



## AN EFFICIENT MODEL FOR THE SELECTION OF LEADERSHIP COMPETENCIES AND PERFORMANCE IMPROVEMENT FOR THE SUCCESS OF TRANSPORTATION PROJECTS

Warda Gul<sup>1</sup>, Azka Nawaz<sup>2</sup>, Hamaz<sup>3</sup>, Maria Tariq<sup>4</sup>, Hamayun Khan<sup>5</sup>

<sup>1</sup>School of Professional Advancement, University of Management and Technology, Lahore

<sup>2,4</sup>School of Business and Economics, University of Management and Technology, Lahore

<sup>3</sup>NFC, Institute of Engineering and Technology, Faisalabad

<sup>5</sup>Department of Computer Science, Superior University, Lahore

Corresponding Author: **Hamayun Khan**

hamayunkhan@gu.edu.pk

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### Abstract

*Infrastructure advancement reflects its key role in the financial and socio-economic progression of Pakistan. Project execution and accomplishment majorly depend on the leadership competencies. The dynamics of leadership define the influence of a leader i.e. project manager in lead on his team to complete any type of project and make it a success. The objective of the study is to investigate the influence of project managers' leadership competencies in light of theory explaining "The Competency School of Leadership" coupled with specific project types on project success outcomes for transport infrastructure projects. A structured questionnaire-based survey was conducted to collect data using purposive sampling from individuals that are currently or have been involved in recently completed projects in the transport infrastructure development of Lahore. A total of 152 useful responses were returned. Findings obtained using moderated regression analysis using Andrew Hayes 'process' technique suggest that leadership competence of project managers is insignificant for successful completion of the projects under a particular project type. Results suggest that the project managers in a leadership position when effectively and efficiently utilize their competencies of intellectual strength, managerial procedures and emotional balance for successful actualization of transport infrastructure projects. Moreover, it has been found that project managers in these projects exhibit efficacious leadership competencies that are substantial without regard to any project type in certain for their successful completion.*

**Keywords:** Transport infrastructure, leadership competency, project type, project success, process moderation, competency school of leadership.

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## **I. Introduction**

As the organizations create and set their strategy and visions, the management has to create projects or programs that are individual after the organization has created their strategy and set their vision and these projects are those projects which together managed the business strategy deliverance. Nowadays frameworks are getting progressed and they remain Infrastructure development has a fundamental part in the financial upbringing of a nation. Primarily, this industry took an impressive part in providing the nation's overall employment and contributing to increasing its revenues. Modern transport services are playing a considerable part in the socio-economic development of the nation. Transport plays a key role in financial development as it encourages trade internally and externally, financial use of natural resources and movability of skilled labor [II]. Furthermore, it enhances agricultural and industrial development as it allows proper access of both divisions to main markets. Transport infrastructure needs to be more efficient as it contributes to the overall development of society. The first and the foremost aspect includes the availability of cheap labor along with the revenue and different tools of development. Tools of development in infrastructure have various important things starting from the sites of construction and different construction commodities [III]. Modern modes of transportation also known as the most common ways of transportation include road development. Currently, different road projects like CPEC, Karachi Lahore Multan motorway are under completion process that indicates its importance in the country's development [IV]. Project execution is solely dependent on the leadership skills of the individual in command following productive teamwork. Up till now, transportation research has focused on all the positive aspects of infrastructure development under the ideal conditions [V]. In Pakistan, infrastructure development is facing some serious issues like power outages, an abrupt increase in dollar rates, oil prices and the overall security situation of the country. The infrastructural conditions of Pakistan are not that up to the mark as it has several deviations from the international standards. The sustainability of society is highly dependent on the development of infrastructure. The government of Pakistan has several shortcomings through which the infrastructure development has not flourished but with the increased leadership competencies' awareness has been developed in the masses [VI]. Insufficiency of infrastructure costs Pakistan to lose about 6 billion \$ which sums 8% of the total GDP of the country (Infrastructure Task Force report, 2018). Lack of transportation infrastructure increases the cost of production. Cost of production has derogatory effects on the overall economy as raw material takes a long time to reach the production site. Product dispatching is highly dependent on the proper road infrastructure along with the proper transportation. It's not that Pakistan is not improving its transport

*Warda Gul et al*

infrastructure but the major problem with this is the lack of funds in the public sector along with other malpractices. The development is based on the public-private partnerships that are more fruitful for the developing ventures [VII]. Pakistan has one of the largest work assets in the world; according to the factbook number of Pakistan's labor power is 63.89 million which makes it the tenth major workforce in the world. Historically, infrastructure projects have been primarily under the government domain. The government has managed, sponsored and operated these projects. Now a day, the government is encouraging the business sector to play a dynamic role in project development and management. Public-Private Partnership (PPP) is an agreement that Private Sector Companies will manage and sponsor the project for an initial period and after the time expires the ownership will again be transferred to the government. According to the report of Fitch Solutions [VIII]. The growth rate of the construction industry will be 8.9 percent on average over the next five years. The construction industry creates new jobs and drives the economic growth of the country. Construction companies in Pakistan have expertise in executing large and complex projects. These companies are playing a vital role in the projects because the project depends on the deliverance by the construction company. Nevertheless, the part of the Project Manager is fundamental in these projects because the whole project depends on his leadership competency [IX]. He is responsible for planning, implementing, monitoring and closing the project. The Project Manager plays a substantial part in the overall success of the project. Lahore being the major metropolitan area has experienced significant growth in population over the last few decades. The transport infrastructure of the city has come under increasing strain. For the last five years, several mega transport projects have been completed in Lahore which includes Metro Bus Lahore, Underpasses, Flyovers and Ring Road Lahore etc [X]. Most of the project fails due to lack of planning and unrealistic scheduling and budgeting. Risk identification in the project is very important, the PM should be well aware of the risks that might affect the project, proper risk identification can be one of the main levers of the successful project. However, in some cases, political interference might cause the failure [XII]. Since the 1970s, researchers have endeavored to get what project success is and which reasons add to it. Project success is a complex concept that includes both the interim project management success productivity and the longstanding accomplishment of predicted results from the project, that is, efficiency and influence [XIII]. To achieve a characteristic kind of what project success is, it must be defined in terms of success standards. The kind of project success criteria has progressed from the over-generalized triple authoritative idea known as the project triangle (time, cost and scope). Numerous researches have explored new extents of the project success [XIV].

*Warda Gul et al*

## **II. Literature Review**

There appear to be no descriptions of this concept, once it may be measured inversely in different types of projects. Different sponsor groups have their acuties of project success suggest five different dimensions of the project success i.e. project competence, effect on the client, effect on the team, corporate achievement, and for the research in future. Project success incorporates values or principles that evaluate project results and outcomes. Project success is a multifaceted concept and it changes throughout product development. The achievement of the project should be evaluated by considering three diverse zones which involve project cost, targets meeting the requirements [XV]. Although lots of literature has addressed the term project success different avenues are yet to be explored. Every perspective of success has various dimensions that vary from one situation to another. Each type has a different outcome under different work conditions. Every project has different stakeholders and success is dependent on the correlation between stakeholders and the project manager. The positive outcome happens when all the stakeholders are on the same page. It should also be kept in mind that even all the stakeholders are on the same page, even then some unseen reason could harm the project outcome [XVI]. These unseen factors include the catastrophes like natural calamities other anti-state activities that harm the state's property. Overall project success is dependent on efficiency and effectiveness. Efficiency indicates the dos and don'ts of the project that maximize the outcomes of the project under a given time frame and conditions. Effectiveness includes the extent to which the organization goes to complete the project [XVII]. The effectiveness and efficiency of the project could be evaluated keeping in view three things that are cost, time and quality. If any project completes all these three pre-requisites, this means it will be a success in the long term. Projects are typically unique and are related to queries, multifaceted nature, and vulnerability. The role of the Project Manager is usually diverse and more challenging than the functional manager's, though the project manager's role is to provide the leadership with direct control over the team [XVIII]. The construction industry has carried new modernizations in almost all areas of life i.e. existing style, conveyance system, irrigation services, water storage facilities and underground constructions, etc. In practice, many civic infrastructures work experience interruptions and financial overruns. In Pakistan, almost 63 percent of the transport infrastructure projects failed due to cost and time overrun. Transport projects are lacking important learning, projects are generally plagued with low execution, for example, cost overwhelms and plans delays [XIX]. NASA Shuttle Orbiter Mission exploded just 73 seconds into the journey, killing all the squad inside the shuttle in 1986. The explosion happened due to seepage in one of two solid rocket boosters that exploded the main fuel tank. Roger's

*Warda Gul et al*

Commission mentioned that the cause of explosion was due to faulty design and unusual cold weather [XX]. The commission also found that the Managers and the officials of NASA allowed the shuttle to launch despite concerns of the engineers. The factors behind the project failure are as following:

- Communication gap
- No proper risk identification
- Managers and engineers not on the same page

Lahore Orange Line Metro Train Project is a mass transit system under construction in Lahore. The total length of the route is 27.1 km with 26 stations. The line was expected to be completed in mid of 2019. The initial cost of the project was Rs. 166 billion but had jumped to Rs. 260 billion due to delay in the project (Pakistan Today, 2019). The project is a failure in terms of scheduling and budgeting as the project managers were not able to categorize the hazards that disturbed the success of the project. The factors behind the project failure are as following:

- No proper risk identification
- No proper stakeholder identification
- Poor planning
- Poor scheduling and budgeting

Nandipur Power Project is a 425 Mega Watt combined cycle thermal power plant. The project was to be completed in 2011 with the cost of 27 billion rupees but actually, the project was completed in 2015 with a final cost of 59 billion rupees. The project attracts several inquiries, court orders and political disagreements. Poor management of the project is the main reason behind the increase in the cost. The factors that fail the project are as following:

- Political involvement
- Technical issues
- Lack of planning
- Unrealistic scheduling and cost

Most projects of Pakistan are delayed due to unrealistic planning and schedules, and political involvement etc. Several studies have been conducted to explore the association between leadership competencies of Project Managers and the success of the project, but no such study has been done concerning the Pakistani Context and it demands further pragmatic evidence. Furthermore, this study investigates whether the moderator i.e. project classification/type will act as an arbiter between leadership competency and project success. Researchers of more than 60 years have been carried to understand the management of projects and yet some of the projects have been finished successfully. In Pakistan, no such study has been done to identify the

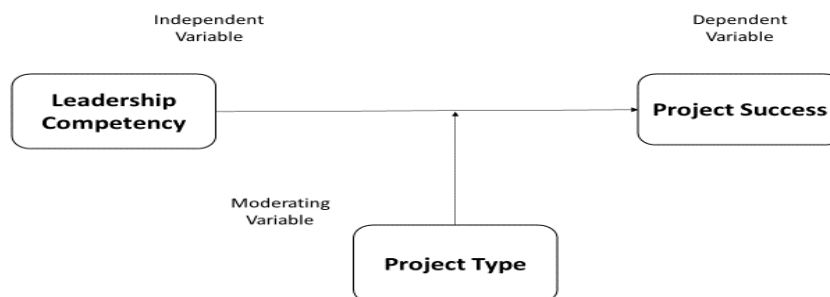
influence of leadership competencies on project success. The intended research study will see that project managers' leadership competencies will have a significant impact on project success. There is a research gap between leadership competency and success of the project; this research will help to further minimize the gap between these two factors and will allow for better identification of appropriate project leaders for a particular project so that the success rate of the project can be increased [XXI].

### III. Problem Statement

Given the past unprosperous and ineffectual Transport Infrastructure Projects in the history of Pakistan, the lack of competent project managers' leadership competencies ascribable to their technical, intellectual and emotional nature has led to the fiasco of competitive pressures, economic downturn, augmented government budget deficit, damage to client' confidence and damage to the firms' reputation. What is the impact of project managers' leadership competencies on the success of Transport Infrastructure Projects of Lahore based on a particular project type?

### IV. Methodology

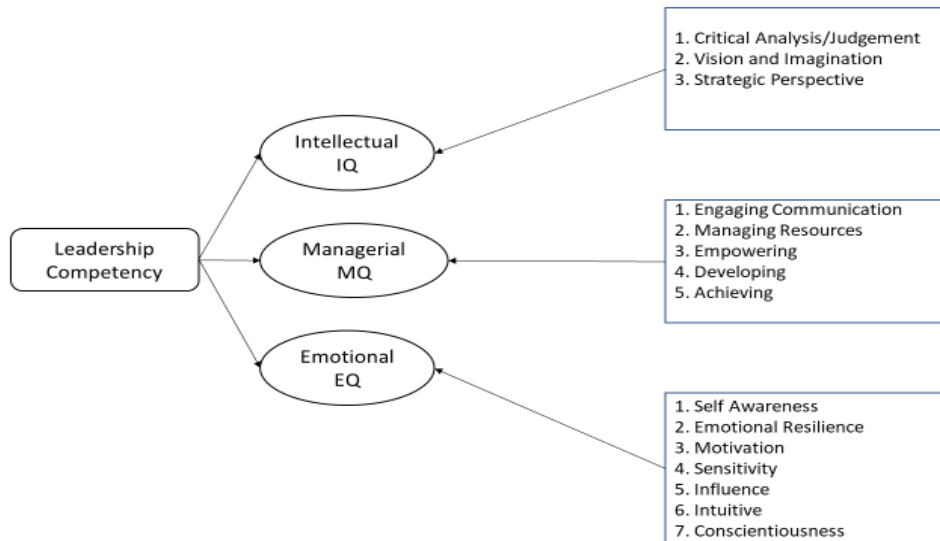
Basis of Literature Review and the resultant hypotheses, following theoretical framework, has been designed.



**Figure 1.** Research design

The method used by the researcher to collect data from the respondent is questionnaire. The survey has been developed through the operationalization of the project success, leadership competencies and project type. Success is principally operationalized in terms of project success, then after this project success is further operationalized in terms of multiple dimensions these dimensions are further operationalized in terms of elements/indicators. The same is the case of leadership competence which is operationalized into dimensions and after that, they are further operationalized in terms of indicators. These indicators are taken from previous researches and literature review to get desired output.

*Warda Gul et al*

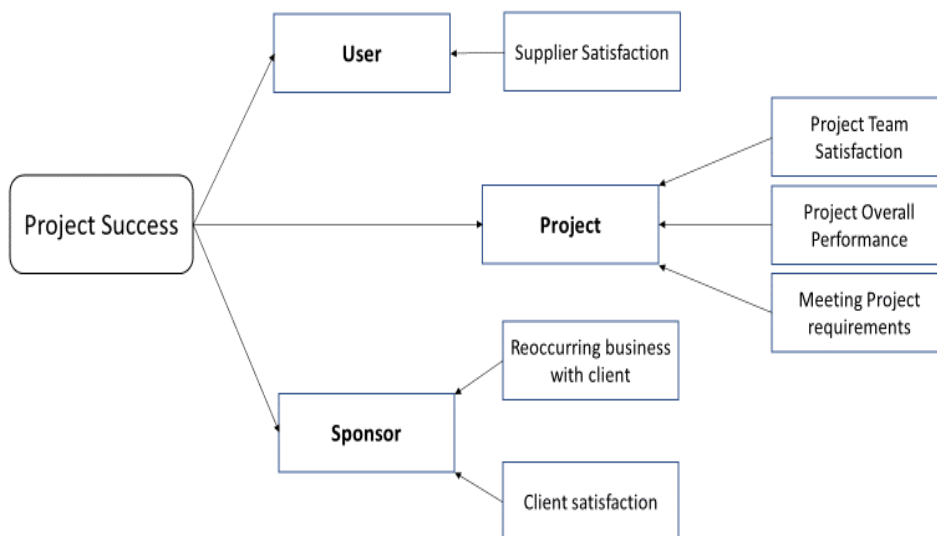


**Figure 2.** Operationalization of scale adapted for leadership competency

This study adopted an empirical research design that is an evidence-based study mainly including data generated from the experiment. The main purpose of using empirical study is the step-wise reduction of the result. The first step of this study starts with the observation that results in the formation of hypotheses that are further tested with experimentation. Rigorous testing is being done of the hypothesis-generating the results. This approach is consistent with the scientific method whereby it is possible to quantify findings based on measurable means [XXII]. The Research paradigm is fundamentally linked with ontology, epistemology and research methodology. Ontology is the technique by which the researcher defines the fact and reality, Epistemology is the technique by which the researcher knows the fact and reality. In this study researcher's epistemology is Objectivism and the Ontological position is Positivism. Objectivist epistemology assumes that reality exists outside, or independently, of the distinct mind. However, research helps provide validity and reliability. The positivist ontology believes that there is a single objective authenticity to any research wonder regardless of the researcher's awareness or trust. Quantitative research attempts to enumerate, collect and evaluate the numerical data. The objective is to test the theory by hypotheses and collection of the data to support or reject the hypotheses [XXIII].

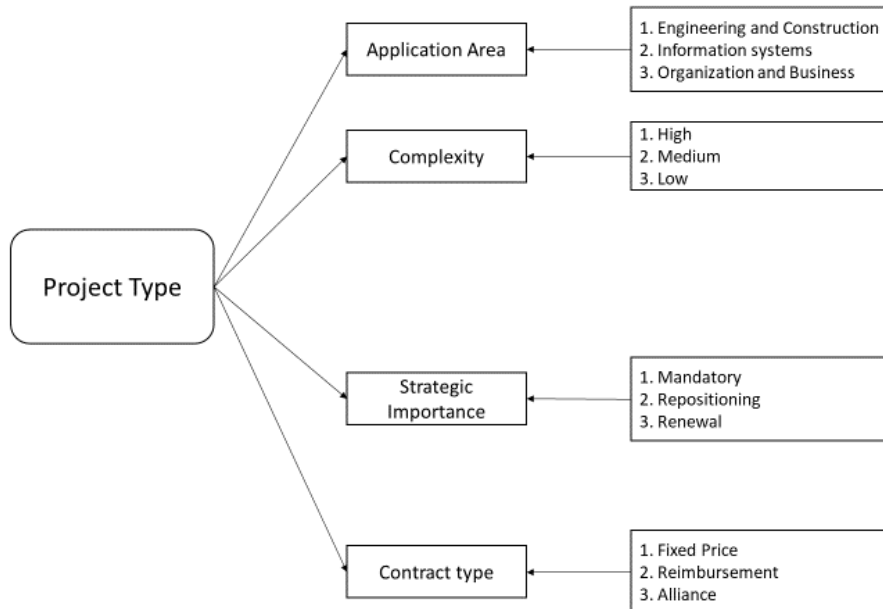
**Table 1: Summary of the Methodology Employed for the Research**

<b>Research Paradigm</b>	Positivism
<b>Nature of Study</b>	Causal
<b>Type of Study</b>	Predictive
<b>Study Design</b>	Cross-sectional Study
<b>Study Design Based on Nature of Investigation</b>	Non-experimental Study
<b>Study Settings</b>	Field Study
<b>Data Collection method</b>	Questionnaire
<b>Unit of Analysis</b>	Individual
<b>Sampling Technique</b>	Purposive/Judgmental
<b>Data Analysis</b>	Moderation Regression Analysis using SPSS



**Figure 3.** Operationalization scale adapted for project success



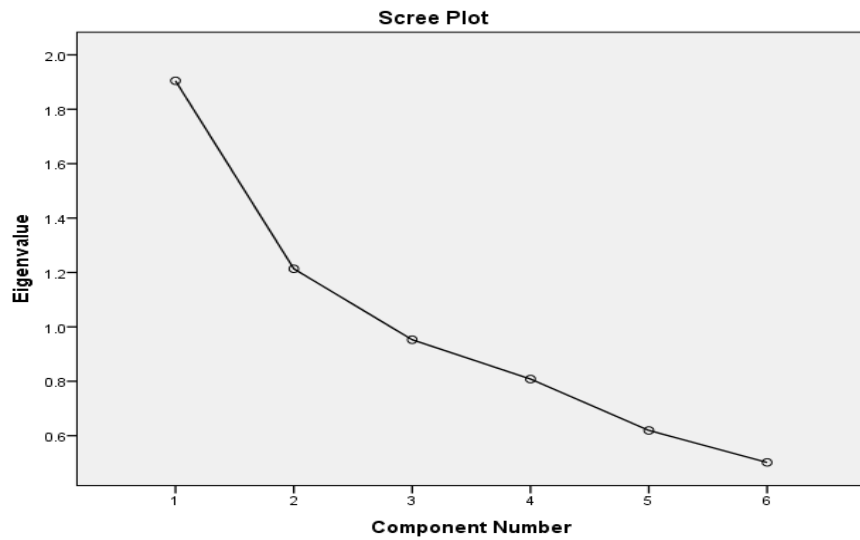


**Figure 4.** Operationalization scale adapted for of project type

Causal Research explores the consequence of one thing on another and more specifically, the effect of one variable on another. It is the study of cause-and-effect relationships. To control causality, it is significant to witness the difference in the variable presumed to cause the change in the other variable, and then measure the changes in the other variable [XXIV]. This research is being used to study the cause and effect relationship of the Leadership Competencies on Project Success.

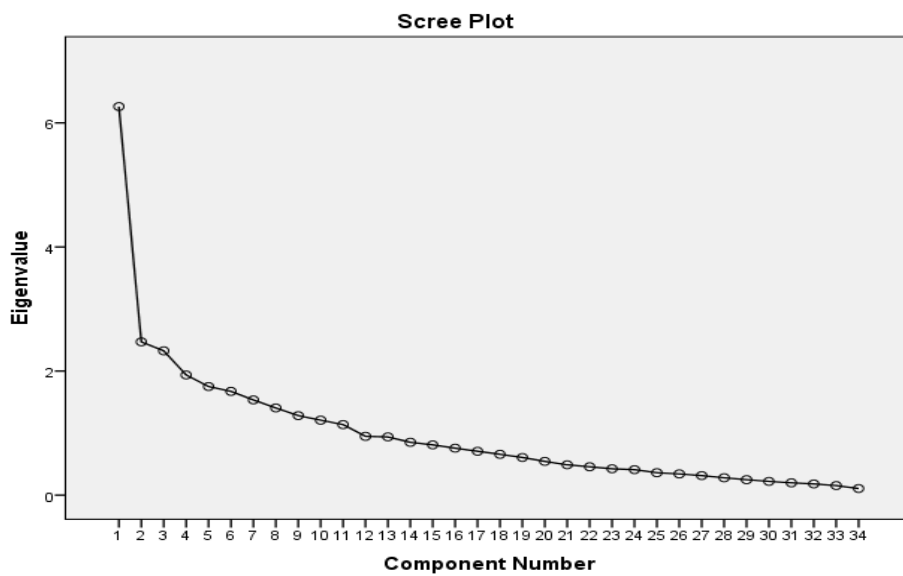
#### **V. Experimental Results**

Screen plot is the graph of Eigenvalue along with the factors. It helps that which factors are important causing variation in analysis. As the Eigenvalue drops below '1' the factor is considered not to be significant and the remaining factors are retained.



**Figure 5.** Screen plot for project success

The plot shows the gradual trailing this is called as a screen. The component whose Eigenvalue is less than '1' is ignored and thus the component whose value is more than '1' is considered as significant.



**Figure 6.** Screen plot for leadership competency

The graph is for the leadership competency and the Eigenvalue of the component less than 1 is considered not to be significant.

**Table 2: Pattern Matrix (Project Success)**

**Pattern Matrix**

	Component	
	1	2
Reoccurring Business with client	.816	
Client satisfaction	.769	
Meeting Project Purpose	.752	
Project team satisfaction		.708
Supplies satisfaction		.692
Meeting Project performance (Time, Cost and Money)		.536

*A. Pattern Matrix*

The matrix includes coefficients for the linear combination of the variables. As suggested by the researcher's judgment the loading of the factors should be greater than '0.5'.

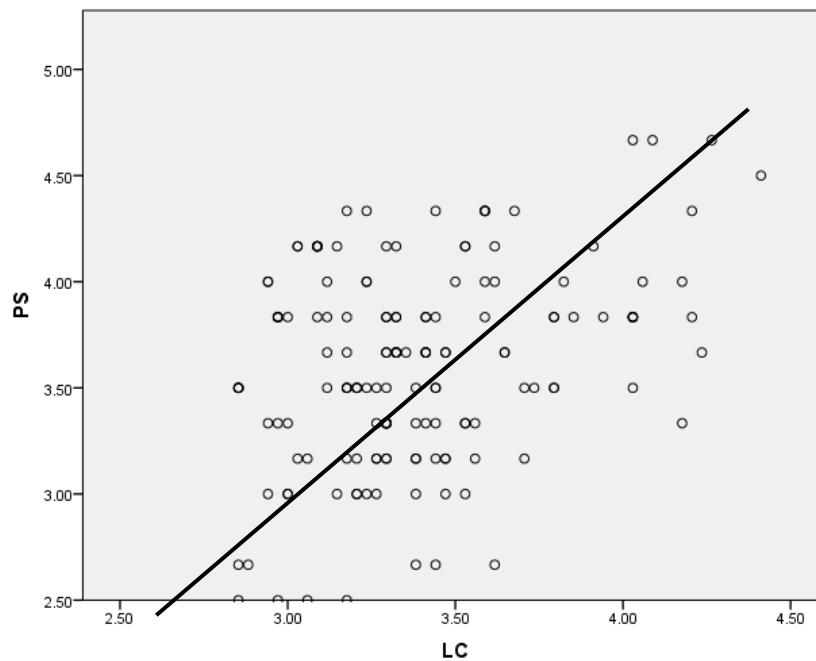
For the project success, there are three variables associated with component 1 and three variables whose loading values above 0.5 are associated with component 2. Six factors had been reduced to only two factors as the rest of the factors show the same association as with other factors. For leadership competency, there are almost 11 factors that were extracted from the factor analysis. The loading of each factor is more than 0.5. Only one item loading is associated with factor 1. Then three-item loading is associated with factor 2 and factor 3. Two item loadings are associated with factors 4, 5, 6 and 7. One item loading is associated with factors 8 and 9. Two item loading is associated with factor 10 and only one variable is associated with variable 11. The association here means that the loading of the item is greater than 0.5.

*B. Regression Analysis*

Regression is used to study the variation between independent and dependent variables. Regression analysis goes beyond the correlation investigation as it also tells the prediction proficiencies. The variable which researcher wants to predict is called the dependent variable and the variable the researcher is using to predict the other variable is called the independent variable. However, in the case of more than two variables the researcher uses the multiple regression analysis. In SPSS, the researcher needs to fulfill the six assumptions so that the result of the test turns out to be valid.

**Assumption 1:**

For checking the first assumption of regression, there should be a linear relationship between the independent variable (IV) and the dependent variable (DV). For this purpose, a scatter plot of the relationship of the independent variable i.e. Leadership Competency and the dependent variable i.e. Project Success has been generated. P-P Plot for Leadership Competency is shown in Figure 7. The straight line drawn represents the linear model for data. Showing a linear relationship, the points of the data narrowly collapse along the linear line. The greater the closeness between these data points, the more accurate the model is. Contrary to this, the outlying and distant points of the data show the errors identified in the model referred to as residuals. The figure shown below confirms the fulfillment of Assumption 1.



**Figure 7.** P-P plot

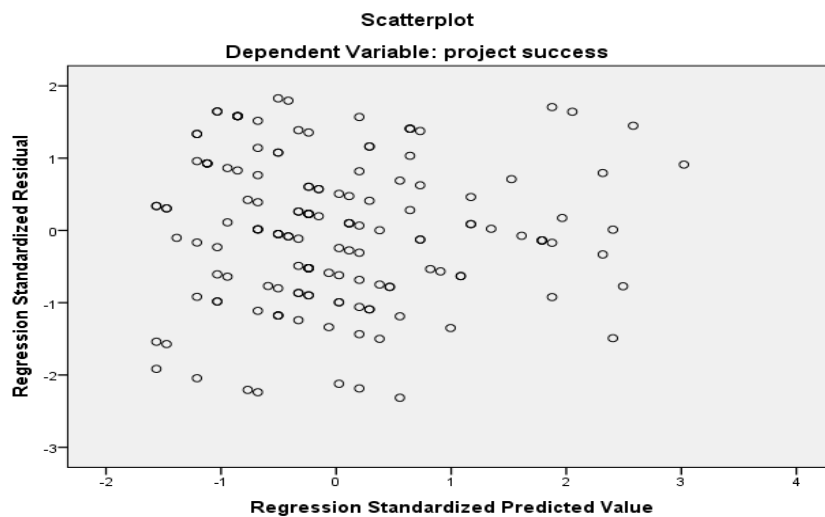
**Assumption 2:**

To confirm the 2<sup>nd</sup> assumption if multiple regression i.e. there does not exist any multi co linearity in data. As shown in Table 16, for confirming that the predictor variables should not be exceedingly correlated to each other, the table of Correlations shows that the correlation of 34.5% is not too higher. Since correlations of above 80% are challenging hence this assumption is also fulfilled.

*Warda Gul et al*

**Assumption 3:**

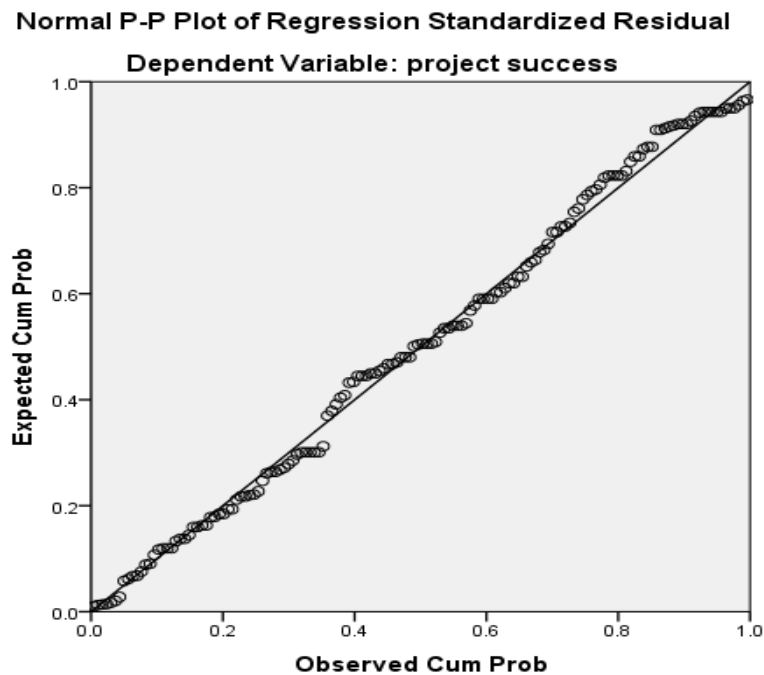
To assess the fourth assumption, which says that residuals must possess a constant or continuous variance, the final graphs of the output of regression analysis should be checked to gauge the assumption for homoscedasticity that shows a similar variation in residuals or error at each point in the model. The graphs are plotted on the predicted standardized values against obtained standardized residuals. For this assumption to support, residual values should depict a similar variation across X, as with the increase in the predicted and should be visible as a haphazard assortment of the dots as shown in Figure 8. Since, this similar pattern is observed in the figure with no funnel-shaped pattern formed, hence it confirms that the assumption for homoscedasticity has not been violated.



**Figure 8.** Scatter plot

**Assumption 5:**

Assumption 5 entails that the residuals must possess normally distributed values. As shown in Figure 9 below shows the “P-P Plot of Regression Standardized Residuals” for the model. This shows that the dots are assorted in a close array in the form of a diagonal line, hence confirming the normal distribution of residuals.



**Figure 9.** Normal P-P Plot

## **VI. Conclusion and Future Work**

In this exploration work, we watch the significant goal is to quantify the influence of project manager's combination of leadership competencies as how they influence the project success, and how does the project type affect the leadership style of the project manager in the project. The study found a positive association between Project Success and Leadership Competence. The research also provides information that how intellectual and managerial strength enhances the project outcome. Moreover, the main objective of the research was to investigate the impact of Leadership Competencies and Project Success. The objective was achieved as the researcher was able to check the impact. The other objective of the research was to assess that how the project type moderated the impact of Project Managers' leadership competencies on the success of the project. The result does not support the supposition that project type moderates the effect of managers' leadership on the project success. Some other findings also indicated that contract type, application area, complexity and strategic importance are unimportant for project managers. The ultimate goal of the project leader should always be focused on the task that they are assigned, rather than project type. Based on study findings and research, some suggestions are recommended for the future. The intended study used a cross-section design. However, there is a need for longitudinal research that would monitor the project from start to end

*Warda Gul et al*

of the project. The study can be done for the whole of Pakistan so that the results of the study can be generalized. The study was conducted on the engineering and construction sector. However, prospective research studies can be done in all sectors so that the results of the study can be taken for granted. Future researches must take into account other factors that can act as a moderator for project success.

#### **Conflict of Interest:**

There is no conflict of interest regarding this article

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