

At the end of the world, turn left: Examining toxic leadership, team silence and success in mega construction projects

Abstract

Purpose

Failures in both followership and leadership become inevitable as mega construction projects are directed and controlled by toxic leaders. Consequently, team member's desire for knowledge hoarding silence is triggered and goal alignment between the leader and team members suddenly fades away to realize success in mega projects. Considering the growing importance of these rarely examined constructs and fragmented literature on toxic leadership, team silence and mega project success in the global construction industry, the present study aimed to examine the effects of toxic leadership and project team member's silence on the success of mega construction projects. Moreover, the mediating influence of project team member's silence to link toxic leadership and mega construction project success has also been explored.

Design/methodology/approach

Drawing on survey data of 326 project professionals directly associated with mega construction projects worth US \$62 billion under the China Pakistan Economic Corridor (CPEC), the conceptual model was tested with covariance-based structural equation modeling (CB-SEM) using Mplus program. Scales were adapted from previous research to measure toxic leadership (with its five-dimensions including abusive supervision, authoritarian leadership, self-promotion, narcissism and unpredictability), project success (with its three-dimensions including project management success, project ownership success and project investment success) and project team members' silence. Reflective-formative second order assessments were specifically applied to measure the multi-dimensional nature of toxic leadership and project success, respectively.

Findings

Mplus estimations revealed that toxic leadership negatively influences project success, besides forcing a culture of silence among project team members. Interestingly, the relationship between toxic leadership and project success is also negatively mediated by the project team member's silence.

Research limitations/implications

The present study's findings are derived from data of project professionals (N=326) to examine success in megaprojects under the China Pakistan Economic Corridor (CPEC). Hence, these findings may be re-validated through future studies on similar megaprojects (e.g., China's Belt and Road Initiative *aka* BRI worth US \$8 trillion) that may also be predicated by toxic leadership tendencies, silent cultures, and high-stakes involved to seize project success.

Practical implications

Policy makers, construction practitioners and other key stakeholders (e.g., departmental heads/supervisors) can take advantage of this new evidence to better interpret the success paradox in mega projects, and to reduce the spread and long-term damage of toxic leadership on team members and eventually create opportunities for project success.

Originality/value

The present study's novelty is manifested within this first empirical evidence on toxic leadership that breeds team silence in underperforming mega projects. Notably, present study offers alarming evidence on mega projects that can be easily derailed from success, as they continue to suffer from team silence and toxic leadership.

Keywords Toxic leadership, project team member's silence, project success, mega construction projects.

1. Introduction

Project failure is an undesirable yet common narrative resulting in financial and reputational losses for project stakeholders. Various factors cause project failures, however, the critical elements are typically related to “human factors” or “people factors” (Antony & Gupta, 2019; Gupta et al., 2019; Hughes et al., 2017; Imam, 2021; Zaman, 2020). Human-related factors can significantly influence interpersonal skills, motivation, culture, morale and team spirit in project-based organizations (Zhu et al., 2019). Team member’s relationship with the leader (Rehman et al., 2020; Zettina, 2021; Zhu et al., 2019), are outcomes of leader’s actions and behaviors (Imam, 2021). Hence, **effective leadership is central to seize success and avoid failures in projects** (Imam, 2021; Nixon et al., 2012; Strang, 2011; Zaman, 2020). In order to establish the role of leadership towards project success, it is necessary to determine the difference between project management and project leadership (Imam, 2021; Yang et al., 2011). Project management is a standard managerial approach that deals with planning, organization, and control of the project activities, by focusing on efficiencies and effectiveness (Zaman et al., 2019). In contrast, project leadership is about influencing and guiding team members and enabling them to attain their full potential, which can positively impact project outcomes (Anantatmula, 2010; Zhu et al., 2019). Leaders are responsible for making key decisions, managing stakeholder’s expectations, and managing team members’ human centric factors and performance (Imam, 2021). The potential traits, behaviors, qualities and transformational role of successful project leaders has been researched extensively (Maqbool et al., 2017; Raziq et al., 2018; Zaman, 2020). Leadership role is pivotal in keeping the pace throughout the project management process, wherein leaders should exercise wide-ranging leadership styles depending on the various project phases and shifting project demands (Imam, 2021; Prabhakar, 2005). Transformational leadership remains one of the dominant leadership styles that has been widely reported to significantly contribute towards project success. Transformational leadership focuses on encouragement, motivation, inspiring team members, adapting to change, driving innovation, and helping members and projects together to reach successful project outcomes (Aga et al., 2016; Prabhakar, 2005, Zaman, 2020). Communication is deemed central to leader-employee relationship, wherein expectations, goals and even challenges are shared for effective organizational and project performance (Imam, 2021; Ruben & Gigliotti, 2016; Zulch, 2014). However, there is limited evidence on the dark side of leadership (generally referred as toxic leadership) and how toxic project leaders can harm team productivity as well as overall project performance (Coakley, 2021; Imam, 2021; Kurtulmuş, 2021; Laguda, 2021; Negash & Hassan, 2020).

Toxic leadership is an approach in which leaders, by means of their dysfunctional traits and destructive behaviors, inflict enduring and serious detriment on their organizations and its individuals (Coakley, 2021; Kurtulmuş, 2021; Laguda, 2021; Lipman-Blumen, 2005). **Toxic leadership can be exhibited in the form of recurring abusive and hostile behaviors (verbal and nonverbal), noncontingent punishment, also sometimes physical maltreatment** (Coakley, 2021; Kurtulmuş, 2021; Laguda, 2021; Milosevic et al., 2020). Toxic leadership behavior can derail organizations and projects towards serious problems (e.g. leading to project failures), including employee deviant behaviors, reduced job satisfaction, higher turnover, lower employee self-esteem, psychological stress and employee silence (Bhandarker & Rai, 2019; Coakley, 2021; Reyhanoglu & Akin, 2020). The adversities of toxic leadership include distancing between leaders and followers, diminished communication, unpleasant interpersonal relationships, disbelief, disorientation and emotional exhaustion (Coakley, 2021). **Consequently, followers feel disengaged, develop a sense of fear, and ultimately seek silence behavior as an act of revenge on their toxic leaders** (Bhandarker & Rai, 2019; Kurtulmuş, 2021; Reyhanoglu & Akin, 2020). Employee silence has recently received scholarly attention in the construction project management literature due to its detrimental effects on project-based organizations (Chou & Chang, 2020; Reyhanoglu & Akin, 2020; Xu et al., 2015; Zhu et al., 2019). Employee silence is a conscious behavior, which is the antithesis of employee voice, where an employee withholds pertinent information, opinions, and concerns to the attention of colleagues, supervisors, or leaders, which is deemed necessary for accomplishing project processes, policies, improvements, and performance (Chou & Chang, 2020; Dong & Chung, 2020). Employee silence is a consequential outcome of toxic leadership (Coakley, 2021; Song et al., 2017; Xu et al., 2015), as employees prefer to stay silent,

especially when they face self-centered and self-serving toxic leaders (Chou & Chang, 2020; Laguda, 2021; Wang et al., 2020). Although the positive leadership traits (e.g., transformational leadership and shared leadership) and their effects on project success have been extensively examined (Ali et al., 2020; Clarke, 2010; Imam, 2021; Maqbool et al., 2017; Raziq et al., 2018; Zhu et al., 2019), paradoxically the dark side of leadership (i.e. toxic leadership) and its impact on project teams and overall project success have yet to be explored (Coakley, 2021; Imam, 2021; Kurtulmuş, 2021; Negash & Hassan, 2020; Zaman, 2020).

Mega construction projects are recognized as outrageously expensive (i.e., costing over US \$1 billion) and complex (i.e., involving multi-stakeholder's interest and engagement), while they frequently face strategic misrepresentation (e.g., high-political influence), overconfidence (e.g., underestimated risks and overestimated abilities for project delivery), significant delays (e.g., Ciudad Real Central Airport, Spain), unexpected cost overruns (e.g., Interstate H-3, Hawaii, USA) and sometimes abandonment (Ryugyong Hotel, North Korea) (Ardakani & Nik-Bakht, 2021; Ma & Fu, 2020; Zaman, 2020). Mega construction projects in emerging and transition economies are generally planned, executed and controlled by authoritarian leadership (i.e., one dimensional component of toxic leadership), while team members feel pressured to remain silent due to fear of retaliation (e.g., loss of job, or demotion), as well as limited and/or dysfunctional channels of communication (Ardakani & Nik-Bakht, 2021; Ma & Fu, 2020; Young, 2021; Zhu et al., 2019). Seminal research by Zhu et al. (2019) highlighted that transformational leadership could reduce silence behavior among project teams. However, the unfavorable effects of team member's silence on project success, especially in mega construction projects remains largely unknown (Ardakani & Nik-Bakht, 2021; Ma & Fu, 2020; Zaman, 2020; Zetna, 2021; Zhu et al., 2019). Importantly, when transformational leadership is non-existent and mega construction projects are largely controlled by toxic leaders (who display traits such as abusive supervision, authoritarian leadership, self-promotion, narcissism and unpredictability), the project team member's silence becomes easily rooted and reinforced (Ardakani & Nik-Bakht, 2021; Coakley, 2021; Negash & Hassan, 2020; Zhu et al., 2019). To address these critical research gaps in the construction management literature concerning mega construction projects (Ardakani & Nik-Bakht, 2021), the present study aimed to introduce and empirically validate a multidimensional (i.e., second order/reflective-formative) model of mega construction project success (measured by three-dimensions including project management success, project ownership success, and project investment success), toxic leadership (measured by five-dimensions including abusive supervision, authoritarian leadership, self-promotion, narcissism and unpredictability) and project team member's silence, respectively (Ardakani & Nik-Bakht, 2021; Coakley, 2021; Musawir et al., 2017; Schmidt, 2008; Zhu et al., 2019). Moreover, the mediating effects of project team member's silence on the relationship between toxic leadership and mega construction project success have been explored (Kurtulmuş, 2021; Ma & Fu, 2020; Zhu et al., 2019).

2. Theoretical background and hypotheses formation

2.1. Toxic leadership

Toxic leadership is classified as a dark side of leaders who demonstrate potentially dysfunctional, unproductive, ineffective, self-serving, and abusive behaviors, actions, and personality traits such as victimization, intimidation, subversive aggression, or manipulation to force employees to follow them (Coakley, 2021; Kurtulmuş, 2021; Laguda, 2021). The dark side of leadership is an ongoing pattern of harmful attributes, including abusive behavior (Wang et al., 2020; Xu et al., 2015), ineffectiveness (Foti & Hauenstein, 2007), destructive personality (Song et al., 2017), narcissism (Blair et al., 2017; Yao et al., 2019), and toxic behaviors (Dobbs & Do, 2019; Lipman-Blumen, 2005; Milosevic et al., 2020; Pelletier, 2010; Reed, 2004). Toxic leadership is a relatively new development in the literature of dark leadership, and despite being a popular concept, it has not been methodologically researched. There are varied explanations of toxic leadership; however, the concept was first introduced by Dr. Marcia Lynn Whicker as a comparison to three types of leaders, i.e., trustworthy, transformational, and toxic (Whicker, 1996). This style of dark leadership is described as a toxic intended and toxic influenced approach that seeks position, power, and control by involving harmful and toxic tactics to impede others' ability to perform

(Milosevic et al., 2020; Pelletier, 2010). Researchers advocate toxic leadership to be detrimental for employee and organizational performance, as a consequence of disparaging and self-serving behaviors focusing on achieving personal goals and benefits by exploiting or compromising the needs and desires of subordinates, teams, and organizations (Zwikael & Meredith, 2019). It has also been reported to be indicative of causing numerous repercussions leading to depression, burnout, low self-esteem, mental illness, high turnover, employees' silence (Bhandarker & Rai, 2019; Dobbs & Do, 2019; Matos et al., 2018), blame cultures, hostility, lack of trust (Weberg & Fuller, 2019), low job satisfaction, absenteeism, and low engagement (Labrague et al., 2020; Mathieu & Babiak, 2016).

Toxic leaders are either intentionally toxic by deliberately harming others to gain personal control and power, or unintentionally toxic by thoughtlessly harming others by being incompetent (Lipman-Blumen, 2005). Schmidt (2008) identified and validated five dimensions of toxic leadership, namely (1) abusive supervision (refers to a recurring form of nonphysical hostility), (2) authoritarian leadership (refers to absolute control over subordinates and complete decision-making power), (3) self-promotion (refers to a forceful way of promoting self-interest and/or personal activities), (4) narcissism (refers to extreme self-involvement and ignorance to others needs), and (5) unpredictability (refers to dramatic mood swings and wide range of unstable behaviors) (Coakley, 2021; Kurtulmuş, 2021; Laguda, 2021; Schmidt, 2008). Toxic leadership has been reported to negatively influence organizational efficiency and employee relations, interpersonal skills, and organizational performance (Blair et al., 2017; Dobbs & Do, 2019; Lipman-Blumen, 2005; Song et al., 2017; Wang et al., 2020; Wang et al., 2020). Additionally, toxic leadership can stimulate deviant workplace behaviors and attitudes in projects and can create a vulnerable working environment that can be instrumental in shaping adverse project outcomes (Kurtulmuş, 2021; Zhu et al., 2019).

2.2. Project team member's silence

The term employee silence is interchangeably used with various virtues, including respect, modesty, shyness and decorum. Although in organizational settings, employee silence needs to be observed as a counter-response to issues around communication (Knoll et al., 2021) tied with leadership style (Perlow & Williams, 2003; Zhu et al., 2019). In organizational settings, employee silence is considered the antithesis of employee voice, which is regarded as a key facilitator in quality decision making, triggering innovation, and exposing workplace problems (Bashshur & Oc, 2015; Xu et al., 2019). Employee voice and opinions are considered to be pivotal in handling competition and the changing business dynamics as they help to inculcate ways to bring in improvements and restrict potential threats (Crant et al., 2011). Voicing out opinions, ideas, and concerns are consequential of favorable outcomes for employees like promotions and improved performance reviews (Dutton & Ashford, 1993; Thompson, 2005). Employees might still opt for silence by withholding their opinions and concerns (Tangirala & Ramanujam, 2008, 2012). Compared with employee voice, employee silence is not simply the opposite of absence of voice. Employees might choose not to speak for different reasons (Chou & Chang, 2020; Dyne et al., 2003; Tangirala & Ramanujam, 2008), including lack of procedural opportunity to speak up (Avery & Quiñones, 2002). Employee silence is regarded as a purposeful, employee decision, absence of voice yet deliberately silent members about various behavioral, affective, and cognitive assessments of organizational situations and environment (Chou & Chang, 2020; Knoll et al., 2021).

Employee silence has also been discussed as a part of a larger behavioral domain. Employee voice is said to be employees' expressive and suppressive communication preference, including upward communications on organizational issues, opposing unethical practices and whistleblowing. Suppression of such communication is known as employee silence (Milliken et al., 2003; Hamstra et al., 2021). Employee silence leads to adverse organizational outcomes, including ineffective decision making, lack of innovation, learning and change adoption (Fast et al., 2014; Ryan & Oestreich, 1991), and most importantly, development of the unethical behavior issues of employees leading to purposefully concealing the significant information pertinent to organizational needs (Dyne et al., 2003). Employee silence as an

outcome of abusive and toxic behavior has been reasonably investigated in general organizational settings and is reported to be a barrier to openness, effective decision-making, innovation, change process and continuous improvements (Fast et al., 2014; Ryan & Oestreich, 1991). Moreover, employee silence has also been claimed to invigorate increased employee stress, intensified dissatisfaction, higher levels of disengagement, and decreased employee retention and performance (Hamstra et al., 2021; Knoll et al., 2021; Morrison, 2014).

2.3. Project success

Project success has been extensively researched in project management (Aga et al., 2016; Ahadzie et al., 2008; Atkinson, 1999; Baccarini, 1999; Baccarini & Collins, 2004; Ika, 2009; Khan et al., 2013; Musawir et al., 2017; Soltani, 2020; Turner & Xue, 2018; Wright & Lawlor-Wright, 2018; Yang et al., 2011; Zaman, 2020), with multiple approaches on how to measure project success (Imam, 2021; Musawir et al., 2017). Initially, project success was measured in terms of cost, quality and time (the iron triangle), and later the performance dimension was the focus of concern (Atkinson, 1999; Barnes & Wearne, 1993; Wright & Lawlor-Wright, 2018). Over time, research in project management researchers has largely recognized that these traditional criteria to measure the success of a project are inadequate (Andersen, 2014; Musawir et al., 2017). Apart from measuring the project success using cost, time, quality and performance criteria, there has been a shift of focus towards measuring project success in terms of value delivered by assessing project inputs, outputs, and benefits attained (PMI, 2016). There have also been discussions around differences between project management success and project success. The conventional cost, time, and quality are considered the criterion around project management, while project success is conditional on the achievement of strategic objectives of the project owner, investors and other stakeholders (Andersen, 2014; Baccarini, 1999; Musawir et al., 2017; Zwikael & Meredith, 2019). Moreover, project success is a comprehensive and inclusive approach, measured in terms of efficiency, future planning, business success, the impact on the project team and stakeholders (Khan et al., 2013; Martens & Carvalho, 2016; Shenhar et al., 2001; Mir & Pinnington, 2014), sustainability (De Carvalho & Rabechini Junior, 2015; Martens & Carvalho, 2016), and impact on the environment (Ahadzie et al., 2008). The complexity around the traditional measurement parameters of project success (Jenner, 2015; Zwikael & Smyrk, 2012) has been recognized. A project that meets cost, time, and quality objectives might not be successful if it does not produce the agreed benefits and values (PMI, 2016; Zwikael & Meredith, 2019). Similarly, a project that could not be completed on the agreed time, cost and quality might still give positive value when completed (Turner & Xue, 2018). A project, which was canceled because of non-compliance with environmental factors and changing business needs, might not be considered as a failed project. Similarly, project success has also been addressed in terms of soft criteria and hard criteria. The hard criteria approach takes into account cost, time, quality, schedule and performance aspects of project success (Baccarini, 1999). Such criteria are objective and can be measured quantitatively. Whereas the soft criteria are related to human factors including communication, trust, teamwork, team cohesion. These later criteria are subjective and qualitative in nature thus difficult to assess (Chiocchio & Hobbs, 2014; De Carvalho & Rabechini-Junior, 2015; Zaman et al., 2019).

The consensus thus is that there is no one size fit all approach in measuring project success. Success criteria may vary across different types of projects (Baccarini & Collins, 2004; Diallo & Thuillier, 2004), with variations in context, size, complexity, lifecycle stages, country, environment, industry, and organizations (Khan et al., 2013; Thomas & Fernández, 2008; Yu et al., 2005). Especially in the case of megaprojects, researchers have argued that the conventional cost, time, quality and performance criteria might not be practical for determining project success (Turner & Xue, 2018; Zidane et al., 2015). The inclusion of stakeholders' value, end-user satisfaction and business success are considered as appropriate measures of project success (Ika, 2009; Khan et al., 2013). Therefore, there is ample literature support available addressing the need to tie stakeholder's value, and organizational needs and benefits; thus, there is a need to include post-project outcomes in the success measurement criteria (Atkinson, 1999; Khan et al., 2013). Aligned with the project success connotations discussed in this study, a three-dimensional project success

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3 approach was taken based on Musawir et al. (2017), also Zwikael and Smyrk (2012). It includes a) project
4 management success, which measures the success of the project from the project managers' perspective in
5 achieving the agreed project schedule; b) project ownership success, which measures the success of the
6 project from the project owner's perspective in attaining the business case; and c) project investment
7 success, which measures the success of projects from the project founder's perspective in generating the
8 return on investment, benefits, and value (Musawir et al., 2017; Zaman et al., 2019; Zwikael & Smyrk,
9 2012).
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11 **2.4. Toxic leadership and projects success**

12 Numerous studies have been carried out identifying the personality traits, leadership skills/styles (Ali et al.,
13 2020; Clarke, 2010; Keller, 1992; Maqbool et al., 2017a; Raziq et al., 2018; Zaman et al., 2019), and
14 leaders' competencies (Geoghegan & Dulewicz, 2008) that positively impact project performance (Imam,
15 2021; Strang, 2011), establishing that project leader characteristic/traits impact the success of a project
16 positively (Imam, 2021, Zaman, 2020). It has also been determined that because of the peculiar and stressful
17 demands of projects, project managers might engage in abusive supervisory behavior, which can adversely
18 impact human factors related to projects, employees and stakeholders (Gallagher et al., 2015; Kurtulmuş,
19 2021). Similarly, toxic behaviors have also been identified in the project setting as one of the possible
20 deviations impairing the effective development of project leadership skills and traits and these behaviors
21 have to be deliberately and carefully addressed during the leadership development process (Coakley, 2021;
22 Hamstra et al., 2021; Negash & Hassan, 2020; Winn, 2016). Toxic leaders rely on intimidation, using
23 legitimate power and fear tactics to disregard employees; this approach might offer short-term success;
24 however, it will be at the cost of teams, culture, and the environment of the organization (Coakley, 2021;
25 Weberg & Fuller, 2019), not to say it is a questionable practice. A study conducted on a renewable energy
26 project concluded that the toxic workplace environment (incivility, bullying, harassment, bullying, and
27 mobbing) has a significant adverse impact on job stress and project success, whereas organizational support
28 positively impacted project success (Wang et al., 2020). Despite all the disruptions of toxic leadership on
29 employees and organizations, paradoxically, there is limited literature available investigating the impact on
30 the effectiveness and the success of projects (Kurtulmuş, 2021; Zhu et al., 2019). Henceforth the first
31 hypothesis of this study aims at confirming the inverse impact of toxic leadership on project success.
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35 H_1 : Toxic leadership has a significant negative effect on project success.
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37 **2.5. Toxic leadership and project team member's silence**

38 Toxic leadership has been studied in relation to its adverse impacts on employees and organizations
39 (Brandebo & Alvinus, 2019; Coakley, 2021; Matos et al., 2018). Similarly, employee silence has been
40 overwhelmingly studied as consequential of narcissistic leadership (Mousa et al., 2020; Wang et al., 2018),
41 destructive leadership (Song et al., 2017), abusive leadership (Wang et al., 2020; Xu et al., 2015), and
42 authoritarian leadership (Duan et al., 2018; Guo et al., 2018). Moreover, specifically in the context of
43 projects and project-based organizations, a study concluded that positive leadership traits (transformational
44 leadership) have an adversative relationship with project silence; positive leadership prevents project
45 member silence by creating the element of trust (Zhu et al., 2019). Studies are supportive of the negative
46 impact of leadership traits on employee voice behaviors, catalyzing employee silence (Kurtulmuş, 2021;
47 Zhu et al., 2019). So far, toxic leadership behavior has not been studied in the project management context.
48 Moreover, the literature is also silent on the impact of toxic leadership in triggering team member's silence
49 in projects and organizations (Coakley, 2021; Ma & Fu, 2020; Kurtulmuş, 2021; Zhu et al., 2019).
50 Therefore, this study proposes its second hypothesis as follows:
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53 H_2 : Toxic leadership has a significant positive effect on project team member's silence.
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2.6. Project team member's silence and project success

Highly participative and vocal employees establish higher-level skills and generate knowledge leading to increased engagement and higher productivity (Abdulgaliimov et al., 2020; Knoll et al., 2021). Particularly from the projects' perspective, effective team and project management are not only pivotal for project success but also the career development of the project team. Dependency on team engagement, communication and voice behavior is considered essential (Abdulgaliimov et al., 2020; Ge, 2020; Knoll et al., 2021) for teamwork. The importance of breaking employee silence on issues regarding project processes, sponsor support, schedule and time management issues, structures, and evaluation of progress are also reported to be critical for project success (Grenny et al., 2007; Nekoei-Moghadam, 2012). It has been suggested that improving the communication between the project team and minimizing employee silence is critical for sharing knowledge, seeking feedback, and securing the significant information needed for achieving the project outcomes (Zhu et al., 2019). Moreover, the literature also emphasizes the importance of project communication and team member's interactions and collaboration for project success (Teerajetgul et al., 2009). Research on Heathrow Airport terminal 5, a megaproject, revealed the importance of interaction, communication, coordination, and cooperation between various stakeholders. It revealed how employee voice impacted the decision-making process, thus leading to project success (Deakin & Koukiadaki, 2009; Negash & Hassan, 2020).

Some early researchers have also postulated the impact of the reluctance of reporting bad news and whistleblowing (Park & Keil, 2009; Tan et al., 2003), and the impact of organization silence (Park & Keil, 2009) on the success of projects. The above discussion clearly rationalizes the importance of communication towards project success. Henceforth, employee silence, being a risk to all the mentioned established relationships, also qualifies to be hypothesized as adversely influencing project success. Moreover, research conducted by Perkins (2014) presents an interesting case of project manager's silence behaviors resulting in project failures. Their findings suggest that the choice of not disclosing and discussing relevant information with project owners, sponsors, and other stakeholders leads to detrimental consequences for project performance (Perkins, 2014). The lack of sharing relevant project information can adversely impact project performance, especially in terms of cost, schedule and quality (Joørgensen & Sjøberg, 2004). Hence advocating the perils of not timely voicing out concerns, issues, and opinions and adopting silent behaviors adversely impacts project success. Similarly, the importance of conversations between project managers and stakeholders over pertinent project information is deemed critical for the success of high-stake projects (Grenny et al., 2007), the absence of which is considered damaging for success (Imam, 2021; Zaman, 2020). Therefore, the above-discussed literature provides satisfactory support in postulating the third hypothesis.

H₃: Project team member's silence has a significant negative effect on project success.

2.7. Mediating role of project team members' silence

The unfavorable role of toxic leadership towards the project and organizational outcomes has been widely established (Coakley, 2021; Dobbs & Do, 2019; Kurtulmuş, 2021; Laguda, 2021). The dangers of such leadership traits, hampering organizational/project success, are catalyzed by various factors. Employee silence has been one of such variables established to mediate the adversities of the dark side of leadership (Guo et al., 2018; Wang et al., 2020). In research aiming at investigating the role of authoritarian leadership on employee creativity and employee fear, which lead to defensive silence, significantly adversely mediated the relationship between the two (Guo et al., 2018). Likewise, a study on Egyptian hospital managers and physicians revealed that narcissistic leadership traits cause physicians to develop organizational cynicism, where physician silence significantly mediated the relationship (Mousa et al., 2020). Similarly, there is also support on the mediating role of employee silence proven as a mechanism of establishing the negative impact of abusive leadership on employee engagement and satisfaction (Wang et al., 2020). Employee engagement has already been stated to impact the organizational success (Kaliannan & Adjovu, 2015) and job satisfaction has been proven to be a positive mediator to project success (Rezvani et al., 2016). To the

best of our knowledge, previous studies have not tested the mediating role of project team member silence impacting toxic leadership and project success (Coakley, 2021; Imam, 2021; Zhu et al., 2019). The above review confirms that toxic leadership (as a dark side of leadership style) and its impact of project success is significantly mediated by team members silence by imposing an adverse impact on organizational or project outcomes (Coakley, 2021; Imam, 2021; Negash & Hassan, 2020; Zhu et al., 2019). Henceforth, it can be inferred then that there is a mediating influence of silence of project team members on the relationship between toxic leadership and project success (Coakley, 2021; Zhu et al., 2019). This leads to the fourth hypothesis.

H₄: Project team member's silence negatively mediates the relationship between toxic leadership and project success.

Figure 1 represents the conceptual model along with four hypotheses framed for this research.

[Insert Figure 1 about here]

3. Methods

3.1. Sampling and procedure

Based on guidelines by Saunders et al. (2009) in their proposed framework (famously known as the research onion), the present study adopted positivism philosophy (i.e., requiring a scientific method of inquiry) and deductive research approach (i.e., validating theoretically derived model), respectively (Zhang et al., 2020; Zaman, 2020). In addition, the quantitative methodology (i.e., collection and analysis of numerical data) and survey-based strategy using cross-sectional data were considered best suited to test the proposed hypotheses with the covariance-based structural equation modeling (CB-SEM) technique (Dash & Paul, 2021; Saunders et al., 2009; Newaz et al., 2021; Zaman, 2020). The combined robustness of the employed research framework (i.e., philosophy, approach, methodology, strategy, time horizon, and data analysis technique) have been extensively applied and validated in various settings across academic disciplines, including similar studies in construction project management (Newaz et al., 2021; Zaman, 2020). Considering the complications of data collection intensified by the COVID-19 global pandemic, especially in developing economies, the present study data was collected online through a standardized self-reported questionnaire, which is recommended as safe, as well as cost and time-effective (Zaman et al., 2021). The recommended sample size for CB-SEM ($N > 200$) was extracted from the entire population of project professionals, e.g., engineers (civil, safety, structural and construction), architects, surveyors, technicians, supervisors, superintendents, site and safety managers) directly associated with the US \$62 billion worth megaprojects (focused on energy, transport, infrastructure, industrial cooperation, special economic zones, social and economic development) under the China Pakistan Economic Corridor (widely known as CPEC) (Kline, 2016; Zaman, 2020). The non-probabilistic convenient sampling has been recommended when the study population is not specified and/or remains unknown. Hence, the convenient sampling technique was preferred for the present study as the information on the population of CPEC project participants remains highly restrictive and currently is not available in the public domain (Zaman, 2020). Therefore, potential participants located inside Pakistan were identified and contacted using the limited information available on the official website (and external link websites) related to the CPEC (e.g., <http://cpec.gov.pk/>; <http://aviation.gov.pk/>; <https://www.engroenergy.com>) as well as networking partners and institutions. An invitation to participate in the survey was shared with 400 identified respondents who contacted through email, social media sites and applications (e.g., WhatsApp, LinkedIn, and Facebook). Eventually, after a few humble reminders to some of the participants, a total of 326 completed responses were secured (i.e., a high response rate of 81.7% in a developing economy). None of the questionnaires were discarded, as all questions in the online survey were marked as mandatory in order to complete the survey (Zaman, 2020).

The survey introduction clearly expressed strong assurances to the participants that the present research had purely academic purposes and any form of participant's identification, as well as their responses, would

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3 remain confidential. Moreover, the recommended procedures to overcome common method bias were
4 carefully applied (e.g., simplicity of the survey, respondents had no information about the hypothesized
5 relationships, respondent's anonymity/confidentiality of responses was clearly expressed, and researchers
6 contact information was shared with the participants to seek clarification about the survey questions,
7 whenever required) during all stages of the data collection (i.e., initial contact stage, reminder stage, and
8 final data collection stage) (Jordan & Troth, 2020; Podsakoff et al., 2012; Zaman, 2020). Taking advantage
9 of the CB-SEM estimations for the initial pilot testing (N=50), the results adequately confirmed the
10 psychometric properties (i.e., reliability and validity) of all adapted scales (i.e., toxic leadership, project
11 team member's silence, and project success). Hence, the next stage CB-SEM estimations for the entire
12 sample (N=326) were subsequently assessed (Mueller & Hancock, 2019).
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14 15 **3.2. Measures**

16 Toxic leadership was measured using an adapted scale which was originally developed and validated by
17 Schmidt (2008). This thirty-item multidimensional construct comprised five (05) dimensions of toxic
18 leadership, including (1) *abusive supervision* (measured by seven-items coded as AS1 to AS7); (2)
19 *authoritarian leadership* (measured by six-items coded as AL1 to AL6); (3) *self-promotion* (measured by
20 five items coded as SP1 to SP5); (4) *unpredictability* (measured by seven items coded as UP1 to UP7); and
21 (5) *narcissism* (measured by five items coded as NA1 to NA5) (Schmidt, 2008). Project team members'
22 silence was measured using a thirteen-item adapted scale (coded as PMS1-PMS13) which was originally
23 developed and validated by Zhu et al. (2019). Lastly, project success was measured through an adapted
24 scale which was originally developed and validated by Musawir et al. (2017). This eleven-item
25 multidimensional construct comprised three (03) dimensions of project success, including (1) project
26 management success (measured by five items (PMS1-PMS5); (2) project ownership success (measured by
27 three items, i.e., POS1-POS3); and (3) project investment success (measured by three items coded as PIS1
28 to PIS3) (Musawir et al., 2017). All measures for the latent constructs, namely toxic leadership, project
29 team member's silence, and project success, were based on the five-point Likert scale (anchored as
30 1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree and 5=strongly agree) (Musawir et
31 al., 2017).
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33 34 **4. Results**

35 The demographic profile of the mega construction project professionals (N=326) was initially analyzed that
36 revealed various specializations, including, engineers (e.g. civil, safety, structural and construction; n=29;
37 8.8%), architects (n=26, 7.9%), surveyors (n=52, 15.9%), technicians (n=81, 24.7%), supervisors (n=33,
38 10%), superintendents (n=61; 18.6%), managers (e.g. site, safety, operations, and admin; n=14, 4.2%),
39 general team members (e.g. public officials; n=21, 6.4%) and others (e.g., procurement specialists; n=10,
40 3%). The work-related industry experience of the mega construction project professionals (N=326)
41 included over 1 year to 5 years (n = 89; 27.2%), between 6-10 years (n = 196, 59.9%), and over 10 years
42 (n = 42; 12.8%) respectively. In the next stage, model estimations were performed through covariance based
43 structural equation modeling (SEM) using Mplus 7.0 (i.e., a fully integrated program for robust SEM
44 estimations, in contract to AMOS, LISREL, R-packages, and EQS) (Byrne, 2013; Dash & Paul, 2021;
45 Mueller & Hancock, 2019; Muthén, Muthén, & Asparouhov, 2017). Structural equation modeling (i.e., a
46 powerful multivariate statistical analysis for testing structural relationships among constructs) has been
47 widely recommended and applied technique by two cohorts of researchers, i.e., partial least squares
48 (variance-based) SEM (referred to as the PLS-SEM) versus covariance-based SEM (referred as the CB-
49 SEM); while both are claiming robustness for SEM estimations (Dash & Paul, 2021; Mueller & Hancock,
50 2019; Zaman, 2020). Unfortunately, PLS-SEM technique has faced serious criticism by editors, reviewers
51 and authors in the past who have argued that PLS-SEM is an invalid and unreliable estimator for SEM
52 (Guide, Daniel & Ketokivi, 2015; McIntosh, Edwards & Antonakis, 2014; Rönkkö, McIntosh & Antonakis,
53 2015; Rönkkö et al., 2016).
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Despite arguments against PLS-SEM (e.g., ignorance of data normality and lacking global goodness of fit statistics), the technique has received steady popularity globally as it has been favored by numerous researchers across multiple disciplines (e.g., marketing, tourism, project management, strategic management and environment management etc.) based on well-established advantages (e.g., suitability for smaller samples, predictive capabilities, explanatory power and robust estimations for complex models) (Dash & Paul, 2021). Recent studies have argued that both techniques (i.e., PLS-SEM versus CB-SEM) with their unique strengths for SEM estimations are complementary in nature rather than competing (Dash & Paul, 2021). Hence, the present study adopted the recommended CB-SEM technique for factor-based models as it provides the necessary estimations for various model fit indices (e.g., Chi-square, GFI, AGFI, RMSEA, TLI, NFI, and CFI) (Byrne, 2013; Dash & Paul, 2021; Mueller & Hancock, 2019). Before proceeding with SEM estimations, data normality was initially determined. Table 1 provides insights into the normality indicators of the constructs. Standard deviation, skewness, and kurtosis are the core data normality indicators. Kline (2016) highlighted that for the data to be normal, standard deviation and skewness values must be between +2 and -2, while kurtosis should be between +3 and -3. The results indicate that all the construct's values were in the acceptable range (see Table 1) (Kline, 2016; Mueller & Hancock, 2019).

[Insert Table 1 about here]

4.1 Measurement model

A confirmatory factor analysis (CFA) was applied for the determination fitness of the measurement model. Figure 2 presents the Confirmatory Factor Analysis (CFA) loadings. To assess the fitness of the measurement model, the Cronbach Alpha, Factor loading, composite reliability (CR), and average variance extracted (AVE) were determined. The items having factor loadings greater than 0.5 were considered (Hair et al., 2016). Thresholds for composite reliability ($CR > 0.70$), average variance extracted ($AVE > 0.50$), and Cronbach's alpha ($\alpha > 0.70$) were considered (Izdihar et al., 2017). The results in Table 2 show that all the constructs achieved the threshold level. Table 2 provides results of factor loadings, CR, and AVEs, which indicate that all the constructs had no reliability and validity concerns. Similarly, Table 3 provides results of multicollinearity & discriminant validity. Square correlations in diagonals indicate that there are no validity concerns, and all the values fall under the acceptable thresholds (Mueller & Hancock, 2019).

[Insert Figure 2 about here]

[Insert Table 2 about here]

[Insert Table 3 about here]

4.2 Path modeling

Table 4 shows the measurement model assessment results. It reports values for t-statistic & beta (β) values or path coefficients. Results ($\beta = -0.451$, $p < 0.00$, $t = 11.245$) reveal that there is a strong negative relationship between toxic leadership and project success, which is related to H1. For H2 ($\beta = 0.585$, $p < 0.00$, $t = 10$), a significant positive relationship between toxic leadership and project team member's silence has been suggested. Moreover, results ($\beta = -0.189$, $p < 0.00$, $t = -5.686$) show a strong negative relationship between project team member's silence and project success (H3). The research model (Figure 1) H4 shows the mediation effect of project team member's silence (PTMS) on the relationship between toxic leadership (TL) and project success (PS). The research has used the PLS bootstrapping method to analyze both the direct and indirect influence to find out the mediating role of project team member's silence. The direct influence of TL and PS was significant. After examining the relationship with PTMS (mediating variable), the relationship between TL and PS was also significant. Values ($\beta = 0.111$, $t = 3.964$, $p < 0.00$, $VAF = 20\%$) show partial mediation and suggests that project team members' silence mediates the relationship

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3 between toxic leadership and project success (H4). Figure 3 presents the total variance explained through
4 R-square and it appeared to be substantial for the entire sample and dimensions (Cohen, 1988). R-square
5 for PS was 0.21. It implies that a 21% variance in project success is explained by the predictor variable
6 toxic leadership. Lastly, in order to adequately establish the validity of the present study's findings, the
7 model fitness for the structural equation model was calculated based on the recommended model fit indices
8 (i.e., Chi-Square, GFI, IFI, CFI, SRMR, TLI and RMSEA). Table 5 presents that all fit indices for the
9 structural equation model (SEM) are within the permissible range (Dash & Paul, 2021; Mueller & Hancock,
10 2019).
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12 [Insert Table 4 about here]

13 [Insert Table 5 about here]

14 [Insert Figure 3 about here]

15 5. Discussion

16 Positive leadership is critical in managing the human factor in project teams by influencing team members
17 to be actively involved and engaged; thus, it is pivotal for the success of any project (Clarke, 2010;
18 Geoghegan & Dulewicz, 2008; Zaman et al., 2019). Conversely, the presence of toxic leadership behaviors
19 can be detrimental to the project team, project performance and success. The present research hypothesized
20 that there is a negative impact of toxic leadership on project success with the mediating role of team
21 member's silence. The multidimensional (second order/reflective-formative) model of project success
22 conceptualized that toxic leadership and team member's silence negatively affect the success of mega
23 construction projects. In order to examine these theoretical propositions, the CB-SEM technique with Mplus
24 was employed on a survey-based data of mega construction project professionals (N=326) associated with
25 the China Pakistan Economic Corridor (CPEC). The first hypothesis was set out to identify the relationship
26 between toxic leadership and project success. Using five-dimensions of toxic leadership and three-
27 dimensions of project success, the Mplus results established a significant negative relationship between
28 toxic leadership and project success ($\beta = -0.451$, $p < 0.01$ and $t = 11.245$). The results suggested that the
29 presence of any form of toxic leadership (i.e., abusive supervision, authoritarian leadership, self-promotion,
30 narcissism and unpredictability) will adversely impact the mega construction project success, including
31 project management success (i.e., affecting project schedule, delivery, quality, and budget), project
32 ownership success (i.e., affecting the valuation of realizing the business case) and project ownership success
33 (i.e., affecting project's future value, revenues and ROI), respectively. Although, the present research
34 hypothesized a negative impact of toxic leadership on project success, the findings are aligned with previous
35 toxic leadership and its unfavorable effects on organizational growth, efficiencies and performance (Day &
36 Lord, 1988; Tejeda, 2020). Moreover, these findings also extend support to leadership studies in the
37 construction project management literature that have strongly attributed leadership styles as a critical factor
38 for project success (Clarke, 2010; Geoghegan & Dulewicz, 2008; Keller, 1992; Strang, 2011; Zaman,
39 2020). Hence, the present research findings are useful in pointing out the inverse impact of toxic leadership
40 on project success (Coakley, 2021; Zaman, 2020).
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47 The present study also revealed another significant finding about the influential role of toxic leadership in
48 triggering project team member's silence (postulated as the second hypothesis), as a direct positive effect
49 of toxic leadership on project team member's silence was established ($\beta = 0.585$, $p < 0.01$ and $t = 10.00$).
50 This implies that the presence of various forms of toxic leadership (i.e., abusive supervision, authoritarian
51 leadership, self-promotion, narcissism and unpredictability) will directly obstruct project team members
52 from voicing out their concerns, opinions, and suggestions, thus endorsing their decision to remain silent.
53 Under the prevalence of toxic leadership, team members are subjected to low self-esteem, low self-efficacy,
54 sense of fear and prefer to withhold their ideas and suggestions. Consequently, withholding vital
55 information at the project team level can be detrimental to the project. This new evidence on toxic leadership
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and its impact on project team member's silence has not been theorized in previous literature. However, this finding is fairly aligned with earlier works on the role of abusive leadership (Wang et al., 2020; Xu et al., 2015), leaders' destructive personality (Song et al., 2017), narcissistic leadership (Mousa et al., 2020; Wang et al., 2018), and authoritarian leadership (Duan et al., 2018), as all of these traits of toxic leadership prompted employee silence. Hence, this specific finding significantly contributes to previous studies on leadership behavior and employee silence (Zhu et al., 2019).

Likewise, the third hypothesized relationship in the present study focused on the consequential effect of team member's silence on project success. Mplus results indicated a significant negative relationship between team member's silence and project success ($\beta = -0.189$, $p < 0.01$ and $t = -5.686$). This finding highlighted the role of deliberate silence of team members in diminishing the environment and culture of innovation, improvement, self-evaluation, feedback and pushing projects towards failure. This new evidence on team member's silence and its negative impact on project success is novel as it is quite difficult yet interesting to compare this finding with previous studies in construction project management. Previous work on employee silence has reflected significant negative associations with organizational success (Nekoei-Moghadam, 2012). Moreover, project manager's silence towards project sponsors have shown adverse impact on project success (Perkins, 2014; Smith et al., 2001), making the findings of this study relevant. Furthermore, there is considerable research work advocating the importance of employee voice and its major role in project success (Deakin & Koukiadaki, 2009), which is similar to the results of this study that claim that the presence of team silence will adversely impact project success (Zhu et al., 2019).

Finally, the fourth hypothesis on the mediating role of project team member's silence in the relationship between toxic leadership and project success, revealed a significant negative mediation ($\beta = -0.111$, $p < 0.01$, $t = 3.964$). This implies that toxic leadership traits impact the morale and motivation of team members, fostering silence attitudes that forces team members to withhold their opinions, suggestion, ideas, vital information, and improvements. This concealment of ideas and/or information can deteriorate problem-solving and decision-making processes, which adversely impacts project success. The results of the mediating role of employee silence in an adverse relationship between leadership and project success resonate with the findings of early work, where employee silence has been studied to play a mediating role between abusive leadership and employee engagement (Wang et al., 2020), and authoritarian leadership and employee creativity (Guo et al., 2018). The mediating role of team member's silence between the toxic leadership and project success is another novel contribution of this research (Hamstra et al., 2021).

5.1. Theoretical implications

The first and foremost contribution of this research is to the growing body of knowledge on toxic leadership and team member's silence, particularly in the construction project management literature (Coakley, 2021; Negash & Hassan, 2020; Zhu et al., 2019). Previous studies have investigated numerous dark sides of leadership, including toxic behavior and how it affects organizational effectiveness and foster employee silence (Day & Lord, 1988; Duan et al., 2018; Mousa et al., 2020; Song et al., 2017; Tejada, 2020; Xu et al., 2015). However, to the best of the authors' knowledge, the impact of toxic leadership on team member's silence and project success within the context of mega construction projects has not been previously addressed. Hence, the present study makes a significant contribution to the existent literature on construction project management by tempting the necessity to study the effects of toxic behavioral traits leading to employee silence and project failures (Coakley, 2021; Imam, 2021; Zhu et al., 2019).

Similarly, in previous project management studies, the concept of 'silence' has been studied in relation to the silence of project manager or leader towards the project sponsor or owner (Perkins, 2014; Smith et al., 2001), thus leading to project failure. The present study advocates that team member's silence and the intention to withhold useful information, ideas, and concerns, will also adversely impede the success of any project, especially mega construction projects. It is therefore plausible to believe that the absence of team member voice in identifying concerns, providing feedback, and initiating improvements drive ineffective

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3 project operations, augment weaknesses, and trigger project failures. Furthermore, employee silence has
4 earlier been fairly recognized as a mediator between various dark leadership traits and other employee
5 behaviors, including employee engagement (Wang et al., 2020) and employee creativity (Guo et al., 2018).
6 The present research extends significant contributions with the conceptualization of project team member's
7 silence 'as a catalyst' between toxic leadership and project success. Hence, the present research speculates
8 that in the presence of toxic leadership in projects, team members adopt a communication avoidance
9 strategy to cope with toxic behaviors (i.e., abusive supervision, authoritarian leadership, self-promotion,
10 narcissism and unpredictability) from the project manager and/or leaders, which can ultimately threaten
11 project success (Coakley, 2021; Zhu et al., 2019).
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13 14 **5.2. Managerial implications**

15 The research findings introduce various significant managerial implications. Firstly, it insists project
16 owners/sponsors focus on recognizing and managing dysfunctional supervisory behaviors and
17 contemplating their adversities on project success (Negash & Hassan, 2020; Zaman, 2020). The toxic
18 leadership/supervisory behaviors in projects can be addressed by establishing various preventive measures,
19 including leadership training, personality assessment, promoting whistleblowing, and open communication
20 channels (Coakley, 2021). The present study sheds light on the perils of team member's silence in
21 endangering project success, so it is recommended that project owners/sponsors set up a mechanism to
22 voice out not only pertinent project information and opinions but also to tackle workplace abuse, bullying,
23 and destructive behaviors (Hamstra et al., 2021). Furthermore, the present study suggests that project
24 leaders' behaviors can directly increase team member's silence. **Keeping a special focus on mega
25 construction projects in the present study, the findings highlighted that mega project are susceptible to
26 budgetary, governance and resource pressures (Ma & Fu, 2020).** Therefore, another managerial implication
27 of this study is about the role of project managers/leaders in establishing a conducive and supportive
28 working environment where the project team members feel safe and motivated to express and voice their
29 opinions comfortably. These suggestions are fairly aligned with previous work (Anantamula, 2010;
30 Maqbool et al., 2017b; Nixon et al., 2012; Ruben & Gigliotti, 2016). Project leaders/supervisors should not
31 only encourage team members to contribute in their inputs (even if they are not aligned with that of the
32 managers), but also should strengthen team cohesion and leader-member relations, which subsequently
33 becomes a catalyst for nurturing project efficiencies and increasing the likelihood of project success (Imam,
34 2021).
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36 37 **5.3. Limitations and future research**

38 Although the study offered some novel findings, there are some limitations and recommendations for future
39 studies. Based on the objectives of the research, a non-probabilistic convenience sampling approach was
40 adopted, introducing sample size representation limitation. This offers opportunities for future work to test
41 findings by adopting an inclusive sampling technique. **Moreover, realizing this new empirical evidence on
42 the four hypothesized relationships in the present research, it is necessary to conduct further examination
43 through additional studies and re-validation of the study findings to extend generalizability. Hopefully,
44 future studies can reinforce these initial findings on toxic leadership, project team member's silence and
45 success in mega construction projects. Although, the focus of the present research was on mega construction
46 projects, future studies may consider extending this research to different industries, sectors, and socio-
47 economic and diverse cultural conditions. Similarly, additional research attempts can also explore the link
48 between team member's silence and project success by involving other underlying factors (e.g., team
49 member's emotional intelligence, citizenship behavior, power distance, value orientation, and
50 psychological involvement) (Zhu et al., 2019; Zaman, 2020).** Such inclusions are deemed necessary in
51 recognizing the antecedents of silence behavior affecting project success (Imam, 2021). Furthermore, based
52 on the established findings of the present research, future studies could also focus on exploring the effective
53 mechanisms to limit toxic leadership and team member's silence behaviors in projects and project-based
54 organizations (Coakley, 2021; Negash & Hassan, 2020).
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6. Conclusion

The present study used CB-SEM to empirically validate a multidimensional (i.e., second order/reflective-formative) model of project success (including project management success, project ownership success, and project investment success), toxic leadership (including abusive supervision, authoritarian leadership, self-promotion, narcissism and unpredictability) and project team member's silence, respectively (Coakley, 2021; Ma & Fu, 2020; Zhu et al., 2019). The findings based on study data of mega construction project professionals (N=326) associated with China Pakistan Economic Corridor (CPEC) demonstrated that project success is negatively influenced by toxic leadership and project team member's silence (Coakley, 2021; Zhu et al., 2019). Moreover, the emergence of silence behavior among team members can cause major disruption (e.g., disengaged workers, communication breakdowns, reduced productivity, misaligned goals and objectives) for mega construction projects, as project team member's silence also negatively mediated the relationship between toxic leadership and project success (Coakley, 2021; Imam, 2021; Zhu et al., 2019). This implies that project team member's silence can become increasingly difficult to reverse (i.e., silence behavior may spread to other team members) as mega projects are directed and controlled by toxic leaders (Laguda, 2021; Ma & Fu, 2020). Hence, project team member's silence should be recognized as an impediment to project success, as there is a high cost of doing nothing and/or ignoring team member's silence especially in mega construction projects (e.g., loss of vital information, absenteeism, strikes or sabotage, and resignation). Regrettably, if toxic leaders misinterpret team member's silence in mega projects (as a form of opportunism or disinterest), then a vicious circle of silence becomes reinforced based on the original assumptions held by silent team members (Kurtulmuş, 2021). Lastly, a failure to achieve mega construction project success can have a substantial impact on the national economy, social welfare, and the overall image of the sovereign state (Ma & Fu, 2020). Hence, toxic leadership and project team member's silence should be proactively addressed before these become contagious and detrimental for the entire team and in particular mega construction project success (Coakley, 2021; Ma & Fu, 2020; Zhu et al., 2019).

Data availability

Data that support the findings of this study are available on request from the first author.

Appendix

Toxic leadership (measured by its *five-dimensions*, namely, *abusive supervision, authoritarian leadership, narcissism, self-promotion and unpredictability*)

A. *Abusive Supervision* – adapted from Schmidt (2008)

1. In this mega project, the leader ridicules subordinates.
2. In this mega project, the leader holds subordinates responsible for things outside their job descriptions.
3. In this mega project, the leader is not considerate about subordinates' commitments outside of work.
4. In this mega project, the leader speaks poorly about subordinates to other people in the workplace.
5. In this mega project, the leader publicly belittles subordinates.
6. In this mega project, the leader reminds subordinates of their past mistakes and failures.
7. In this mega project, the leader tells subordinates they are incompetent.

B. *Authoritarian Leadership* – adapted from Schmidt (2008)

8. In this mega project, the leader controls how subordinates complete their tasks.
9. In this mega project, the leader invades the privacy of subordinates.
10. In this mega project, the leader does not permit subordinates to approach goals in new ways.
11. In this mega project, the leader will ignore ideas that are contrary to his/her own.
12. In this mega project, the leader is inflexible when it comes to organizational policies, even in special circumstances.
13. In this mega project, the leader determines all decisions in the unit, whether they are important or not.

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C. **Narcissism** – adapted from Schmidt (2008)

14. In this mega project, the leader has a sense of personal entitlement.
15. In this mega project, the leader assumes that he/she is destined to enter the highest ranks of my organization.
16. In this mega project, the leader thinks that he/she is more capable than others.
17. In this mega project, the leader believes that he/she is an extraordinary person.
18. In this mega project, the leader thrives on compliments and personal accolades.

D. **Self-Promotion** – adapted from Schmidt (2008)

19. In this mega project, the leader drastically changes his/her demeanor when his/her supervisor is present.
20. In this mega project, the leader denies responsibility for mistakes.
21. In this mega project, the leader will only offer assistance to people who can help him/her get ahead.
22. In this mega project, the leader accepts credit for successes that do not belong to him/her.
23. In this mega project, the leader acts only in the best interest of his/her next promotion.

E. **Unpredictability** – adapted from Schmidt (2008)

24. In this mega project, the leader has explosive outbursts.
25. In this mega project, the leader allows his/her current mood to define the climate of the workplace.
26. In this mega project, the leader expresses anger at subordinates for unknown reasons.
27. In this mega project, the leader allows his/her mood to affect his/her vocal tone and volume.
28. In this mega project, the leader varies in his/her degree of approachability.
29. In this mega project, the leader causes subordinates to try to “read” his/her mood.
30. In this mega project, the leader affects the emotions of subordinates when impassioned.

F. **Project Team Member’s Silence** – adapted from Zhu et al. (2019)

1. In this mega project, I am not willing to speak up with suggestions for change because I am disengaged.
2. In this mega project, I keep any ideas for improvement to myself because I have low self-efficacy to make a difference.
3. In this mega project, I withhold ideas about how to improve the work around here based on being disengaged.
4. In this mega project, I do not speak up and suggest ideas for change based on fear.
5. In this mega project, I withhold relevant information due to fear.
6. In this mega project, I omit pertinent facts in order to protect myself.
7. In this mega project, I avoid expressing ideas for improvement due to self-protection.
8. In this mega project, I refuse to divulge information that might harm the organization.
9. In this mega project, I protect confidential organizational information appropriately, based on my concern for the organization.
10. In this mega project, I protect proprietary information to benefit my organization.
11. In this mega project, I withhold confidential information based on cooperation.
12. In this mega project, I passively withhold ideas based on intended resignation.
13. In this mega project, I withhold my solutions to problems because I am motivated by fear.

Project Success (measured by its *three-dimensions*, namely *project management success*, *project ownership success*, and *project investment success*)

A. **Project Management Success (PMS)** – adapted from Musawir et al. (2017)

1. In this mega project, the budgetary goals have been satisfactorily accomplished.
2. In this mega project, the scheduling goals have been satisfactorily accomplished.

3. In this mega project, the required outputs have been satisfactorily delivered.
 4. In this mega project, undesired outcomes have been managed and avoided.
 5. In this mega project, the project plans have been successfully achieved.
- B. Project Ownership Success (POS) – adapted from Musawir et al. (2017)**
6. In this mega project, the owner's achieved their planned target outcomes.
 7. In this mega project, the owner's intended purpose was successfully followed.
 8. In this mega project, the owner's intended purpose was successfully met.
- C. Project Investment Success (PIS) – adapted from Musawir et al. (2017)**
9. In this mega project, the target outcomes supported the achievement of overall project objectives.
 10. In this mega project, the investment objectives have been successfully accomplished.
 11. In this mega project, the expected investment benefits have been successfully accomplished.

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Table 1. Data Normality (N=326)

Constructs	N	M	SD	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SP	326	2.2939	0.81533	0.746	0.135	0.406	0.269
AS	326	4.0031	0.65284	-0.759	0.135	1.390	0.269
NA	326	3.2620	1.28316	-0.420	0.135	-1.025	0.269
AL	326	3.1534	1.21409	-0.319	0.135	-1.149	0.269
PMS	326	2.8305	0.84639	0.099	0.135	-0.680	0.269
POS	326	3.8149	0.69245	-0.759	0.135	1.457	0.269
PIS	326	3.4765	0.82605	-0.340	0.135	0.042	0.269
UP	326	3.8601	0.61033	-0.775	0.135	1.358	0.269
PTMS	326	2.9011	0.72964	-0.139	0.135	-0.213	0.269

Notes: SP: self-promotion, AS: abusive supervision, NA: narcissism, AL: authoritarian leadership, UP: unpredictability, PMS: project management success, POS: project ownership success, PIS: project investment success, PTMS: project team member's silence.

Table 2. EFA/CFA, Composite Reliability, and Convergent Validity of Measurement Model (N=326)

Constructs & Items	ρ	λ	CR	AVE
Self-Promotion			0.933	0.737
SP1	0.710	0.738		
SP2	0.815	0.796		
SP3	0.992	0.983		
SP4	0.828	0.810		
SP5	0.947	0.942		
Abusive Supervision			0.924	0.709
AS1	0.766	0.853		
AS2	0.732	0.921		
AS3	0.767	0.870		
AS4	0.966	0.783		
AS5	0.962	0.773		
Narcissism			0.956	0.813
NA1	0.972	0.996		
NA2	0.829	0.840		
NA3	0.959	0.931		
NA4	0.873	0.833		
NA5	0.893	0.899		
Authoritarian Leadership			0.906	0.625
AL1	0.880	0.993		
AL2	0.653	0.585		
AL3	0.940	0.750		
AL4	0.905	0.726		
AL5	0.841	0.970		
AL6	0.751	0.642		
Unpredictability			0.812	0.574
UP1	0.748	0.818		
UP2	0.570	0.676		
UP3	0.599	0.549		
UP4	0.481	0.499		
UP5	0.793	0.832		

Project Management Success			0.851	0.602
PMS1	0.969	0.946		
PMS2	0.581	0.602		
PMS3	0.519	0.549		
PMS4	0.922	0.921		
Project Ownership Success			0.882	0.716
POS1	0.651	0.872		
POS2	0.720	0.917		
POS3	0.542	0.739		
Project Investment Success			0.872	0.694
PIS1	0.656	0.775		
PIS2	0.764	0.848		
PIS3	0.812	0.874		
Project Team Members Silence			0.947	0.581
PTMS1	0.773	0.678		
PTMS2	0.725	0.653		
PTMS3	0.907	0.857		
PTMS4	0.865	0.808		
PTMS5	0.781	0.775		
PTMS6	0.740	0.708		
PTMS7	0.763	0.829		
PTMS8	0.822	0.822		
PTMS9	0.877	0.842		
PTMS10	0.725	0.678		
PTMS11	0.663	0.622		
PTMS12	0.641	0.764		
PTMS13	0.768	0.823		

Notes: * $p < 0.05$; ρ = Factor loadings at 0.40 using EFA; λ = standardized factors loadings using CFA; CR = Composite Reliability; AVE = average variance extracted; SP: self-promotion, AS: abusive supervision, NA: narcissism, AL: authoritarian leadership, UP: unpredictability, PMS: project management success, POS: project ownership success, PIS: project investment success, PTMS: project team member's silence.

Table 3. Multicollinearity and Discriminant Validity (N = 326)

	PTMS	AL	NA	AS	SP	UP	PMS	PIS	POS
PTMS	0.762								
AL	-0.024	0.790							
NA	0.096	0.204	0.902						
AS	0.377	0.059	0.112	0.842					
SP	0.364	0.020	0.062	0.259	0.859				
UP	0.357	0.068	0.041	0.545	0.228	0.688			
PMS	0.315	0.132	0.153	0.239	0.287	0.260	0.776		
PIS	0.533	0.116	0.046	0.546	0.252	0.475	0.285	0.833	
POS	0.259	0.069	-0.022	0.551	0.209	0.563	0.103	0.405	0.846

Notes: SP: self-promotion, AS: abusive supervision, NA: narcissism, AL: authoritarian leadership, UP: unpredictability, PMS: project management success, POS: project ownership success, PIS: project investment success, PTMS: project team member's silence.

Table 4. Results on Hypotheses Testing (N = 326)

Hypotheses	Relationships	Path Coefficients	t-statistic	p-values	Outcomes
H1	TL → PS	-0.451**	11.245	0.00	Accepted
H2	TL → PTMS	0.585**	10.000	0.00	Accepted
H3	PTMS → PS	-0.189**	-5.686	0.00	Accepted
H4	TL → PTMS → PS	-0.111**	-3.964	0.00	Accepted

Notes: ** $p < 0.05$; TL: toxic leadership, PTMS: project team member's silence, PS: project success

Table 5. Structural Equation Model Fit Indices (N = 326)

Constructs	Chi-Square	DF	χ^2/DF	GFI	IFI	CFI	SRMR	TLI	RMSEA
Model	2127.520	1082	1.966	0.799	0.942	0.938	0.055	0.932	0.054

Notes: DF = Degree of freedom, χ^2/DF = Chi-square /degree of freedom, GFI = Good-of-fit index, IFI = Incremental Fit Index, CFI = Comparative fit index, SRMR = Standardized Root Mean Squared Residual, TLI = Tucker-Lewis Index, RMSEA = Root Mean Square Error of Approximation,

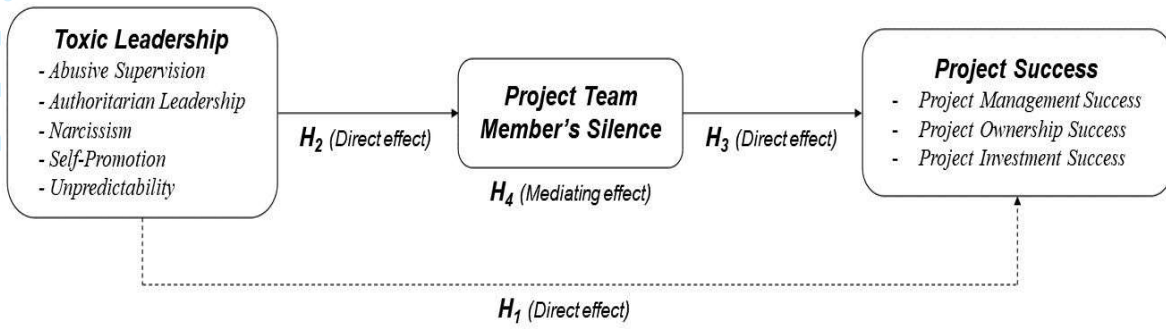


Fig 1. Conceptual Model of Mega-Construction Project Success

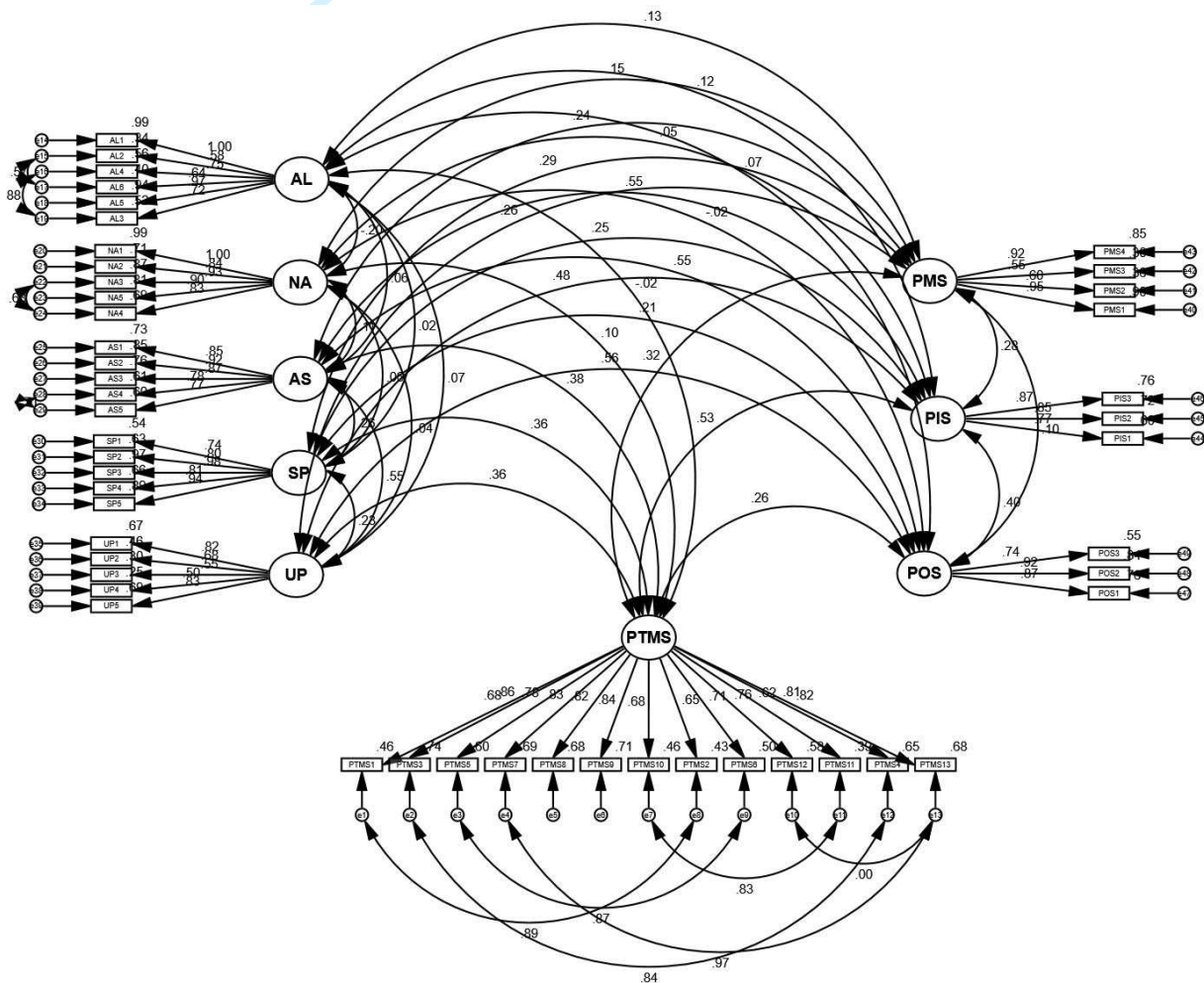


Fig 2. Confirmatory Factor Analysis (CFA)

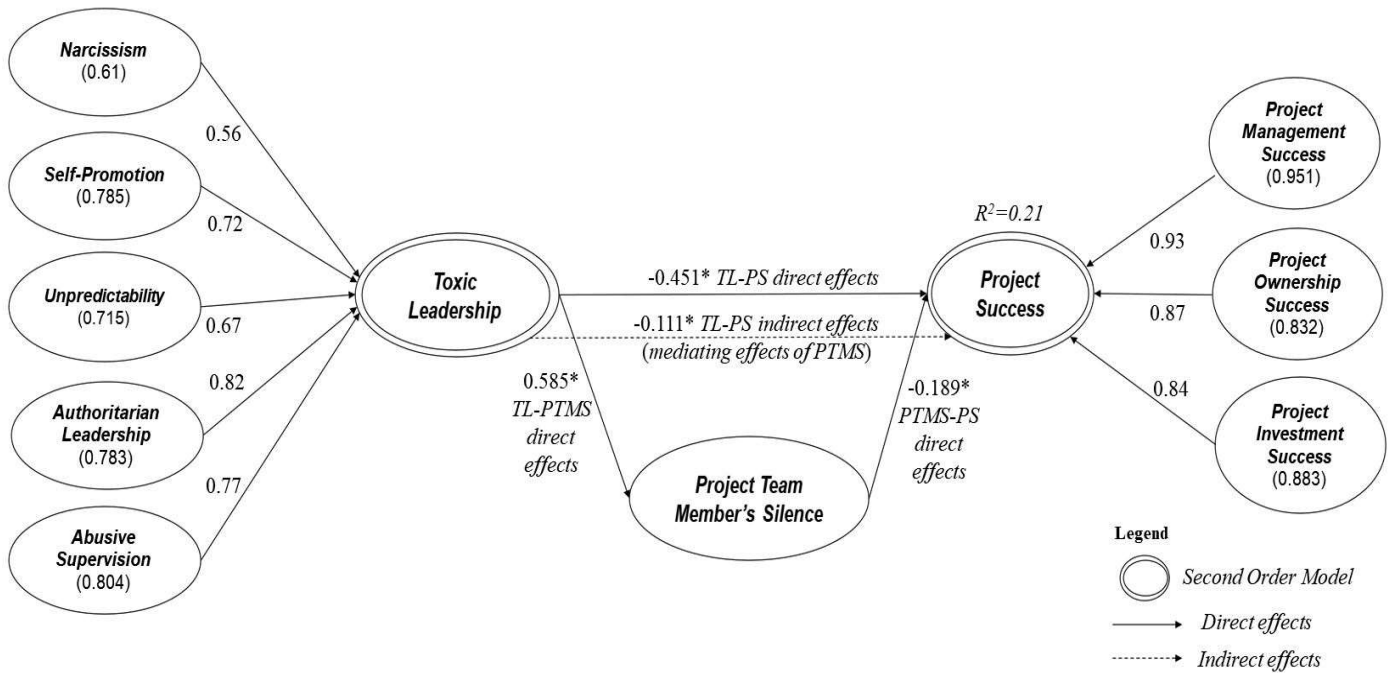


Fig 3. Structural Path Model (based on CB-SEM)