important part of project management plan which not only regulates the functioning of the projects but also ensures the timely delivery of product at minimal cost along with maintenance of quality.

1.2. Schedule Management planning role in software projects

Information technology is evolving and becoming an essential contributor in complex business environments. Better management of software projects has become a necessity. The challenge for software teams is that development and maintenance of the projects should be in such a way that future trends could be met and continuous upgradation and improvement could take place(Damasiotis et al., 2017). Software projects deal with project management related issues like time management, cost management, risk management, quality management, communication management, human resource management, integration management, and procurement management for easing up the complexities involved in the development of software projects(Fitsilis & Damasiotis, 2015; Pal, 2018). Through domain analysis, adoption of new paradigms and technologies, different artifacts designing, developing communication systems with end-user, continuous testing of software projects for improvements and bug fixing, timely completion of projects, providing assistance to consumers, and making products development at minimal cost, SMP helps control a project's outcome(Stellman & Greene, 2014).

SMP enables organizations to understand the influence of factors like changeability, interaction, invisibility, solution exactness, uniqueness, and estimation; and provide the software project team with the ability of keeping costs within the estimated budget (Marchewka, 2003;Pal, 2018). The process of SMP starts with the identification of all the resources that would be required for the development of a particular software project. This is followed by allocation of resources which involves the examination of the resources, work, or task dependencies wherein the purpose would be to understand the working of software projects development. Lastly, the project schedule is prepared wherein time of delivery, task completion deadlines, and mitigation of all risks in the process of completion take place (Schwalbe, 2011). Thus, balancing the actual working on an IT project with the planned work, SMP in software projects involves budgeting, communicating, measuring, monitoring, and controlling the entire working procedure with minimization of error possibility.

II. RESEARCH GAP

Contemporary business organisations are faced with complex and challenging projects which demand optimum resource utilization at minimal costs through superior technological alternatives. Such processes are also designed to foster economic and social well-being. The digitalization of economy has promoted the development of better alternatives for effective management of software projects. However, most such methods fail to help manage complexities due to uncertainty, continuously evolving demand and internal management changes, which hampers the functioning of software project. Many researchers examined the presence of complexities in the working of organizations and suggested the usage of project management for overcoming them. however, the aspect of SMP as a methodology or a tool for project management is relatively underdeveloped. Evidence related to SMP with respect to software projects is even scarcer. This study aims to bridge this gap in existing research by assessing the complexities of software projects and understanding the role of SMP in overcoming these complexities and increasing the efficiency of project management.

III. AIM OF STUDY

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The main aim of this study is to examine the use of SMP in successful completion of software projects in IT companies in India by using the structural equation modeling. Further, the study also examines the complexities borne by IT companies and understands the role of SMP in overcoming these issues.

IV. SIGNIFICANCE OF THIS RESEARCH

The information technology sector of a country plays a significant role in its economic growth. Despite recent developments in the field of software development, the industry is fraught with complexities that challenge its functioning and growth. Schedule management planning is a mechanism/ tool that enables sustainable functioning of a software team by helping project members react to external changes in a timely fashion and coordinate complex business activities in remote geographical locations and teams. This study by assessing the role of SMP in software projects helps identify the measures which could be adopted in order to reduce the influence of uncertainties, meet the continuously changing demand of consumers, and achieve timely delivery of projects.

The findings of this study will be significant in academia as it adds to the existing body of knowledge on the subject of project management, particularly SMP which is a much lesser-explored sub-domain. The findings with respect to software industry can prove beneficial to academia in order to devise suitable strategies and theories pertaining to project planning to improve results.

Secondly, this study will also help the industry i.e. information technology by identifying critical gaps that keep it from achieving optimal results with respect to timely completion of projects, resource utilization, cost minimization, and quality management. Using the critical findings of this study, industry practitioners can develop cutting-edge solutions that help software teams react proactively to changes in external environment.

Finally, this study can also benefit the governments and regulatory bodies of the information technology industry and the service sector in general by devising industry-friendly regulations that help easy application of solutions to tackle critical challenges of project management. Not only the IT industry but service sector as a whole will benefit from these regulations.

V. LITERATURE REVIEW

1.3. Importance of Schedule Management Planning

Each organization with the aim of achieving its objectives directs some of the practices towards project management wherein the purpose is to complete the project in effective manner by reducing costs and fulfilling consumer needs(Al-Hajj and Zraunig, 2018). There are various facets to project management such as risk management, time management, budgeting, materials management, forecasting and estimation,and schedule management planning is one of them.Itrefers to a template that specifies the procedure and policies a team must adhere to for better execution, control, development, and monitoring of the project. Being a time management tool, SMP focuses on specification of the targeted time for each activity in order to ensure that the working on a particular project takes place in a chronological order and all the chances of error while working or losses due to mismanagement of resources can be avoided (Ronald, 2013).

Atef, El-henawy and Abdel-Baset, (2015) mentioned about the relevance of schedule management plan and stated that it works as a guidance or the pathway for having timely completion of project. By the statement of deliverables and milestone, SMP describes about all the possible problems that could exist in functioning in order to list out the actions which could be undertaken for coping up with those problems. In changing business environments, organizations need to formulate a mechanism for dealing with close-fitting budgets, resource scarcity, and latest technologies for coping up with dynamism.SMPworks as a guide for the modulation of project execution procedure in such a way that documentation is perfected, time related costs are reduced, risks are minimised, and budget allocation could be maintained (Invensis, 2019). Hence, SMP is a technique which not only enables the completion of project on time but also regulate the quality and functioning of project by employees' performance evaluation, keeping a track of working, preventing rework due to lack of understanding, effectiveness management, and building up the success capacity for the organization.

1.4. Elements in Schedule Management Planning

As SMP is designed at the beginning of a project, clearly defined scope and critical

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documentation on each element of the project is essential (C. Carson, 2011; Pal, 2018). The significant components of SMP are defined below:

- Project Charter – It refers to the reference documents that are needed for creating the SMP. The process of schedule management plan differs with the requirement of each project. Therefore before creating the plan there is a need for organizationstocollect documents such as contracts, specification detail of project, project drawings, master schedule provided by owner, scheduling specification, notice to proceed, area designation plan, sequencing plan, liquidated damages schedule, and bills of materials(Enani, 2015; Mohamed, 2017).
- Project management plan – A project management plan refers to the procedure of developing the scope of project by proving information on how schedule will be developed along with mentioning about the approach, estimating techniques, schedule controlling technique, and scheduling tools statement. The planning procedure of a schedule is dependent on the team involved in the working process. Therefore an organizational chart should be prepared for having information about the team members, details about the people who will use schedule (input, updates, review, approving source, and accuracy check providers). It also consists of responsibility assignment matrix preparation as per the role of each individual who is team member. Further, the software identification is done and information about the work product of schedule is provided (purpose of schedule and reports generation) (C. Carson, 2011; Mohamed, 2017)
- Enterprise environmental factors identification –The organization herein works on identifying the factors influencing the functioning of a project. Targeting the assessment of organizational culture and structure, commercial database, team resource availability and skills, physical availability of resources, and scheduling software, the outline for the preparation of schedule is set. Along with focusing on the internal milestone that the organization may have to bear, the focus is also on identifying the external factors i.e. agreements, public opinion, market conditions, and regulatory situation. Identification of the internal and external factors enablea the organization to identify the possible challenges and prepare the document for listing out the mechanism of overcoming these problems(Mohamed, 2017; Tepede, 2009)
- Organizational process assets examination – The organizational process assets consist of the policies, processes, procedures, and corporate knowledge base for retrieving and storing information. This element of SMP works on assessing the historical information of the organization, schedule development, guiding the organization for stating standard processes and procedures, and monitoring the working for effective execution of developed plan and having the working as per the stated plan (Mohamed, 2017; Usmani, 2020).

1.5. Effectiveness of Schedule Management Planning in Project Management

Project management effectiveness refers to the degree to which the objectives of the organization is achieved. The maintenance of effectiveness in project management helps in full satisfaction of users, completion of all activities on time, and safeguarding the interest of project sponsors (Hyväri, 2016; Wysocki, 2011). Schedule management defines the time when project activities would take place based on the deadlines and precedent tasks, thus it is an important component of project management. Dvir, Raz and Shenhar, (2003) studied the role of project planning in success of a project and defined that during the initial phase of project, the management of project enables the organization to use resources optimally, reduce uncertainty, and raise the likelihood of success by focusing on result-oriented working. Watt, (2010) further added schedule preparation ensures the management of all tools, knowledge, skills, and techniques required for project due to which clear procedure is stated for the entire project. Thus, schedule management not only controls the time, cost and quality of final product but also controls the functioning of all activities by monitoring them.

Mouri, (2011) mentioned that in a project inappropriate allocation of funds, inadequate fund flow, and mismanagement of time could hamper the functioning of a project. Schedule management helps overcome these issues. Solis-Carcano et al., (2015) stated that SMP ensures that there would be timely completion of project which would prevent the projects to be considered as delayed work. This would provide better consumer experience and raise the effectiveness of the final outcome. Thus, schedule management is an important part of project planning procedure and for having the maintenance of the final quality of product, risk management, consumer satisfaction, and objectives

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attainment, it is essential that organizations should ensure effective implementation of schedule management plan in the project management process (Siriram, 2018).

1.6. Factors affecting Schedule Management planning

SMP is a multi-faceted process with many factors that affect its functioning. With the constant challenges borne by the technology and management field, slight deviation in scheduling could result in cost and time overrun. Wambui et al.(2014)examine the factors affecting the timely completion of a project and find that they are project management experience, availability of funds for project, project information technology availability, availability of skilled labors and quality of equipments used for the completion of project. Aziz & Abdel-Hakam(2016) added more information to their results by stating that factors like delay in financial availability for making payments, non-availability of materials and equipments, mismanagement, lack of coordination, non-implementation of the owners orders, poor quality of materials, and lack of experience of staff could result in increasing the time required for completion of project and even many-a-times raise the cost of project.

Sinesilassie et al. (2017) also identified the factors influencing schedule management and stated that project manager's knowledge and experience, regular monitoring and feedback, coordination and communication, responsibility definition and clear statement of plans are the aspects working on which would enable the timely completion if project and reducing the chances of deviation. Shah & Patel (2018) stated that the factors contributing to this deviation in the projects could be the poor management and supervision, ineffective project planning and scheduling, commitment of project participants, lack of knowledge and coordination issues, conflict among project participants, hostile socioeconomic environment, availability of skilled labor, incompetent project team, inadequate experience, priority deviation in project, inefficient use of technology, scheduling techniques and software, delay in progress payments, or financial constraints. Thus, effective implementation of the developed SMP requires the organizations to consider all these stated factors and appropriate management of funds and team to prevent any deviation of work from the schedule.

1.7. Use of Schedule Management Planning in IT projects

Software projects often face the risk of failure in their working even in the case of having standard supervision availability. The involvement of a large number of stakeholders from different backgrounds and domainsoften make software projects some of the most complex projects. Even the complicated, technology-dependent and supple nature of software projects are affected by technological and organizational factors (Damasiotis et al., 2014). SMP helps manage both these factors effectively.Ngyuyen, (2006) with regard to this stated that the software industry is an important source of economic development as it creates value addition in economy at a much higher rate as compared to any other industry with skilled human resources.

Bhoola, (2015) added more information on IT based companies by mentioning that these continuously expanding companies are day by day diverifing their area of work by entering in services like service integration, network management, and software package implemetation.Therefore effective project management by these companies would reduce the chances of failure. Laird, (2016) supported Bhoola results by stating that schedule management plan reduces the risk associated with each project and hence successful delivery of project to client after meeting the continuously evolving demand of consumer could take place. Thus, failure in proper management of schedule and its estimation would result in failure of projects. As software project need proper handling, effective schedule management planning is a must for IT based companies manageement(Mansour, 2019).

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6.6. Conceptual Framework

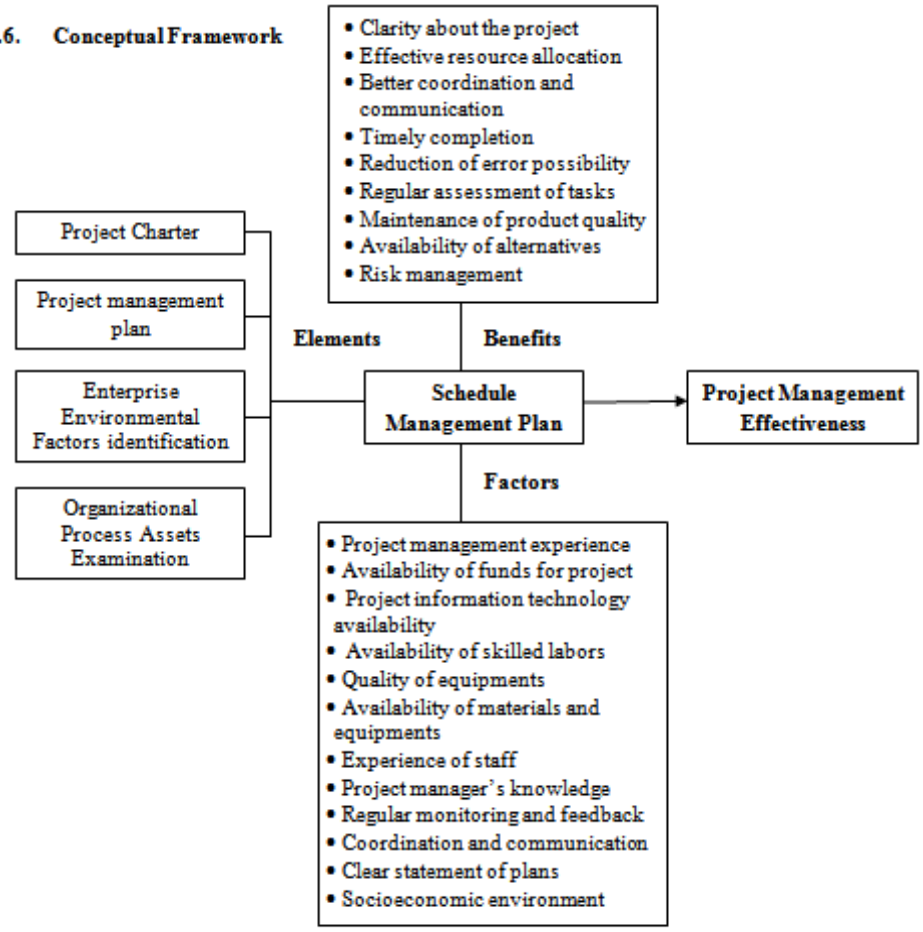

Figure 1: Conceptual Framework of study

The conceptual framework of the study shows in Figure 1 depicts that schedule management plan consisting of project charter, project management plan, enterprise environmental factors identification, and organizational process assets examination; is an important process for the successful completion of a project. However, aspects like project management experience, availability of funds for project, project information technology availability, skilled labors availability, quality of equipments, availability of materials and equipments, experience level of staff, project manager's knowledge, regular monitoring and feedback, coordination and communication, clear statement of plans, and socio-economic environment; have influence on the efficiency of the schedule management plan. As implementation of schedule management plan provide the benefits like clarity about the project, effective resource allocation, better coordination and communication, timely completion of projects, reduction of error possibility, regular assessment of tasks, maintenance of product quality, availability of alternatives, and risk management; thus there is a need that its role in the effectiveness of project management need to be determined. Hence, considering this requirement, this study examines the influence of schedule management plan in the project management effectiveness for IT based projects.

VI. METHODOLOGY

1.8. Research strategy

A research strategy details the components of a study like researcher perspective, focus area of research, research methods, and the study design; that the study needs for working towards the objectives attainment (Johannesson & Perjons, 2014).Epistemology is the research paradigm that was used for the study. The influence of SMP on outcome of a software project is analyzed through hypothesis testing,Therefore the positivist research philosophy is used by the researcher for the analysis procedure. Primary as well as secondary sources of information are used for the study. Lastly, not many studies deal with the application

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of schedule management plan in software projects.Thereforethis study uses the explanatory research design.

1.9. Data Type

This study makes use of quantitative data through survey method in order to achieve the aim, i.e. assessing the impact of SMP on software project effectiveness. Quantitative analysis refers to the form of analysis wherein using officially published datasets like government websites, international agencies, development agencies, published research papers, newspaper and other media articles or building in the reliable instrument of data collection using questionnaire or a survey, the purpose of the study is fulfilled (Intrac, 2017).

1.10. Data Collection Procedure

The data collection procedure defines the process followed for collection of the dataset required for attaining the objectives of study. Below stated sub-sections discusses about the targeted population, sampling plan, and the questionnaire design and administration that are used in this study.

1.10.1. Target Population

Since this study explores the application of SMP specifically in software projects, the perception of people working on IT projects are examined. This enabled the researcher to understand the complexities of software projects and have better understanding about the role of schedule management. Further, focusing on studying the project management in the IT based companies of India, thus the researcher gathered information from the people working in IT based companies of India and more specifically the companies based in Bangalore.

1.10.2. Sampling Plan

With the focus on examining the perception of the employees working on software projects with IT based companies in Bangalore region, the sample for fulfilling the purpose of this study was selected using the probability based sampling method i.e. random sampling method. This sampling type allows the collection of information from those working with software projects by giving all employees equal chance of being the part of study. Reducing the influence of biasness on the results, this sampling method enables the derivation of relevant information. Further, minimizing the chances of error in deriving the results, the study focuses on selection of the sample population by using Cochran's formula with 95% of confidence level.

$$n = \frac{z^2 * p * (1 - p)}{e^2}$$

$$n = 195.9216 \approx 200$$

Wherein,

n = sample size of study

Z = z-score value at the selected confidence level i.e. 95% (z value at 0.95 is 1.96)

p = estimated population proportion having attribute required for study (85% of population i.e. 0.85)

e = level of error (5% level of error i.e. 0.05)

Thus, 200 is the number of employees from 5 different IT based companies based in Bangalore were targeted for the study. However, despite repeated follow ups with all of them, only 189 respondents ended up participating in the study.

1.10.3. Questionnaire Design and Administration

The questionnaire used for capturing the responses of selected sample employees is a set of close-ended questions which are focused on grabbing information about the demographical characteristics of the respondents by including details about age, gender, experience, income or designation; knowledge about the schedule management plan and those practices by their organization; and have determine the role of schedule management plan in the project management effectiveness maintenance.

For administering the questionnaire, the researcher first identified and approached 10 middle-sized IT firms based in Bangalore who are using SMP in their software projects. An initial introductory email was sent to all of them, explaining the intent of the study and its scope. After repeated follow-ups, 5 agreed to participate in the study. Thereafter the researcher sought a telephone conversation with the HR representatives of the firm in order to decide the time, day and method of survey. Over this call, the researcher explained the ethical considerations that are adhered to i.e. confidentiality of data. Following this, the researcher shared a Google Form consisting of the close-ended survey questions with the HR representatives, who further shared the same with the chosen software project members within the firm. These responses took over 2 months to be collected.

1.11. Data Analysis Procedure

The data analysis procedure defines the process followed by the researcher for fulfilling the objective of study and deriving relevant information from the selected sample. Herein, initially the demographical characteristics of the respondents and their background information, i.e. knowledge pertaining to SMP in their organization wasanalysed using frequency analysis. Further, in order to determine the influence of schedule management plan on the project management

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effectiveness, each of the elements representing schedule management plan is considered. For this below stated hypothesis are assessed. .

H_{01}: There is no significant influence of project charter on the software project management effectiveness

H_{A1}: There is a significant influence of project charter on the software project management effectiveness

H_{02}: There is no significant influence of project management plan on the software project management effectiveness

H_{A2}: There is a significant influence of project management plan on the software project management effectiveness

H_{03}: There is no significant influence of enterprise environmental factors identification on the software project management effectiveness

H_{A3}: There is a significant influence of enterprise environmental factors identification on the software project management effectiveness

H_{04}: There is no significant influence of organizational process assets examination on the software project management effectiveness

H_{A4}: There is a significant influence of organizational process assets examination on the software project management effectiveness

Herein, for assessing the above stated hypothesis SEM analysis was performed using SPSS AMOS software. With the factor loading assessment and the derivation of the path suitable for building in the linkage between variables, the regression analysis was done. The results derived from the hypothesis testing is completely based on the employees' perception, thus the working on the projects are free from biasness. As all details about the responses of the study participants are kept confidential in a password protected device, thus the final results from the hypothesis testing are ethical.

VII. DATA ANALYSIS

The quantitative analysis refers to the statistical examination of the numerical data derived from either the published resources or the primary collected dataset. Herein, using the statistical tool SPSS AMOS, the purpose of analysis is to build in the linkage between variables, assess the basic nature of the dataset, examine the perception of researcher, and more relevant prediction based on the contribution of one variable in influencing other variables. With the aim of the study to have more information about the schedule management plan and determine its contribution in influencing the project management effectiveness for software teams, the analysis is done on the responses of 189 employees working in IT based companies. Below section presents the demographic characteristics of the respondents, basic knowledge level about the schedule management plan, reliability and validity of the model, and the hypothesis testing for the schedule management influence in the effectiveness of software team project management.

1.12. Demographic Analysis

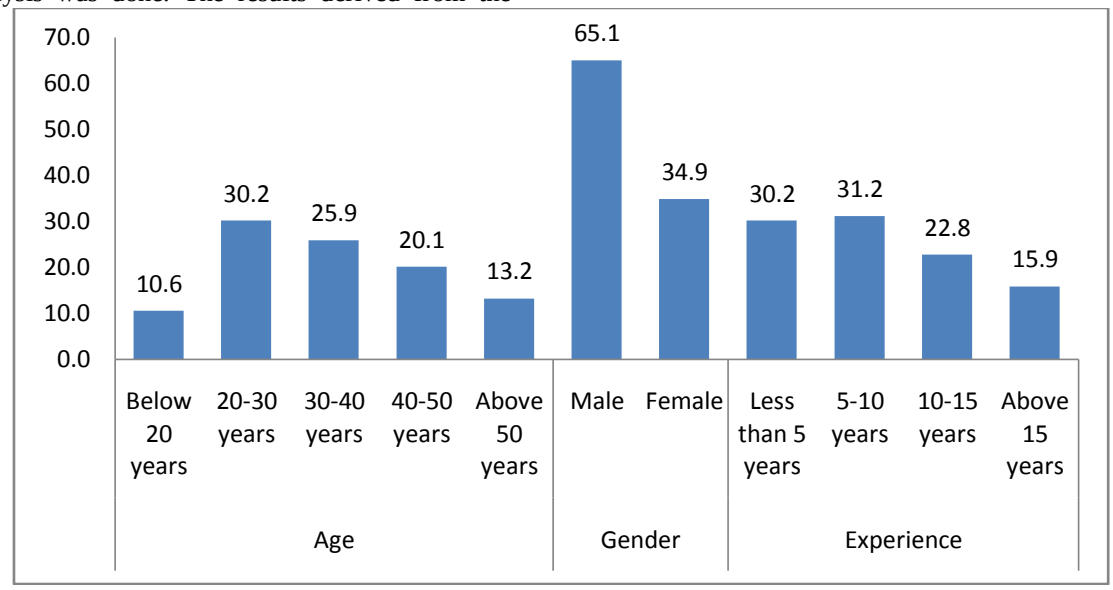

Figure 2: Demographic Analysis

Above figure shows that among the selected 189 respondents, about 10.6% of the employees working in the IT Company has age below 20 years, 30.2% of them belong the age

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category of 20-30 years, 25.9% of the study participants are within the age group 30-40 years, 20.1% of the selected employees belong to the age group between 40-50 years, and remaining 13.2% of the respondents have age above 50 years. Gender based assessment of the selected respondents depict that about 65.1% of the employees are male while remaining 34.9% of them are females showing that mostly the included employees in the study from IT based company are male. Experience based examination of the respondents perception depict that about 30.2% of the employees have the experience of less than 5 years, 31.2% of them have been working on the software projects with 5-10 years of experience, 22.8% of the employees included in study are those having experience of about 10-15 years and remaining 15.9% of the selected employees are the one with highest level of experience i.e. above 15 years. Thus, the employees are experienced enough to provided relevant information about the schedule management plan and the project management effectiveness.

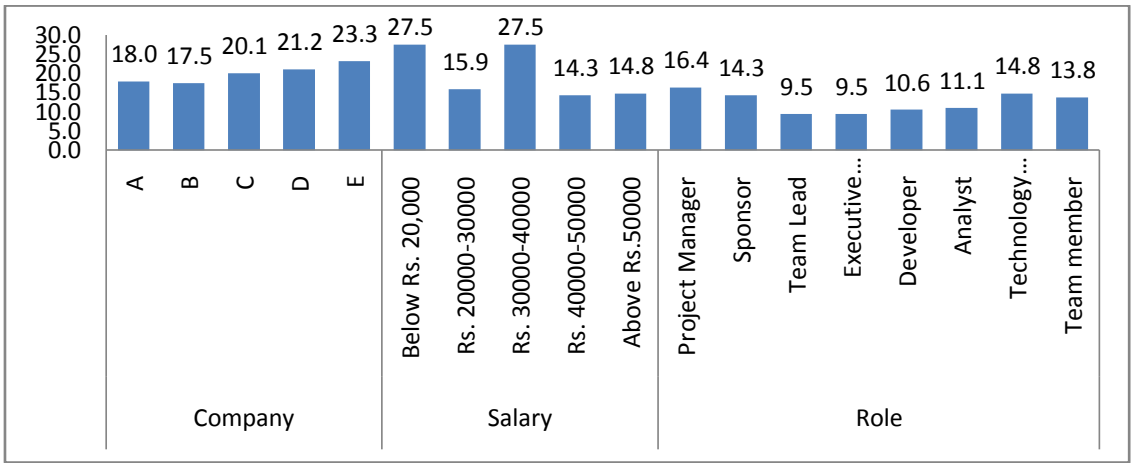

Figure 3: Demographic Analysis

The Figure 3 provide more information about the demographical characteristics of the respondents by showing that about 18% of the employees selected in the study are working in Company A, 17.5% of them are from Company B, 20.1% of the respondents are part of Company C, 21.2% of the selected employees are working with Company D and remaining 23.3% of the study participants are part of Company E. Salary based assessment of the respondents depict that about 27.5% of them have monthly income below Rs 20000, 15.9% of the selected employees salary is between the range of Rs 20000 – 30000, 27.5% of the study participants have monthly income ranging from Rs 30000 – 40000, 14.3% of them have income between Rs 40000 – 50000, and remaining 14.8% of the employees are the one with income above Rs 50000. Lastly, the examination of the role of each employee shows that about 16.4% of them are project manager, 14.3% of the study participants are sponsors, 9.5% of the selected employees are team lead, 9.5% of them are the executive committee member, 10.6% of employees are developer, 11.1% of the respondents are analyst, 14.8% of them are working in technology support, and remaining 13.8% of the selected employees are just team members. Hence, the demographical analysis of the respondent's perception depicts that the employees included in the study are mostly young and middle age group people having sufficient experience with medium level salary who are effective enough to provide reliable information about the schedule management plan and project management effectiveness.

1.13. Background Analysis

Background analysis is the process of having the examination of the basic knowledge level of the study participants with regard to the concept related with research. The assessment of the background information enables the determination of the aspect that whether the participants included in the study are effective enough to provide adequate information or not. Herein, having the focus on understanding the concept of schedule management plan and determining the influence of schedule management plan on the software project management effectiveness, the background analysis assess the knowledge of respondents about the difficulties borne by their company and the relevance of

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schedule management plan in their company. Below figure shows the frequency based analysis of the study participant's perception.

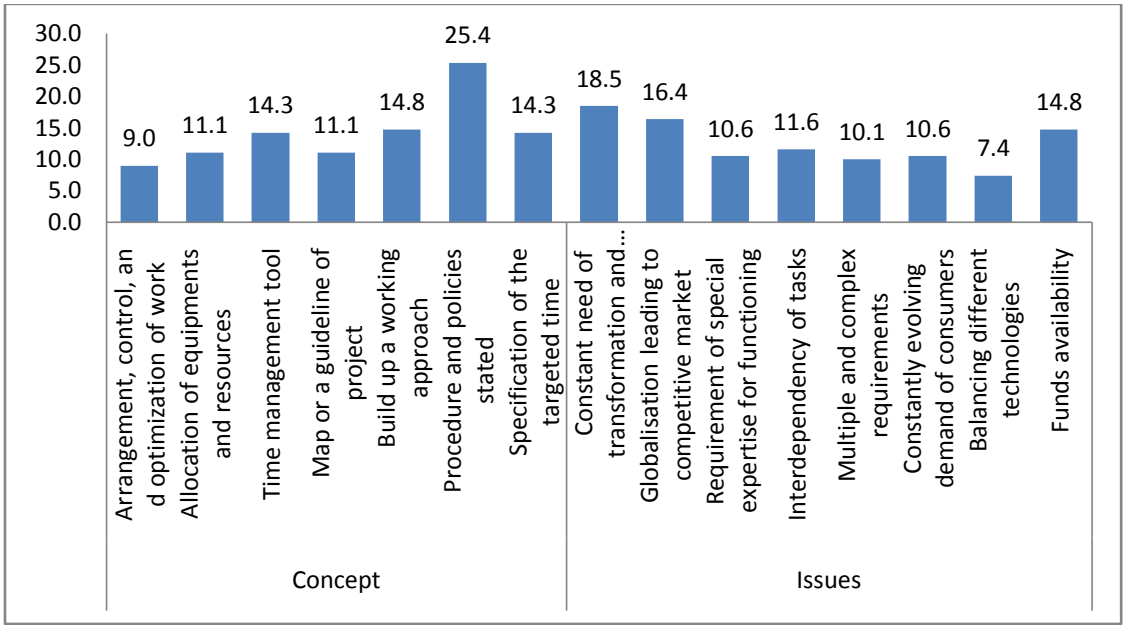

Figure 4: Background Analysis

Above figure shows that about 9% of the study participants believe that schedule management plan is something related to the source of arrangement, control, and work optimization; 11.1% of the respondents consider that schedule management plan is a medium to have allocation of equipments, resources, workforce, materials, and production plan; 14.3% of the employees regard schedule management plan as time management tool, 11.1% of them further consider schedule management plan as a map or guideline provided to the project for having guidance; 14.8% of the respondents consider that schedule management plan is something which build up a working approach guided by thought-out process, 25.4% of employees regard schedule management plan as the procedure or policies stated by the company before processing with the work; and remaining 14.3% of the study participants considered schedule management plan as the specification of the targeted time for each activity. Assessment of the difficulties borne by their company while working on software projects, about 18.5% mentioned constant need of transformation and upgradation as a difficulty, 16.4% of the employees considered globalization creating the market for software projects as competitive is the complexity, 10.6% of respondents mentioned about requirement of special expertise for functioning as a problem, 11.6% of them considered interdependency of tasks as an issue in working, 10.1% of study participants regarded multiple and complex requirements of software projects as a problem, 10.6% of employees mentioned constantly evolving demand of consumers as a complexity, 7.4% of them considered balancing different technologies as difficult part in software projects, and remaining 14.8% of employees regarded funds availability as an issue. Thus, there are lots of problems borne by the IT based companies while working on their software projects.

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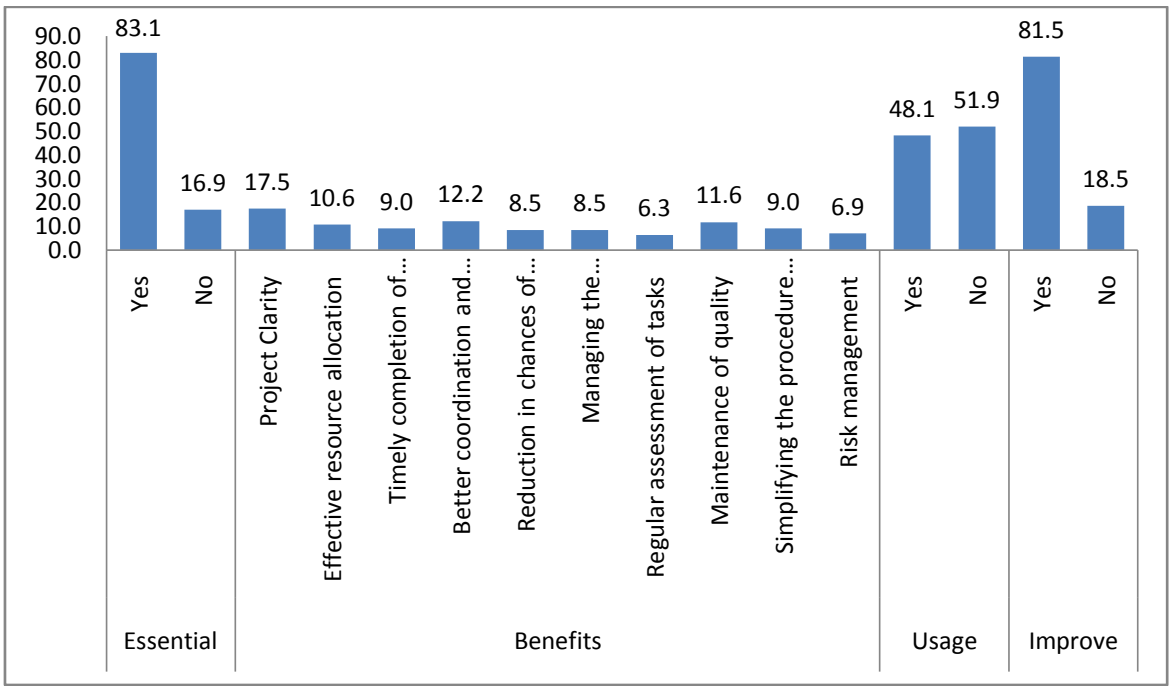

Figure 5: Background Analysis

Above figure shows that about 83.1% of the employees included in the study consider schedule management plan as an essential source of improving the project management effectiveness, and remaining 16.9% of them does not consider schedule management plan essential for project management effectiveness. Examination of the schedule management plan benefits depicts that about 17.5% of employees consider schedule management plan helps in project clarity, 10.6% of study participants believe it as source of effective resource allocation, 9% of respondents include schedule management plan as medium of timely completion of projects, 12.2% of them work on schedule management plan for better coordination and communication development, 8.5% of employees believe that due to schedule management plan there is reduction in chances of error, 8.5% of respondents consider that schedule management plan helps in managing the interdependency of work, 6.3% employees consider it as source of regular assessment of tasks, 11.6% of selected employees consider that schedule management plan as a source of having maintenance of quality, 9% of the respondents mentions role of schedule management plan in simplifying the procedure of working, and remaining 6.9% of employees consider schedule management plan as a source of risk management. Thus, selected employees agree that the usage of schedule management plan is beneficial for organization. Assessment of the schedule management plan depicts that about 48.1% of employees agreed that their organization work on effective development of schedule management plan while remaining 51.9% of selected employees denied their organization any efforts towards effective schedule management plan preparation. Lastly, the perception of employees about the requirement of schedule management plan in software projects depicts that about 81.5% of respondents agree with its relevance while 18.5% of them deny the requirement of schedule management plan in software projects management. Hence, background analysis show that the selected employees are aware of the concept of schedule management plan and its relevance in improving the efficiency of project management.

1.14. Determination of the factors influencing software project management effectiveness through Schedule Management

In order to build in the linkage between the schedule management plan and project management effectiveness for the software projects, certain statements were considered which would represent this relationship between elements of schedule management plan and project management effectiveness. For have the reduction in the complexity and simplifying the analysis, the considered statements very coded. The coding for the statements is shown in below table

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Statements	Code
Project Management Effectiveness (Dependent)	PM
Project Charter	
Having the documentation of plan simplifies the procedure of working	PC1
Designing of plan before working provides guidance	PC2
With the schedule management plan, all tasks could be performed chronologically	PC3
Opportunity of reducing the damages is available with pre-statement of plan	PC4
Project Management Plan	
Schedules helps in having effective allocation of resources	PMP1
Better coordination and communication could be maintained among the team members	PMP2
Timely completion of each of the task is done by having schedules	PMP3
There is less possibility of having wastage of resources i.e. time or money with specified plan availability	PMP4
Enterprise Environmental Factors Identification	
Possibility of conflicts due to interdependency of work could be reduced	EEF1
The issues of lack of management or fault in organizational culture could be tackled initially	EEF2
Better experience is provided to the consumers and shareholders	EEF3
Identification of the problems and statement of alternative could be done at early stage	EEF4
Organizational Process Assets Examination	
Regular monitoring of tasks enables successful delivery of projects	OPA1
Clear specification helps in managing the quality of product and meeting up the specified standards	OPA2
Easy access to all information including the historical one is available	OPA3
Clear statement of policies and procedures provide more efficient and productive working environment	OPA4

Table 1: Coding for the statements representing influence of schedule management plan on project management effectiveness

Based on the above stated coding, the analysis is done for all the elements individually to understand their contribution in the project management effectiveness.

1.14.1. Influence of Project Charter on Project Management Effectiveness

The path based analysis for the influence of project charter on project management effectiveness depicts the influence of having documentation in the management of project. This analysis for the building in the linkage is shown in belong figure via factor loadings i.e.

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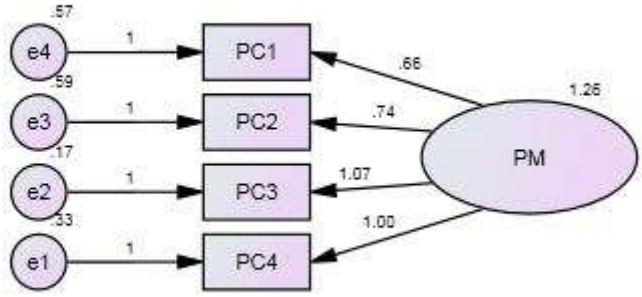

Figure 6: Path Diagram for linking Project charter with project management effectiveness

Above figure shows the factor loadings for each variable and e1 to e4 represents the error in computation of linkage. Factor loadings for the linkage are shown in below table.

PE	Factor Loadings
PC1	0.66
PC2	0.74
PC3	1.07
PC4	1.00

Table 2: Factor loading Results for Project charter and project management effectiveness

Above table shows that the factor loading for PC1 is 0.66, PC2 is 0.74, PC3 is 1.07 and PC4 is 1.00 which are all greater than the required value of 0.5, thus each statement has contribution in affecting project management effectiveness.

As the linkage could be drawn between project charter and project management effectiveness, thus before studying their relationship it is essential to examine the validity and reliability of the results. For this, initially the model fitness of the linkage is examined using the absolute fitness indexes, incremental fitness index, and parsimonious fitness index. Results for this model fitness is shown in below table

Name of category	Name of index	Index value	Adequate fit	Comments
Absolute fit measure	CMIN/Df	2.45	Less than 5	Required level is derived
	GFI	0.99	Greater than 0.90	Required level is derived
	AGFI	0.94	Greater than 0.90	Required level is derived
	RMSEA	0.09	Less than 0.10	Required level is derived
Incremental fit measure	NFI	0.99	Greater than 0.90	Required level is derived
	CFI	0.99	Greater than 0.90	Required level is derived

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	TLI	0.98	Greater than 0.90	Required level is derived
	IFI	0.99	Greater than 0.90	Required level is derived
Parsimonious fit measure	PGFI	0.20	Greater than 0.50	Required level is not derived
	PCFI	0.33	Greater than 0.50	Required level is not derived
	PNFI	0.33	Greater than 0.50	Required level is not derived

Table 3: Model fitness values for Project charter and project management effectiveness

Above table shows that the absolute fitness measure value for each index satisfy the requirement criteria i.e. CMIN/Df (normed/relative Chi-Square) is 2.45< 5, GFI(Goodness of fit) is 0.99 >0.9, AGFI (adjusted goodness of fit) is 0.94> 0.9 and RMSEA(root mean square of approximation) is 0.09 < 0.10. Incremental fitness depicts that the value of NFI(normal fit index) is 0.99 >0.9, CFI(comparative fit index) is 0.99> 0.9, TLI(Tucker Lewis index) is 0.98> 0.9, and IFI(Incremental fit index) is 0.99> 0.9. Parsimonious fitness index values depicts thatPGFI (parsimony goodness of fit index) is 0.20 < 0.5, PCFI (parsimony comparative fit index) is 0.33 < 0.5, and PNFI(parsimony normed fit index) value is 0.33< 0.5. Though the model is not parsimoniously fit but still approximately the value is close to 0.5, thus the linkage between project charter and project management effectiveness is absolutely, incrementally, and parsimoniously fit.

The variability and reliability of the linkage is further assessed by cronbach alpha and average variance explained.

Cronbach's Alpha (α)	**Average Variance Extracted (AVE)**
0.89	0.78

Table 4: Reliability and validity results for Project charter and project management effectiveness

Results shown in Table 4 depicts that cronbach alpha value is 0.89 > 0.7 and average variance extracted (AVE) is 0.78 > 0.5. Thus, there is presence of the internal consistency and discriminant validity in the model representing the linkage between project management effectiveness and project charter.

H_{01}: There is no significant influence of project charter on the software project management effectiveness

H_{A1}: There is a significant influence of project charter on the software project management effectiveness

The analysis results for the stated hypothesis are shown in below table.

PE	**S.E.**	**C.R. (z-value)**	**p (sig) value**
PC1	0.06	11.49	0.00
PC2	0.06	12.42	0.00
PC3	0.06	18.54	0.00

Table 5: Regression results of project charter impact on project management effectiveness

Table 5 shows that the value of standard error (S.E.) for each statement is less than 0.1 i.e. PC1, PC2 and PC3 is 0.06. Thus, there is presence of less biasness in the computation of results. Further, p-value testing for impact determination reveals that as value is 0.00 which is less than the

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significance value of the study i.e. 0.05 and even each statement has z-value higher than its value at 95% of confidence i.e. 11.49, 12.42 and 18.54 > 1.96. Thus, the null hypothesis of having no significant influence of project charter on the software project management effectiveness is rejected. Hence, schedule management plan via project charter enables the documentation of plan before working, designing of plan before working provide guidance, performance of all tasks chronologically and opportunity of reducing damage which raise the effectiveness of project management for software teams.

1.14.2. Influence of Project Management plan on project management effectiveness

The path based analysis helps in linking the elements representing project management plan with project management effectiveness. Building in the linkage between both the variables, there could be determination of the aspect that whether any influence could be present or not.

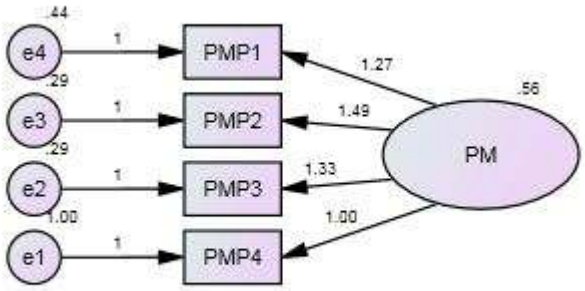

Figure 7: Path Diagram for linking Project management plan with project management effectiveness

Figure 7 shows the linkage between project management plan and project management effectiveness wherein the error in computation of linkage is represented by e1 to e4. Factor loading for each statement is shown in below table.

PE	Factor Loadings
PMP1	1.27
PMP2	1.49
PMP3	1.33
PMP4	1.00

Table 6: Factor loading Results for Project management plan and project management effectiveness

Table 6 represent that the value of PMP1 (1.27), PMP2 (1.49), PMP3 (1.33), and PMP4 (1.00) is greater than 0.5 showing that each of the statements has effective contribution in representing project management effectiveness. Before understanding the influence of project management plan in affecting project management effectiveness, it is essential to understand the reliability and validity of the linkage. The model fitness assessment results are shown in below table.

Name of category	Name of index	Index value	Adequate fit	Comments
Absolute fit measure	CMIN/Df	1.95	Less than 5	Required level is derived
	GFI	0.99	Greater than 0.90	Required level is derived
	AGFI	0.95	Greater than 0.90	Required level is derived

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	RMSEA	0.07	Less than 0.10	Required level is derived
Incremental fit measure	NFI	0.99	Greater than 0.90	Required level is derived
	CFI	1.00	Greater than 0.90	Required level is derived
	TLI	0.99	Greater than 0.90	Required level is derived
	IFI	1.00	Greater than 0.90	Required level is derived
Parsimonious fit measure	PGFI	0.20	Greater than 0.50	Required level is not derived
	PCFI	0.33	Greater than 0.50	Required level is not derived
	PNFI	0.33	Greater than 0.50	Required level is not derived

Table 7: Model fitness values for Project management plan and project management effectiveness

Above table shows that the index value for absolute fitness measures is CMIN/Df is 1.95< 5, GFI is 0.99 > 0.9, AGFI is 0.95> 0.9 and RMSEA is 0.07 < 0.10 wherein each index satisfy the requirement criteria. Incremental fitness index values satisfy the criteria i.e. NFI is 0.99 >0.9, CFI is 1.00 > 0.9, TLI is 0.99 > 0.9, and IFI is 1.00 > 0.9. Parsimonious fitness index values however does not fulfill the requirement as each index value is small i.e. PGFI is 0.20 < 0.5, PCFI is 0.33 < 0.5, and PNFI value is 0.33 < 0.5. Though due to low values, model is not parsimoniously fit but still as each index value is close to 0.5, thus the linkage between project management plan and project management effectiveness could be referred as absolutely, incrementally, and parsimoniously fit.

Validity and reliability analysis via the cronbach alpha and average variance extracted is shown in Table 8.

Cronbach's Alpha (α)	**Average Variance Extracted (AVE)**
0.87	1.65

Table 8: Reliability and validity results for Project management plan and project management effectiveness

As value of cronbach alpha is 0.87 > 0.7 and AVE is 0.78 > 0.5, thus there is internal consistency and discriminant validity presence in the model stating the linkage between project management plan and project management effectiveness.

H_{02}: There is no significant influence of project management plan on the software project management effectiveness

H_{A2}: There is a significant influence of project management plan on the software project management effectiveness

The assessment of the hypothesis is shown in below table

PE	**S.E.**	**C.R. (z-value)**	**p (sig) value**
PMP1	0.15	8.61	0.00
PMP2	0.16	9.06	0.00
PMP3	0.15	8.97	0.00

Table 9: Regression results of Project management plan impact on project management effectiveness

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Table 9 represent that the value of standard error for each statement is low showing less biasness presence in results computation i.e. PMP1 (0.15), PMP2 (0.16) and PMP3 is 0.15. Further, testing of hypothesis by p-value shows that as each of statement value is 0.00 < 0.05 and even the z-value for each statement is more than 1.96, thus, the null hypothesis of having no significant influence of project management plan on the software project management effectiveness is rejected. Hence, schedule management plan via project management plan helps ineffective allocation of resources, better coordination and communication, timely completion of tasks, and less possibility of having wastage of resources, which in turn would result in effectiveness derivation while working with software team projects.

1.14.3. Influence of Enterprise environmental factors Identification on project management effectiveness

In order to build in the linkage between the enterprises environmental factors identification and project management effectiveness, the path based analysis would be done. The analysis for the linkage is shown below

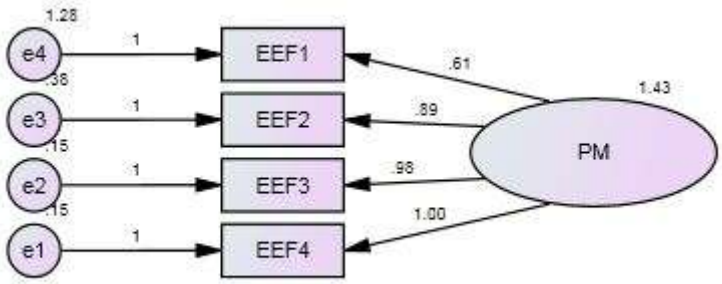

Figure 8: Path Diagram for linking Enterprise environmental factors identification with project management effectiveness

Figure 8 shows that each of the elements representing enterprise environmental factors linkage with project management is derived wherein e1 to e4 shows the error in computation of linkage. Factor loading for each element is shown in below table.

PE	Factor Loadings
EEF1	0.61
EEF2	0.89
EEF3	0.98
EEF4	1.00

Table 10: Factor loading Results for Enterprise environmental factors identification and project management effectiveness

Above table shows that the value for EEF1 is 0.61, EEF2 is 0.89, EEF3 is 0.98, and EEF4 is 1.00 which is more than 0.5 showing that enterprise environmental factors identification has linkage with project management effectiveness. Before determining the relationship between both the variables, it is essential to examine the reliability and validity of the model. Results of model fitness index are shown in below figure.

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Name of category	Name of index	Index value	Adequate fit	Comments
Absolute fit measure	CMIN/Df	2.68	Less than 5	Required level is derived
	GFI	0.99	Greater than 0.90	Required level is derived
	AGFI	0.93	Greater than 0.90	Required level is derived
	RMSEA	0.10	Less than 0.10	Required level is derived
Incremental fit measure	NFI	0.99	Greater than 0.90	Required level is derived
	CFI	1.00	Greater than 0.90	Required level is derived
	TLI	0.98	Greater than 0.90	Required level is derived
	IFI	1.00	Greater than 0.90	Required level is derived
Parsimonious fit measure	PGFI	0.20	Greater than 0.50	Required level is not derived
	PCFI	0.33	Greater than 0.50	Required level is not derived
	PNFI	0.33	Greater than 0.50	Required level is not derived

Table 11: Model fitness values for Enterprise environmental factors identification and project management effectiveness

Above table shows that the absolute fitness measures index values satisfy the requirement criteria i.e. CMIN/Df is 2.68 < 5, GFI is 0.99 > 0.9, AGFI is 0.93> 0.9 and RMSEAis 0.10 = 0.10. Incremental fitness index values areNFI is 0.99 >0.9, CFI is 1.00 > 0.9, TLI is 0.98> 0.9, and IFI is 1.00 > 0.9 wherein each index value is as per the required level. Parsimonious fitness index values though is smaller than desired values i.e. PGFI is 0.20 < 0.5, PCFI is 0.33 < 0.5, and PNFI value is 0.33 < 0.5 but still as index value is close to 0.5, thus the model representing linkage between enterprise environmental factors identification and project management effectiveness is absolutely, incrementally, and parsimoniously fit.

Cronbach alpha and average variance extracted value depicting the validity and reliability is shown in below table.

Cronbach's Alpha (α)	Average Variance Extracted (AVE)
0.89	0.78

Table 12: Reliability and validity results for Enterprise environmental factors identification and project management effectiveness

Cronbach alpha value is 0.89> 0.7 and AVE is 0.78 > 0.5, showing that there is presence of reliability and validity in the model stating the linkage between enterprise environmental factors identification and project management effectiveness.

H_{03}: There is no significant influence of enterprise environmental factors identification on the software project management effectiveness

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H_{A3}: There is a significant influence of enterprise environmental factors identification on the software project management effectiveness

Results of the hypothesis testing is shown in below table

PE	S.E.	C.R. (z-value)	p (sig) value
EEF1	0.07	8.38	0.00
EEF2	0.05	19.82	0.00
EEF3	0.04	26.26	0.00

Table 13: Regression results of Enterprise environmental factors identification impact on project management effectiveness

Table 13 depict that standard error value is less than 0.1 for each statement i.e.EEF1 (0.07), EEF2 (0.05), and EEF3 (0.04). Further, as the p-value for each statement is 0.00 < 0.05 and z-value is more than 1.96, thus, the null hypothesis of having no significant influence of enterprise environmental factors identification on the software project management effectiveness is rejected. Hence, schedule management plan through enterprise environmental factors identification helps in reduction of conflicts possibility caused by interdependency, tackling of lack of management or faulty issues, better experience of consumers and stakeholders, and identification of problems and statement of alternatives, which in turn would help in improving project management effectiveness for the software teams.

1.14.4. Influence of Organizational process assets examination on project management effectiveness

Path based analysis is used to build in the linkage between organizational process assets examination and project management effectiveness in order to understand their connection. The path diagram for the linkage is shown below

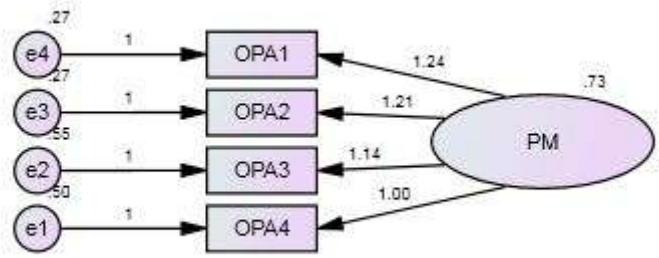

Figure 9: Path Diagram for linking Organizational process assets examination with project management effectiveness

Figure 6 represent the connection between both variables wherein e1 to e4 shows the error possibility in understanding linkage. Further, the strength of linkage could be determined by factor loading i.e.

PE	Factor Loadings
OPA1	1.24
OPA2	1.21
OPA3	1.14
OPA4	1.00

Table 14: Factor loading Results for Organizational process assets examination and project management effectiveness

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Table 14 shows that the value of factor loading for OPA1 is 1.24, OPA2 is 1.21, OPA3 is 1.14, and OPA4 is 1.00 which are all greater than 0.5. Thus, there is presence of linkage between both the variables. Before building in the relationship between organizational process assets examination and project management effectiveness, it is essential to have information about the reliability and validity of model. Thus, analysis would be done. As the value of indexes was not satisfying the required value, thus modification was done and the new model is shown in below figure.

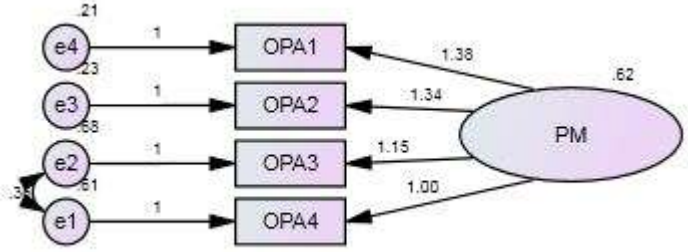

Figure 10: Path Diagram after modification for linking Organizational process assets examination with project management effectiveness

Above figure represent increase in factor loadings i.e. for OPA1 is 1.38, OPA2 is 1.34, OPA3 is 1.15, and OPA4 is 1.00. Further, model fitness examination results is shown in below table.

Name of category	Name of index	Index value	Adequate fit	Comments
Absolute fit measure	CMIN/Df	1.13	Less than 5	Required level is derived
	GFI	1.00	Greater than 0.90	Required level is derived
	AGFI	0.97	Greater than 0.90	Required level is derived
	RMSEA	0.03	Less than 0.10	Required level is derived
Incremental fit measure	NFI	1.00	Greater than 0.90	Required level is derived
	CFI	1.00	Greater than 0.90	Required level is derived
	TLI	1.00	Greater than 0.90	Required level is derived
	IFI	1.00	Greater than 0.90	Required level is derived
Parsimonious fit measure	PGFI	0.10	Greater than 0.50	Required level is not derived
	PCFI	0.17	Greater than 0.50	Required level is not derived
	PNFI	0.17	Greater than 0.50	Required level is not derived

Table 15: Model fitness values for Organizational process assets examination and project management effectiveness

Table 15 shows that the absolute fitness measures index values are CMIN/Df is 1.13 < 5, GFI is 1.00 > 0.9, AGFI is 0.97> 0.9 and RMSEA is 0.03 < 0.10 wherein each value satisfy required

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criteria. Incremental fitness index values are NFI is 1.00 >0.9, CFI is 1.00 > 0.9, TLI is 1.00 > 0.9, and IFI is 1.00 > 0.9 which are as per the required level. Parsimonious fitness index values is smaller than required values i.e. PGFI is 0.10 < 0.5, PCFI is 0.17 < 0.5, and PNFI value is 0.17 < 0.5 but still as value is close to 0.5, thus the model state linkage between organizational process assets examination and project management effectiveness is absolutely, incrementally, and parsimoniously fit.

The validity and reliability analysis results for the model is shown in below table

Cronbach's Alpha (α)	Average Variance Extracted (AVE)
0.91	1.51

Table 16: Reliability and validity results for Organizational process assets examination and project management effectiveness

Herein, as the value of cronbach alpha is 0.91 > 0.7 and AVE is 1.51 > 0.5, thus there is presence of internal consistency and discriminant validity in the model. Finally, analysis could be done to determine the impact of organizational process assets examination on project management effectiveness by below stated hypothesis i.e.

H_{04}: There is no significant influence of organizational process assets examination on the software project management effectiveness

H_{A4}: There is a significant influence of organizational process assets examination on the software project management effectiveness

Results of the analysis is shown in below table

PE	S.E.	C.R. (z-value)	p (sig) value
OPA1	0.12	11.72	0.00
OPA2	0.11	11.69	0.00
OPA3	0.08	14.69	0.00

Table 17: Regression results of Organizational process assets examination impact on project management effectiveness

Table 17 depict that the value of standard error is OPA1 (0.12), OPA2 (0.11) _and OPA3 (0.08) which are all very low showing less biasness in results computation. Further, p-value test the hypothesis wherein as value of each statement is 0.00 < 0.05 and z-value is higher than 1.96, thus the null hypothesis of having no significant influence of organizational process assets examination on the software project management effectiveness is rejected. Hence, the analysis represent that schedule management plan by organizational process assets examination helps in regular monitoring of tasks, manage quality of product as per standard, access to historical information, and clear statement of policies and procedure which in turn would lead to project management effectiveness derivation for the software teams.

VIII. CONCLUSION

As the world is moving towards digitalization, there has been a drastic change in the demands of consumers. The continuous need of process upgradation, presence of more competitive market, and the usage of artificial technologies are raising the difficulties in the functioning of IT based companies. Interdependency of tasks in software projects place the need for these companies to have the effective project management along with timely delivery of products and services to the consumers. However, the complexity in the working environment hampers the working process and even could lead to wastage of resources. In order to overcome these aspects, schedule management plan is used. As effective development of schedule management plan guarantee the timely completion of project, simplifies the working procedure and even monitor all tasks for having cost-effective, quality assured, and productive work. Thus, considering this relevance of schedule management plan, this study examined the role of schedule management in the effectiveness of software project management.

The analysis of the 189 respondents from 5 different companies in Bangalore shows that most of the employees belonging to young and middle age group with experience and medium level of salary, effective information could be derived about schedule management plan.The respondents consider schedule management as a medium of allocating resources, time management tool, guideline, and procedure or policies of working. most of them think that usage of schedule

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management could improve their project management effectiveness and overcome issues like constant need of transformation, interdependency of tasks, multiple and complex requirements, and funds availability. As the dataset derived from the perception of employees is absolutely fit, incrementally fit, parsimoniously fit, reliable and valid, the results derived from the impact analysis is consistent, stable, and could be generalized. With the assessment of the stated hypothesis, it is concluded that SMP works as a source of documenting plan, providing guidance, chronological task performance, and damage reduction by project charter; resource allocation, coordination and communication, task completion, and reduction in wastage of resources by project management plan;reducing conflicts possibility, controlling management issues, better experience provider, and problem identifier by enterprise environmental factors identification; and regular monitoring, standard maintenance, information access, and policies and procedure statement by organizational process assets examination, thus problems of working in software teams could be tackled and effectiveness is derived in project management. Hence, effective development of schedule management plan is essential for IT companies and each company should plan activities using SMP to successfully deliver a project to consumer.

IX. RECOMMENDATIONS

The study highlights relevance of schedule management plan in improving the project management effectiveness for software team projects and supporting the timely delivery of the product to the consumer but it is also stated that software team has to bear lots of complexities in their working. In order to reduce the influence of these difficulties and have the effective development of schedule management plan, below stated are some of the strategies which could support the IT based companies.

1. Building in portal for internal communication – One of the major complexities in the project management process is interdependency of tasks. Though schedule management plan would enable the completion of tasks on time which would reduce the influence of interdependency of tasks, the organizations should work on more usage of A.I. technologies in their internal communication system. Herein, a portal should be developed to provide the digital facility to everyone for sharing their feedbacks, suggestions, and even doubts. This would ease flow of information by reducing the loss of time. Employees could share information about their task on the portal and prevent the discrepancies due to delay in tasks.
2. Flexible environment creation – Though formal environment provide more opportunity of having productive work but this would also lead to presence of rigidity and lack of motivation among employees. Thus, instead of having the command and control method and following the rigid working structure, the companies should focus on using both formal and information system. Herein, the companies should be flexible enough to accept the changes going on the business environment and make relevant changes in the business environment. Even to avoid loathing feeling among employees due to rigidity regular events should be organized for motivating them to work more productively
3. Update, release and repeat method should be adopted – IT based companies are mainly about the latest trends. The usage of the outdated trend would degrade the consumer interest in the company and their services. Thus, companies should work on regular testing and evaluating the working process and the mechanism should be upgraded timely. This would help the companies to overcome the existing complexity of regular upgradation and help to meet the continuously evolving demand of consumers.
4. Recommendation system development – As with the promotion of AI technology usage, the consumers are becoming more personalization conscious. Thus, companies should adopt recommendation system wherein consumers could suggest the things that they want. This would help the IT based companies to reduce the efforts in upgradation and provide more satisfaction to consumer and have better plan implementation.

X. LIMITATIONS OF STUDY AND SCOPE OF FUTURE RESEARCH

Following are the shortcomings identified in this study.

1. The purpose though is to assess the project effectiveness for software teams in case of IT based companies of India but still the selected sample is from only 5 companies located in Bangalore. In order to have generalization of results, there is a need that the study should have included the respondents from different regions of India.

2. The sample considered for study is just 189 employees working in IT based companies. This size is very small which is not adequate enough to have more generalized results. Thus, larger sample size should have been considered for analysis.
3. Study though targets the management concept with focus on schedule management plan but still the analysis was from all employees. There must be inclusion of manager's responses via an interview based examination. Thematic analysis could have been used.

Hence, based on limitations stated above and the limited information availability about schedule management plan, there is scope of further study to increase the researches about the concerned research topic. Thus, further analysis could be done by having the focus on the IT based companies set up in metropolitan cities of India in order to have more information about the issues borne by IT companies and role of schedule management plan. Even as India is moving towards development the digitalization of the government sector is an important aspect which creates possibility of sustainable development and overcome the delay in services issue of government sector. Thus, analysis could be done to determine the role of schedule management plan in improving the project management efficiency for government sector. Lastly, overcoming the current study limitation, the study could be done to have thematic analysis of the manager'sperception about schedule management role in software team project management effectiveness by including quantitative analysis sample of around 500 respondents.

REFERENCES

[1]. Al-Hajj, A., & Zraunig, Ma. M. (2018). The Impact of Project Management Implementation on the Successful Completion of Projects in Construction. International Journal of Innovation, Management and Technology, 9(1).
[2]. Atef, A., El-henawy, I., & Abdel-Baset, M. (2015). Project Scheduling: Survey and Research Potentials. International Journal of Computer Applications Technology and Research, 4(4), 235–239. https://doi.org/10.7753/ijcatr0404.1005
[3]. Aziz, R. F., & Abdel-Hakam, A. A. (2016). Exploring delay causes of road construction projects in Egypt. Alexandria Engineering Journal, 55(2), 1515–1539. https://doi.org/10.1016/j.aej.2016.03.006
[4]. Bhoola, V. (2015). Impact of Project Success Factors in Managing Software Projects in India: An Empirical Analysis. Business Perspectives and Research, 3(2), 109–125. https://doi.org/10.1177/2278533715578555
[5]. Bowen, P. A., Cattel, K. S., Hall, K. A., Edwards, P. J., & Pearl, R. G. (2012). Perceptions of Time, Cost and Quality Management on Building Projects. Australasian Journal of Construction Economcis and Building, 2(2), 48–56.
[6]. Carson, C. (2011). Design and development of a schedule management plan. In PMI Global Congress. https://www.pmi.org/learning/library/project-development-schedule-management-plan-6205
[7]. Carson, C. W. (2011). Design and development of a schedule management plan. PMI Global Congress 2011. https://www.pmi.org/learning/library/project-development-schedule-management-plan-6205
[8]. Damasiotis, V., Fitsilis, P., Considine, P., & O'Kane, J. (2017). Analysis of software project complexity factors. ACM International Conference Proceeding Series, January, 54–58. https://doi.org/10.1145/3034950.3034989
[9]. Damasiotis, V., O'Kane, J. F., & Fitsilis, P. (2014). Scope management complexity in software projects: An approach to evaluate it. BAM2014 Conference Proceedings.
[10]. Duggan, T. (2018). What Is the Importance of Project Scheduling & Its Role in Business Projects? https://yourbusiness.azcentral.com/importance-project-scheduling-its-role-business-projects-9503.html
[11]. Dvir, D., Raz, T., & Shenhar, A. J. (2003). An empirical analysis of the relationship between project planning and project success. International Journal of Project Management, 21(2), 89–95. https://doi.org/10.1016/S0263-7863(02)00012-1
[12]. Enani, J. (2015). Project charter. International Journal of Scientific & Engineering Research, 6(3), 7–9. https://doi.org/10.4324/9781351239585-2
[13]. Fitsilis, P., & Damasiotis, V. (2015). Software Project's Complexity Measurement: A Case Study. Journal of Software Engineering and Applications, 08(10), 549–556. https://doi.org/10.4236/jsea.2015.810052

[14]. Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. Evidence-Based Nursing, 18(3), 66–67. https://doi.org/10.1136/eb-2015-102129
[15]. Hildreth, J. C., & Munoz, B. P. (2005). An Introduction to the Management Principles of Scheduling. In Virgina Tech.
[16]. Hyväri, I. (2016). Roles of Top Management and Organizational Project Management in the Effective Company Strategy Implementation. Procedia - Social and Behavioral Sciences, 226(October 2015), 108–115. https://doi.org/10.1016/j.sbspro.2016.06.168
[17]. Igwenagu, C. (2016). Fundamentals of Research Methodology and Data Collection. LAP Lambert Academic Publishing, June, 4. https://www.researchgate.net/publication/303381524_Fundamentals_of_research_methodology_and_data_collection
[18]. Ikediashi, D. I., Ogunlana, S. O., & Udo, G. (2013). Structural equation model for analysing critical risks associated with facilities management outsourcing and its impact on firm performance. Journal of Facilities Management, 11(4), 323–338. https://doi.org/10.1108/JFM-10-2012-0046
[19]. Intrac. (2017). Secondary data sources.
[20]. Invensis. (2019). Project Schedule Management- How to Plan, Develop, Maintain & Control? https://www.invensislearning.com/resources/pmp/project-schedule-plan-develop-maintain-control
[21]. Johannesson, P., & Perjons, E. (2014). Research Strategies and Methods. In An Introduction to Design Science (pp. 39–73). Springer International Publishing. https://doi.org/10.1007/978-3-319-10632-8_3
[22]. Laird, D. J. (2016). The Impact of Planning and Other Organizational Factors on the success of small information technology projects.
[23]. Levin, G. (2018). Project Schedule Management. PMP, 53–75. https://doi.org/10.1201/9780429024672-3
[24]. Mansour, F. (2019). Analysis of software projects success and failure factors in Afghanistan. Afghanistan Times.
[25]. Marchewka, J. (2003). Information technology project management- providing measurable organizational value.
[26]. Mohajan, H. K. (2017). Two Criteria for Good Measurements in Research: Validity and Reliability. Annals of Spiru Haret University. Economic Series, 17(4), 59–82. https://doi.org/10.26458/1746
[27]. Mohamed, M. A. (2017). Scheduling professional.
[28]. Mouri, H. R. (2011). An Evaluation of Project Management Processes in Public Sector Organizations Like Public Works Department (PWD). BRAC Institute of Governance and Development.
[29]. Ngyuyen, Q. M. (2006). Planning in Software Project Management - An Empirical Research of Software Companies in Vietnam.
[30]. Pal, S. K. (2018). Software Project Management Complexities.
[31]. Pretoria, U. of. (2003). Validilty and reliability. 49–80. https://doi.org/10.1016/j.cattod.2014.06.035
[32]. Ronald, S. K. (2013). Project Schedule Management. In Atlantic international University.
[33]. Schwalbe, K. (2011). Information Technology Project Management. In CRC Handbook of Chemistry and Physics: Vol. 82nd ed. (Issue January 2007). https://doi.org/10.1093/nar/gks1218
[34]. Shah, D. R., & Patel, D. N. (2018). Review: Factors affecting scheduling of multiple projects. International Research Journal of Engineering and Technology, 5(3).
[35]. Sharanyasreenivas, J., Gajalakshmi, G., & Theja, R. (2017). Project Planning , Scheduling and Preparation of Quality Assurance Control Documents. International Research Journal of Engineering and Etchnology, 4(11), 1862–1869.
[36]. Sinesilassie, E. G., Tabish, S. Z. S., & Jha, K. N. (2017). Critical factors affecting schedule performance: A case of Ethiopian public construction projects - Engineers' perspective. Engineering, Construction and Architectural Management, 24(5), 757–773. https://doi.org/10.1108/ECAM-03-2016-0062
[37]. Siriram, R. (2018). Project management assessments (PMAs): An empirical study. South African Journal of Industrial Engineering, 29(1), 108–127. https://doi.org/10.7166/29-1-1675
[38]. Solis-Carcano, R., Corona-Suarez, G. A., & GarciaIbarra, A. J. (2015). The Use of Project Time Management Processes and the Schedule Performance of Construction Projects in Mexico. Journal of Construction Engineering, 9.
[39]. Stellman, A., & Greene, J. (2014). Applied

Software Project Management: Estimation.
[40]. Tepede, D. (2009). Enterprise Environmental Factors.
[41]. Usmani, F. (2020). Enterprise Environmental Factors (EEF) & Organizational Process Assets (OPA). PM Study Circle. https://pmstudycircle.com/2012/01/enterprise-environmental-factors-organizational-process-assets/
[42]. Wambui, D. N. U., Ombui, K., & Kagiri, A. (2014). Factors Affecting Completion of Road Construction Projects in Nairobi City County: Case Study of Kenya Urban Roads Authority (KURA). International Journal of Scientific and Research Publications, 5(11), 525. www.ijsrp.org
[43]. Watt, A. (2010). Project Management (Issue June).
[44]. Wysocki, R. K. (2011). Effective Project Management: Traditional, Agile, Extreme (6th Editio). Wiley Publishing.
[45]. Yaghootkar, K., & Gil, N. (2012). The effects of schedule-driven project management in multi-project environments. International Journal of Project Management, 30(1), 127–140. https://doi.org/10.1016/j.ijproman.2011.02.005
[46]. Zait, A., Alexandru, U., & Cuza, I. (2011). Methods for Testing Discriminant Validity. Management & Marketing, 9(2), 217–224.

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