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Project Managers' Personality and Project Success: Moderating Role of External Environmental Factors

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Abstract: Successful project completion is a challenging phenomenon for project managers. Various factors play an indispensable role in the success of a project. The objective of this study is to examine the role of project managers' personalities in project success with the moderating role of external environmental factors i.e., political, economic, social. The study includes 145 project managers from 36 large-scale construction projects, from both the public and private sectors. The big five personality model was used to evaluate the personality traits of project managers and triple constraint criteria (cost, time, and quality) was used to gauge project success. Data has been collected through a well-structured questionnaire. The analysis of data indicated that personality traits like extraversion and openness are positive predictors of project success, whereas conscientiousness, agreeableness, and neuroticism did not have any direct relationship with project success. Importantly, the findings of this study concluded that external environmental factors—like political, economic, and social—moderately influence the link of specific project managers' personality traits to project success. The role of external environmental factors as moderators has been discussed. The findings indicate the essential personality traits, as well as the role of external factors for achieving project success. The research contributions have relevance to both theory and practice and provide a deeper insight that is useful for individuals, organizations, researchers, practitioners, and decision-makers.

Keywords: project management; project success; personality traits; external factors; construction; moderators

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1. Introduction

Over the last few decades, organizations are striving hard to complete their projects successfully in the shortest possible time [1]. They are constantly devising ways to improve practices and strategies for achieving higher rates of project success. Over the years, 'project success' has become an imperative part of project management literature. Due to the high rate of complications in projects, organizations are moving towards project-based structures [2]. Several organizations and projects are ineffective due to their limited knowledge and project management capabilities. It was reported that nearly one-third of multi-billion dollar projects funded by the World Bank in Pakistan failed to achieve their projected results due to the lack of project management capabilities and professional approach [3]. Similarly, in Indonesia, it has been observed that the cause of overbudgeting and delay in projects, was ineffective utilization of project management knowledge [4]. Likewise, in Saudi Arabia, more than 70% of projects are delayed [5,6]. Various factors play

an indispensable role in the success of projects, these factors are characteristics of project managers, size of the project, teams composition, structure of the organization, external environmental factors, knowledge management, and organizational project management support, mechanisms, and finances [7].

Project managers' personality plays a vital role in achieving project deliverables successfully. The fundamental objective of this research work is to investigate the influence of personality traits (the big five model) exhibited by project managers on project success, with moderating role of external environmental factors. Literature is available on finding the effects of personality in terms of job performance [8], organizational commitment [9], and job satisfaction. However, the literature on project success factors has overlooked the impact of project managers' personalities on project success regarding implications of external environmental factors. Recently, the need to identify the relationship of project managers' competencies in the context of organizational and project performance has been highlighted by de Vale et al. [10], and similarly, the effects of the moderator or mediator that may impact this relationship have been emphasized by Joslin et al. [11]. It was found that based on the person-organization fit theory, a project manager's personality plays an important role in achieving high performance and success [12], whereas, failure is usually caused due to the lack of project management skills and leadership competencies [13]. Project management literature provided evidence that the literature on project success factors did not include the role of leadership style as a success factor to projects, as compared with the general management literature. The human skills of project managers were concluded as one of the most critical success factors in construction as well as other types of projects [14]. Peterson, et al. elucidated the impact of leaders' psychological traits on firm's performance and found that positive psychological traits of leaders are strongly linked with firm performance [15].

The significance of the big five personality traits (extraversion, conscientiousness, openness, agreeableness, neuroticism) with reference to project success in NGOs was studied by Hassan et al. and indicated that agreeableness, extraversion, and openness to experience were directly linked with project success [16]. Another study indicated that two of the personality traits, consciousness, and openness were positively correlated with project managers' success [17]. On the other hand, external environmental factors also have a substantial influence on project success. Musa, et al. [18] measured the influence of external environmental factors (political, economic, and social) on project success and found that they had high influence. Moreover, these effects can be seen in different phases of the projects. Some of these factors significantly affect the projects during the planning phase but some factors like social and natural environmental factors continue affecting till the completion of the project. Another such factor that significantly impacts the project's success is the political factor [19]. There is no significant evidence of the effects of project managers' personality traits on project success while considering the impact of external environmental factors like social, economic, and political in the construction sector.

In recent years, the construction sector has observed huge and rapid growth worldwide. Ongoing and upcoming mega construction projects are unique, dynamic, and complex in nature, with each costing millions of dollars **[20]**. The development of management guidelines for such future construction projects has been emphasized. Similarly, the construction sector is the largest employment producing sector in Pakistan and a vital factor for the country's economic advancement [21]. The sector has registered a growth of 9.13 percent during 2017–2018 [22]. This sector has marked special attention due to the ongoing China-Pakistan Economic Corridor (CPEC) project. However, like other countries [23], the construction industry of Pakistan shows a poor record of project success in terms of cost and time [21,24] whereas the construction sector is being considered the backbone of the economy.

Objectives and Scope of the Study

Timely completion of the project, with prescribed quality standards within the given cost, is the main objective of the project management team. Therefore, project managers' personality plays a vital role in achieving project deliverables successfully. There is a lack of comprehensive investigations on personality traits of project managers which are highly influenced by the external environment, as dynamics of projects change. In addition, the traits are often boosted by external support and sometimes lead to disastrous decisions for projects. In the light of the discussion, the team with the right experience, personality traits, and dynamics is required, whose criteria are not comprehensively defined yet. Therefore, the current research tries to explore the personality in relation to project success with external factors. The case is limited to projects in Pakistan, which is an area where political differences, economic instabilities (payment deferment and other financial issues), and social sensitivity are highly volatile.

Conclusively, there is a need to investigate the role of project managers' personality traits in project success while considering the role of external environmental factors, such as social, economic, and political, which are very much important for a country like Pakistan. This research study, therefore, adds to the extant literature by indicating the role of the big five personality traits in predicting project success in the construction sector while considering the moderating role of external environmental factors. The objectives of the study are provided below.

- How do Project Managers' Personalities influence and drive Project Success?
- How do environmental factors influence the link between Project Managers' Personalities and drive Project Success?
- What are the primary traits that Project Managers should focus on for dealing with environmental factors?

The structure of the article is as follows: the coming Section 2 discusses the literature, hypothesis development, and conceptual framework of this research, Section 3 describes the research method in detail and Section 4 explains results and analysis. Finally, the discussion is presented in Section 5, and conclusions are presented in Section 6.

2. Theoretical Background

This section includes literature on the effects of personality traits on project success and the role of external environmental factors (political, economic, and social). Finally, based on the discussion, the hypotheses for this study are presented.

2.1. Big Five Personality Traits and Project Success

The five factors personality model was presented by Digman [25] which included factors like extraversion, conscientiousness, openness, agreeableness, and neuroticism that could be used for accessing the personality. The concept of the big five-factor model was later put into practice by McCrae and John [26]. The influence of project managers' personalities on project success has been highlighted and expounded by many researchers. Project outcomes greatly depend upon the personality of the project manager. If the project manager is adroit, marvel, and skillful, the project will lead towards success [27]. In this respect, the selection of the right people for the right job is extremely important for achieving success in the project.

The extraversion personality trait encompasses sociability, gregariousness, assertiveness, loquaciousness, and activeness. It shows to what extent the person is outgoing and social [28]. There is a profound and substantial influence of extroversion on project success. This kind of project manager is persuasive and communicative with their subordinates which helps to encourage them to discuss issues more openly for a useful resolve. Such a type of environment helps to foster the relationship between the workforce which propels the whole unit to strive for higher project performance [29]. Extraversion traits also have positive effects on team performance [30].

Hypothesis 1 (H1). *Extraversion correlates positively with project success.*

A high level of contemplativeness, great impulse, strong control, and having behavior that is directed towards achieving goals are all main attributes of conscientiousness. Conscientiousness and self-efficacy are positively related to each other [16,31]. A study by Aretoulis et al. concludes that conscientiousness is the most important trait that defines the competence of project managers in the construction sector [32]. Conscientious people tend to be organized and check details of things blow-by-blow, and meticulously examine project plans which help to increase the chances of project success and reduces the chances of any unforeseen circumstances. This increases their effectiveness, which translates into project success [17].

Hypothesis 2 (H2). *Conscientiousness Correlates positively with project success.*

The openness trait is also known as intellect. The trait characteristics show a person who is imaginative, independent-minded, prefers diversity and has intellectual curiosity [33]. Managers who secure the highest rank in openness are more inquisitive and have explorative and divergent thinking. Such people are more curious and eager to learn new things which eventually help them to experience the success of the project. The findings of Thal and Bedingfield [17] also concluded a positive correlation of openness with project managers' success.

Hypothesis 3 (H3). *Openness Correlates positively with project success.*

Agreeableness includes affection, kindness, altruism (concern for the wellbeing of others), trusting, forgiving and cooperative characteristics [34]. Project managers having these attributes are kind towards their team members which ultimately contributes towards the success of the project [35]. Halfhill et al. [36] reported that the agreeableness trait is useful in creating and maintaining cooperative working atmospheres. The agreeableness trait also has a positive impact on team performance [37]. Leaders owning this trait were also found to achieve better results because of higher intellectual stimulation and being conceived as kind, warm and generous [38].

Hypothesis 4 (H4). *Agreeableness Correlates positively with project success.*

The neuroticism trait refers to the lack of emotional stability or adjustment and nervousness [38]. The main characteristics of this factor are melancholy, emotional instability, anger, depression, fear, and anxiety [35]. Research has concluded that neuroticism is strongly related to low self-esteem and self-efficacy. People having such characteristics lack intellectual inspiration and idealized influence. They usually avoid leadership roles [39]. A project manager possessing these attributes negatively affects the project team and hence project success [35]. Next, Section 2.2 discusses how project success is defined in the literature and what are key attributes being measured for benchmarking project success.

Hypothesis 5 (H5). *Neuroticism Correlates negatively with project success.*

2.2. Project Success Evaluation

'Project Success' is gaining special attention from researchers in project management literature [40]. It's because companies are getting interested in investigating the causes associated with projects' failure. Timely completion of the project, with prescribed quality standards within the given cost, are the main objectives of the project management team. The findings of such research could help organizations in achieving the project goals successfully [41]. Project managers play an important role in the success of a project, and

effective management of the project is directly associated with the possession of the skill set required for its completion [42].

Project managers have to manage three important areas which include increasing the speed of construction, increasing the speed of delivery, and reducing the time duration [43]. Large and complicated projects usually take a long time and involve high costs. As the construction market is growing at a rapid speed [44], the need to estimate the quality cost is becoming an indispensable requirement, considering as an intent to attain a good quality product at a low cost and meet the requirements of the customers [45]. The focus of project management success hinges upon the process of project and successful accomplishment of objectives of 'cost' and 'time'. In the context of construction projects, it has been argued that the third criterion should be something other than quality, such as either scope, performance, or requirements [46]. It was argued that it would be more suitable to incorporate scope than quality as the third vertex of the iron triangle. Mokoena, et al. [47] defined the scope of the iron triangle as a combination of three aspects i.e., quality, specifications, and standards. Other suggested substitutes include performance and requirements. The iron triangle concept of project success is the most widely cited term by different researchers [48]. The study of White and Fortune [49] concluded that the majority of the project managers consider the iron triangle as the main principle of defining project success. The iron triangle concept is appreciated by project managers regardless of their experience level [50]. Berssaneti and Carvalho [51] were of the view that there is a great link between project management maturity and the iron triangle. The reason for choosing the iron triangle as a key criterion of project success is its ease in measure [52].

Section 2.3 discusses "what we mean by external environmental factors and how these can impact project performance?".

2.3. External Environmental Factors (Political, Social and Economic) and Project Success

Success factors are the fundamental components of a project that are required for the successful completion of a particular project. Moreover, the external factors establish an optimum and enabling environment for the project to go towards an effective completion and execution [53]. External environmental factors mainly include various categories and variables influencing a project in different ways. These external factors also ensure the success of a project in terms of time, cost, and efficiency. Precisely, external environmental factors can be defined as the factors affecting a project externally and on which the project management team does not have direct control [54]. Previous work found that different external environmental factors—mainly political, economic, and social—at a macro level, pose a noteworthy impact on projects success [55].

A favorable political environment has a significant impact on the smooth completion and execution of a project. These factors mainly include government stability, tax policies, employment laws, environment-related regulations, and tariffs. The capability of the government matters a lot when we talk about the legal framework and getting political support [56]. Political factors are linked with political steadiness and government interference for providing benefits and inducements through political support [57]. Moreover, the policies launched by the government and frequently made changes in policies may impact the project's success adversely. Political influence in terms of taxation may or may not be beneficial [58]. However, a favorable legal framework may have an essential contribution and effect on project success [59]. The literature concludes that political factors potentially moderate the relationship between project managers' personality traits and project success because of their influence.

Hypothesis 6 (H6). *Political factors moderate the relationship between project managers' personality traits and project success.*

Economic factors also see out the control of an organization executing a project and have an impact at the macro-economic level [60]. Economic factors are primarily concerned with the flow of funds and are directly attached with financial affordability aspects of a

project including inflation rate, interest rate, economic growth and stability, exchange rate, etc. Moreover, economic factors also include a stable economic environment with minimum economic fluctuations and long-term credit availability in order to have positive impacts on the project's success [61]. Economic factors also have a significant impact on the project's success at the macro-economic level. These factors are not within the control of the project management team but, rather, are influenced by the economic situation of the country [62]. These mainly include lower interest rates, normal inflation rates, long-term credit, and repaying facilities that impact the project success extensively by means of profitability and long-term sustainability [63,64]. The various situation caused due to economic factors made project managers nervous, depressed, and ineffective, which might lead to anxiety and stress-related symptoms. Such circumstances adversely affect the project's success [62,65].

Hypothesis 7 (H7). *Economic Factors moderates the relationship between project managers' personality traits and project success.*

Social factors are primarily focused on the cultural aspects, quality of life, welfare, and well-being of individuals through the execution of a project [61]. In the given context, the social factors' influence determines how social factors at work influence the execution of a project. Verburg et al. concluded that achievement in a project was almost guaranteed if the social environment fulfilled the social needs and was taken as beneficial [66]. Social factors may have an influential moderating impact on the relationship between the personality of managers and project success. Guidene et al. [56] developed a framework of critical success factors of construction projects. According to the proposed framework, the factors are mainly grouped together as related to project managers, team members, clients, institutional factors, contractors, project management, and external environmental factors. The external environmental factors mainly contain political, economic, and social factors. In the perspective of different organizational conditions, Hyvri [67] studied the success factors of different projects. He further grouped the factors as project-related factors, leadership/project managers' factors, project team members' factors, organizational factors and factors related to environment. Here again, the factors related to the external environment include political, social, and economic factors. Performance of the project is affected by the project manager whereas the project manager's effectiveness hinges upon his leadership qualities.

Hypothesis 8 (H8). *Social Factors moderates the relationship between project managers' personality traits and project success.*

It is evident from the literature that a project manager's personality has a profound effect on project success, however, different traits affect the project performance differently. Moreover, every project has its own dynamics, requirements, customer expectations, and different environmental factors that can affect the project. As the impact of project managers' personality traits on project success is varying within the literature, the topic needs further investigations. Moreover, there is no such evidence of investigating the impact of external environmental factors as moderating factors between project managers' personality traits and project success in the construction sector.

In the purview of the literature and link of personality traits with project success, the hypotheses considered for the study are presented in Table 1.

Table 1. Formulated hypothesis for the study.

Hypothesis	Theoretical Support
H1: *Extraversion correlates positively with project success*	[16,29,68]
H2: *Conscientiousness Correlates positively with project success*	[32,69–71]
H3: *Openness Correlates positively with project success*	[72,73]
H4: *Agreeableness Correlates positively with project success*	[16,29,32,72,73]
H5: *Neuroticism Correlates negatively with project success*	[29,70,71,74,75]
H6: *Political factors moderates the relationship between project managers' personality traits and project success*	[73,76,77]
H7: *Economic Factors moderates the relationship between project managers' personality traits and project success*	[10,75,78–80]
H8: *Social Factors moderates the relationship between project managers' personality traits and project success*	[72,81,82]

The upcoming section describes the conceptual framework for testing these hypotheses.

2.4. Conceptual Framework

Figure 1 demonstrates the overall picture of the study through a conceptual research framework. The framework shows that there are three types of variables introduced in this study. Five personality traits like extraversion, conscientiousness, openness, agreeableness, and neuroticism are taken as independent variables, whereas project success factors like time, cost, quality/scope are considered as dependent variables. Moreover, external environmental factors—including political, economic, and social—are being considered as moderating variables. Thus, the study has investigated the impact of independent variables (personality traits) on dependent variables (project success), while considering moderating role of moderating variables (external environmental factors). Section 3 describes the method in detail.

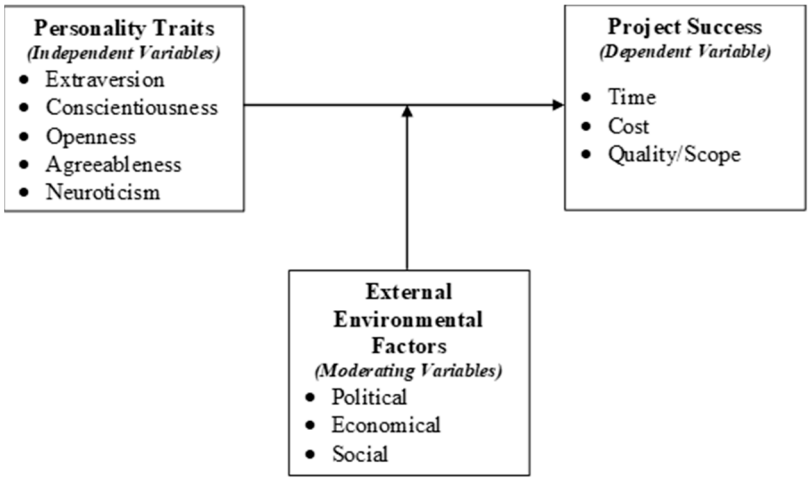

Figure 1. Conceptual Research Model.

3. Methodology

This section describes the overall methodology that includes a discussion on a sample population, data collection instrument, and the way data has been collected.

3.1. Population and Sample

The targeted sector of the current study was the government and nongovernmental construction sector of Pakistan. The data was collected from 28 approved national and multinational construction companies and client organizations, under which 36 projects were selected for this study. The selected sample includes sizeable projects with a minimum duration of one year and a contract price of 1M USD to 500M USD. Projects selected in the

study were from the areas of power, oil and gas, buildings infrastructure, transportation, highways, barrages, and airports. All the variables in the study including project managers' personality traits were self-reported by the managers of construction projects who were extensively involved in the project and directly linked with projects' success, these mainly included project leaders, team leaders, other key members. Supporting staff of the projects was not included in the sample. Data was collected through well-structured questionnaire using a cross-sectional approach. Pre-developed data collection instruments to measure responses against each variable (independent, dependent, and moderating variable) were used. Data collection took four months (January 2019 to April 2019). Two hundred and twenty-five (225) project managers from client, consultant, and contractor organizations were approached for data collection purposes. Finally, 145 responses from the collected ones have been used for final data analysis. The data profile of respondents is shown in Table 2. The companies were approached through industrial seminars, joint meetings, formal visits of faculty, and personal visits. The questionnaire was distributed through official channels (email and by post) followed by reminder messages and phone calls. The study questionnaire was distributed in hard and soft forms (google forms) for the ease of respondents. This process led to affirm high response rate of around 64.44%. An independent sample t-test was applied to check the significance of results of project success for the projects in progress (N = 89) and those that were completed (N = 56). In the light of the results, it was concluded that the project success was statistically significant for the completed and the projects which were still in progress.

Table 2. Data profile of respondents.

Category	Description	Value	Category	Description	Value
Gender of Respondents	Male	97.24%	Organization type	Client	7.59%
	Female	2.76%		Consultant	60%
Average age	-	32 years		Contractor	32.41%
Work experience	1 to 5 years	31.72%	City	Islamabad	14.28%
	6 to 10 years	50.34%		Lahore	25%
	11 to 20 years	11.72%		Karachi	17.87%
	21 to 30 years	4.14%		Peshawar	7.14%
	31 years above	2.07%		Others	35.71%
Education of respondents	Bachelors	46.21%	Project status	In-progress	61.38%
	Masters	53.10%		Completed	38.62%
	PhD	0.69%	Questionnaire response rate	-	64.44%

3.2. Measure

Data was collected through a well-structured questionnaire (this will be made available on request for readers). The data collection instrument was mainly divided into three parts which are: project managers' personality traits, project success, and external environmental factors. All of the participants were well qualified; they did not have any difficulty in filling the questionnaire in the English language. Further details of the measurement of each variable are given in sub-subsequent sections.

3.2.1. Project Managers' Personality Traits

The big five personality trait scale by Oliver and Srivastava [83] was adopted to measure the project managers' personality traits. The instrument measures the level of respondents against extraversion, conscientiousness, openness, agreeableness, and neuroticism. The internal consistency reliabilities of the measures in the current study against extraversion, conscientiousness, openness, agreeableness, and neuroticism were α = 0.71, 0.65, 0.74, 0.73, and 0.70 respectively.

3.2.2. Project Success Evaluation

The project success was evaluated by using project success criteria. The well-established basic iron triangle (time, cost, and scope/quality) was used to measure project success [20]. There is a consensus on the use of two components of the iron triangle i.e., cost and time; however, the third suggested component varies. Some researchers debate that it should be other than quality, which can be either scope, performance, or requirements [84]. The third element selected for the study is quality, which is defined as "meeting project requirements as per the agreement"; this definition of quality limits the project requirements as per the contract that has been agreed upon among the stakeholders. In this study, a composite continuous measure of project success was established i.e., was or is that the project meets time, cost, and scope/quality. The construct was internally consistent, and items were measured on a 5-point Likert scale ranging from strongly disagree to strongly agree. The internal reliability of this measure was $\alpha = 0.79$.

3.2.3. External Environmental Factors

Some of the factors were considered, after the pilot survey of projects executed in Pakistan, as only relevant to the geographical domain of Pakistan and placed in the questionnaire after checking the reliability of the construct. The role of external environmental factors as moderators is one of the key gaps identified in the literature, which is taken as the third variable (moderating variable) to measure their effect together with personality on project success.

There are several factors considered in the study regarding the measurement of external environmental factors. Respondents were asked about the impact of external environmental factors like unstable political environment, government involvement in contract agreements, non-priorities of successive governments, inflation, exchange rates, delay in the approval of loans, late release of funds and payments, the effect of social and cultural factors, income level of worker, etc., in the projects they were managing. External environmental factors (political, economic, and social factors) were taken as moderating variables. To measure these variables, instruments were opted from previously published researches [85–88]. The factors were explicitly categorized and combined for analysis with respect to relevancy as per the intellectual output of two experts to record the opinion of project managers. Respondents were enquired about the effects of political, economic, and social environments on the projects. The questionnaire was designed for respondents to measure the effect of each factor using a Likert scale ranging from 0 to 4, where 0 represented 'No effect' and 4 represented 'Very High effect' on two extremes. The internal reliabilities of the measures for political, economic, and social factors were $\alpha = 0.79$, 0.82, and 0.80 respectively.

4. Results and Analysis

The descriptive statistics are shown in Table 3 below. As mentioned, there were a total of 145 respondents, mean and standard deviation values (as per the Likert scale) for all the variables are shown. Normality has been tested prior to the execution of the analysis by using the Kolmogorov test which endorsed the distribution of the data. The demographic variables of the study were age, gender, and work experience. Gender was coded 0 = male and 1 = female. Age was recorded in years, and work experience was also recorded in the number of years the respondents had been managing the construction projects. Table 4 shows that most of the big five personality traits are not correlated significantly with the demographic variables; however, neuroticism was significantly related to age and work experience; conscientiousness was related to gender whereas agreeableness was significantly related to work experience. However, gender diversity was limited in the study because of the smaller number of females working as project managers in the construction industry.

Table 3. Descriptive statistics.

Variables	N	Range	Mean	Std. Deviation
Extraversion	145	2.50	3.759	0.586
Conscientiousness	145	3.50	3.523	0.827
Openness	145	2.43	3.471	0.499
Agreeableness	145	2.43	2.086	0.520
Neuroticism	145	3.50	2.514	0.764
Project Success	145	3.33	3.708	0.817
Political	145	3.86	2.119	0.859
Economic	145	3.17	1.931	0.735
Social	145	3.80	2.193	0.931

Table 4. Bivariate correlation matrix of all study variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1.Age	1											
2.Gender	0.237 **	1										
3.Work Experience	0.824 **	0.217 **	1									
4. Extraversion	−0.082	0.043	−0.096	1								
5. Conscientiousness	0.134	0.196 *	0.146	0.154	1							
6. Openness	0.048	−0.004	−0.075	0.358 **	0.066	1						
7. Agreeableness	−0.170	−0.061	−0.174 *	−0.313 **	−0.395 **	−0.138	1					
8. Neuroticism	−0.214 **	−0.136	−0.287 **	−0.353 **	−0.560 **	−0.206 *	0.433 **	1				
9. Project Success	−0.061	0.004	−0.070	0.513 **	0.159	0.382 **	−0.229 **	−0.302 **	1			
10. Political	−0.133	−0.113	−0.141	0.129	0.078	−0.185 *	−0.167 *	−0.018	0.112	1		
11. Economic	−0.106	−0.065	−0.150	0.180 *	0.141	−0.083	−0.200 *	−0.068	0.152	0.086	1	
12. Social	−0.135	−0.105	−0.141	0.152	0.046	−0.203 *	−0.141	−0.017	0.122	0.133	0.846 **	1

N = 145.

* $p < 0.05$; ** $p < 0.01$.

Bivariate correlation results (significant at $p < 0.05$) are shown in Table 4. The correlation of project success, which is the target variable of the research, is significantly positively related to the extraversion trait of project managers (r = 0.513, $p< 0.01$). The association of project success is significantly positively related to openness (r = 0.382, $p < 0.01$). The association of project success with agreeableness is weak and negatively significant (r = −0.229, $p < 0.01$). The personality trait of neuroticism is found to have a negative, weak, and significant correlation with project success (r = −0.302, $p < 0.01$). However, the conscientiousness trait did not show a significant correlation with project success at $p < 0.05$ but shows significance at $p < 0.10$ level. On the other hand, external environmental factors (political, economic, and social) are not directly significant to project success.

The hypothesized relations of personality traits and project success were tested by regression analysis. The overall regression model is significant, inferring that personality traits significantly affect project success (F = 13.95, $p < 0.01$). Given that, the variation in the personality traits (R^2) explains 33.4% variation in the project success while after adjusting errors the variation explanation (ΔR^2) was reduced to 31%. The results of the regression analysis showed that the extraversion is predicting the success of the project significantly in a positive manner i.e., (β = 0.420, $p < 0.01$). The personality trait of openness also shows significant positive relation with project success (β = 0.420, $p < 0.01$). Thus, the analysis supported the H1 and H3 hypotheses. Conscientiousness (β = −0.033, $p = 0.70$), Agreeableness (β = 0.420, $p = 0.78$) and Neuroticism (β = −0.420, $p = 0.05$) were not statistically significant predictors of project success despite having significant bivariate correlations with project success as represented in Table 4. Therefore, Hypotheses H2, H4, and H5 were not supported. Upcoming sub-Section 4.1 discusses the role of moderating variables like political, economic, and social.

The Table 4 highlights the correlation of variables with each other. In addition, the significance of the relation is represented with 99% and 95% confidence. The external factors related to political is significantly correlated with openness (β = −0.185, $p = 0.05$) and agreeableness (β = −0.167, $p = 0.05$). Additionally, economic factors are found correlated extraversion (β = 0.180, $p = 0.05$) and agreeableness (β = −0.200, $p = 0.05$). Similarly, social factors are only related to openness (β = −0.203, $p = 0.05$). The conscientiousness

has significant correlation with the gender. The openness is remarkably correlated to extraversion ($\beta = 0.358$, $p = 0.01$) trait. In addition, agreeableness is correlated to work experience, conscientiousness ($\beta = -0.395$, $p = 0.01$), and extraversion ($\beta = -0.313$, $p = 0.01$). Moreover, neuroticism is significantly correlated to age ($\beta = -0.214$, $p = 0.01$), work experience ($\beta = -0.287$, $p = 0.01$), extraversion ($\beta = -0.353$, $p = 0.01$), conscientiousness ($\beta = -0.560$, $p = 0.01$), openness ($\beta = -0.206$, $p = 0.05$), and agreeableness ($\beta = -0.433$, $p = 0.01$).

4.1. Moderating Effects of External Environment

Baron and Kenny stated about moderato as "the type of qualitative or quantitative variable which impacts the relation of an independent variable and a dependent variable in terms of its direction and/or magnitude [82]". The moderation process includes an interaction effect and enlighten "when" certain effects will take place, under "individual differences" or "contextual variables" [82,89].

The attainment of the aim of this research is linked with the assessment of the effect of the big five personality traits on the success of the project in the presence of external environmental factors (political, social, and economic) as moderators. The Hayes Moderation Analysis [90] has been employed to investing the moderating effects of external environmental factors between independent and dependent variables. The analysis was performed separately between each of the personality traits (predictors) and project success (outcome variable) with political, economic, and social factors as moderators. There was a total of five independent, one dependent, and three moderating variables which devised 15 ($5 \times 1 \times 3$) models; however, only eight significant models were derived which depicted the role of external environmental factors as significant moderators between personality traits and project success as shown in Table 5. An analysis using 5000 bootstrapped samples with 95% confidence levels was performed after mean-centering the continuous predictor variables. The moderation analyses of Hayes PROCESS Macro version 3.3 for SPSS were run independently to check the interaction effects of independent and moderator variables. The only significant results at $p < 0.05$ are shown in Table 5. The results show that the introduction of the political factor with neuroticism trait of project managers produces a significant change in R^2 as 0.061 with significant interaction effects. This concludes that the political factor only moderates the relation of neuroticism and project success. The moderation effect is investigated with the models having an R^2 score of around ~30%. In literature, another study [19] on non-governmental organizations (NGOs) related to project managers' personality traits found an R^2 score in range with the current study (supporting the significance of models for moderation effects). Similarly, the results show that for economic factors, the interaction term is significant with extraversion, openness, and neuroticism traits of project managers with R^2–change as 0.021, 0.026, and 0.065 respectively. This shows that the economic factor moderates the relation of extraversion, openness, neuroticism with project success. Similarly, the analysis for social environment indicates that the interaction of social factors is significant with extraversion, conscientiousness, openness, and neuroticism traits of project managers, except for agreeableness. The R^2–change for these relations were 0.0194, 0.0278, 0.0255, and 0.0756 respectively. This concludes that the social factor moderates the relation of personality traits and project success, except for agreeableness.

Table 5. Significant effects of political, economic, and social factors as moderators between the big five personality traits (IVs) and project success (DV).

Interaction Terms IV × M	Coeff (b3)	LL 95 CI	UL 95 CI	R^2	ΔR^2
Neuroticism × Political	0.3096 **	0.1217	0.4975	0.185	0.0613
Extraversion × Economic	−0.2551 *	−0.498	−0.0122	0.314	0.021
Openness × Economic	−0.3075 *	−0.592	−0.023	0.188	0.0263
Neuroticism × Economic	0.3700 **	0.1535	0.5865	0.195	0.0652
Extraversion × Social	−0.2028 *	−0.4043	−0.0013	0.310	0.0194
Conscientiousness × Social	−0.1813 *	−0.357	−0.0056	0.310	0.0278
Openness × Social	−0.2363 *	−0.4572	−0.0153	0.194	0.0255
Neuroticism × Social	0.3229 **	0.1483	0.4975	0.201	0.0756

Note. IV = Independent variable, M = Moderator, DV = Dependent Variable, LL = Lower Limit, UL = Upper Limit, CI = Confidence Interval. * $p < 0.05$; ** $p < 0.01$.

4.2. Plot of Interaction Points

For specifying the nature of effects of external environmental factors as moderators, the interaction coefficient (b3) could be inspected [91]. The coefficients of b3 are shown in Table 5. The coefficient shows the number of units that slope of Y (i.e., project success) on X (i.e., personality traits) changes, given a one-unit change in Z (i.e., external environmental factors) [92]. For the clear presentation of results, regression lines have been plotted for the regression of Y and X for the value of Z as one standard deviation above and one standard deviation below the mean [92]. The illustrations are shown from Figures 2–9 below for political, economic, and social environment respectively.

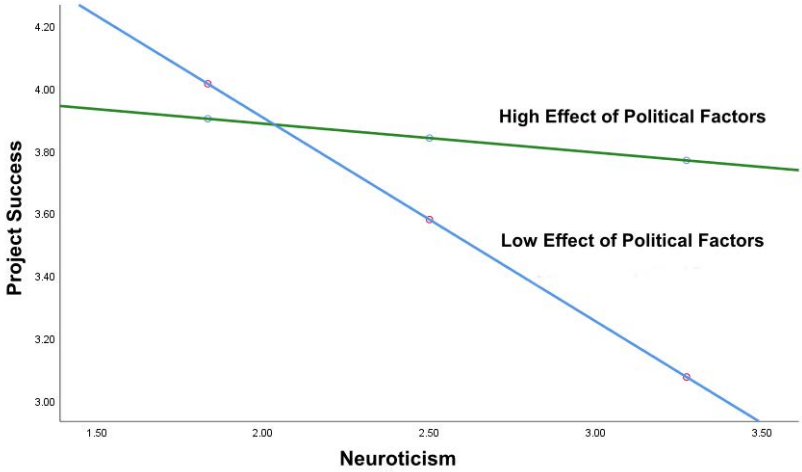

Figure 2. Plot of moderating effect of political factors with neuroticism.

4.2.1. Moderating Effects of Political Environment

The interaction plot of political factors with neuroticism trait shows that at low levels of the neuroticism trait in project managers, project success is high with a gradually decreasing trend as neuroticism increases, whereas, at a high influence of political factors, project success shows only a slight decrease as neuroticism increases (Figure 2). As per the guidelines provided by Hayes [90], hypothesis H6 is therefore partially supported. The guidelines by Hayes include (i) a moderator is a variable that specifies conditions under which a given predictor is related to an outcome. The moderator explains 'when' an outcome and predictor are related; (ii) Moderation implied an interaction effect, where introducing a moderating variable changes the direction or magnitude of the relationship between two variables; (iii) A moderation effect could be: enhancing where increasing the moderator would increase the effect of the predictor (IV) on the outcome (DV); buffering, where increasing the moderator would decrease the effect of the predictor on the outcome;

or antagonistic, where increasing the moderator would reverse the effect of the predictor on the outcome.

4.2.2. Moderating Effects of Economic Environment

The moderation of economic factors with extraversion, openness, and neuroticism traits have been found significant. The interaction plot of an economic factor with extraversion trait shows that at a low effect of economic factors, project success increases as extraversion increases, however, at a high effect of economic factors the project success is initially higher as compared to that of low effect as shown in Figure 3. A similar kind of effect of economic factors with the openness trait of a project manager is shown in Figure 4. Thus, hypothesis H7 is partially supported.

The interaction plot of economic factors with neuroticism trait shows that at a low level of neuroticism trait of project managers, the project success is higher with a gradually decreasing trend with an increase in neuroticism. Whereas with the high effect of economic factors, the project success shows a slight decrease as the neuroticism of project managers rises as shown in Figure 5.

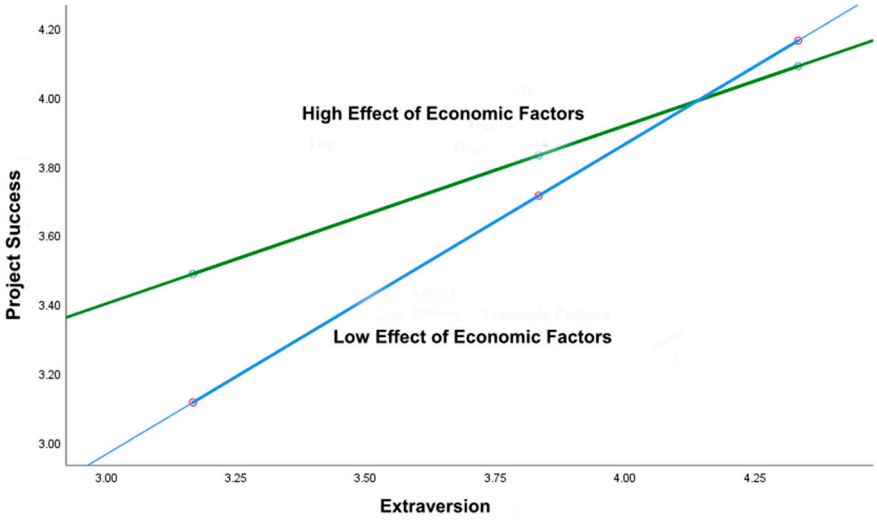

Figure 3. Plot of moderating effect of economic factors with extraversion.

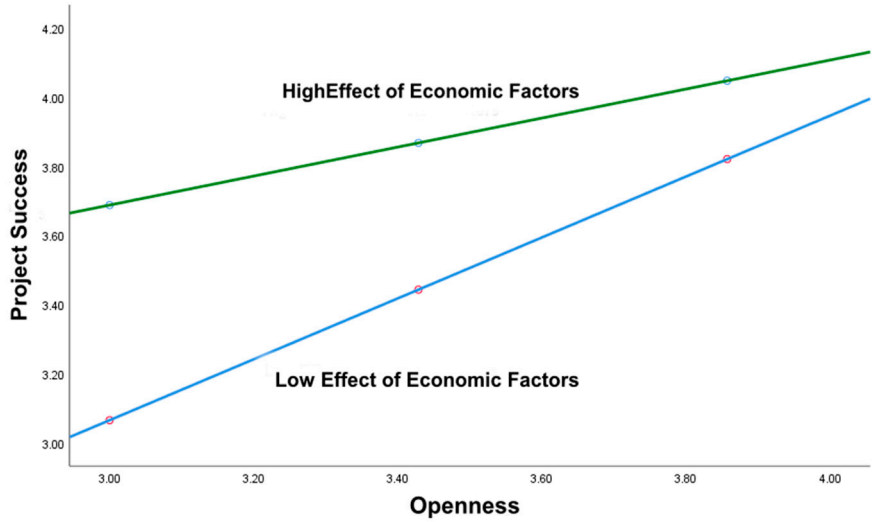

Figure 4. Plot of moderating effect of economic factors with openness.

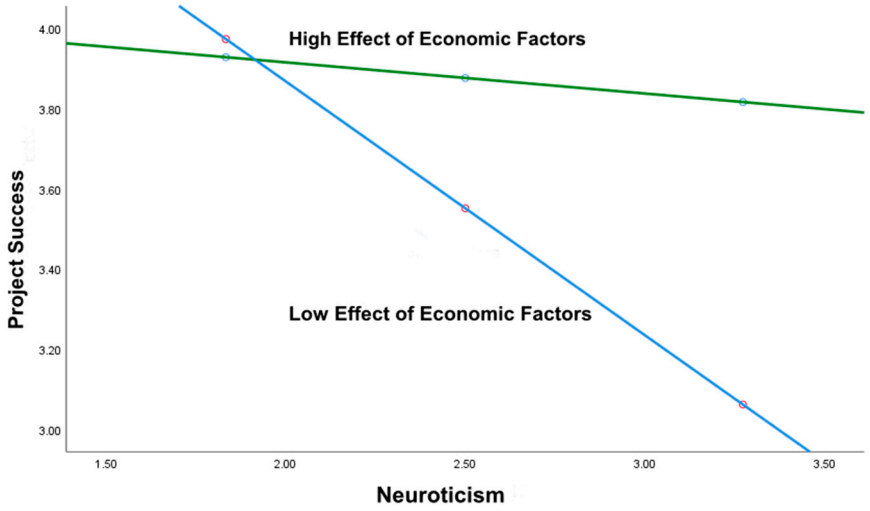

Figure 5. Plot of moderating effect of economic factors with neuroticism.

4.2.3. Moderating Effects of Social Environment

The results presented in the Figures 6–9 are illustrating the moderation of social factors with personality traits (extraversion, conscientiousness, openness, and neuroticism) and project success. The interaction plot of social factors with extraversion trait shows that project success increases with an increase in extraversion considering a low effect of social factors. However, at a high effect of social factors in projects, the success is initially high when compared to that of low effect as shown in Figure 6. In the case of the conscientiousness trait of project managers, the project success increases with an increase in conscientiousness, but it is approximately at a constant level at a high effect of social factors (Figure 7). As shown in Figure 8, when the openness decreases, a high degree of social factors facilitates the success of the project. It can be concluded from Figure 9 that, when neuroticism decreases, the low effect of social factors facilitates and enhances project success. Therefore, hypothesis H8 was supported except for the agreeableness trait of personality.

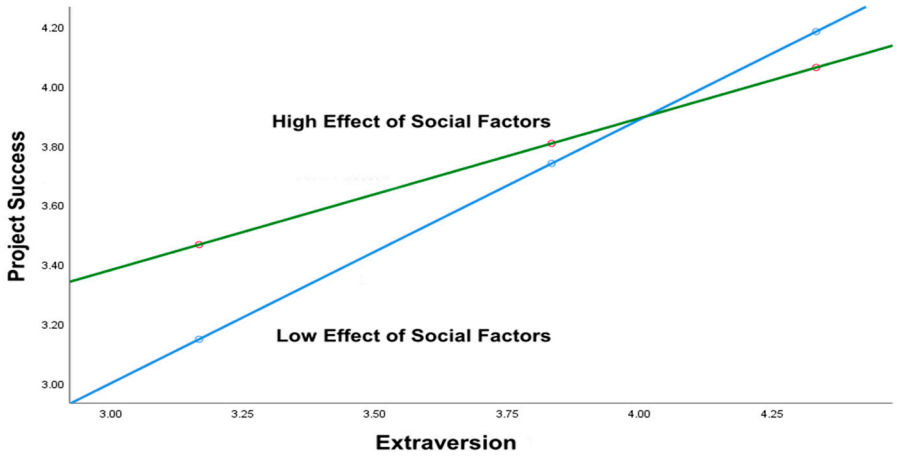

Figure 6. Plot of moderating effect of social factors with extraversion.

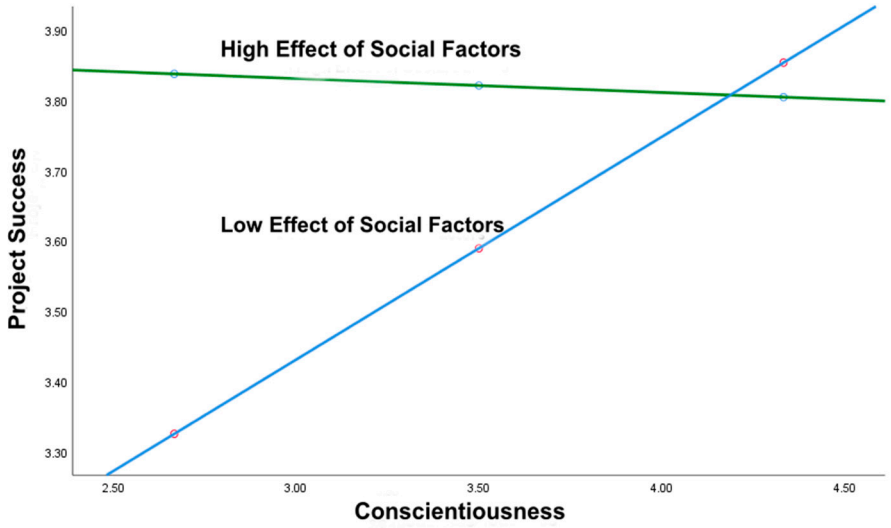

Figure 7. Plot of moderating effect of social factors with conscientiousness.

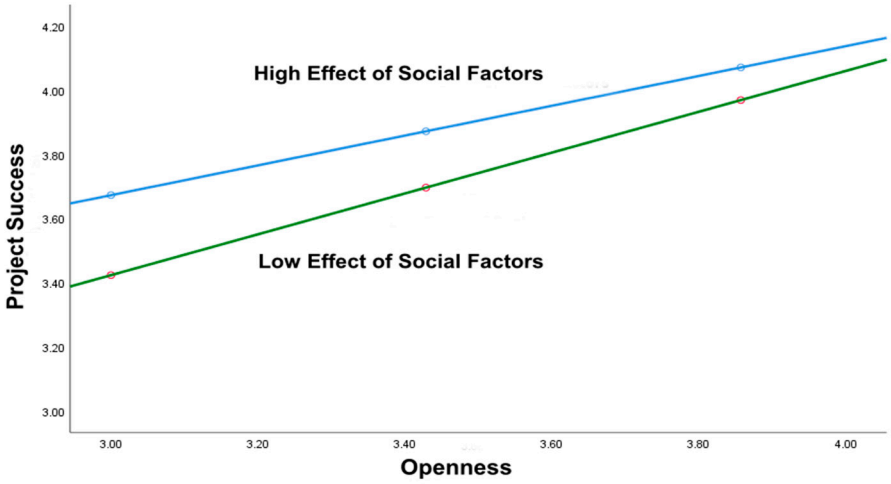

Figure 8. Plot of moderating effect of social factors with openness.

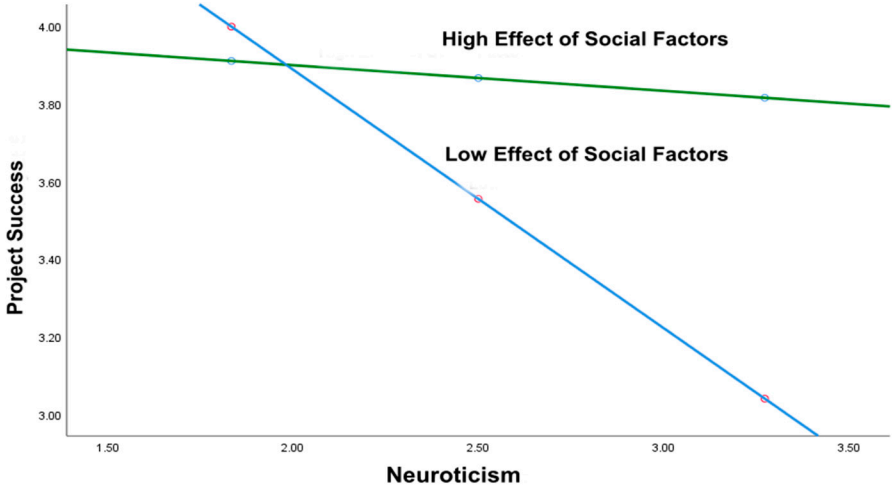

Figure 9. Plot of moderating effect of social factors with neuroticism.

5. Discussion

This research study provided some important insights for researchers and professionals in terms of the relationship of project success with personality traits and external environmental factors. It was revealed from the analysis of the data (shown in Table 4) that the project managers' personality traits influence the success of construction projects, where the influence of traits like extraversion and openness has been found to be significant. These findings are supported by the findings of Yiu and Lee [93], who concluded that extraversion and openness are highly effective for negotiators and managers in the construction industry. People who secure the highest ranks in openness, are more inquisitive and have explorative and divergent thinking. Thus, they are more curious and eager to learn new things. Sometimes there are situations where managers and leaders need to think more creatively and provide out-of-the-box solutions for achieving better results. Extraversion trait is concluded as a significant predictor of project success. In previous studies, it was found that extraverted managers were persuasive, outgoing, and communicative with their subordinates which could help to encourage subordinates to discuss issues and solutions more openly with the project managers. This participative environment increases the employer's ownership, teamwork, and motivation that could result in achieving project goals successfully [29,94,95].

Conscientious people are those who work within given rules as per the plans. George Zhou [96], posited that conscientiousness results in a lower level of creativity among employers. The current study did not prove conscientiousness as a significant predictor of project success. Another study [97] concluded conscientiousness is not the only trait that best judges managerial performance in all professional areas, as there are other important factors. A recent study by Hassan et al. [16] also found that there is no significant relation of conscientiousness with project success.

Agreeableness is also considered an important trait of project managers, however, this trait was not found as a predictor of project success in this study. Previously, it was concluded that agreeableness increases with age [98,99], as, in this study, project managers are at the mid of their career, which might be the possible reason for this variation. Moreover, these findings necessitate the promotion of agreeableness trait among the project managers at the earlier stage of their career so that they could negotiate in a better way. This could be done through training. Another possible reason for this is the belief of managers that practicing agreeableness at the workplace might compromise control over the team members. This further highlights the need for promoting a participative organizational culture where everyone should feel that employees' opinions matter. Correlation results of neuroticism show significant and negative relation with project success whereas its regression result shows significance at $p < 0.01$ level. In other studies, neuroticism trait was negatively linked with leader performance [100] and team performance [101].

The research findings of Cohen et al. [102] showed that the effective management of projects is reliant on the personality traits of the specific manager handling it irrespective of gender. In this respect, the cumulative findings of this research are similar as concluded earlier.

In this study, no direct relationship between the external environmental factors and project success was found (Table 4). However, moderation effects of the external environment were found to be significant with different personality traits. Political factors only moderate the relationship of neuroticism trait of project managers and project success (Table 5). Economic factors negatively and significantly moderate the relationship of extraversion and openness traits of project managers with project success (Table 5). These factors also moderate the relationship between neuroticism and project success but they have a positive interaction effect on project success (Table 5). Similarly, the impact of social factors as moderators is significant when it comes in relationship with extraversion, conscientiousness, openness, neuroticism, and project success (Table 5).

Overall, the study in hand elucidates that the role of external environmental factors as moderators have a significant interactional effect with the personalities of project managers

which ultimately influences project success (Table 6). This is in line with the findings of Musa et al. [18] who reported the significant impact of external environmental factors on project success. Similarly, the findings coincide with the research of Moura et al. [75] where it was surmised that external factors like political, economic, and social factors and conditions affect the entrepreneurial profile, which results in changing personalities of managers that is linked with the performance. Moreover, the study carried out by Dvir, et al. [73] also concluded the effects of social structure on the personality of project managers. Almlund et al. [79] also inferred that economic, as well as social aspects of a country, affect the cognitive capabilities of the project managers that bring changes in their personalities and eventually the success of the projects. Consequently, the analysis and findings coincide with other studies as well. However, there is no previous research on the construction sector in which personality traits, project success, and external environmental factors have been considered simultaneously. In this way, this research contributes to three knowledge domains and provides a deeper insight that is useful for researchers, practitioners, and decision makers.

Table 6. Hypothesis and its results for project success.

Hypothesis	Result
H1: *Extraversion correlates positively with project success*	**Supported**
H2: *Conscientiousness correlates positively with project success*	**Not Supported**
H3: *Openness correlates positively with project success*	**Supported**
H4: *Agreeableness correlates positively with project success*	**Not Supported**
H5: *Neuroticism correlates negatively with project success*	**Not Supported**
H6: *Political factors moderates the relationship between project managers' personality traits and project success*	**Partially Supported**
H7: *Economic factors moderates the relationship between project managers' personality traits and project success*	**Supported** (Except for Conscientiousness and Agreeableness)
H8: *Social factors moderates the relationship between project managers' personality traits and project success*	**Supported** (Except for Agreeableness)

The collective results and findings of this study provide input to the existing literature on the extent of project managers' personalities and the role of the external environment in large-scale construction projects. The study exclusively puts light on project managers' role in achieving project success. The main findings of the study concluded the vital role of the big five personality traits of project managers in project success. Previous studies concluded in different areas like NGOs, Defence, and other sectors [16,29,103] but this study specifically targeted project managers from large-scale construction projects. This study will be a guiding source for project managers, and policymakers of the construction sector by providing information regarding required specific personality traits for the successful accomplishment of project objectives. Moreover, this study further highlights the moderating influence of external environmental factors in the given context which is quite crucial in developing countries' perspectives where political and economic factors are more dynamic.

6. Conclusions

This study aims to investigate the link of project manager personality with project success while considering the moderating role of external environmental factors like political, economic, and social factors.

6.1. Theoretical Implications

The findings of the present study provide important insights that could be a guiding source for employees and employers specifically related to the construction industry. Firstly, it concluded that project managers' personalities played an important role in project success. The study also concluded that the managers who were more extroverted and open

to implementing novel changes in the projects were major contributors towards project success. Importantly, the findings of this study concluded that external environmental factors like political, economic, and social moderately influence the link of specific project managers' personality traits and project success. For example, the political environment significantly influences neurotic project managers. The economic environment has moderated relationship with extraversion, openness, and neuroticism traits and project success. Likewise, the social environment in projects also influences the performance of project managers having traits like extraversion, conscientiousness, openness, and neuroticism.

6.2. Practical Implications

The results of this research are equally useful for individuals who plan to start their careers as project managers, for managers who are currently working and interested in improving their performance, and organizations for critically evaluating the employees during the selection process. The results of this study have great significance for organizations and project management trainers who may put a special emphasis on developing specific behavioral propensities and styles among the managers for achieving success in the projects. Due to varying local circumstances, the context and significance of external environmental factors are different from project to project and region to region. This study highlights the significance of thorough investigations about the external factors as these are moderating the relationship between project managers' personality traits and project success. Accordingly, the required traits could be incorporated in the recruitment process and improved through training so that the probability of failure could be reduced. In this way, this research contributes to three knowledge domains simultaneously and provides a deeper insight that is equally useful for individuals, organizations, researchers, practitioners, and decision-makers.

7. Limitations and Future Directions

Regardless of the impact of results and findings, there are few limitations associated with this study. The research is based on a cross-sectional design with a special focus on the construction sector. The methodology could be used to further investigate the impact of personality traits on project success in other sectors. Considering the limitations of the study, the role of organizational dynamics could be used as possible moderators as each construction project is unique and different as it is situated in a different location and carry a different external environment. The role of external environmental factors could be investigated further at different project stages and statuses, and locations like regions and countries as well as developing and developed countries. Demographic effects could be investigated by conducting a study in a multicultural environment. Future research can also be conducted on a longitudinal study design to access real-time effects on project success against different success variables like project completion time, cost of the project, and quality compliance as per the standard. Likewise, the effects of organizational professional development policies and training could be analyzed in terms of their effectiveness for achieving project success.

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