

# The role of project managers' attributes in project sustainability management and project performance under China-Pakistan economic corridor

Muhammad Zaheer Hashim, Liu Chao and Chao Wang  
*School of Economics and Management, Beijing University of Technology, Beijing, China*

Role of project managers' attributes

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## Abstract

**Purpose** – Steered by upper echelon theory, this study aims to scrutinize the prevalence of project manager demographic factors (age, education and experience) in project sustainability management and project performance.

**Design/methodology/approach** – We used a sample of 209 project managers/supervisor/team leaders who were working in the projects of the China-Pakistan Economic Corridor (CPEC).

**Findings** – The results indicate that project manager demographic factors have a significant influence on project performance (except experience) and project sustainability management. Moreover, project sustainability management partially mediates the relationship between age, education and project performance while it fully mediates the path between experience and project performance.

**Practical implications** – The research recommends senior, high educated and experienced managers for CPEC who promote sustainability and gain high project performance.

**Originality/value** – A number of studies have been carried out to assess the relationship between top managers' attributes and environmental activities. However, so far, none of the studies has paid attention to the CPEC and projects working in Pakistan.

**Keywords** Project managers, Demographic attributes, Project sustainability management, Project performance, CPEC, SMEs, Project manager attributes

**Paper type** Research paper

## Introduction

Considering sustainability and environmental cleanness in operational activities have become one of the most crucial strategic decisions for today's managers (Anwar and Li, 2021; Rameshwar *et al.*, 2020; Kong *et al.*, 2020). Society demands a clean and safe environment (Khattak, 2020). Based on this concept, society looks to the senior and responsible managers of companies, not the company itself, to act socially responsible (Holcomb and Smith, 2017). Moreover, governments have also increased pressure on corporations as well as small firms to consider environmental and sustainable activities, rather than merely emphasizing profitability (Li *et al.*, 2017; Esfahbodi *et al.*, 2017). This move has created challenging situations for executives, managers and businessmen and they must cope with it. As managers have a crucial role in determining the socially responsible behaviors of a company and research should govern how they carry out social activities (Holcomb and Smith, 2017). Specifically, project managers who are directly



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concerned with the workplace and team activities – have significantly modified their strategic frame to adjust to the socially responsible environment (Martens and Carvalho, 2017). As result, many studies have been conducted on the strategic response of project managers to social challenges in developed and emerging economies (Nwete, 2007; Narula *et al.*, 2017; Tang-Lee, 2016). The success of a project depends on the project manager's ability to ensure a timely response, efficient use of resources, a caring environment and adhering to budget constraints (Schmid and Adams, 2008). Managers with adequate competences easily scan the environmental issues to generate favorable results (Cannella *et al.*, 2009). However, studies have not yet recognized how project managers' demographic factors influence project sustainability management and project performance. To fill the gap, this research scrutinizes the influence of project managers' demographic factors, namely, age, education and project experience on project performance with the mediating role of project sustainability management.

This research focused on the managers who are the part of China-Pakistan Economic Corridor (CPEC). In 2015, China and Pakistan mutually initiated a project named CPEC with an initial investment of US\$47bn (reached to US\$62bn in 2020) to mitigate social and economic challenges in the way to economic growth. Since then, the government of China and Pakistan started several small and big projects in the four provinces of Pakistan, namely, Khyber-Pakhtunkhwa, Punjab, Sindh and Baluchistan in the form of energy, infrastructure and electricity, etc. These projects are in progress in rural and urban areas of Pakistan. Several research studies have discussed micro-level (Kanwal *et al.*, 2019; Saad *et al.*, 2020; Shah *et al.*, 2021) and macro-level (McCartney, 2020; Ul Hassan, 2020; Ali *et al.*, 2020) determinants of CPEC. Surprisingly, studies have not paid attention to how project managers' demographic factors impact project performance through project sustainability management.

There are several motives behind testing the demographic factors toward project sustainability and project performance. First, top managers' demographic factors play a significant role in organizational outcomes and performance. This notion – “top managers demographics factors and psychological factors influence organizational performance” is extensively discussed in the lens of upper echelon theory (Hambrick, 2007). Studies have also claimed that managerial characteristics affect sustainable and social activities (Huang, 2013; Shaukat *et al.*, 2016; Fernández *et al.*, 2006; Park *et al.*, 2012). In fact, studies on the relationship between top managers' demographic factors and corporate social responsibility (CSR) strategy are lacking (Reimer *et al.*, 2018). Additionally, how project management sustainability mediates the association between project managers' attributes and project performance has been missed. Hence, our research contributes to the upper echelon theory by applying ample evidence from the emerging market on the relationship between managerial background, project sustainability management and project performance. Second, CPEC has started its operation in recent years and has received tremendous attention from Chinese and Pakistani scholars. As shown by its name, CPEC is composed of many projects in the field of energy, electricity and infrastructure (Saad *et al.*, 2020; Shah *et al.*, 2021). These projects are under progress in many rural and urban areas of China and Pakistan. However, prior studies have ignored to test the importance of project managers' attributes in project sustainability management and project performance. The insights help how and which types of attributes significantly influence project sustainability management and project performance. Third, our research acknowledges several policy implications for practicing managers, project managers and the government to protect the environment and keep on social care. For instance, Saad *et al.* (2019) claimed that rural residents feel unhappy with CPEC projects because of environmental pollution and lack of

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social initiatives. It needs the attention of the government to initiate social activities and environmental protection in rural areas. Hence, our research has several policy implications for the government to connect with project managers and keep the environment clean. Also, this tie will help in gaining sustainable development goals (SDGs) through the small projects.

By using the empirical evidence of 209 project managers working under CPEC in Pakistan, our research unleashes that project managers' age, education and experience play a key role in project performance, whereas project sustainability management play a partial mediating role.

### **Theoretical background**

According to the Upper Echelon theory (Hambrick, 2007), managerial characteristics such as education, experience, gender, age and psychological factors significantly influence organizational consequences. The theory has categorized top managers' demographic factors in two parts, namely, psychological and non-psychological. The psychological factors mainly focus on top managers' personality traits, cognition and mental behaviors that can influence organizational outcomes (Anwar *et al.*, 2018; Ong and Ismail, 2013). However, non-psychological factors shed light on the role of education, age, gender and experience in organizational performance (Seghers *et al.*, 2012). In the present study, we focused on non-psychological factors, namely, age, education and experience that influence sustainable and project performance in small and medium enterprise (SMEs). The existing literature has paid attention to these factors and have scrutinized the positive relationship between managerial demographic factors and organizational outcomes (Ameer and Khan, 2020; Nadkarni and Herrmann, 2010). However, so far, studies have not emphasized on these factors in sustainability management and project performance of SMEs operating in emerging economies. Our research contributes to the theory (upper echelon) by using empirical data of Pakistani projects to endorse the theory as well as to extend its scope. Our results demonstrate that project managers' age, education and experience play a significant role in project performance and project sustainability management. Our research calls future researchers to extend the theory in other contexts such as sustainable development and R and D projects.

### **Literature review and building hypotheses**

#### *Managers attributes and project performance*

Project manager's demographic factors play a crucial role in the success of organizations. For instance, a meta-analysis conducted by Bell *et al.* (2011) indicates that demographic diversity influences team performance, team creativity and innovation. Dayan *et al.* (2017) also scrutinized that demographic factors have a stronger influence on new product creativity. Favoring the notion, Li (2017) revealed that top managers' demographic factors significantly influence decision-making and business performance. Similarly, several other studies have confirmed the impact of manager demographic factors, namely, age, education and experience on firm performance (Kagzi and Guha, 2018; Diaz-Fernández *et al.*, 2014; Post and Byron, 2015). Consequently, Arun and Kahraman Gedik (2020) also described that leadership styles significantly influence the decision-making process, middle managers activities and operational performance of organizations. Hence, based on this evidence, we expect that project manager demographic factors affect project performance.

The success of a project depends on the project manager's ability to ensure a timely response, efficient use of resources, a caring environment and adhering to budget constraints (Schmid and Adams, 2008). A recent study conducted by Ameer and Khan

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(2020) that managers' age significantly affects sustainable business performance. Müller and Turner (2007) revealed that project managers' age and nationality influence project success. Experience is very crucial for the recognition of opportunities and superior performance in emerging businesses (Anwar *et al.*, 2020). Kang *et al.* (2019) describe that knowledge and experience differentiate firms from others in terms of profitability and performance. Seghers *et al.* (2012) demonstrate that experienced and educated managers use different tactics for strategic posture and decision-making to gain maximum benefits. Experience is very essential for decision-making in small businesses. Senior and literate managers contribute sustainable competitive advantage and performance of business ventures (De Clercq *et al.*, 2012). Considering the evidence, we posit that:

- H1. Project managers with older age positively influence high project performance.
- H2. Project managers with a high level of education positively influence project performance.
- H3. Project managers with a high experience positively influence project performance.

#### *Managers attributes and project sustainability management*

Top managers' demographic factors such as age, education and experience significantly influence the environmental and social activities of an organization (Panwar *et al.*, 2010; Fernández *et al.*, 2006; Park *et al.*, 2012). Demographic factors such as age, education and experience are the best predictors of green strategies (Dief and Font, 2010).

However, in terms of managers' age, there is little controversy on either younger or older managers are entrepreneurially orientated. For instance, some studies have suggested that younger people are more entrepreneurially sensitive (Tognacci *et al.*, 1972; Zimmer *et al.*, 1994) as they have high knowledge of environmental issues (Diamantopoulos *et al.*, 2003). On the other hand, Harry *et al.* (1969), claimed that older people are likely to engage in entrepreneurial activities and support communities. Van Liere and Dunlap (1980) revealed that younger people have a low level of environmental interest and are less integrated into the social order. Fabrizi *et al.* (2014) argued that young managers are short-term goal-oriented and they do not significantly tend to concentrate on CSR and social activities. However, senior managers have a high motivation for the environment and social issues. Hence, they are likely to engage in environmental and sustainable issues (Fabrizi *et al.*, 2014). Younger managers are profit-oriented and have a lack of interest in environmental and social performance (Shahab *et al.*, 2020).

In general, it is argued that senior managers have a high desire for CSR (Jones Christensen *et al.*, 2014) and benefited from their position, relationship with external partners and communities (Cheng *et al.*, 2014). Grounded on upper echelon theory, managers' age has been indicated as a significant predictor of environmental and social performance in firms (Lee *et al.*, 2018). While testing the influence of education on environmental issues, Diamantopoulos *et al.* (2003) found that highly educated people can understand environmental problems, therefore, they are more motivated to be environmentally responsible and social. Highly educated consumers are pro-environmentally-oriented (Patel *et al.*, 2017). Education is considered an important predictor of environmental practices and environmental concerns (Wall, 1995). According to Tran and Pham (2020), the educational background of the chief executive officer (CEO) significantly contributes to the environmental performance of firms. Favoring the notion, Quazi (2003) describes that the level of education has a significant influence on CSR perceptions. Generally, a high level of education leads to high environmental performance (Panwar *et al.*,

2010). Several studies have confirmed that highly educated managers have a high desire for environmental and social activities (Amore *et al.*, 2019; Meyer, 2016).

Studies have also scrutinized previous experience has a greater influence on environmental activities and environmental performance (He *et al.*, 2015). High environmental performance in companies can be gained through top managers' experience and abilities of understanding (Egri and Herman, 2000):

- H4. Project managers with older age positively influence project sustainability management.
- H5. Project managers with a high level of education positively influence project sustainability management.
- H6. Project managers with a high level of experience positively influence project sustainability management.

#### *Managers attributes, project sustainability management and project performance*

Stakeholders and environmental legislation put pressure on firms to change and adopt environmental practices. In response to this, the role of managers is remarkable (Fernández *et al.*, 2006). The pressure from society and consumers on companies concerning environmental activities and CSR has continued to increase. The fact of starting this pressure begun with lack of environmental interest, poor social activities and lack of interest by top management. To upsurge managerial interest and social norms, companies need to comply with the legislation to take advantage of gaining high performance and recognizing new opportunities (Ashford, 1993; Dieleman and de Hoo, 1993). Hence, both responding to regulations and stakeholders' requirements is a very important strategy for top managers.

Individuals' factors such as skills, creativity and experience can influence environmental activities in companies that can result in a high or low level of performance (Hostager *et al.*, 1998). Similarly, Egri and Herman (2000) argued that managers' demographic factors such as age, education and gender influence environmental responsibilities. More precisely, a high level of education and senior managers easily execute social activities and environmental responsibilities that pay to organizational performance. Experienced managers produce sustainable products that care environment, are demanded by customers and have a high value for the firm (Luo and Bhattacharya, 2006). Erdogan *et al.* (2015) describe that management commitment and awareness is an important element in adopting social and environmental initiatives. A study conducted by Lau *et al.* (2016) in Chinese companies reveals that managers with foreign as well as international experience have a high motivation of CSR activities that ultimately contribute to the organizational consequences.

In the current era, environmental activities pay off in long run to organizations in the form of financial performance. However, for unleashing environmental and social activities, organizations need experienced and effective managers who have a broad knowledge of CSR and environmental issues (Slater and Dixon-Fowler, 2009; Manner, 2010). CEOs that are more senior pay significant attention to environmental issues to protect the organization's profile (Ambec and Lanoie, 2008). Senior and educated CEOs understand the demands and choices of communities; they care environment and pay attention to social needs and social activities. In turn, these corporate philanthropic activities contribute to their sales volumes and performance (Wang *et al.*, 2008; Russo and Perrini, 2010). It is argued that CSR activities mediate the relationship between total quality management and green performance. Considering the suggestion, we believe that project sustainability management mediates the relationship between managers' attributes and project performance:

- H7. Project sustainability management mediates the relationship between manager age and project performance.
- H8. Project sustainability management mediates the relationship between manager education and project performance.
- H9. Project sustainability management mediates the relationship between project experience and project performance.

Figure 1 illustrates the conceptualized model of our research.

### Methodology

For testing our hypothesized model, we surveyed project managers who were engaged in CPEC-related projects. We used a structured questionnaire to collect evidence from the managers related to their demographics, project sustainability management and project performance. We used an English version of the questionnaire because all the official documents in Pakistan are prepared in English – easily understandable by businessmen. Two professors and two project managers helped us in pretesting and pilot testing of the questionnaire. Due to COVID-19, it was difficult to find project managers in the workplace and meet them face to face. Hence, we approached them online by using email, WhatsApp and call to gather information. We used a google doc version of the questionnaire with two major sections: demographics detail and main variables. CPEC authority and Small and Medium Enterprises Authority (SMEDA) helped us in recognition of the projects and managers who are working with CPEC. The routes of CPEC across all four provinces of Pakistan. To mitigate biases, enhance validity and generate useful implications, we approached 600 project managers who were engaged in the four provinces of Pakistan named: Punjab, Khyber-Pakhtunkhwa, Sindh and Baluchistan. These managers were engaged in different types of projects, namely, electricity, infrastructure, hospitals, roads and the energy sector. Refer to Table 1 for the project and managerial descriptions.

### Measures

In this research, we used a closed-ended questionnaire where managers were given five options to select the most relevant one by considering the statement. For project sustainability management and project performance, the options were displaying: strongly disagree 1 to strongly agree 5.

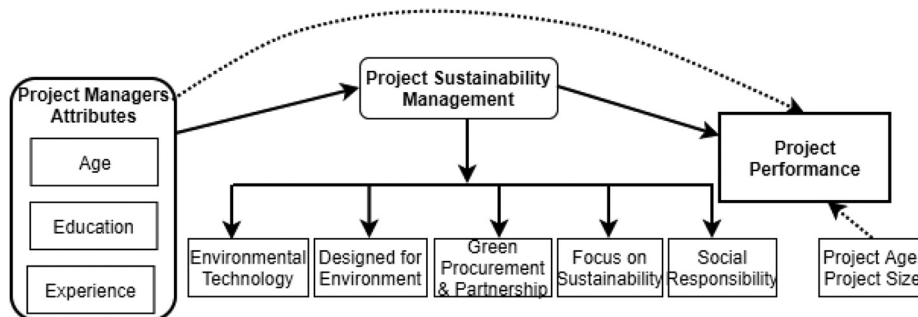


Figure 1. Conceptualized model of our research



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### *Demographic variables*

Age, educational background and experience of project managers were used as independent variables in this study. These are the most significant and used variables as demographic in recent studies (Shah *et al.*, 2021; Ying *et al.*, 2019). Gender was not used in this research because more than 98% of project managers are male in Pakistan and women can be rarely seen in this perspective. In our research, we found only three female project managers. A minor portion of respondents does not provide suitable logic in research. Moreover, managers above 20 years old were considered in this study as below 30 years of project managers have no experience or lack of project knowledge.

Age was measured with five options showing 20–30 years, 31 to 40 years, 41 to 50 years, 51 to 60 years, 61 and above years. Educational background was also measured with five options displaying, intermediate, bachelor, MA/MSc, MS/MPhil, doctoral degree. The experience was measured with five points showing, 5 years and less, 6–10 years, 11 to 15 years, 16–20 years, 21 and above.

### *Project sustainability management*

Sustainability in a project is viewed from internal and external lenses. In both aspects, project managers care about the environment and social morality. To measure project sustainability management, we used five dimensions; designed for the project, environmental technology, green procurement and partnership, focus on sustainability and social responsibility that are adopted from Carvalho and Rabechini (2017). A sample item for; designed for the environment “The ISO 14000 principles were applied in the project” environmental technology “Clean technologies were prioritized and applied along with the project product development” focus on sustainability “There are stakeholders requirements related to sustainability” green procurement and partnership “The material supply system is aligned to project strategies for sustainability” and social responsibility “Project manager is committed to social responsibility in project context.”

### *Project performance*

There is no universal measure for project performance in the literature. We used nine items that were used and validated by Maqbool *et al.* (2017). The reason behind choosing these items is that the authors have used these items in a similar industry (e.g. Pakistan construction industry). However, to meet our research goal, we slightly modified the items. A sample item is “We are able to achieve the satisfaction of my team members with overall project management and performance.”

### **Control variables**

Size of the project, project duration, location of the project and position of the project managers are used as control variables while testing the hypothesized model as the factors can influence project outcomes (Rehman *et al.*, 2020). The categorical variables such as the location of the project and position of the managers were tested through analysis of variance and the result displayed insignificant results. Hence, these variables did not proceed further. However, the size and age of the project have a significant influence on project performance while the insignificant influence on project sustainability management.

### **Data analysis**

The data of this research are analyzed through SmartPLS. There are several reasons to perform SmartPLS on the data as it is recommended for:

- a model having mediating variables;
- a small sample size;
- an abnormal data; and
- a complex model (Anwar *et al.*, 2021).

We executed a two-stage analysis of which in the first phase, we tested the inner model and then assessed the outer model.

**Measurement model**

In the SmartPLS, we performed our data in two ways. First, we applied an algorithm approach for the measurement model to know factors loading, validity and reliability of the variables (Figure 2). We did not extract major cross-loading between the items of one variable with another variable as shown in Table 2. The results indicated the convergent validity of all the variables is equal or above 0.50 which met the condition suggested by Hair *et al.* (2011). Discriminant validity of all the variables is equal to or above 0.70 which provided desirable results (Hair *et al.*, 2011). Finally, Cronbach’s alpha and composite reliability of all the variables are equal to or greater than 0.70 that provides desirable outcomes (Santos, 1999). Additionally, skewness and kurtosis values are lower than ±2 (Table 3) which reveals that our sample data are free of abnormality problems (Hair *et al.*, 2006).

**Correlations coefficient**

Table 4 illustrates the correlation of the variables. Our results show that top managers attributes such as age ( $r = 0.568$ ), education ( $r = 0.496$ ) and experience ( $r = 0.474$ ) are

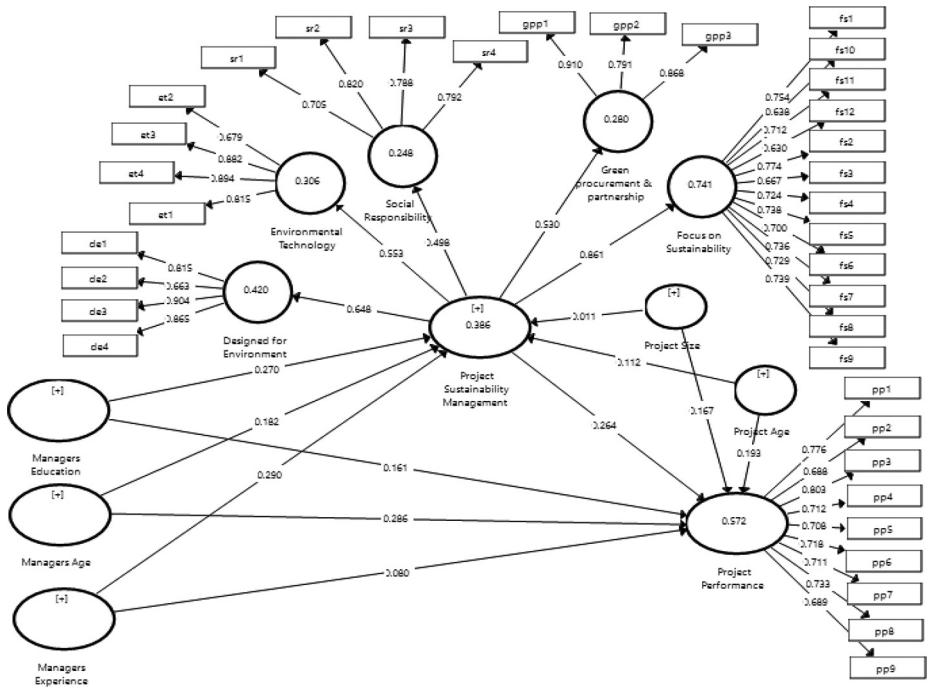


Figure 2. Measurement model



Description	Frequency	(%)	Description	Frequency	(%)
Manager education			Project type		
1. Intermediate and below	8	3.8	1. Renewable energy	93	44.5
2. Bachelor	97	46.4	2. Non-renewal energy	66	31.6
3. Master	99	47.4	2. Connectivity	49	23.4
4. PhD	5	2.4	Missed	1	0.5
Manager age			Project age		
1. 20–30 years	7	3.3	1. 2 years and less	23	11.0
2. 31–40 years	63	30.1	2. 3–4 years	100	47.8
3. 41–50 years	120	57.4	3. 5–6 years	85	40.7
4. 50 and above	19	9.1	Missed	1	0.5
Manager experience			Project size		
1. 3 years and less	11	5.3	1. 10–50 employees	20	9.6
2. 4–10	64	30.6	2. 51–100 employees	48	23.0
3. 11–15	111	53.1	3. 101–150 employees	70	33.5
4. 16–20	22	10.5	4. 150–200 employees	47	22.5
5. 21 and above	1	0.5	5. 200–250 employees	22	10.5
Manager position			6. 251 and above	2	1.0
1. Project manager	87	41.6			
2. Supervisor	95	45.5			
3. Team leader	27	12.9			
Total	209	100	Total	209	100

Role of project managers' attributes

**Table 1.** Demographic information of project managers and projects

Cross loadings	Designed for environment	Environmental technology	Focus on sustainability	Green procurement and partnership	Project performance	Social responsibility
de1	0.815	0.287	0.240	0.192	0.284	0.274
de2	0.663	0.267	0.208	0.215	0.297	0.254
de3	0.904	0.329	0.253	0.298	0.332	0.298
de4	0.865	0.437	0.304	0.296	0.381	0.283
et1	0.324	0.815	0.264	0.140	0.193	0.127
et2	0.208	0.679	0.264	0.149	0.176	0.017
et3	0.405	0.882	0.214	0.213	0.262	0.142
et4	0.392	0.894	0.211	0.214	0.254	0.137
fs1	0.214	0.217	0.754	0.161	0.334	0.120
fs10	0.191	0.207	0.638	0.156	0.301	0.145
fs11	0.347	0.265	0.712	0.250	0.353	0.276
fs12	0.271	0.141	0.630	0.062	0.315	0.368
fs2	0.174	0.198	0.774	0.323	0.325	0.117
fs3	0.255	0.240	0.667	0.176	0.340	0.256
fs4	0.176	0.229	0.724	0.301	0.353	0.070
fs5	0.248	0.185	0.738	0.152	0.334	0.178
fs6	0.238	0.201	0.700	0.266	0.378	0.098
fs7	0.131	0.179	0.736	0.161	0.348	0.193
fs8	0.198	0.211	0.729	0.322	0.351	0.054
fs9	0.205	0.172	0.739	0.174	0.335	0.282
gpp1	0.235	0.182	0.309	0.910	0.316	0.177
gpp2	0.309	0.196	0.161	0.791	0.318	0.225
gpp3	0.263	0.190	0.277	0.868	0.337	0.249
pp1	0.369	0.200	0.397	0.312	0.776	0.264
pp2	0.254	0.224	0.365	0.323	0.688	0.301
pp3	0.384	0.248	0.351	0.334	0.803	0.309
pp4	0.267	0.138	0.348	0.240	0.712	0.276
pp5	0.251	0.217	0.430	0.213	0.708	0.259
pp6	0.285	0.215	0.279	0.299	0.718	0.224
pp7	0.248	0.163	0.338	0.140	0.711	0.224
pp8	0.300	0.216	0.338	0.313	0.733	0.321
pp9	0.233	0.140	0.253	0.275	0.689	0.252
sr1	0.248	0.124	0.150	0.223	0.228	0.705
sr2	0.251	0.076	0.233	0.183	0.307	0.820
sr3	0.307	0.162	0.116	0.190	0.243	0.788
sr4	0.254	0.066	0.268	0.192	0.366	0.792

**Table 2.**  
Cross loadings

positively related to project performance. Similarly, these attributes: age ( $r = 0.438$ ), education ( $r = 0.475$ ) and experience ( $r = 0.496$ ) are also positively related to project sustainability management. Additionally, there is a positive association between project sustainability management and project performance ( $r = 0.589$ ). In the correlation, all the values are below 0.80 which confirms that there is no threat of multicollinearity in the used data set.

### Multicollinearity

To assess if there are overlapping problems in the constructs, we ensured the variance inflation factor that is shown in Table 5. A value below 3 reveals desirable results without multicollinearity threat (Hair *et al.*, 2006). In our results, none of the values is greater than 3 for project sustainability management and project performance. Hence, we say that our data has not an overlapping problem.

Construct reliability and validity	Cronbach's alpha	Composite reliability	AVE	Skewness	Kurtosis	Role of project managers' attributes
Designed for environment	0.829	0.888	0.667	1.418	-0.941	<b>Table 3.</b> Validity, reliability and normality
Environmental technology	0.836	0.892	0.676	1.942	-0.639	
Focus on sustainability	0.912	0.925	0.508	1.075	-0.760	
Green procurement and partnership	0.819	0.893	0.736	1.104	-0.021	
Project performance	0.888	0.910	0.529	1.020	-0.970	
PSM	0.899	0.912	-	1.180	-1.193	
Social responsibility	0.782	0.859	0.605	1.585	0.012	
Project size	-	-	-	-0.542	0.101	
Manager's age	-	-	-	0.115	-0.278	
Manager's education	-	-	-	-0.329	-0.125	
Manager's experience	-	-	-	0.146	-0.160	
Project age	-	-	-	-0.643	-0.342	

### Heterotrait-Monotrait ratio

We also tested discriminant validity through a new criterion named the heterotrait-monotrait ratio (see Table 6). According to Franke and Sarstedt (2019), a value below 0.90 illustrates that discriminant validity is achieved. In our results, none of the values is above 0.90 that met the condition of the validity.

### R<sup>2</sup> and F square

R<sup>2</sup> illustrates 38.60% of the change/variation in the project sustainability management and 57.2% of project performance that is explained by project managers attributes in the presence of the control variables. F square indicates the size effects of each managerial attribute in project sustainability management and project performance. In terms of project sustainability management, our results show that f square value by managers age = 0.040, managers education = 0.093 and managers experience = 0.10, respectively. However, concerning project performance, the f square value of managers age = 0.136, managers education = 0.044 and managers experience = 0.010, respectively.

### Common method bias

A cross-sectional data set (full questionnaire, same respondent and the same time) can cause common method variance (MacKenzie and Podsakoff, 2012). To check if there is any threat of common method variance, we executed Harman's single factor statistical test in statistical package for social science by entering all the items of the variables. The results illustrated the first factor with a variance of 27.94% which is less than the cutoff of 50%. Hence, our results confirm that our data set has no problem with common method bias.

### Outer model (structural model)

In the second step of SmartPLS, we tested the hypotheses through the structural model by using the bootstrapping approach of 2,000 resamplings (Figure 3).

The results (see Table 7) indicate that project manager age ( $\beta = 0.286$ ,  $t = 4.171$ ,  $p = 0.000$ ) and education ( $\beta = 0.161$ ,  $t = 2.743$ ,  $p = 0.006$ ) have a significant positive influence while project manager experience ( $\beta = 0.080$ ,  $t = 1.392$ ,  $p = 0.164$ ) has not a direct significant positive impact on project performance which supported *H1* and *H2* but rejected *H3*.

**Table 4.**  
Correlation  
coefficients

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. <i>Designed for Environment</i>	1.000											
2. <i>Environmental Technology</i>	0.411	1.000										
3. <i>Focus on Sustainability</i>	0.310	0.287	1.000									
4. <i>Green procurement and partnership</i>	0.310	0.219	0.296	1.000								
5. <i>Managers Age</i>	0.238	0.219	0.411	0.161	1.000							
6. <i>Managers Education</i>	0.331	0.151	0.418	0.308	0.362	1.000						
7. <i>Managers Experience</i>	0.301	0.254	0.466	0.172	0.430	0.378	1.000					
8. <i>Project Age</i>	0.211	0.167	0.232	0.211	0.287	0.248	0.213	1.000				
9. <i>Project Performance</i>	0.398	0.271	0.476	0.377	0.568	0.496	0.474	0.434	1.000			
10. <i>Project Size</i>	0.101	0.035	0.167	0.079	0.108	0.166	0.226	0.144	0.313	1.000		
11. <i>PSM</i>	0.648	0.553	0.861	0.530	0.438	0.475	0.496	0.294	0.589	0.157	1.000	
12. <i>Social Responsibility</i>	0.339	0.134	0.252	0.252	0.256	0.239	0.247	0.129	0.373	0.029	0.498	1.000

The impact of project manager age ( $\beta = 0.182, t = 2.803, p = 0.005$ ), education ( $\beta = 0.270, t = 4.926, p = 0.000$ ) and experience ( $\beta = 0.290, t = 4.647, p = 0.000$ ) have a significant influence on project sustainability management that supported *H4–H6*.

The indirect influence (see Table 8) of project manager age on project performance (through project sustainability management) is significant ( $\beta = 0.048, t = 2.112, p = 0.035$ ) and the direct impact remained significant which partially supported *H7*. It reveals that project sustainability management partially mediates the relationship between project manager age and project performance. The indirect influence of project manager education on project performance (via project sustainability management) is significant ( $\beta = 0.071, t = 2.346, p = 0.019$ ) and the direct impact remained significant that partially also supported *H8*. Finally, our findings show that the indirect impact of manager experience on project performance (through project sustainability management) is significant ( $\beta = 0.077, t = 2.555, p = 0.011$ ), but the direct impact of project manager experience on project performance

Inner VIF values	Project performance	Project sustainability management
Manager's age	1.403	1.349
Manager's education	1.388	1.269
Manager's experience	1.499	1.362
Project age	1.153	1.133
Project size	1.071	1.071
PSM	1.629	–

Table 5. Multicollinearity

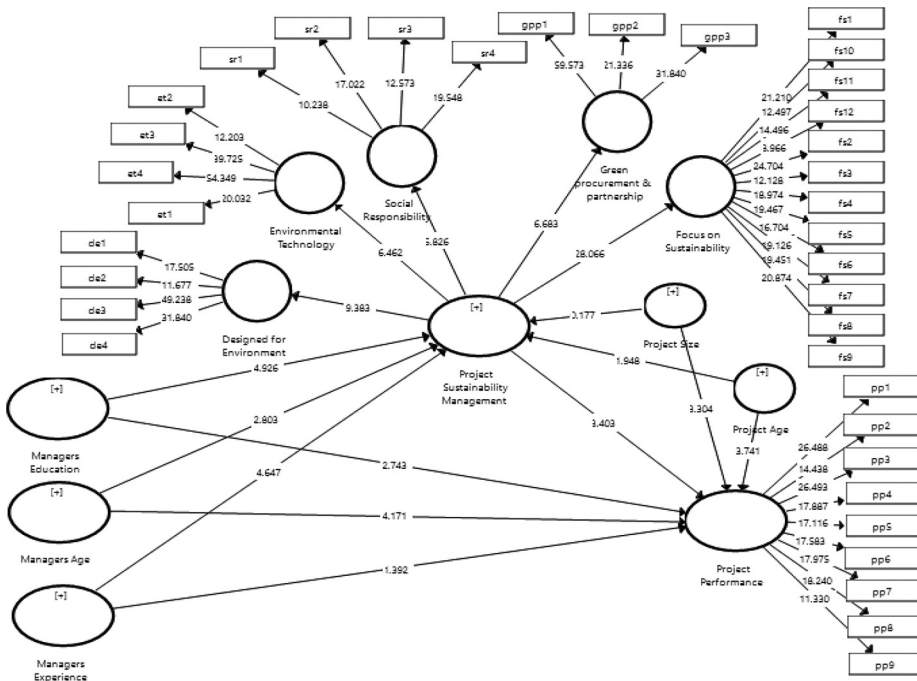


Figure 3. Measurement model





Paths	$\beta$	T	P-values	Role of project managers' attributes
Managers age → project performance	0.286	4.171	0.000	<hr/> <p style="text-align: right;"><b>Table 7.</b> Direct effect</p>
Managers education → project performance	0.161	2.743	0.006	
Managers experience → project performance	0.080	1.392	0.164	
Managers age → PSM	0.182	2.803	0.005	
Managers education → PSM	0.270	4.926	0.000	
Managers experience → PSM	0.290	4.647	0.000	
Project age → project performance	0.193	3.741	0.000	
Project age → PSM	0.112	1.948	0.052	
Project size → project performance	0.167	3.304	0.001	
Project size → PSM	0.011	0.177	0.860	
PSM → designed for environment	0.648	9.383	0.000	
PSM → environmental technology	0.553	6.462	0.000	
PSM → focus on sustainability	0.861	28.066	0.000	
PSM → green procurement and partnership	0.530	6.683	0.000	
PSM → social responsibility	0.498	5.826	0.000	
PSM → project performance	0.264	3.403	0.001	

Paths	B	T	P-values	Indirect effects
Managers age → PSM → project performance	0.048	2.112	0.035	<p style="text-align: right;"><b>Table 8.</b> Indirect effects</p>
Managers education → PSM → project performance	0.071	2.346	0.019	
Managers experience → PSM → project performance	0.077	2.555	0.011	
Managers age → PSM → designed for environment	0.118	2.698	0.007	
Managers education → PSM → designed for environment	0.175	4.471	0.000	
Managers experience → PSM → designed for environment	0.188	4.130	0.000	
Project age → PSM → designed for environment	0.072	1.847	0.065	
Project size → PSM → designed for environment	0.007	0.178	0.859	
Managers age → PSM → environmental technology	0.101	2.550	0.011	
Managers education → PSM → environmental technology	0.149	4.192	0.000	
Managers experience → PSM → environmental technology	0.160	3.659	0.000	
Project age → PSM → environmental technology	0.062	1.834	0.067	
Project size → PSM → environmental technology	0.006	0.177	0.860	
Managers age → PSM → focus on sustainability	0.157	2.763	0.006	
Managers education → PSM → focus on sustainability	0.232	4.636	0.000	
Managers experience → PSM → focus on sustainability	0.249	4.443	0.000	
Project age → PSM → focus on sustainability	0.096	1.943	0.052	
Project size → PSM → focus on sustainability	0.009	0.177	0.859	
Managers age → PSM → green procurement and partnership	0.096	2.464	0.014	
Managers education → PSM → green procurement and partnership	0.143	3.985	0.000	
Managers experience → PSM → green procurement and partnership	0.153	3.694	0.000	
Project age → PSM → green procurement and partnership	0.059	1.890	0.059	
Project size → PSM → green procurement and partnership	0.006	0.175	0.861	
Project age → PSM → project Performance	0.030	1.535	0.125	
Project size → PSM → project Performance	0.003	0.174	0.862	
Managers age → PSM → social responsibility	0.091	2.369	0.018	
Managers education → PSM → social responsibility	0.134	3.551	0.000	
Managers experience → PSM → social responsibility	0.144	3.776	0.000	
Project age → PSM → social responsibility	0.056	1.761	0.079	
Project size → PSM → social responsibility	0.005	0.177	0.859	

CMS	Paths	$\beta$	T	P-values
	Managers age → project performance	0.334	5.153	0.000
	Managers education → project performance	0.233	3.902	0.000
	Managers experience → project performance	0.156	3.142	0.002
	Managers age → designed for environment	0.118	2.698	0.007
	Managers age → environmental technology	0.101	2.550	0.011
	Managers age → focus on sustainability	0.157	2.763	0.006
	Managers age → green procurement and partnership	0.096	2.464	0.014
	Managers age → PSM	0.182	2.803	0.005
	Managers age → social responsibility	0.091	2.369	0.018
	Managers education → designed for environment	0.175	4.471	0.000
	Managers education → environmental technology	0.149	4.192	0.000
	Managers education → focus on sustainability	0.232	4.636	0.000
	Managers education → green procurement and partnership	0.143	3.985	0.000
	Managers education → PSM	0.270	4.926	0.000
	Managers education → social responsibility	0.134	3.551	0.000
	Managers experience → designed for environment	0.188	4.130	0.000
	Managers experience → environmental technology	0.160	3.659	0.000
	Managers experience → focus on sustainability	0.249	4.443	0.000
	Managers experience → green procurement and partnership	0.153	3.694	0.000
	Managers experience → PSM	0.290	4.647	0.000
	Managers experience → social responsibility	0.144	3.776	0.000
	Project age → designed for environment	0.072	1.847	0.065
	Project age → environmental technology	0.062	1.834	0.067
	Project age → focus on sustainability	0.096	1.943	0.052
	Project age → green procurement and partnership	0.059	1.890	0.059
	Project age → project performance	0.222	4.164	0.000
	Project age → PSM	0.112	1.948	0.052
	Project age → social responsibility	0.056	1.761	0.079
	Project size → designed for environment	0.007	0.178	0.859
	Project size → environmental technology	0.006	0.177	0.860
	Project size → focus on sustainability	0.009	0.177	0.859
	Project size → green procurement and partnership	0.006	0.175	0.861
	Project size → project performance	0.170	3.269	0.001
	Project size → PSM	0.011	0.177	0.860
	Project size → social responsibility	0.005	0.177	0.859
	PSM → designed for environment	0.648	9.383	0.000
	PSM → environmental technology	0.553	6.462	0.000
	PSM → focus on sustainability	0.861	28.066	0.000
	PSM → green procurement and partnership	0.530	6.683	0.000
	PSM → project performance	0.264	3.403	0.001
	PSM → social responsibility	0.498	5.826	0.000

**Table 9.**  
Total effects

is insignificant that fully supported *H9*. It illustrates that project sustainability management fully mediates the relationship between manager experience and project performance.

Total effects (see [Table 9](#)) of project manager age ( $\beta = 0.334, t = 5.153, p = 0.000$ ), education ( $\beta = 0.233, t = 3.902, p = 0.000$ ) and experience ( $\beta = 0.156, t = 3.142, p = 0.002$ ) on project performance show significant positive results that demonstrate a substantial role of project managers attributes in project sustainability and project performance. In terms of the control variables, our results show that project age and size have a significant influence on project performance but an insignificant influence on project sustainability management. Moreover, summary of the full hypothesized results are discussed in [Table 10](#).

Hypotheses	Results	Role of project managers' attributes
H1. Project manager age positively influences project performance	Accepted	<hr/> <p style="text-align: right;"><b>Table 10.</b> Hypotheses remarks</p>
H2. Project manager education positively influences project performance	Accepted	
H3. Project experience positively influences project performance	Not accepted	
H4. Project manager age positively influences project sustainability management	Accepted	
H5. Project manager education positively influences project sustainability management	Accepted	
H6. Project experience positively influences project sustainability management	Accepted	
H7. Project sustainability management mediates the relationship between manager age and project performance	Partially accepted	
H8. Project sustainability management mediates the relationship between manager education and project performance	Partially accepted	
H9. Project sustainability management mediates the relationship between project experience and project performance	Accepted	

## Discussion and conclusion

Grounded on the upper echelon theory, this research examines the impact of project managers attributes, namely, age, education and experience in project performance with a mediating role of project sustainability management. The theory has been widely tested by previous studies with regard to organizational performance (Ying *et al.*, 2019; Liu *et al.*, 2018; Ahmadi *et al.*, 2018), innovation (Shah *et al.*, 2021) and internationalization (Anwar *et al.*, 2018). Studies have also attempted the theory on the relationship between managerial attributes and CSR (Al-Mamun and Seamer, 2021; Cho *et al.*, 2019; Patel *et al.*, 2017). However, our extensive search in different databases acknowledged that the theory has been ignored in terms of project performance, project sustainability management and project managers attributes. More precisely, we test the upper echelon theory for the first time through empirical evidence gathered from project managers who are working in an emerging economy. We contribute to the theory by using project sustainability management as a mediator between managerial attributes and project performance. By doing so, our results confirmed that project managers' attributes significantly influence project sustainability management and project performance in emerging economies. Hence, our research opens a new door for future researchers to extend the theory in different projection work and regions. The theory can be used in the environmental and sustainable research model to articulate the insights in a better way.

We found that project managers' age and educational background significantly positively influence project performance. In line with previous studies, Müller and Turner (2007) scrutinized that senior project managers have more advantages of performing operational activities in a way to gain high project performance. Similarly, our results match Seghers *et al.* (2012), who revealed that highly educated managers manage resources and information efficiently that can give maximum benefits. However, our findings are not related to De Clercq *et al.* (2012), who scrutinized a significant positive influence on experience on organizational performance. We found that experience does not significantly influence project performance.

Our results revealed that project manager age, education and experience significantly influence project sustainability management. Our findings support previous studies where Jones Christensen *et al.* (2014) acknowledged a significant positive association between manager age and sustainable activities. Similarly, Dief and Font (2010) also described that senior managers have knowledge of environmental and social issues, hence they tend to practice sustainable activities. Consistent with Diamantopoulos *et al.* (2003) found that highly educated people understand environmental

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problems, consequently, they are more motivated to be environmentally responsible and social. Similarly, it has also resulted that highly educated consumers are pro-environmentally-oriented (Patel *et al.*, 2017). Based on the relationship between experience and sustainability management, our results support Egri and Herman (2000), who showed that experienced managers understand the environmental process and overcome barriers faced by firms. As result, their firms perform better with respect to environmental and sustainable activities.

Our findings demonstrate that project sustainability management partially mediates the relationship between project manager age, education and project performance. Our findings support previous studies where Wang *et al.* (2008) found that senior managers focus on CSR and environmental activities and pay equal attention to profitability. Egri and Herman (2000) state a high level of education and senior managers easily execute social activities and environmental responsibilities that pay to organizational performance. Our findings match Slater and Dixon-Fowler (2009), who states that in the current era, environmental activities pay off in long run to organizations in the form of financial performance. However, to unpack environmental and social activities, organizations need experienced and effective managers who have a broad knowledge of CSR and environmental issues (Manner, 2010).

### **Implications for practice**

Based on the analysis, we have suggested several implications for project managers and policymakers (SMEDA and the government). First, based on our insights, we recommend senior and educated project managers authorize project operational activities to sustain performance. Our results displayed that project management experience does not directly affect project performance. However, project sustainability management mediates the association between project experience and project performance. Hence, aiming for project sustainability management can be gained through experienced project managers. We found that project sustainability management partially mediates the association between age and educational background of project managers and project performance. It demonstrates that senior and highly educated project managers equally benefit project sustainability management and project performance. Our research strongly emphasizes project sustainability management that, in turn, can enhance project performance. Senior managers should also encourage young and fresh managers to care about environmental activities and cleaner tactics. To summarize, our research recommends a senior, high educated and experienced management team for CPEC projects who can consider sustainable activities and gain high performance.

Second, concerning the policy implications, our research recommends SMEDA to initiate formal acts of environmental and social activities in the business industries. It will motivate project managers to achieve the target of sustainable goals. SMEDA should support project managers in practicing sustainable activities, it will result in high performance. For instance, SMEDA can arrange seminars and workshops for environmental literacy and awareness to promote sustainable strategies. The government aims to gain SDGs through several tactics. Based on our insights, the government should also support project managers by providing them with space and services. Therefore, they will easily perform green activities in the areas where CPEC crosses. Our research also suggests policymakers and advisors of CPEC connect with project managers and their teams for promoting sustainability. The government can call meetings between project managers and policymakers to sustain environmental activities smoothly. Especially senior managers should be called, as they will help in formulating the strategic posture for environmental concerns.

### Limitations and future research

In addition to the several policy implications, our research faces a few constraints that can be addressed in future research studies. Our first limitation is the use of cross-sectional data, which has threats of common method bias. Hence, to mitigate the chances of social desirability biases, we suggest data collection through an in-depth interview. Second, our research is limited to the projects working in Pakistani under CPEC. Future researchers can extend this model in other regions especially China, India, Malaysia to unpack how managerial attributes affect sustainability practices in projects. Consequently, we suggest data collection from project managers working in European countries to gain pedestrian insights and implications. Third, due to a very low number of female project managers, our model is limited to the attributes of male project managers. Future researchers in other countries can extend the model by assessing attributes such as gender, business education and psychological traits. Fourth, we assessed the mediating role of project sustainability management and project performance as a dependent. More sustainable and social determinants such as social values, CSR and contributions to SDGs can be considered in future studies. Also, it is suggested to understand what problems managers faced while opting for sustainability activities. There is the possibility to assess the difference of sustainability management between young and old, experienced and fresh and low and highly educated managers. Similarly, managerial psychological factors can be considered in future studies to contribute to the upper echelon theory. Finally, we recommend future researchers test other theories such as resource-based view theory, social capital theory and theory of planned behaviors in projects working under CPEC.

### Conclusion

CPEC has been announced together by China and Pakistan at the end of 2015 – aiming to promote free trade and enhance economic growth. Since then, a number of projects are started in the form of renewable energy, non-renewal energy and connectivity. As a result, academia and scholars have shown high interest in researching the determinants of CPEC. However, to date, none of the previous studies has examined the influence of project manager demographic factors on project sustainability management and project performance. Our research fills the gap and scrutinizes the impact of project managers' attributes, namely, age, education and experience on project performance with the mediating role of project performance. We used a structured questionnaire and collected data from 209 project managers/supervisors/team leaders under CPEC. The results of the SmartPLS illustrate that project managers' age and education have a significant influence on project performance while experience does not show any significant impact. All the attributes significantly influence project sustainability management. Additionally, we found that project sustainability management partially mediates the association between age, education and project performance while it fully mediates the relationship between experience and project performance. Our research recommends a senior, high educated and experienced management team for CPEC projects who can consider sustainable activities and gain high performance.

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### About the authors

Muhammad Zaheer Hashim is a PhD scholar in the school of economics and management, Beijing University of Technology, Beijing China. He completed a Bachelor degree in electrical engineering and master degree in engineering management. He also works for National Engineering Services Pakistan (Nespak) as senior engineer.

Liu Chao is a professor in the College of Economics and Management, Beijing University of Technology, China. He received a Ph.D. from Tianjin University (TJU) in 2009. His research interests include socioeconomic system analysis and optimization. He has published over 70 papers in various journals, such as IEEE Transactions on Evolutionary Computation, Applied Soft Computing, Expert Systems with Applications, and International Journal of Fuzzy Systems. Liu Chao is the corresponding author and can be contacted at: [liuchao@bjut.edu.cn](mailto:liuchao@bjut.edu.cn)

Chao Wang is a professor in the College of Economics and Management, Beijing University of Technology, China. He received a Ph.D. from Beijing Jiaotong University (BJTU) in 2015 with joint training at Purdue University in 2013 and 2014. He was a postdoctoral fellow at the Center for Polymer Studies and Department of Physics of Boston University from 2017 to 2019. His research interests include complexity economics, sustainable supply chains, and complex networks. He has published over 70 papers in various journals, such as Omega, Resources, Conservation and Recycling, Cities, Ecological Economics, Transportation Research Part A/D, and Applied Energy.

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