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Shadow of Your Former Self: Exploring Project Leaders' Post-Failure Behaviors (Resilience, Self-Esteem and Self-Efficacy) in High-Tech Startup Projects

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Abstract: Globally, demands for sustainable strategies in the ICT industry have attracted greater momentum as high-tech projects continue to fail in large numbers. Recent studies have underpinned project resilience as a major factor for overcoming these increasing project failures, delays, or termination. However, the complex behaviors of resilient project leaders, especially in post-failure conditions, have been largely overlooked. To address this critical research gap, the present study identifies the direct relationships between three potential behavioral traits of project leaders (i.e., resilience, self-esteem, and self-efficacy) and examines how they move forward beyond project failures. The present study also explored whether self-esteem mediates project leaders' resilience and self-efficacy. Drawing on data from 232 project leaders in Pakistan's high-tech start-ups, the new findings suggest that there are significant positive effects of project leaders' resilience and self-esteem on their self-efficacy, and that project leaders' resilience and self-efficacy is significantly mediated by their self-esteem. As the project resilience theory gains traction, the present study findings have pinpointed major steps for meeting project challenges ahead of time, allowing leaders and teams to learn from failures, and also for improving organisations' ability to implement successful and sustainable high-tech projects especially in emerging economies.

Keywords: sustainable high-tech projects; post-failure behavior; project leaders; resilience; self-esteem; self-efficacy; structural equation modeling; Bandura's self-efficacy theory; Maslow's need theory

1. Introduction

The sustainability journey in high-tech startups has remained complex and daunting due to frequent project failures [1,2]; however, these are considered important experiences from which learning can take place [3–5]. Failure is very common; about 60 percent of projects fail because they do not meet the requirements of the implementation process itself [1,2,6,7], the perceived value of the project, the pre-set strategic business goals, or do not achieve client satisfaction [8]. This especially happens in high-tech startups [1,2,9,10], research and development organisations [11] that are subjected to dynamic and complex environments [12,13]. In this context, failure is defined as the termination of an initiative to create organisational value that has fallen short of its goals [14]. Failures are triggered by

different reasons, such as a lack of effective resource management measures, an unclear project mission, a lack of technical expertise and support, unrealistic project schedules, and sometimes even personnel and project team incompetency [15,16]. Since failures perturb organisations [17], and because project leaders need to take decisions and look for solutions [14], researchers have suggested that organisations can learn and benefit more from failures more than from successes [18]. The opportunity of a project leader to learn from a failure experience and to then take actions that benefit the organisation may be impacted by the leader's own behaviours. When the project leader is equipped with a set of positive post-failure behavioral traits [19], any failure can become a learning opportunity. For a project manager, failures are part of their career journey. Positive behaviors of project leaders during project management activities, post-failure and/or successful outcomes [20–24], are important for the project leader to move forward.

Despite failure being a source for learning, there are obstacles to learning from failure. Specifically, obstacles that arise from attitudes and negative behaviors [25]. Mourning and grieving over failure, and a constant continuation of such behaviours, makes a project leader less capable of handling new projects due to low confidence and self-belief, lack of courage and commitment, and unclear perceptions of the future [26]. Project leaders who experience emotions that are more negative over failure also show lower commitment toward their organisations [27]. On the other hand, there are personality traits and positive attitudes that can support the project leader in learning from failure. Positive reactions result from certain personality traits in project leaders [28]; the power of acceptance (for both failure and post-failure changes), resilience, self-efficacy, self-esteem, transformational leadership, communication and convincing power, are some of the most discussed traits and behaviors that can allow a project leader to learn [29]. The project leader may already have these traits and positive attitudes or may need to develop them. Leaders with these traits approach failures as learning opportunities and thus turn failures into new knowledge and actions when no success is achieved. In this case, a project leader needs to recognise failure, gather their courage, accept the situation and cope with organisational or team changes. Afterwards, they can sustain action solutions and new projects with good commitment and effort. These are the steps of the systematic process that good project leaders follow, from a project's failure to another project's success [30,31].

Some studies have considered resilience [32] and self-efficacy as a reflection of leadership capabilities [33] and well-being [34], but have not considered the opportunities to learn from failures [35], especially in projects [35–37]. Other studies have considered the mediating roles of resilience, well-being and self-esteem, but at the organisational level rather than the project leader's level [38]. In addition, some studies in other organisational fields have considered the positive relationship between self-efficacy and resilience but have not considered mediating factors [39]. Most of the research work that has been performed in project management [40,41] focuses on the criticality and benefits of positive behaviors in post-failure conditions and the importance of learning from failure [42]. The focus of this study is to further explore the fundamentals and essentials of both these phenomena. Joint considerations of these phenomena are important because project leaders are responsible for managing both projects and technical components (planning, executing, monitoring, controlling, and reporting), but also managing project teams (boosting morale and motivating them to successfully complete the project goals). It is therefore necessary for a project leader to be able to withstand the burden of this dual responsibility [23]. If project leaders can gain knowledge about the personality traits and behaviors that allow them to learn from failure, project leaders and organisations can improve their ability to implement and carry out projects [35–37,43].

Building on psychological theories of behavioral changes and traits [31,32], this study examines learning from failure and traits that allow this learning to happen. In developing and testing this theoretical model, important aspects and relationships between post-failure behaviors are extended with an important consideration of traits and sense-making logic. Organisational and project management research has typically focused on the role and

importance of project leaders [43], their qualities [33,34] and their personalities [35,36], but has rarely investigated the inter-trait relationships of project leaders. In particular, the project leader's personality traits allow them to cope with and learn from failure. The relationship through which a personality trait (resilience) of a project leader is associated with another personality trait (self-efficacy and self-esteem) remains largely unknown. Another relationship to be tested and confirmed is the one between self-esteem and self-efficacy. Consideration of these relationships is important because what may enhance one personality trait may diminish another. Equally, one personality trait may assist in developing another trait.

Hence, based on prior empirical evidence, theoretical foundations (i.e., Bandura's self-efficacy theory and Maslow's need theory) and critical research gaps (i.e., extremely limited research on the underlying relationships between resilience, self-esteem and self-efficacy—especially in the context of project leaders and their post-failure behaviors), the present study aimed to examine the effect of project leaders' resilience on their self-esteem and self-efficacy, and also whether project leaders' resilience and self-efficacy is mediated by their self-esteem [3–7].

2. Theoretical Background and Hypothesis Development

2.1. Project Leaders' Resilience

Resilience is the psychological and behavioral ability to cope with the pressures of failure. It reflects the capability of one's consciousness to recover from a failure [44–46]. Connor [31] comprehensively studied the role of leaders' resilient behavior in absorbing diverse-natured organisational changes. This study revealed the types of changes within an organisation or project team after a project failure. It asserted that project leaders and managers often needed to show tolerance to organisational changes in roles, commitments, synergy, culture, nature, process structures and resistance within an organisational setup or project team. It is concluded that the success of these changes mainly depends on the extent and nature of reliance shown by the project manager. For a project manager, resilience is one of their most important psychological traits, as it gives them motivation to move forward from difficult times and projects [31]. Different studies have been conducted in order to uncover the importance of the behavioral resilience of project managers and project teams and its role in determining the success or post-failure fate of a project [31,47–50].

Karlsen and Berg [22] also conducted a study to investigate the prime behavior strengths of a team leader to successfully induce resilience within a project team's collective attitude. It was determined that project managers' personality traits, including persistence, leadership, open-mindedness and hope, significantly influence the induction of resilience in project teams. He et al. [47], suggested that emotional regulation and resilience in attitudes converts the negative relationship between failure velocity and learning behaviors of entrepreneurs into a positive one. With proper integration of resilience with emotional regulation towards failure, a positive relationship can be achieved. Johnson et al. [48] reviewed the effects of showing resilience to emotional breakdowns in response to errors, failure, or mistakes. It was observed that high self-esteem, low socially-set perfectionism, and a positive attitude were the main factors that most effectively induce resilience in one's attitude.

Todt et al. [49] explored the role of resilience and social support in dealing with the negative psychological impacts of project termination using a sample of software developers from European companies. It was concluded that resilience positively relates to the commitment from the developers for starting a new project after another has terminated. Strong evidence of a positive correlation between social support from colleagues and organisation management and the resilience potential of project managers were observed. Wang et al. [50] studied a sample of project teams and technology-related companies to uncover the role of post-failure behavior in learning from failure and commitment to new projects. It was observed that self-control played a significant role in project commitment and learning from failure from previous projects. Moreover, it was observed that post-failure

behavior had a strong influence on how a project manager would respond to the project failure. Wang et al. [41] investigated the importance of error-learning attitudes in learning from project failures in employees from project teams. A positive relationship between error-learning orientation and learning from project failures was observed. Moreover, they also determined that the relationship was much stronger for employees with a lower fear of loss-of-face and a more resilient attitude than those employees with higher fear of loss-of-face and low resilience.

2.2. Project Leaders' Self-Esteem

Self-esteem involves a number of self-beliefs, including self-appraisal of emotions, beliefs and behaviors. A number of studies have been conducted to develop different theoretical frameworks on the role of self-esteem in individual behaviors and the role of self-esteem in determining an individual's behavioral attributes [51–58]; it is one's subjective assessment of one's personal value. In other words, self-esteem is about how much an individual likes and appreciates him or herself. Feng et al. [52] conducted a study to explore the roles of self-esteem and social support in mitigating the impacts of psychological distress related to the job and work environment. It used the Rosenberg self-esteem scale [55,59] and the multidimensional scale of perceived social support [60] on a sample of practicing nurses. Self-esteem and social support were identified in order of importance as protective measures against job or work environment psychological distress. Moreover, self-esteem was identified as having an indirect mitigation effect.

Yang et al. [58] studied different personality traits, and self-esteem and generalized self-efficacy were recognized as being among several buffers for job stress and job burnout in construction project managers. Kim and Beehr [53] implemented structured equation modeling on a sample of full-time employees to study the importance of organisation-based self-esteem and meaningful work in mitigating the effects of empowering leadership on the behavior of employees. Self-esteem and meaningful work were found to be positively related to empowering leadership. Takhsha et al. [56] conducted a study aiming to assess the impacts of workplace isolation or ostracism on organisation-based self-esteem (OBSE), organisational silence and idea/information/knowledge sharing. The empirical findings suggested that ostracism or isolation and organisational silence negatively impact knowledge and idea-sharing within organisations. Ostracism positively influenced workplace silence while OBSE was negatively influenced by workplace ostracism. Additionally, it was found that OBSE positively influenced knowledge sharing and that there was an indirect negative relationship between ostracism and information flow through workplace silence, although this mediating role of OBSE was not confirmed in the relationship between knowledge sharing and organisational ostracism.

Yang et al. [57] also investigated the effects of job social support and servant leadership on employees' better halves, under the mediating role of organisation-based self-esteem. These findings supported the research hypothesis suggesting that organisation-based self-esteem played a significant arbitrating role in bringing about positive effects from job social support and servant leadership. Callea et al. [51] studied the role of self-esteem as a mediator of the association between two variables, quantitative/qualitative job insecurity and well-being at work. The supposed threat of losing some of the features related to a job or to work (qualitative insecurity) exhibited a fully mediating role on the impact of an apparent threat of job loss (quantitative insecurity). Moreover, self-esteem showed a moderating role on the impact of quantitative insecurity and induced job satisfaction among employees.

2.3. Project Leaders' Self-Efficacy

Self-efficacy is an individuals' self-evaluation of his or her abilities to design, organize, set and execute the course of actions needed to achieve pre-set goals. Bandura [61,62] defined self-efficacy as an individuals' beliefs in his or her capability to implement the behaviors required to achieve specific performance goals. It reflects ones' confidence in

their ability to exercise control over one's behavior, motivation, and social environment. Assessment of self-efficacy has been marked as one of the best and direct indicators of individual performance in various disciplines [63,64]. An increasing number of studies have been conducted to understand and determine the role of self-efficacy in determining an individual's behavior toward project commitment and post-failure response [61–68].

Blomquist et al. [64] also investigated the importance of self-efficacy as a performance indicator and presented a construct and validation of several domain-specific project management self-efficacy scales. It provides strong evidence of the capability of project management self-efficacy (as an indicator) to forecast project performance. Paglis [67] conducted an extensive review on leadership self-efficacy focusing on Bandura's construct from 1977. The study established that leadership self-efficacy (LSE) had a significantly positive correlation with team performance as well as with the individual performance of the leader. It found reliable evidence of the link between a leader's personal performance and a team's collective performance and efficacy. Paglis and Green [68] developed a leadership model based on leadership self-efficacy (LSE), focusing on project leaders' motivation and self-belief for exercising leadership during times of change (transformational leadership). The results indicated a positive relationship between different leadership self-efficacy dimensions and self-esteem, performance abilities, and the manager's or leader's job control.

Chan [65] conducted a study to investigate the role of self-efficacy as a prime mediator between a volunteer's performance and transformational leadership. It was found that self-efficacy fully mediated the relationship between volunteers' performance and transformational leadership. Additionally, a positive relationship between both the variables was observed. Jacobs and Kamohi [66] also studied the influence of self-efficacy improvements on the efficiency of project managers in current environments. It was found that self-efficacy has a strong beneficial impact on different personal competencies that are required in modern-day organisational set-ups. These personal competencies, which evolve under the influence of self-efficacy, include flexibility/adaptability according to different situations, persistence, resilience, emotional intelligence and ability to handle ambiguity. The findings suggest that self-efficacy significantly enhanced and improved the aforementioned personality traits in project managers in modern organisations. Bayraktar and Jiménez [63] studied the role of self-efficacy as a mediator between transformational leadership and the extent of changes (organisational or project team), role, commitment and the nature of the changes, as well as the responses to such changes. The findings show that self-efficacy played a significant role as a mediator between transformational leadership and responses or reactions to change. Self-efficacy seemed to be a highly important and instrumental measure, leading to acceptance and a positive attitude toward changes in a varying context.

The above studies discuss to some extent that all the three variables, project leader resilience, self-esteem and self-efficacy, play a direct or indirect key role in shaping a positive attitude after a project failure. The post-failure response may be in the form of accepting and adapting to changes in project teams and roles and/or showing resilience against emotional breakdown after errors and failures, and successfully dealing with negative psychological impacts after the project termination. However, the review also reveals that the relationship and magnitude between these three personality traits remain significantly unclear. This study aims to uncover the relationship between the three most important post-failure response variables: resilience, self-esteem and self-efficacy. A group of project leaders in high-tech start-ups across Pakistan was used to investigate the relationship between resilience, self-esteem and self-efficacy in project leaders. In doing so, this study aims to highlight how one positive trait in personality assists in the development of another. The following hypotheses were accordingly designed in an effort to best describe these inter-relationships.

2.4. Project Leaders' Resilience and Self-Efficacy

Bandura [61,62] pioneered the research on self-efficacy and built a base for investigations on the role of self-efficacy in forming different behaviors, habits, and responses in different conditions. Self-efficacy influences the course of activities that are preferred or selected by project leaders for themselves and their project teams to achieve certain goals and accomplishments. The more confidence they have in their abilities, the more effort they put in to fulfil project goals. A project leader's resilience can be described as his or her ability to withstand the negative impacts of project failure and to show strength and adaptation in their behavior. Lorenz [32] initially proposed a theory of resilience in social sciences and disaster management. Other studies [22,47–49] have suggested that a resilient project leader tends to show greater strength and more bounce-back ability after a failure. Additionally, resilience in a project leader induces a positive attitude towards accepting changes and roles in project teams [31].

The self-efficacy of a project leader indicates his or her confidence and belief in his or her abilities to plan and execute tasks to achieve specific goals. Higher self-efficacy induces higher self-confidence in the attitude of a project leader. Both qualities are associated with positive behavior, i.e., the presence of these qualities generates an overall positive behavior after an error or failure [63–68]. The dynamics of overcoming negative events and developing a positive attitude is a step-wise procedure, the steps of which are derived and supported by different behavioral dimensions and which heavily rely on each another, as suggested by Rutter [69]. After a project failure, a project leader might be reluctant to test his or her limits or to freely rely on their personal skills in upcoming projects in order to achieve goals. With a resilient attitude, the project leader first fights the negativity of failure and develops a positive post-failure attitude and acceptance of changes. With positive behavior, a project leader gains confidence in his or her abilities, and thus can freely rely on them and efficiently use those abilities in the cause of project success. In order to gather the courage to rely on abilities after a project failure, a project leader needs to be positive and mentally prepared for the new project, which is mainly determined by resilience in the leader's post-failure behavior. Thus, it is important to uncover the effect of resilience on self-efficacy, for which the first hypothesis of the study was formulated as:

Hypothesis 1 (H1). *A project leader's resilience has a significant positive effect on the project leader's self-efficacy in high-tech startups.*

2.5. Project Leaders' Resilience and Self-Esteem

Several studies have investigated the relationship between resilience and self-esteem [70–73]. However, the exact association between the two variables remains unclear. Benetti and Kambouropoulos [70] suggest that resilience is a precursor of self-esteem and that resilient people tend to have higher self-esteem compared to non-resilient people. In contrast, Schmeichel et al. [73] assert that resilience is inessential for self-esteem, which indicates a lower degree of association between the two variables. Gardner [71] considers resilience as a reverberation of self-esteem, while Lee et al. [72] disassociates both variables and suggest that there is no relation between resilience and self-esteem. Bashir et al. [74] consider self-esteem as an inherent and permanent personality component of resilient people. The diverse views towards the associations between resilience and self-esteem are mainly derived by the background and conditions of the subject of research. Still, an unclear relationship between these two positive personality traits is of significant importance, as these qualities are indicators of positive post-failure behavior.

The dynamic process of recovery from failure depends upon various personality traits. For instance, a motivated and confident project leader may find it easy to cope with the after-effects of a failure, but a less resilient demotivated project leader might be vulnerable in such conditions. As soon as a project leader moves on from a hard phase of failure and post-failure stress, further variables or dimensions of positive responses are induced in his or her attitude. A project leader that has courage against the negativity of failure and works

hard for success would be routinely successful in new projects (and in bouncing back). The course of success improves self-confidence, self-appreciation and self-perception of competitiveness, in contrast to vulnerable and demotivated project leaders. The degree of how much a project leader appreciates, praises and believes in him or herself as being to achieve success is indicated by the self-esteem of that project leader. This is the process of self-evaluation, involving its own appraisal of beliefs, emotions and behaviors. Resilience and self-esteem equally influence the commitment and aspirations of a project leader with regards to new projects. Based on the existing literature, it can be asserted that both variables, resilience and self-esteem, contribute to the positive post-failure behavior of a project leader. Additionally, there is a potential association between these variables that is suggested by most studies. This study hypothesizes a significant association between a project leader's resilience and the project leader's self-esteem, which is formulated as:

Hypothesis 2 (H2). *A project leader's resilience has a significant positive effect on the project leader's self-esteem in high-tech startups.*

2.6. Project Leaders' Self-Esteem and Self-Efficacy

Both self-efficacy and self-esteem have been conceived of as overall self-assessments [75], and both constructs include semantic, psychological, and motivational elements. Conversely, a significant distinction between self-efficacy and self-esteem is that self-efficacy represents more of a motivational judgment or confidence in one's job and work abilities, while self-esteem is a self-assessment or feeling of self-competence [71]. Consequently, self-efficacy and self-esteem vary with regard to their comparative focus on psychological and affective elements. Self-efficacy should be more closely related to accomplishment and motivational dynamics, while self-esteem should be more strongly correlated with anxiety-protective affective dynamics. Given these conceptual disparities, some studies [76,77] have clearly demonstrated that the two main self-assessment constructs, self-efficacy and self-esteem, are closely associated. In addition, other studies [78,79] have noticed that it is challenging to differentiate between self-efficacy and self-esteem functionally since they are so closely related. This prompts the concern of whether the main self-assessment constructs, in particular self-efficacy and self-esteem, are distinct constructions.

Although the association between self-evaluation constructs is unclear, the post-failure behavior scenario of a project leader suggests that both dimensions of self-evaluation are equally important. Self-efficacy promotes competence, confidence and self-belief in the attitude of a project leader after a failure, and self-esteem develops feelings of self-appreciation and self-appraisal of behaviors, beliefs and emotions—although without a sense of competence and confidence in oneself, one cannot freely appreciate one's own beliefs and behaviors. In other words, a project manager cannot be fully confident in their own abilities until he or she freely appreciates and praises his or her abilities, behaviors and emotions. This develops a closed-loop relationship between leader's self-esteem and self-efficacy, which still does not give a clear indication of which is the predecessor and/or successor leadership behavior in post-failure conditions.

Hypothesis 3 (H3). *A project leader's self-esteem has a significant positive effect on the project leader's self-efficacy in high-tech startups.*

2.7. Project Leaders' Self-Esteem as a Mediator between Resilience and Self-Efficacy

In a post-failure scenario, the behavior of a project leader can be indicated by three different constructs: resilience, self-esteem and self-efficacy. These three behavioral variables determine the success of the post-failure behavior of a project leader—that is, their commitment and attitude towards starting a new project. Resilient project leaders with high self-esteem and high self-efficacy tend to be more positively engaged in new projects after a project failure and thus are likely to succeed in the new project. On the contrary, vulnerable project leaders with low self-esteem and self-efficacy are very unlikely to ac-

comply with the pre-set goals of a new project after a project failure. This implies that the main three constructs heavily influence overall post-failure behavior and the commitment to new projects moving forward. The three constructs of post-failure behavior affect each other, as mentioned and hypothesized in previous sections.

While all the three constructs of post-failure behavior can be hypothesized to be directly inter-related, based on the relevant past literature, there is also a hypothesized indirect association between a project leader's resilience and self-efficacy—while the project leader's self-esteem plays a mediating role in the relationship. Hypothetically, a project leader's resilience will have a significant positive effect on the project leader's self-efficacy, and a project leader's self-esteem will have a significant positive effect on the project leader's self-efficacy; thus, self-esteem will mediate the relationship between a project leader's resilience and their self-efficacy (hypothetically). This hypothesized relation indicates that a project leader's resilience positively affects the project leader's self-esteem, which further affects the project leader's self-efficacy in a positive way.

Pragmatic studies have also demonstrated that transformational leadership, a larger domain for project leader's resilience and project team resilience, is correlated with self-efficacy, but the processes underpinning this association are as yet understudied. A few studies have demonstrated that self-efficacy serves a significant role and is also used as a mediator through which transformational leaders assert their control [80]. Nielsen et al. [81] also found that self-efficacy fully mediates the association between transformational leadership and psychological well-being, while Sobhani et al. [82] found that self-efficacy is a significant predictor of psychological well-being. Based on the evidence from the relevant literature, a project leader's self-esteem is hypothesized to fully mediate the relationship between the project leader's resilience and self-efficacy, and the fourth hypothesis was formulated as stated below:

Hypothesis 4 (H4). *A project leader's self-esteem mediates the relationship between the project leader's resilience and self-efficacy in high-tech startups.*

2.8. Underpinning Theories

The theoretical support for the hypothesized relationships was determined from different recognized theories of behavioral changes. Bandura's theory of self-efficacy [61,62] provided significant theoretical reinforcement for the relevant hypothesized relationships. Bandura defined self-efficacy as a self-perception of oneself concerning how well or badly a person is capable of coping with given conditions based on personal skills and the complexity of the circumstances. As per Bandura [61], self-efficacy influences people and management ventures in all aspects. The evaluation of self-belief, which someone holds of oneself for facing difficult situations, adds to that person's ability to withstand such complex circumstances. Various efforts have been conducted linking Bandura's self-efficacy theory with different disciplines of management and leadership [67,83,84]. Similarly, Maslow's [85] hierarchy of needs theory provides dependable evidence that self-esteem is a significant indicator of self-confidence, strength or resilience, and self-belief. Maslow identified that by fulfilling one's needs of self-esteem, different behavioral changes (increased confidence and self-belief), and strength and resilience can be triggered in one's attitude. This theory highlights the significant role of self-esteem in inducing resilience and self-efficacy in a person. Rutter [86] defined resilience as a behavioral approach employed during high-risk situations, and the positive consequences of such situations. The related psychological outcomes are mostly a boosted self-belief and self-appraisal. According to Rutter [86], resilient people experience more highly positive psychological states in difficult situations compared to non-resilient people. Several studies have linked theories of resilience with management, leadership, and management behaviors [87–89].

3. Methods

To explore the relationships between the key personality traits of project leaders (i.e., project leader resilience, self-esteem and self-efficacy) and mediating effects (through self-esteem), study data on these behavioral traits (in specific context of project failure) was obtained from a sample of project leaders in high-tech startups. This was an appropriate sample in which to investigate the relationships between behavioral traits and failure since: (1) managers can learn more from failures than from successes [42]; (2) project failure is relatively common because leaders in high-tech startups conduct projects in highly uncertain environments [43]; (3) learning from failure is an important job requirement; (4) high-tech project leaders are trained to search for the underlying causes of project failure and to move forwards to understand why failures have occurred.

A quantitative research approach was conducted to examine the proposed relationships between the three latent constructs (i.e., project leader resilience, self-esteem and self-efficacy) and the mediating effect of a project leader's self-esteem on the hypothesized relationship between the project leader's resilience and self-efficacy. A sample of 232 respondents was selected from a population of project leaders in high-tech startups across Pakistan. A non-probabilistic sampling method (i.e., convenience sampling) approach was implemented to collect the relevant data from the respondents due to specific study limitations beyond the control of the researchers (i.e., the unknown number of ICT professionals in Pakistan who are working on high-tech projects, as well as data collection complications during the ongoing COVID-19 pandemic). Hence, convenience sampling was preferred, as it allowed the selection of respondents who were prepared to take part in the survey, with consideration to time and financial constraints. A self-administered research instrument, i.e., a research questionnaire was used, and the response items in each construct were collected on a 5-point Likert scale (1—strongly disagree to 5—strongly agree). The survey also included an initial eliminating question, i.e., "Have you recently experienced project failure(s) in the last 6-months" (Yes or No). Those participants who replied negatively were automatically removed from the survey. Importantly, an introductory statement to start the survey with was also included; "Considering your recent experience of project failure(s), please complete the survey question(s) below with your best possible answer(s)".

For the analysis, a statistical computational tool, AMOS, was used to perform covariance-based structural equation modelling (CB-SEM) [90,91]. Project management, operations management, accounting and finance, human resources management, travel and hospitality, R&D, and supply chain management are among the research areas where CB-SEM technique has gained prominence. Hence, CB-SEM was used to evaluate and measure the structural relationships between the research constructs. Several statistical methods were also used to assess the data, measures, constructs, and items for their reliability and validity. Factor analyses, namely EFA and CFA, were employed as factor-loading analyses, and measurements of composite reliability and convergent validity, while descriptive statistics provided support for data normality. The multicollinearity and discriminant validity of the constructs were also evaluated. A pilot questionnaire was revised by academic researchers to ensure that the items and aggregate questions were clear and understandable. Any suggested amendments by these researchers were incorporated before the questionnaire was actually distributed. Both online and offline distribution methods were employed, including direct e-mails, Facebook, WhatsApp, LinkedIn, and limited face-to-face surveys, due to the COVID-19 pandemic.

3.1. Measures

3.1.1. Project Leaders' Resilience

For project leader resilience, a scale was adapted from prominent studies [92,93], which showed adequate validity and reliability for measuring resilience among the studied subjects. The adapted scale, based on ten items, was mainly designed for the evaluation of leadership resilience in project-based (i.e., temporary organisation) settings. The items incorporated in the scale were mainly related to leadership behaviors with colleagues and

project team members at different stages of the project management cycle and after completion or failure and termination of any project. These scales have also been extensively validated by numerous studies. Responses for each item were collected from respondents on a five point-based Likert scale (ranging from 1—strongly disagree to 5—strongly agree). Examples of the adapted scale included “I can achieve project goals, despite obstacles”; “I am able to adapt to change”; “I can stay focused under pressure”; “I am not easily discouraged by failure”; “I can deal with whatever comes in the project”; “I maintain a strong sense of purpose”; “Even when things look hopeless, I don’t give up” and “I make unpopular or difficult decisions” [92,93].

3.1.2. Project Leaders’ Self-Efficacy

The self-efficacy scales previously used and validated by Chen, Gully and Eden [79], and also by Magaletta and Oliver [94], were adapted in this study to determine the project leader self-efficacy measure. A total of fifteen items were included in the scale including: “support for change”, “direction setting by PLSE”, and “perceived crisis”, among others. The scale items were mainly centered on collecting responses regarding the role of self-efficacy in post-failure conditions from project managers. These items were arranged on a five-point Likert scale (similar to the one in Section 3.1.1). Examples of the adapted scale included “When facing difficult project tasks, I am certain that I will accomplish them”; “I am confident that I can perform effectively on many different project tasks”; “I think that I can achieve important project outcomes”; “I believe that I can succeed at most any endeavor relating to the project”; “I believe that I will be able to successfully overcome any project challenges”; “I can always manage to solve difficult project problems if I try hard enough” and “In the project, no matter what comes my way, I’m usually able to handle it” [79,94].

3.1.3. Project Leaders’ Self-Esteem

The scale for the project leader self-esteem measure was adapted from Rosenberg [59]. This widely validated scale included ten items that were specifically developed to assess the impact of the project leader’s self-esteem on overall post-failure behavior and behavior during project management stages. Similar to the other measures, items of this construct were also arranged on a five-point Likert scale. Examples of the adapted scale include “I feel that I have many good qualities to lead the project”; “In every project, I take a positive attitude toward myself”; “At all times, I feel the sense of my usefulness for the project”; “On the whole, I am satisfied with myself when dealing with multiple projects”; and “All in all, I am inclined to feel that I am successful in leading many projects”; [59].

4. Results

Data was collected from two hundred and thirty-two respondents. Demographic results are presented in Table 1, which indicate that 55.2% men and 44.8% women participated in this study. In terms of age, the majority of the respondents were 26–33 years old (44.4%). Almost 71.6% of the respondents had a Bachelor’s degree and 24.1% had a Master’s degree. Lastly, in terms of professional work experience, 32.8% respondents had 1–5 years of work experience, 29.7% had 6–10 years, and 25.9% had 11–15 years of work experience. Detailed results of the demographic outcomes can be seen in Table 1.

Table 1. Demographics Outcomes (N = 232).

Items		Respondents	Percentage
Gender	Male	128	55.2%
	Female	104	44.8%
Age	18–25 years	20	8.6%
	26–33 years	103	44.4%
	34–40 years	62	26.7%
	41–47 years	31	13.4%
	48–55 years	15	6.5%
	56 years and above	1	0.4%
Education	Bachelor's	166	71.6%
	Master's	56	24.1%
	Doctorate	6	2.6%
	Other	4	1.7%
Experience	Less than 1 year	10	4.3%
	1–5 years	76	32.8%
	6–10 years	69	29.7%
	11–15 years	60	25.9%
	15 years and above	17	7.3%

Project leader resilience is denoted by RE, project leader self-esteem is denoted by SE, and project leader self-efficacy is denoted by PLSE. In order to ensure that the data had no concerns regarding abnormality and that the data attained was precise, initial statistical tests were conducted to pre-screen the data. Descriptive statistics provided insights regarding data normality, and exploratory factor analysis and confirmatory factor analysis were conducted to check constructs of strength, associations and relationships. Furthermore, discriminant and convergent validity tests were also conducted to determine the items' consistency and reliability, and the validity of the items. Finally, the structural model was developed to evaluate the hypotheses.

4.1. Data Normality

Descriptive statistics, presented in Table 2, show the skewness and kurtosis values for the three variables included in the study. Although a negative value of skewness indicates that the data is left distributed, values within a typical range of -1 to 1 [95] indicate approximate normality of the data. Likewise, kurtosis values in the range of -3 to 3 [96] provide evidence of data having an approximately normal distribution.

Table 2. Descriptive statistics (N = 232).

Variables	M	SD	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
RE	2.9194	0.78416	−0.141	0.160	−0.107	0.318
SE	3.9940	0.61816	−0.736	0.160	1.558	0.318
PLSE	3.7284	0.57187	−0.876	0.160	2.693	0.318

4.2. Confirmatory Factor Analysis (CFA)

A confirmatory factor analysis (CFA) was conducted to determine how the construct indicators match up with what is known regarding the nature of the variables (Kline, 1998). The aim of the CFA was to see how the data suited the measurement model that was proposed. Table 3 provides the composite reliability (CR), convergent validity, average variance-extracted (AVE) and a factor analysis of the measurement model. Note that the CR value for every scale surpasses the minimum threshold value of 0.7, which indicates the internal reliability of the construct items. Additionally, the AVE value for all the constructs was observed to be greater than 0.5, as suggested by [97,98]. The values for the exploratory

factor analysis (EFA), indicated by ρ , for all the items included in each construct were greater than 0.4, which indicates that all the items in each construct significantly influenced the construct variables. Thus, the findings suggest that the items and variables in the hypothetical model are reliable. The findings of the confirmatory factor analysis (CFA) are shown in Figure 1.

Table 3. EFA/CFA, composite reliability, and convergent validity of the measurement model (N = 232).

Constructs & Items	ρ	λ	CR	AVE
Project leader's resilience			0.941	0.617
RE1	0.641	0.678		
RE2	0.827	0.836		
RE3	0.792	0.757		
RE4	0.768	0.787		
RE5	0.887	0.868		
RE6	0.908	0.886		
RE7	0.614	0.690		
RE8	0.838	0.815		
RE9	0.851	0.830		
RE10	0.727	0.672		
Project Leader's self-efficacy			0.933	0.587
PLSE1	0.549	0.612		
PLSE2	0.583	0.627		
PLSE3	0.703	0.727		
PLSE4	0.571	0.550		
PLSE5	0.745	0.806		
PLSE6	0.804	0.861		
PLSE7	0.766	0.778		
PLSE8	0.734	0.815		
PLSE9	0.577	0.680		
PLSE10	0.826	0.759		
PLSE11	0.694	0.536		
PLSE12	0.765	0.752		
PLSE13	0.768	0.691		
PLSE14	0.653	0.504		
PLSE15	0.693	0.646		
Project leader's self-esteem			0.952	0.666
SE1	0.763	0.788		
SE2	0.778	0.859		
SE3	0.907	0.905		
SE4	0.812	0.811		
SE5	0.910	0.841		
SE6	0.908	0.944		
SE7	0.861	0.787		
SE8	0.685	0.708		
SE9	0.789	0.824		
SE10	0.750	0.655		

Measurement model fit statistics:

a. Absolute fit indices

$\chi^2 = 1054.407$, $df = 548$, $\chi^2/df = 1.924$, $p = 0.000$, $GFI = 0.792$, $AGFI = 0.761$, $RMSEA = 0.063$, $SRMR = 0.038$

b. Incremental fit indices

$CFI = 0.939$, $NFI = 0.881$ and $TLI = 0.933$

Note: $p < 0.05$; ρ = Factor loadings at 0.40 using EFA; λ = Standardized factors loadings using CFA; CR = Composite reliability; AVE = Average variance extracted.

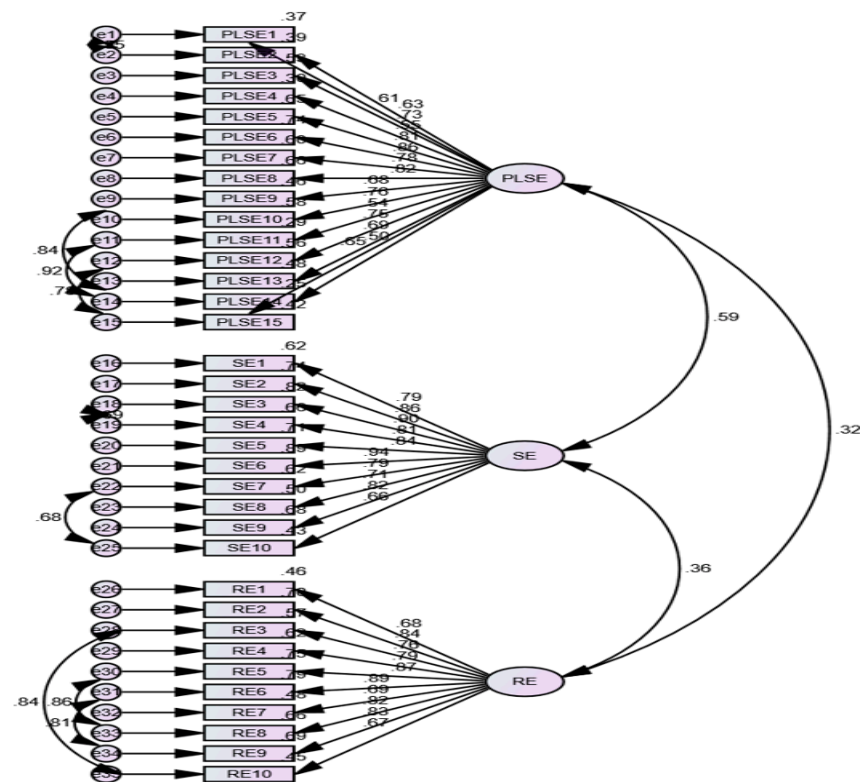


Figure 1. Confirmatory Factor Analysis (CFA) of the constructs.

Table 4 shows the results of the multicollinearity and discriminant validity tests for all three variables of the study. The diagonal values represent the square root of variance between the measures of the construct (AVE) and the construct itself, while the off-diagonal values are the correlation values between the constructs. Note that those diagonal values (in bold) are greater than the off-diagonal values, which indicates the discriminant validity of the constructs. Additionally note that all the values of AVE are greater than 0.50, which further evidences the discriminant validity of the constructs and items.

Table 4. Multicollinearity and discriminant validity (N = 232).

Variables	AVE	MSV	PLSE	SE	RE
PLSE	0.587	0.349	0.698		
SE	0.666	0.349	0.590	0.816	
RE	0.617	0.126	0.323	0.355	0.786

Note: AVE = Average variance extracted, MSV = Maximum shared variance.

Correlation coefficients among RE, SE, and PLSE were also estimated, as reported in Table 5. The values of Pearson's correlations among the constructs should be between ± 1 [96]. Correlation values greater than 0.80 are considered high and are treated as a multicollinearity issue. Correlation values greater than 0.20 and less than 0.80 are considered moderate and reasonable, while correlation values less than 0.20 are considered low [96,99]. The correlation table indicates that there is moderate relationship among the constructs, as the correlation between SE and RE (0.374), SE and PLSE (0.345), and RE and PLSE (0.620) are all statistically significant.

Table 5. Correlation Analysis (N = 232).

Variables	RE	SE	PLSE
RE	1		
SE	0.374 **	1	
PLSE	0.345 **	0.620 **	1

Note: ** Correlations significant at 0.01 level.

4.3. Structural Model

The hypothesis testing was done after attaining positive correlations between the variables. The path coefficients of the structural models and the relationship between the latent constructs were determined by covariance-based SEM using AMOS [91]. Figure 2 presents the structural model, while the relationship between RE, PLSE and SE is shown in Table 6, which summarizes the results of relevant hypotheses using path coefficients, t-statistics and *p*-values. Positive values of the path coefficients for all the relationships indicate positive effects, as hypothesized in the study. Moreover, higher t-values reflect a significant relationship between the measures, as t-values indicate significant differences in results when the null hypothesis is rejected. Likewise, *p*-values lower than 0.05 indicate the strength of the hypothesized statements [99]. Note that the findings strongly support all the hypotheses of the study. The model fit measures of the structural equation are provided in Table 7. Higher values of fit indices, 0.792, 0.939, 0.939, 0.881, 0.933 and 0.761, were observed for GFI, IFI, CFI, NFI, TLI and AGFI, respectively. These values indicate an acceptable model fit for the structural equation. The value of RMSEA was observed to be greater than 0.05 and within the range of 0.05 to 0.1, which indicates a fair fit for the structural equation. These outcomes indicate that the structural equation model fit measures complied with the required standards.

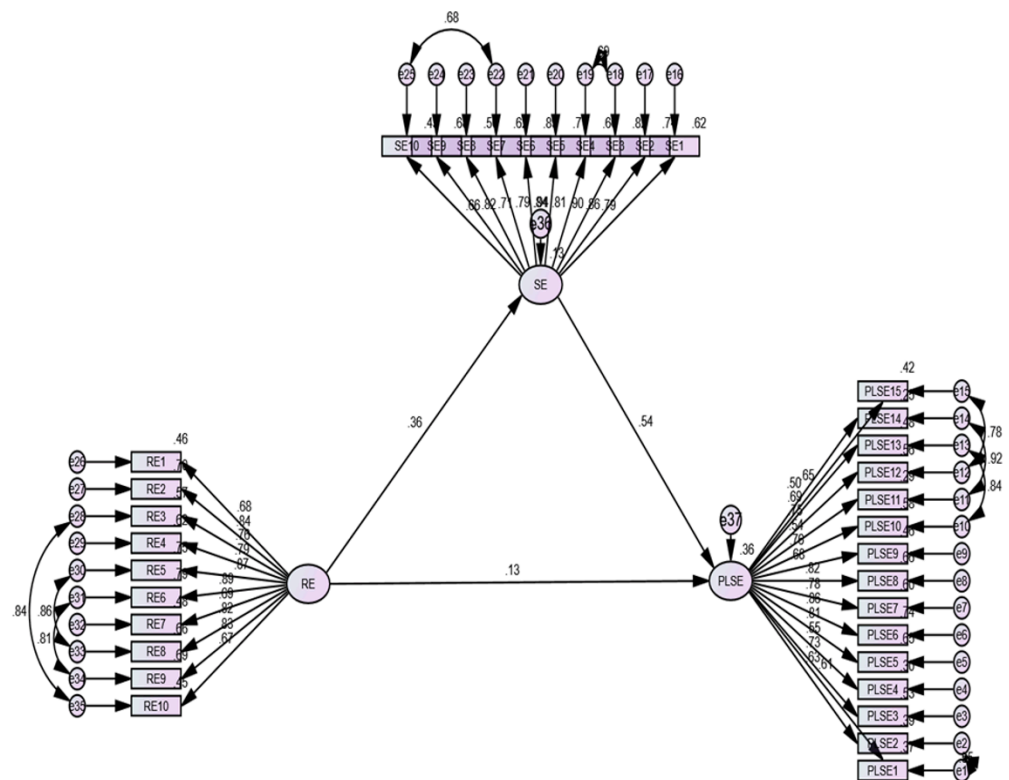


Figure 2. Structural Model.

Table 6. Results of hypotheses (N = 232).

Hypotheses	Relationships	Path Coefficients	t-Statistics	p-Values	Results
H1	RE → PLSE	0.130	2.031	0.042	Supported
H2	RE → SE	0.355	4.892	0.000	Supported
H3	SE → PLSE	0.544	6.632	0.000	Supported
H4	RE → SE → PLSE	0.193	4.948	0.000	Supported

Table 7. Structural equation model fit measures (N = 232).

Constructs	Chi-Square	DF	χ^2/DF	GFI	IFI	CFI	NFI	TLI	AGFI	RMSEA
Model	1054.407	548	1.924	0.792	0.939	0.939	0.881	0.933	0.761	0.063

DF = Degree of freedom, χ^2/DF = Chi-square /degree of freedom, AGFI = Adjusted good-of-fit index, TLI = Tucker-Lewis Index, NFI = Normed Fit index, CFI = Comparative fit index, IFI = Incremental Fit Index, RMSEA = Root Mean Square Error of Approximation.

4.4. The Mediating Effect

A covariance-based SEM technique was also implemented to study the mediating effect of project leader self-esteem (SE). From Table 6, it can be seen that the RE → SE → PLSE relationship, represented by H4, returned a t-value of 4.948 and a p-value equals to 0.000 (p -value < 0.05), which supports the developed hypothesis. Thus, it can be concluded that self-esteem (SE) mediates the relationship between resilience (RE) and project leader self-efficacy (PLSE). A positive path coefficient value (0.193) indicates a positive regression between the mediator (SE) and the relationship between the two measures (RE and PLSE).

5. Discussion

Based on extremely limited prior evidence on post-failure behaviors of project leaders, the present study investigated the underlying relationships between project leader resilience, self-efficacy and self-esteem in high-tech projects in the ICT industry [1–6]. Balgiu [100] asserted that self-esteem can be rendered as a predicting factor of resilience in personality, which identifies a direct relationship between self-esteem and resilience. Hence, the present study's findings are strongly in-line with most of the previous literature on resilience, self-efficacy and self-esteem in multiple work settings, including project management [22,47,49,52,53]. Our findings suggest significant positive relationships between these three latent constructs. Project leader resilience showed a significant positive impact on the project leader's self-esteem, as well as project leader's self-efficacy. Besides presenting new evidence, the present study also validates earlier findings and conclusions and the operationalization of these latent constructs as reported in recent studies [3–6,22,47,49]. Furthermore, the findings also identified a mediating role of project leader self-esteem on the relationship between resilience and self-efficacy. The mediating role of self-esteem on the relationship between different behavioral traits has also been previously confirmed by prominent scholars [56,58]. Veselska et al. [101] conducted a study in which the association of resilience and self-esteem with adolescent behavior was assessed. The findings suggested that the effects of self-esteem on adolescent behavior were opposite to those of resilience on behavior [3,102], which indirectly indicates an inverse relation between self-esteem and resilience. The finding of this study on resilience and self-esteem does not show parallels to the findings by Veselska et al. [101]. However, Yang et al. [103] asserted that self-efficacy can be further developed by gaining self-esteem and increasing resilience [3–7]. While highlighting the criticality and importance of a project manager in the project management process, Alvarenga et al. [16] marked that the project leader's self-esteem seems to be of great significance in achieving project success [21,102,104–106].

5.1. Theoretical Implications

The present study makes significant contributions to existing research by identifying and clearly defining the underlying relationships between project leader positive behaviors

in post-failure conditions [3,4,21,64]. The study investigated three of the major behavioral traits (i.e., resilience, self-esteem, and self-efficacy) found in an overall positive personality in project leaders in a post-failure context [21,107]. Moreover, the study also highlighted the mediating effect of self-esteem on the resilience and project leader self-efficacy relationship [3,21,108]. Most of the research that has been done in this field [16,18,41] focuses on the criticality and benefits of showing positive behaviors in post-failure conditions and the importance of learning from failure. In the theoretical development of self-efficacy, extensive work has been done by Bandura [61,62], which has been the foundation of research on self-efficacy to date. This study also finds sufficient theoretical support from prominent studies on self-efficacy. This study posits that self-efficacy is significantly dependent on self-esteem and resilience [108,109], which is consistent with Bandura's [61] findings on self-efficacy and behavioral change. Similarly, recognized work on self-esteem [55,102] supports the findings of this study regarding project leader self-esteem. Furthermore, the mediating role of self-esteem found in this study is consistent with previous research findings on the mediating effects of self-esteem on the relationship between different behavioral attributes [56,57]. Hence, the present study fills research gaps by exploring the fundamentals and less-understood linkages between these potential behavioral traits of project managers (i.e., resilience, self-esteem, and self-efficacy)—especially when they face failures [3,4,110,111].

5.2. Managerial Implications

By uncovering the significant positive relations between the resilience, self-esteem and self-efficacy of a project leader, this study provides a practical roadmap for project managers who struggle to reconcile in an organisational set-up after an unfortunate project failure or termination [3–6,112]. The identified positive significant effect of resilience on project leader self-efficacy can be helpful for resilient project managers in regaining self-confidence [3,4]. Additionally, for organisational executives, this finding of the study can automatically provide confidence in resilient managers, and shows that these types of managers are preferable for upcoming projects even in light of possible failures [87]. The clear understanding of the personality traits that are critical in project management might help in the selection and training of suitable project managers for relevant tasks [16]. The effects of resilience on self-esteem and of self-esteem on self-efficacy are also significantly positive, which implies that the presence of any one of the three behavioral attributes in a manager's attitude can trigger the development of the other two.

5.3. Limitations and Future Work

This study uses a research population of project leaders in high-tech start-ups across Pakistan. It would be interesting to test these hypotheses in a different research sample with a different demographic background. The diversity of the demographics is a limitation regarding the research population. These limitations, though, provide opportunities for future research, which can focus on different sectors including construction projects [27,113], general organisational set-ups and other sectors such as manufacturing and information technology, among others, to provide a reliable generalization of the findings. Moreover, the behavior of a person is also under the influence of external determinants including social and personal conditions, which are mostly varied for different respondents. No such variables have been taken into account in this study. Future studies should also incorporate such individual specific variables (e.g., project leader character strengths, leadership styles, social skills and political skills); as well as project and/or organisation-specific variables (e.g., absorptive capacity, project visibility, project flexibility, project complexity and high-performance work practices) to gain a better understanding of post-failure behavior [106,107]. This study used convenience sampling due to financial and time constraints, which limited the random selection of respondents [104]. This reduces the reliability of generalization of the study for the whole research population. Future research studies can be conducted to incorporate random sampling techniques for data collection.

Demographics results should be used as controlled variables in future studies. Finally, the research instrument used in this study was based on a quantitative approach; as such, mixed or qualitative methods could also be applied in future studies to better understand the relationships between the selected measures [105].

6. Conclusions

Self-evaluation and resilience [107] are much needed in project management due to the increasing rates of project failures and terminations [3,4,104]. Higher rates of project failure implies that project managers need to be resilient, bear the burden of loss, and accept failure [3,4,105]. The role of self-efficacy and self-esteem in the self-evaluation of project leaders is essential for regaining self-confidence, as well as team confidence, after project failure [3,4,21]. This exploratory study was undertaken given the importance of these three behavior traits in project leaders, as well as the need to determine the link between these traits. This study identified and empirically supported the positive relationship between resilience, self-efficacy and self-esteem. Furthermore, the results of the study suggest that there is a significant positive mediating effect of self-esteem on the relationship between resilience and self-efficacy. These findings help both managers and executives in the processes of learning from losses and recruiting suitable project managers for their organisations, respectively. This will help companies and organisations to appoint project leaders who display such personality traits. Preferably, project leaders should be individuals who have resilience, high self-esteem and high self-efficacy. This means that in the selection process of future projects, project leaders' personalities should be considered as one of the selection criteria. These three traits offer a unique potential for understanding and improving project performance and for increasing the probability of project success.

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