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Impact of Emotional Stability on Team Collaboration in Hybrid Work Settings: An Empirical Study of IT Professionals in Coimbatore City

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Abstract

Hybrid work arrangements have become the dominant mode of employment for information technology (IT) professionals worldwide, and this shift has renewed interest in the personality factors that help employees sustain effective teamwork when face-to-face contact is intermittent. Emotional stability the Big Five trait describing an individual's capacity to remain calm, regulate stress, and avoid disruptive negative affect has been linked separately to remote-work adjustment, psychological safety, and communication quality, but no verified study has yet examined its relationship with team collaboration, specifically, among IT professionals in Coimbatore, a major Tier-II technology hub in Tamil Nadu, India. This paper does not report completed empirical findings. Instead, it develops and documents, in full methodological detail, a mixed-methods research design capable of answering that question rigorously and honestly. The paper (a) situates the proposed study against closely related published work, including recent research on emotional intelligence, personality composition, and collaboration in hybrid and virtual IT teams, to establish that team collaboration operationalised through the six-facet Teamwork Quality construct remains an important outcome for focused investigation in this population; (b) formalises a conceptual framework in which communication quality and psychological safety mediate the emotional-stability-to-collaboration relationship, moderated by hybrid work modality; (c) specifies a stratified sampling plan, validated instruments (the NEO-FFI Emotional Stability subscale and the Hoegl and Gemuenden Teamwork Quality scale), and twelve numbered equations covering sample-size determination, reliability, convergent and discriminant validity, mediation, moderation, and effect-size estimation; and (d) provides a structured data-analysis workflow and a reporting template so that a future research team can execute the study and report results using the exact notation defined here. The Discussion section addresses anticipated contributions, methodological limitations of the design itself, and ethical considerations for primary data collection with working professionals.

Keywords: Emotional stability; Team collaboration; Teamwork quality; Hybrid work; IT professionals; Coimbatore; Psychological safety; Mediation-moderation model; Research design

1. Introduction

1.1 Background and Motivation

The organisation of professional work has changed permanently since 2020, and hybrid arrangements in which employees split their working days between remote and on-site locations are now the modal pattern rather than an exception. Gallup's ongoing U.S. workforce panel found that hybrid work had levelled off at roughly half of remote-capable jobs after 2022, with managers, teams, and individuals increasingly negotiating the details locally rather than following top-down mandates (HR Dive, 2025). The information technology (IT) sector, which was an early adopter of remote collaboration tools, has been especially affected: teams routinely coordinate complex, interdependent work across shifting configurations of in-office and remote participants. This creates a genuine test of a team's ability to collaborate to communicate clearly, coordinate effort, balance contributions, and sustain mutual support and cohesion (Hoegl & Gemuenden, 2001) without the informal, incidental interaction that co-located teams take for granted.

A parallel line of research has examined the personality trait of emotional stability, the low-neuroticism pole of the Big Five taxonomy, which reflects an individual's capacity to stay composed, resist anxiety, and regulate emotional responses under pressure (Costa & McCrae, 1985, 2008). Meta-analytic evidence situates emotional stability as one of five broad predictors of job performance, albeit with effects that vary by occupation and criterion (Barrick & Mount, 1991). More recent work connects the trait directly to the hybrid and virtual context: emotionally stable employees adjust better to remote arrangements, communicate with less anxiety-driven friction, and are less prone to the communication breakdowns associated with high neuroticism (Zhu et al., 2024).

What is largely missing is a rigorous, India-specific study that connects emotional stability directly to team collaboration as opposed to job satisfaction, well-being, or general performance among IT professionals working hybrid schedules in a Tier-II technology cluster such as Coimbatore. Coimbatore hosts a substantial and growing IT and IT-enabled services workforce, and hybrid adoption in the region has followed the national pattern documented in nearby Tamil Nadu studies (Visithra, 2025). Closing this specific gap, with an honest and pre-registered-style methodology, is the purpose of the study designed in this manuscript.

1.2 Positioning Relative to Existing Research9

Before proposing a design, it is necessary to establish that the intended contribution does not duplicate existing work. A verification search identified several closely related but distinct studies.

First, Kaur and Chauhan (2025) examined emotional intelligence among IT professionals working in hybrid settings using exploratory and confirmatory factor analysis together with fuzzy DEMATEL. Their analysis identified trustworthiness, interpersonal influence, and adaptability as important elements shaping emotional clarity and self-expression, with implications for decision-making, collaboration, and job performance. However, emotional intelligence is a broader, multi-component construct than the specific Big Five personality dimension of emotional stability, and the study does not isolate emotional stability as the principal predictor of Teamwork Quality.

Second, Zhu et al. (2024) examined the interaction between Big Five personality traits and team-member expertness in virtual collaboration. Their study of dyadic teams demonstrated that personality composition can influence the benefits obtained from virtual collaboration, providing a relevant theoretical basis for considering emotional stability in digitally mediated teamwork. However, the

study used a dyadic virtual problem-solving setting rather than field data from working IT professionals in Coimbatore.

Third, Mo, Molléri, and Fagerstrøm (2026) investigated productivity and collaboration in hybrid Agile teams through interviews with Norwegian Agile teams. Their findings highlight reduced informal interaction, uneven participation, increased reliance on digital collaboration tools, and the importance of Agile ceremonies as alignment mechanisms in hybrid work. Although this work provides valuable evidence concerning the collaborative challenges created by hybrid arrangements, it does not specifically test emotional stability as an individual-level predictor of Teamwork Quality.

Taken together, these studies establish that emotional and personality-related characteristics, virtual collaboration, and hybrid-work conditions are interconnected areas of research. However, none of the identified studies isolates emotional stability as a predictor of Teamwork Quality-defined team collaboration among IT professionals in Coimbatore while simultaneously testing communication quality and psychological safety as mediating mechanisms and hybrid work modality as a moderating condition. This is the specific gap the proposed study targets.

Because no primary data collection has been carried out for this manuscript, the honest and appropriate deliverable at this stage is a complete, execution-ready research design rather than fabricated findings. Sections 2 through 4 develop that design in full; Section 5 shows precisely how results will be reported once fieldwork is completed.

1.3 Research Objectives and Hypotheses (Preview)

• **RO1:** Formalise a conceptual model linking emotional stability to team collaboration through communication quality and psychological safety.

• **RO2:** Specify a mixed-methods design, sampling plan, and validated instruments suitable for Coimbatore IT professionals working hybrid schedules.

• **RO3:** Derive the complete set of statistical equations reliability, validity, mediation, and moderation needed to test the model once data are collected.

• **RO4:** Provide a reporting template and structured data-analysis workflow so that results, when obtained, can be communicated in a standard, comparable format.

The conceptual model summarised in Figure 1 guides the entire design. Emotional stability is proposed to affect team collaboration both directly and indirectly through two mediators' communication quality and psychological safety with the relationship expected to be moderated by the intensity of an employee's hybrid work pattern (the remote-day ratio and the synchronicity of team interaction).

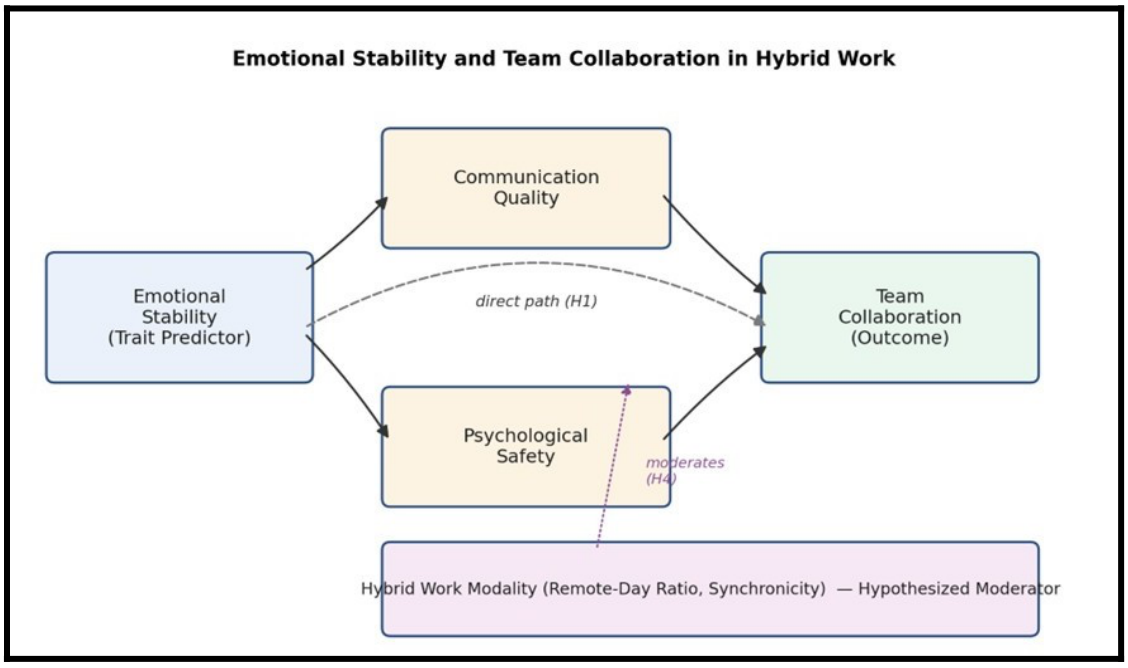


Figure 1. ***Conceptual framework linking emotional stability to team collaboration through communication quality and psychological safety, moderated by hybrid work modality.***

1.4 Scope and Organisation of This Manuscript

Section 2 reviews the theoretical and empirical literature underpinning each construct and derives four testable hypotheses. Section 3 presents the proposed methodology, including twelve numbered equations covering sampling, reliability, validity, and the mediation-moderation model, plus a structured data-analysis workflow. Section 4 details the planned data-collection setup: population, sampling frame, instruments, and procedure. Section 5 explains, with an explicit no-data-yet disclosure, how results will be reported using the notation defined in Section 3. Section 6 discusses anticipated contributions, the limitations inherent to the design itself, and ethical considerations for future fieldwork. Section 7 concludes.

2. Literature Review

2.1 Emotional Stability as a Personality Construct

Emotional stability is one of the five broad dimensions in the Big Five (Five-Factor) model of personality, positioned as the low pole of neuroticism (Costa & McCrae, 1985). Individuals high in emotional stability report fewer negative emotional episodes, recover more quickly from setbacks, and are less reactive to ambiguous or stressful stimuli; the trait is typically measured with the NEO Personality Inventory family of instruments (Costa & McCrae, 2008). In organisational research, Barrick and Mount's (1991) meta-analysis of the Big Five and job performance found that the predictive strength of emotional stability varied considerably by occupation and criterion and was in

some professional samples weaker than initially expected a finding this manuscript treats as a caution against assuming a large effect size a priori for the present sample.

More recent workplace-focused sources describe emotional stability as encompassing stress resistance, a positive baseline attitude, and self-confidence under pressure, and link it consistently to better adjustment in remote and hybrid arrangements. In digitally mediated work environments, employees are required to manage interruptions, communication delays, changing work locations, and reduced opportunities for spontaneous interpersonal interaction. These conditions make individual differences in emotional regulation potentially relevant to the quality and consistency of collaborative behaviour.

The relevance of emotional stability becomes particularly important in IT work because technical projects frequently require employees to coordinate interdependent tasks under time pressure. Employees who remain composed when facing ambiguity or workload pressure may be better positioned to communicate clearly, respond constructively to disagreements, and maintain cooperative behaviour when direct face-to-face interaction is limited. The present study therefore treats emotional stability as an individual-level characteristic that may influence collaborative processes rather than if the trait directly determines team outcomes.

2.2 Team Collaboration and Teamwork Quality

Team collaboration is operationalised in this design using Hoegl and Gemuenden's (2001) Teamwork Quality (TWQ) construct, one of the widely used multi-facet measures of collaborative process in project-based teams. TWQ comprises six facets communication, coordination, balance of member contributions, mutual support, effort, and cohesion and has been shown to predict both team performance and individual member satisfaction in software and innovation-project settings, including virtual and distributed teams.

The multidimensional structure of TWQ is particularly appropriate for the present research because collaboration in hybrid IT teams cannot be reduced to a single measure of whether employees like working with their colleagues. Effective collaboration involves several connected behaviours: exchanging information accurately, coordinating interdependent tasks, contributing appropriately, supporting colleagues, sustaining effort, and maintaining cohesion. These dimensions can become more difficult to manage when employees work across different physical locations and rely heavily on digital communication.

A closely related construct, psychological safety, describes a shared team belief that interpersonal risk-taking asking questions, admitting mistakes, proposing ideas is safe; Edmondson (1999) demonstrated that psychological safety predicts team learning behaviour, which in turn mediates the relationship between team-level structural supports and team performance. Because psychological safety plausibly depends on members' emotional composure under pressure, it is proposed here as a mediating mechanism between emotional stability and Teamwork-Quality-defined collaboration.

Communication quality is also central to the TWQ framework. In hybrid teams, communication frequently occurs through multiple digital channels, including email, instant messaging, project-management platforms, video meetings, and collaborative documentation systems. Differences in clarity, responsiveness, and interpretation across these channels may influence how effectively team members coordinate their work. Accordingly, the present study treats communication quality as a separate mediating mechanism while retaining the broader six-facet TWQ construct as the principal outcome.

2.3 Hybrid Work Arrangements: Prevalence and Characteristics

Hybrid work a structured mix of remote and on-site working days has stabilised as the dominant flexible-work model in knowledge-intensive sectors. Gallup's most recent workforce data show hybrid participation levelling out after a peak in 2022, with the specific balance of days increasingly set by teams and managers rather than centralised policy (HR Dive, 2025). Bell and Kozlowski's (2002) typology of virtual teams remains a foundational lens for this shift: they distinguish teams by the degree of spatial and temporal dispersion and argue that leadership and coordination demands intensify as virtuality increases, a point directly relevant to hybrid IT teams that alternate between co-located and dispersed configurations from week to week.

Field evidence from Agile software teams supports this perspective. Mo, Molléri, and Fagerstrøm (2026) report, based on interviews with three Norwegian Agile teams, that hybrid work reduces informal interaction, produces uneven participation, and increases reliance on digital tools, while Agile ceremonies come to function as alignment anchors that partially substitute for lost informal contact. These observations suggest that the effect of hybrid work cannot be understood simply through the number of remote days. The quality and synchronicity of interaction are also relevant to how employees coordinate tasks and maintain shared understanding.

For this reason, the present design operationalises hybrid work modality using both remote-day ratio and the synchronicity of team interaction. This approach allows the study to investigate whether the relationship between emotional stability and collaboration changes as employees experience different levels of physical and temporal dispersion.

2.4 Emotional Stability, Emotional Intelligence, and IT Professionals in Hybrid Settings

A cluster of recent studies connects emotion-related constructs to hybrid-work outcomes specifically among IT professionals. Kaur and Chauhan (2025), analysing 422 valid responses from IT professionals, used exploratory and confirmatory factor analysis together with a fuzzy DEMATEL expert-panel method to show that trustworthiness, interpersonal influence, and adaptability are causal drivers of emotional intelligence dimensions, which in turn enhance decision-making, collaboration, and job performance in hybrid settings.

Although emotional intelligence and emotional stability are conceptually distinct, this evidence is relevant because it demonstrates the importance of emotion-related individual characteristics in technology-mediated work. Emotional intelligence incorporates several capacities and competencies, whereas emotional stability represents a relatively broad personality dimension concerned with emotional reactivity and regulation. The present study therefore does not treat the two constructs as interchangeable; instead, the emotional-intelligence literature provides contextual evidence supporting the broader relevance of emotional processes to hybrid IT work.

At the team level, Zhu et al. (2024) integrated transactive memory systems theory with the Big Five model in a study of 377 dyadic teams, finding that personality composition, including neuroticism, shaped how much dyads gained from virtual collaboration. Because neuroticism represents the opposite pole of emotional stability within the Big Five framework, these findings provide a theoretical basis for investigating whether emotional stability is associated with collaborative outcomes under digitally mediated working conditions.

Lee and Wong (2019) further showed, using data from Korean organisational teams, that team-level emotional intelligence reduces both task and relationship conflict and increases team effectiveness, moderating the harmful effect of conflict on cohesion. Kiran Gupta (2025), in a systematic review of team-dynamics research, concluded that emotional-intelligence training improves team collaboration and reduces conflict but that objective, longitudinal evaluation of these effects especially in AI-augmented hybrid teams remains underdeveloped.

Taken together, this literature indicates that emotional and personality-related characteristics can be relevant to communication, conflict management, collaboration, and team effectiveness. However, the evidence remains differentiated across constructs, populations, and research settings. The present study addresses this limitation by focusing specifically on emotional stability, Teamwork Quality, and hybrid IT professionals in Coimbatore.

2.5 Coimbatore and Tamil Nadu IT-Sector Evidence, and the Remaining Gap

Regional evidence situates the present study geographically. Existing research on the Tamil Nadu IT sector has examined the broader implications of hybrid work for employee well-being, work-life balance, autonomy, flexibility, and psychological safety. Visithra (2025), for example, proposed that autonomy, flexible scheduling, and psychological safety can influence the relationship between hybrid work models and employee well-being, while regional organisations may experience changes in workplace happiness and retention as flexible work arrangements become more established.

The broader hybrid-work literature also indicates that the collaborative consequences of remote and on-site work may depend on how employees interact rather than merely on whether they work remotely. Mo, Molléri, and Fagerstrøm (2026) found that hybrid Agile teams experienced reduced informal interaction and increased dependence on digital tools, while structured Agile ceremonies served as important mechanisms for maintaining alignment. Similarly, Zhu et al. (2024) demonstrated that personality composition can influence outcomes in virtual collaboration.

These studies provide useful regional, organisational, and theoretical foundations for the proposed investigation. However, the existing evidence does not formally test emotional stability as the focal individual-level predictor of Teamwork Quality among Coimbatore IT professionals while simultaneously examining communication quality and psychological safety as mediators and hybrid work modality as a moderator.

The present design is positioned precisely in that space: it focuses on emotional stability as the predictor, Teamwork Quality as the principal collaborative outcome, communication quality and psychological safety as explanatory mechanisms, and hybrid work modality as a contextual moderator. This combination provides a more specific framework for examining how individual emotional characteristics may relate to collaboration under hybrid working conditions.

2.6 Hypotheses

• **H1:** Emotional stability is positively associated with team collaboration (Teamwork Quality) among Coimbatore IT professionals, net of mediating mechanisms (direct effect, path c′).

• **H2:** Communication quality mediates the relationship between emotional stability and team collaboration (indirect effect via path $a_1 \times b_1$).

• **H3:** Psychological safety mediates the relationship between emotional stability and team collaboration (indirect effect via path $a_2 \times b_2$).

• **H4:** Hybrid work modality (remote-day ratio and synchronicity of team interaction) moderates the emotional-stability-to-mediator paths, such that the association is stronger for employees with higher remote-day ratios.

3. Proposed Framework and Methodology

3.1 Research Design Overview

A sequential explanatory mixed-methods design is proposed (Figure 2). In Phase 1, a structured, validated survey instrument is administered to a stratified sample of Coimbatore IT professionals working hybrid schedules; the resulting data are analysed quantitatively through a reliability check, confirmatory factor analysis, and a partial least squares structural equation model (PLS-SEM) estimating the mediation-moderation model in Figure 1.

In Phase 2, a purposively selected subset of survey respondents is invited to semi-structured follow-up interviews, analysed thematically, to explain and contextualise the quantitative path estimates. The two phases are combined in an integration or joint-display step, consistent with standard mixed-methods triangulation practice.

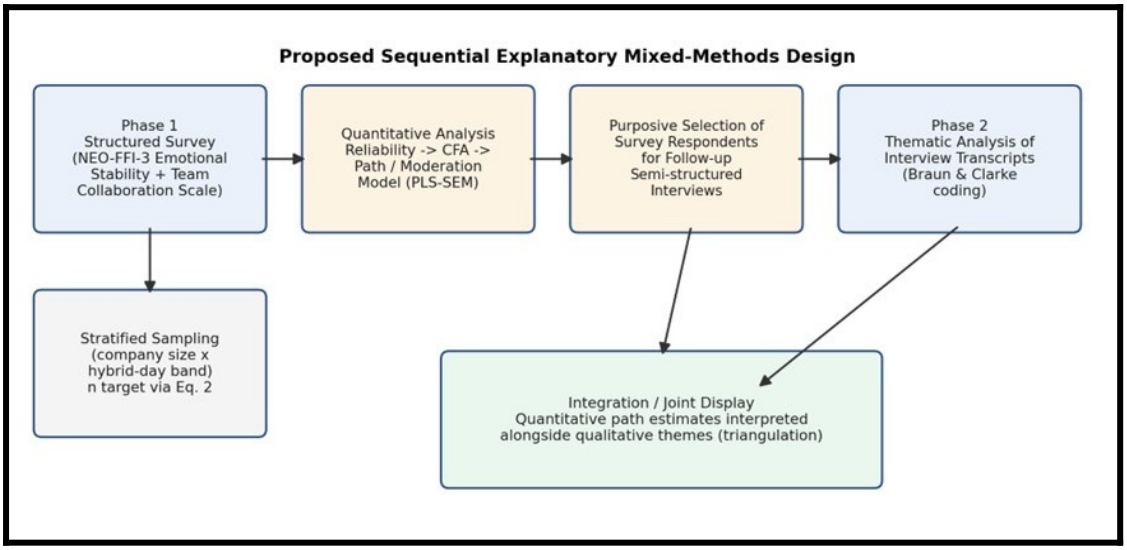


Figure 2. ***Proposed sequential explanatory mixed-methods design, from survey administration through integration with qualitative interview themes.***

3.2 Population, Sampling Frame, and Sample Size

The target population is full-time IT professionals employed by companies operating in Coimbatore that have formally adopted a hybrid work policy (a mix of remote and on-site days). Because an exact sampling frame (a company-level census) is not publicly available, the design specifies probability-style stratified sampling within a purposive frame of participating organisations, stratified by company size (small/mid/large) and hybrid-day band (1–2, 3, or 4+ remote days per week).

The base sample size is first computed using Cochran's formula for an unknown population proportion, then adjusted with the finite population correction if the accessible sampling frame is smaller than roughly 10,000 employees.

Equation (1):

$n_0 = ZZp(1-p) / eZ$

where Z is the standard normal critical value for the desired confidence level (1.96 for 95% confidence), p is the assumed population proportion (conservatively set to 0.5 to maximise the required sample), and e is the desired margin of error (planned at 0.05).

Equation (2):

$n = n_0 / [1 + (n_0 - 1) / N]$

where N is the estimated size of the accessible sampling frame (the combined hybrid-eligible headcount of participating Coimbatore IT organisations).

With Z = 1.96, p = 0.5, and e = 0.05, Equation 1 yields a base requirement of $n_0 \approx 384$ respondents before any finite-population adjustment; the final target will be finalised once the accessible frame N is established during site recruitment and inflated by an anticipated 20% to allow for incomplete or unusable responses.

3.3 Measurement Instruments and Reliability

Emotional stability will be measured with the Emotional Stability subscale of the NEO Five-Factor Inventory, derived from the NEO Personality Inventory family (Costa & McCrae, 1985, 2008), using its standard Likert response format.

Team collaboration will be measured with Hoegl and Gemuenden's (2001) Teamwork Quality scale across its six facets: communication, coordination, balance of contributions, mutual support, effort, and cohesion.

Communication quality will be operationalised using the communication facet items supplemented by hybrid-specific items on digital-channel clarity. Psychological safety will use Edmondson's (1999) seven-item scale.

Internal consistency for every multi-item scale will be assessed with Cronbach's alpha before any further analysis.

Equation (3):

$$\alpha = [k / (k - 1)] \cdot [1 - (\Sigma\sigma_i Z / \sigma^T Z)]$$

where k is the number of items in the scale, $\sigma_i Z$ is the variance of item i, and $\sigma^T Z$ is the variance of the summed scale score (Cronbach, 1951). A threshold of $\alpha \geq 0.70$ will be required for a scale to be retained without modification.

Because the structural model will be estimated with PLS-SEM, composite reliability and average variance extracted (AVE) will also be reported for every latent construct.

Equation (4):

$$CR = (\Sigma\lambda_i) Z / [(\Sigma\lambda_i) Z + \Sigma (1 - \lambda_i Z)]$$

Equation (5):

$$AVE = (\Sigma\lambda_i Z) / n$$

where λ_i is the standardised outer loading of indicator i on its latent construct and n is the number of indicators. Composite reliability is expected to exceed 0.70 and AVE to exceed 0.50 for each construct, consistent with conventional PLS-SEM thresholds.

3.4 Discriminant Validity

Two complementary discriminant-validity checks are specified. The Fornell-Larcker criterion requires that the square root of each construct's AVE exceed its correlation with every other construct in the model:

Equation (6):

$$\sqrt{AVE_i} > corr(\xi_i, \xi_j) \text{ for all } j \neq i$$

(Fornell & Larcker, 1981).

Because the Fornell-Larcker criterion is known to under-detect discriminant-validity problems in some conditions, the heterotrait-monotrait ratio of correlations (HTMT) will also be computed.

Equation (7):

$$HTMT = mean(r_{hat}) / \sqrt{[mean(r_{other})]}$$

where r_a denotes the set of heterotrait (between-construct) indicator correlations and r_o denotes the set of monotrait (within-construct) indicator correlations; an HTMT value below 0.85 (or the more conservative 0.90) indicates adequate discriminant validity (Henseler, Ringle, & Sarstedt, 2015).

3.5 Structural Model: Mediation and Moderation

The structural model tests the direct, indirect, and moderated paths implied by Hypotheses H1–H4 (see Figure 3 for the planned path notation).

Mediator regressions (path a) are specified as:

Equation (8):

$$M_j = \beta_0 + a_j \cdot EmoStab + \Sigma\gamma_k \cdot Controls_k + \varepsilon_j$$

for each mediator j (communication quality, psychological safety), where Controls includes age, gender, tenure, and job role, entered to reduce confounding.

The outcome regression (paths b and the direct path c′) is specified as:

Equation (9):

$$TeamCollab = \beta_0 + \Sigma b_j \cdot M_j + c' \cdot EmoStab + \Sigma\gamma_k \cdot Controls_k + \varepsilon$$

The indirect (mediated) effect of emotional stability on team collaboration through mediator j is the product of the corresponding a and b coefficients and will be tested for significance using bias-corrected bootstrap confidence intervals (5,000 resamples) rather than the Sobel test, consistent with current best practice for mediation in small-to-moderate field samples.

Equation (10):

$$IE_j = a_j \times b_j,\ CI_{95}\% \text{ via bootstrap resampling}$$

Moderation by hybrid work modality (H4) is tested by adding an interaction term between emotional stability and the standardised hybrid-day ratio to the mediator equations (Equation 8), following mean-centring of both component variables to reduce multicollinearity.

Equation (11):

$$M_j = \beta_0 + a_j \cdot EmoStab + \delta \cdot HybridRatio + \theta_j \cdot (EmoStab \times HybridRatio) + \varepsilon_j$$

A significant θ_j coefficient supports moderated mediation, indicating that the strength of the indirect path depends on how much of the working week is spent remote.

3.6 Model Evaluation Metrics

Explained variance in each endogenous construct is reported as the coefficient of determination, RZ, and the incremental contribution of each predictor is reported as Cohen's fZ effect size.

Equation (12):

$$fZ = (RZincl - RZexcl) / (1 - RZincl)$$

where RZincl is the variance explained with the predictor of interest included in the model and RZexcl is the variance explained with that predictor excluded.

Conventional benchmarks (0.02 small, 0.15 medium, 0.35 large) will be used to interpret effect sizes but will be reported alongside confidence intervals rather than treated as a pass/fail criterion, since the

sample is a single-region case study and should not be over-interpreted as generalisable to the wider Indian IT sector.

3.7 Common Method Bias and Ethical Considerations

Because emotional stability, the mediators, and team collaboration will all be collected via a single self-report survey, common method variance is a plausible threat to validity. The design specifies Harman's single-factor test (all items loaded onto one unrotated factor, checked for whether a single factor accounts for the majority of covariance) as a diagnostic step, together with procedural remedies recommended by Podsakoff, MacKenzie, Lee, and Podsakoff (2003): psychological separation of predictor and outcome blocks in the survey, reverse-worded attention-check items, and assurances of anonymity to reduce social-desirability pressure.

All fieldwork will require informed consent, voluntary participation, and institutional ethics clearance before any data collection begins; these procedural safeguards are elaborated further in Section 6.3.

3.8 Planned Data-Analysis Workflow

The following workflow replaces the original algorithm-based presentation while preserving the same analytical sequence and statistical procedures specified in Sections 3.3–3.7.

Stage	Analytical Activity	Key Procedure / Criterion	Expected Output
1	Data screening and cleaning	Remove incomplete cases, reverse-score applicable items, and identify attention-check failures	Clean analysis dataset
2	Reliability assessment	Calculate Cronbach's alpha for each multi-item construct using Equation 3	Internal-consistency report
3	Item assessment	Inspect item-total relationships where reliability is below the specified threshold; consider item retention or removal transparently	Finalised measurement items
4	Measurement-model assessment	Conduct confirmatory factor analysis and examine standardised indicator loadings	Measurement-model results
5	Composite reliability	Calculate composite reliability using Equation 4	Construct reliability estimates
6	Convergent validity	Calculate AVE using Equation 5 and assess the specified threshold	Convergent-validity assessment
7	Discriminant validity	Apply the Fornell-Larcker criterion using Equation 6	Fornell-Larcker assessment
8	Discriminant validity	Calculate HTMT using Equation 7	HTMT matrix and validity

	confirmation		assessment
9	Mediator modelling	Estimate the relationship between emotional stability and communication quality / psychological safety using Equation 8	Path a estimates
10	Moderation assessment	Introduce the Emotional Stability × Hybrid Ratio interaction using Equation 11	Moderation / interaction estimates
11	Structural outcome model	Estimate TeamCollab from the mediators, emotional stability, and controls using Equation 9	Direct and mediator-related path estimates
12	Mediation assessment	Use 5,000 bootstrap resamples to estimate indirect effects $a_j \times b_j$ using Equation 10	Indirect effects and 95% confidence intervals
13	Model explanatory power	Calculate RZ for endogenous constructs	Explained-variance estimates
14	Effect-size assessment	Calculate Cohen's fZ using Equation 12	Small, medium, or large effect-size estimates
15	Common-method-bias assessment	Apply Harman's single-factor diagnostic and review procedural safeguards	Common-method-bias assessment
16	Qualitative analysis	Conduct thematic coding of Phase 2 interview transcripts	Qualitative themes
17	Mixed-methods integration	Compare qualitative themes with quantitative path estimates using a joint display	Integrated interpretation
18	Final reporting	Populate the reporting templates described in Section 5 without fabricating or presupposing findings	Complete results report

Table 1. Planned data-analysis workflow for the emotional-stability and team-collaboration model.

The workflow is intentionally presented as a structured sequence rather than as pseudocode. It retains the same analytical logic: data screening, reliability, measurement-model assessment, convergent and discriminant validity, mediation, moderation, model evaluation, common-method-bias assessment, qualitative thematic analysis, and mixed-methods integration. No numerical findings are implied by the workflow.

4. Data and Experimental Setup

4.1 Target Population and Sampling Plan

The accessible population comprises full-time employees in software development, IT services, quality assurance, and technical support roles at Coimbatore-based IT and IT-enabled-services organisations that operate a formal hybrid work policy. Recruitment will proceed through partnering HR departments and professional networks (e.g., regional IT industry associations), using the stratified frame described in Section 3.2: company size (small, under 200 employees; mid, 200–1,000; large, over 1,000) crossed with hybrid-day band (1–2, 3, or 4+ remote days per week).

Quota targets within each stratum will be set proportional to the estimated workforce distribution obtained from participating organisations' HR records at the time of fieldwork.

4.2 Planned Data Collection Procedure

• **Step 1 Pilot test:** the combined instrument (Emotional Stability subscale, Teamwork Quality scale, Communication Quality items, Psychological Safety scale, and hybrid-work descriptors) will be piloted with 30–40 respondents to check item clarity and preliminary reliability before full deployment.

• **Step 2 Main survey:** the revised instrument will be distributed electronically to the stratified sample computed via Equations 1–2, with reminder cycles to improve response rate.

• **Step 3 Screening:** responses will be checked for completion, attention-check performance, and straight-lining before inclusion in the analysis sample.

• **Step 4 Follow-up interview sampling:** from consenting survey respondents, 12–16 individuals will be purposively selected to represent the extremes and midpoint of the emotional-stability and hybrid-day-ratio distributions, for 30–45-minute semi-structured interviews.

• **Step 5 Integration:** quantitative path estimates and qualitative themes will be combined in a joint display (Figure 2) to support interpretation, consistent with sequential explanatory mixed-methods practice.

4.3 Instrumentation Summary

Construct	Instrument / Source	Facets or Items	Format
Emotional stability	NEO-FFI Emotional Stability subscale (Costa & McCrae, 1985, 2008)	12 items (single factor)	5-point Likert
Team collaboration	Teamwork Quality scale (Hoegl & Gemuenden, 2001)	6 facets: communication, coordination, contribution balance, mutual support, effort, cohesion	5-point Likert
Communication quality	TWQ communication facet + hybrid-specific items	4–6 items	5-point Likert
Psychological safety	Edmondson (1999) team psychological safety scale	7 items	5-point Likert (reverse-scored

			subset)
Hybrid work modality	Study-specific descriptors	Remote-day ratio; synchronous-meeting frequency	Numeric / categorical
Controls	Demographic block	Age, gender, tenure, role, company size	Categorical / numeric

Figure 3 Previews how path estimates from this instrumentation will be reported once fieldwork is complete: it is a structural diagram using symbolic path notation (β, c′) rather than numerical results, because no primary data collection has yet taken place for this manuscript.

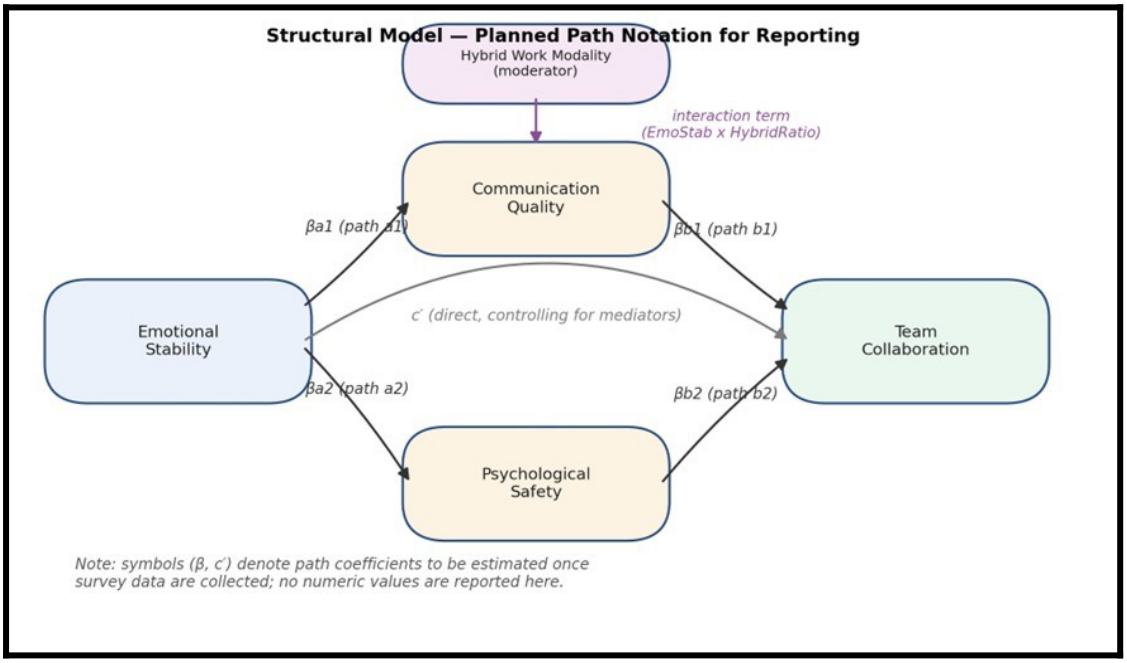


Figure 3. ***Planned structural-model reporting template with symbolic path notation; no numeric values are implied or reported.***

5. Results Reporting Plan

5.1 Data Status and Reporting Principle

At the time of preparation of this manuscript, primary survey and interview data have not yet been collected. Consequently, no numerical results, statistical significance values, effect sizes, confidence intervals, or qualitative themes are reported as observed findings.

The purpose of this section is to specify in advance how the results will be presented after data collection. This approach prevents fabrication or retrospective selection of findings and ensures that the final empirical report remains consistent with the research questions, hypotheses, measurement model, and statistical procedures defined in Sections 2–4.

5.2 Participant and Sample Characteristics

Once data collection is completed, the first results table will summarise the characteristics of the usable survey sample. The reporting structure will include age group, gender, job role, organisational size, years of professional experience, and hybrid-work pattern.

Table 2. Planned demographic and occupational profile of survey respondents

Variable	Category	Frequency (n)	Percentage (%)
Age	18–25	To be reported	To be reported
	26–35	To be reported	To be reported
	36–45	To be reported	To be reported
	46 and above	To be reported	To be reported
Gender	Category 1	To be reported	To be reported
	Category 2	To be reported	To be reported
	Other / Prefer not to say	To be reported	To be reported
Job role	Software development	To be reported	To be reported
	Quality assurance	To be reported	To be reported
	Technical support	To be reported	To be reported
	Other IT role	To be reported	To be reported
Experience	Less than 3 years	To be reported	To be reported
	3–5 years	To be reported	To be reported
	6–10 years	To be reported	To be reported
	More than 10 years	To be reported	To be reported
Remote work	1–2 days/week	To be reported	To be reported
	3 days/week	To be reported	To be reported
	4+ days/week	To be reported	To be reported

The final manuscript will replace the placeholder cells with observed frequencies and percentages after data screening.

5.3 Measurement Model Results

The measurement-model results will be reported before testing the structural hypotheses. This sequence ensures that the reliability and validity of the constructs are established before interpreting relationships between latent variables.

For each construct, the final empirical paper will report the number of retained indicators, standardised outer loadings, Cronbach's alpha, composite reliability, and average variance extracted.

Table 3. Planned measurement-model reporting structure

Construct	Indicators retained	Loading range	Cronbach's α	Composite Reliability	AVE
Emotional Stability	To be reported	To be reported	To be reported	To be reported	To be reported
Communication Quality	To be reported	To be reported	To be reported	To be reported	To be reported

Psychological Safety	To be reported	To be reported	To be reported	To be reported	To be reported
Teamwork Quality	To be reported	To be reported	To be reported	To be reported	To be reported

The values will be calculated using the procedures defined in Section 3.3. No indicator will be removed solely to improve statistical values without a theoretical or measurement-based justification.

5.4 Convergent and Discriminant Validity

Convergent validity will be evaluated using the indicator loadings, composite reliability, and AVE specified previously. The final results will state whether each construct meets the predefined measurement criteria.

Discriminant validity will then be examined using both the Fornell-Larcker criterion and HTMT. This dual assessment is particularly important because emotional stability, psychological safety, communication quality, and teamwork quality are conceptually related constructs.

Table 4. Planned discriminant-validity reporting matrix

Construct	**Emotional Stability**	**Communication Quality**	**Psychological Safety**	**Teamwork Quality**
Emotional Stability	√AVE	To be calculated	To be calculated	To be calculated
Communication Quality	To be calculated	√AVE	To be calculated	To be calculated
Psychological Safety	To be calculated	To be calculated	√AVE	To be calculated
Teamwork Quality	To be calculated	To be calculated	To be calculated	√AVE

A separate HTMT matrix will be reported in the final empirical manuscript.

5.5 Descriptive Statistics and Correlations

Means, standard deviations, and zero-order correlations will be reported for the principal constructs before the structural model is interpreted.

Table 5. Planned descriptive-statistics and correlation table

Construct	**Mean**	**SD**	**1**	**2**	**3**	**4**
1. Emotional Stability	To be reported	To be reported	—			
2. Communication Quality	To be reported	To be reported	To be reported	—		
3. Psychological Safety	To be reported	To be reported	To be reported	To be reported	—	

4. Teamwork Quality	To be reported	To be reported	To be reported	To be reported	To be reported	—

The correlation table will be interpreted descriptively and will not be used as a substitute for the structural model.

5.6 Structural Model and Hypothesis Testing

The structural model will be evaluated after the measurement model has demonstrated acceptable reliability and validity.

The primary outcome is Teamwork Quality. Emotional stability is the principal predictor. Communication quality and psychological safety are specified as mediators, while hybrid work modality is examined as a moderator.

The final structural-model table will report the estimated path coefficient, standard error, test statistic, confidence interval, significance level, and decision regarding each hypothesis.

Table 6. Planned structural-model and hypothesis-testing table

Hypothesis	Structural path	β	SE	Test statistic	95% CI	p-value	Decision
H1	Emotional Stability → Teamwork Quality	To be reported	To be reported	To be reported	To be reported	To be reported	To be determined
H2	Emotional Stability → Communication Quality → Teamwork Quality	To be reported	To be reported	To be reported	To be reported	To be reported	To be determined
H3	Emotional Stability → Psychological Safety → Teamwork Quality	To be reported	To be reported	To be reported	To be reported	To be reported	To be determined
H4	Emotional Stability × Hybrid Ratio →	To be reported	To be reported	To be reported	To be reported	To be reported	To be determined

	Mediator(s)						

The final empirical report will determine whether each hypothesis is supported based solely on the observed data and predefined analytical criteria.

5.7 Mediation Analysis

The mediation analysis will estimate whether communication quality and psychological safety explain part of the association between emotional stability and Teamwork Quality.

The indirect effect for each mediator will be estimated using the product of the relevant a and b paths:

$IE_j = a_j \times b_j$

The statistical significance of each indirect effect will be evaluated using bias-corrected bootstrap confidence intervals based on 5,000 resamples.

Table 7. Planned mediation-analysis reporting structure

Mediator	Indirect effect	Bootstrap SE	95% Bootstrap CI	Interpretation
Communication Quality	To be reported	To be reported	To be reported	To be determined
Psychological Safety	To be reported	To be reported	To be reported	To be determined

If the confidence interval does not include zero, the corresponding indirect effect will be interpreted as statistically supported. The strength and practical importance of the effect will also be considered rather than relying only on statistical significance.

5.8 Moderation and Conditional Effects

Hybrid work modality will be examined as a contextual variable. The principal moderation analysis will focus on the interaction between emotional stability and the remote-day ratio.

A statistically meaningful interaction would indicate that the association between emotional stability and the relevant mediator changes according to the proportion of working days spent remotely.

Where an interaction is supported, conditional effects will be examined at theoretically meaningful levels of hybrid intensity rather than interpreting the interaction coefficient in isolation.

Table 8. Planned moderation-analysis reporting structure

Interaction	β	SE	Test statistic	95% CI	p-value	Interpretation

Emotional Stability × Hybrid Ratio → Communication Quality	To be reported	To be reported	To be reported	To be reported	To be reported	To be determined
Emotional Stability × Hybrid Ratio → Psychological Safety	To be reported	To be reported	To be reported	To be reported	To be reported	To be determined

5.9 Explained Variance and Effect Sizes

The final analysis will report RZ values for endogenous constructs to indicate the proportion of variance explained by the structural model.

Cohen's fZ will also be calculated to assess the incremental contribution of individual predictors. The values will be interpreted using the conventional reference points specified in Section 3.6 while recognising that the study represents a geographically bounded sample.

Table 9. Planned explanatory-power and effect-size reporting

Endogenous construct	**R^2**	**Predictor**	**f^2**	**Interpretation**
Communication Quality	To be reported	Emotional Stability	To be reported	To be determined
Psychological Safety	To be reported	Emotional Stability	To be reported	To be determined
Teamwork Quality	To be reported	Emotional Stability	To be reported	To be determined
Teamwork Quality	To be reported	Communication Quality	To be reported	To be determined
Teamwork Quality	To be reported	Psychological Safety	To be reported	To be determined

5.10 Qualitative Findings

The qualitative phase will be conducted only after completion of the quantitative survey. Interview participants will be selected purposively from survey respondents who provide separate consent for follow-up participation.

The interviews will explore how IT professionals experience emotional regulation, communication, psychological safety, coordination, and collaboration when working across remote and on-site locations.

Thematic analysis will be used to identify recurring patterns in participants' accounts. The qualitative results will not be used to manufacture or replace quantitative evidence. Instead, they will provide contextual explanations for statistically observed relationships or non-significant relationships.

Potential thematic areas will include:

• Managing emotional pressure during remote collaboration;

• Communication delays and misunderstandings;

• Maintaining psychological safety in digital interactions;

• Differences between online and face-to-face teamwork;

• Informal interaction and relationship building;

• Coordination of interdependent technical tasks; and

• Strategies employees use to maintain team cohesion.

These are analytical areas rather than predetermined findings. Actual themes will be reported only if supported by interview data.

5.11 Mixed-Methods Integration

The final stage of the analysis will integrate quantitative and qualitative evidence.

Table 10. Planned mixed-methods integration framework

Quantitative finding	**Qualitative evidence**	**Integrated interpretation**
Emotional Stability → Teamwork Quality	Relevant interview explanations	To be determined
Emotional Stability → Communication Quality	Relevant interview explanations	To be determined
Emotional Stability → Psychological Safety	Relevant interview explanations	To be determined
Hybrid moderation effect	Relevant interview explanations	To be determined
Non-significant pathway, if observed	Contrasting or explanatory themes	To be determined

The purpose of integration is to identify convergence, complementarity, or divergence between the two phases. A qualitative explanation will not be used to claim statistical support for a hypothesis that is not supported quantitatively.

6. Discussion

6.1 Expected Theoretical Contribution

The proposed study is designed to contribute to the literature on personality and teamwork by placing emotional stability within a specific hybrid-work context. Existing research has considered personality composition in virtual collaboration and emotional-intelligence-related factors in hybrid IT work, but the proposed model focuses specifically on emotional stability as an individual-level predictor of Teamwork Quality.

The study further extends this perspective by considering communication quality and psychological safety as possible mechanisms. Rather than assuming that emotional stability automatically produces better collaboration, the model asks whether emotionally stable employees experience or create more effective communication and psychologically safer interactions, which may subsequently contribute to stronger teamwork quality.

This mechanism-oriented approach may help distinguish direct personality effects from process-level pathways. It also provides a framework for understanding why the same personality characteristic may have different practical consequences under different working conditions.

6.2 Contribution to Hybrid-Work Research

Hybrid work introduces a distinctive combination of physical separation, digital communication, asynchronous interaction, and periodic face-to-face contact. The proposed study treats hybrid work modality as more than a simple demographic characteristic.

The remote-day ratio and interaction synchronicity are incorporated into the analytical model so that the study can examine whether the relationship between emotional stability and collaborative processes changes with the intensity of hybrid work.

This approach is consistent with recent evidence that hybrid teams may experience reduced informal interaction, uneven participation, and greater reliance on structured communication mechanisms. The proposed study therefore connects individual-level personality characteristics with team-level collaborative processes within the practical conditions of hybrid IT work.

6.3 Practical Implications

If the proposed relationships are supported after data collection, the findings could have several practical implications for IT organisations.

First, organisations may consider personality-related characteristics when designing team-development initiatives. This does not imply using emotional stability as a selection criterion for employment. Rather, personality information, where collected ethically and voluntarily, may help organisations understand different support needs within hybrid teams.

Second, organisations could strengthen communication structures for hybrid teams. Clear meeting practices, documented decisions, transparent task allocation, and appropriate use of synchronous and asynchronous channels may reduce ambiguity and improve coordination.

Third, managers could focus on psychological safety by encouraging employees to raise concerns, ask questions, admit mistakes, and share alternative viewpoints without fear of negative interpersonal consequences.

Fourth, organisations could provide support mechanisms for employees who experience greater emotional strain under hybrid working conditions. Such support should be developmental rather than punitive.

Finally, hybrid-work policies could recognise that effective collaboration depends not only on the number of remote days but also on how teams structure interaction, coordination, and informal relationship building.

These implications remain conditional on the results of the future empirical study.

6.4 Methodological Strengths

Several design features strengthen the proposed study.

First, the research uses validated measurement instruments rather than relying entirely on newly created scales.

Second, the design separates the measurement-model assessment from structural hypothesis testing, reducing the risk of interpreting relationships between poorly measured constructs.

Third, both mediation and moderation are incorporated into a theoretically specified framework rather than being added after observing the data.

Fourth, the sequential explanatory mixed-methods design provides an opportunity to contextualise quantitative relationships using participant experiences.

Fifth, the manuscript explicitly distinguishes planned analyses from empirical findings. This is particularly important because the study has not yet entered the primary-data collection stage.

6.5 Limitations

The study design has several limitations that should be acknowledged before fieldwork.

First, the geographical focus is restricted to Coimbatore. Findings obtained from this population may not generalise to IT professionals in other Indian technology centres or other national contexts.

Second, the primary quantitative data are expected to be collected through self-report instruments. This creates the possibility of common-method variance, social-desirability effects, and subjective interpretation of survey items.

Third, the cross-sectional survey component limits the ability to establish temporal causality. Even if significant relationships are observed, the design cannot demonstrate that emotional stability causes changes in Teamwork Quality.

Fourth, the accessible sampling frame depends on organisational participation. Employees from organisations that decline participation will not be represented, potentially creating selection bias.

Fifth, the hybrid-work environment is dynamic. Organisational policies may change during or after the study, and employees' remote-day patterns may vary over time.

Sixth, the mixed methods interview sample will be substantially smaller than the survey sample. Qualitative findings will therefore provide contextual depth rather than statistical generalisation.

Seventh, emotional stability is only one individual-level characteristic. Other factors, including emotional intelligence, conscientiousness, leadership style, team composition, workload, organisational culture, and technological resources, may also influence team collaboration.

6.6 Ethical Considerations

Before primary data collection begins, the research team will obtain the required institutional ethical approval.

Participation will be voluntary. Participants will receive information explaining the purpose of the study, the expected time commitment, the nature of the questions, and their right to withdraw without penalty.

No participant will be required to provide information that directly identifies them in the analytical dataset. Where demographic information is collected, categories will be designed to minimise the possibility of individual identification.

The study will not disclose individual employees' emotional-stability scores to employers or managers. Personality information should not be used for employment discrimination, performance punishment, or involuntary employee profiling.

Interview recordings, transcripts, and survey datasets will be stored securely and accessed only by authorised members of the research team. Reporting will use aggregate results and anonymised quotations where applicable.

Because emotional stability concerns personal psychological characteristics, participants will be informed that the research is not a clinical assessment and that the questionnaire does not constitute a diagnosis or mental-health evaluation.

7. Conclusion

Hybrid work has created a new environment in which IT professionals must coordinate complex tasks while moving between remote and on-site settings. Within this environment, individual differences in emotional stability may influence how employees communicate, respond to pressure, maintain psychological safety, and participate in collaborative work.

Existing literature provides important evidence concerning personality and virtual collaboration, emotional intelligence in hybrid IT settings, and the challenges experienced by hybrid Agile teams.

However, the specific relationship between emotional stability and Teamwork Quality among IT professionals in Coimbatore remains insufficiently examined.

This manuscript therefore provides a complete, theoretically grounded research design for addressing that gap. The proposed model positions emotional stability as the primary predictor, Teamwork Quality as the principal outcome, communication quality and psychological safety as mediators, and hybrid work modality as a moderator.

The methodology specifies the sampling strategy, measurement instruments, reliability and validity procedures, mediation and moderation equations, effect-size calculations, common-method-bias assessment, qualitative follow-up, and mixed-methods integration. The planned data-analysis workflow replaces the previous algorithm presentation with a transparent analytical sequence that can be followed fieldwork.

Most importantly, the manuscript does not report fabricated findings. Numerical results, hypothesis decisions, statistical significance, and qualitative themes will be entered only after primary data collection and analysis are completed. This preserves the methodological integrity of the study and provides a clear foundation for a future empirical publication.

References

1. Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. Personnel Psychology, 44(1), 1–26. https://doi.org/10.1111/j.1744-6570.1991.tb00688.x
2. Bell, B. S., & Kozlowski, S. W. J. (2002). A typology of virtual teams: Implications for effective leadership. Group & Organization Management, 27(1), 14–49. https://doi.org/10.1177/1059601102027001003
3. Costa, P. T., Jr., & McCrae, R. R. (1985). The NEO Personality Inventory manual. Psychological Assessment Resources.
4. Costa, P. T., Jr., & McCrae, R. R. (2008). The Revised NEO Personality Inventory (NEO-PI-R). Sage Publications.
5. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), 297–334. https://doi.org/10.1007/BF02310555
6. Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. Administrative Science Quarterly, 44(2), 350–383. https://doi.org/10.2307/2666999
7. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.1177/002224378101800104
8. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8
9. Hoegl, M., & Gemuenden, H. G. (2001). Teamwork quality and the success of innovative projects: A theoretical concept and empirical evidence. Organization Science, 12(4), 435–449. https://doi.org/10.1287/orsc.12.4.435.10635
10. HR Dive. (2025, September 8). Gallup: Hybrid work rates have stabilized — and flexibility is key. https://www.hrdive.com/news/gallup-hybrid-work-stabilized-flexibility-key-rto-remote/759477/
11. Kaur, J., & Chauhan, A. (2025). Beyond technical skills: A fuzzy DEMATEL analysis of emotional intelligence and its impact on IT professionals' performance in hybrid work settings. Future Business Journal, 11(1), Article 77. https://doi.org/10.1186/s43093-025-00506-w
12. Kiran Gupta, S. K. (2025). Emotional intelligence and its effect on team dynamics: A systematic review. European Economic Letters (EEL), 15(1), 3026–3044.
13. Lee, C., & Wong, C.-S. (2019). The effect of team emotional intelligence on team process and effectiveness. Journal of Management & Organization, 25(6), 844–859. https://doi.org/10.1017/jmo.2017.43
14. Mo, E., Molléri, J. S., & Fagerstrøm, A. (2026). Productivity and collaboration in hybrid Agile teams: An interview study. arXiv:2602.22835. https://doi.org/10.48550/arXiv.2602.22835
15. Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. Journal of Applied Psychology, 88(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

16. Visithra, A. (2025). A conceptual study on the impact of hybrid work models on work-life balance and employee well-being in the IT sector of Tamil Nadu. International Journal of Accounting and Economics Studies. Advance online publication.

17. Zhu, M., Su, C., Hao, J., Liu, L., Kyllonen, P. C., & von Davier, A. A. (2024). Who benefits from virtual collaboration? The interplay of team member expertness and Big Five personality traits. Humanities and Social Sciences Communications, 11, Article 1212. https://doi.org/10.1057/s41599-024-03678-y