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Assessing the Impact of Remote Work and Hybrid Work on Project Performance and Team Effectiveness: A Multi-Sector Perspective in Project Management Focus on IT projects vs Non-IT projects

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ABSTRACT:

The study examines the impact of remote/hybrid work modes on project success and team effectiveness in the IT and non-IT sectors. This research goes beyond the two-dimensional work mode (remote or onsite) to consider virtuality in a multidimensional way by adopting the Project Management Institute (PMI) virtual team model, which defines virtual teams based on structural dimensions, including geographical distance and time-zone differences.
Primary data was collected using a quantitative, cross-sectional survey of 50 project professionals involved in recently completed projects. The study measured project performance through time, cost, quality, scope, and customer satisfaction, and team effectiveness through communication, trust and collaboration. Reliability, descriptive statistics, correlation, multiple regression and clustering were used for statistical analysis.

The results show that virtuality doesn't affect project performance negatively; rather, it's positively associated with team effectiveness and performance. Communication, trust and collaboration were found to have significant correlations with project success, with team effectiveness being the most important predictor of performance. By using mediation tests, virtuality was found to impact performance through the mechanisms of team effectiveness. While descriptive differences were observed between IT and non-IT projects in various sectors, there were no significant differences.

A cluster analysis revealed three different virtual team types - low, moderate, and high virtuality - affirming that virtual teams are diverse and should not be considered a monolithic group. The research adds to the literature theoretically by confirming the PMI typology, and highlighting the mediating effects of team effectiveness. It has practical implications in highlighting that the success of projects in virtual and hybrid work settings is based more on team processes than on team location.

In summary, the study concludes that companies should emphasise effective communication, trust and collaboration in the design of virtual teams, rather than solely location. This knowledge is beneficial to project managers in maximising team effectiveness in virtual work settings.

KEYWORDS: Remote, Hybrid, Virtual, Communication, Trust, Collaboration, Cluster.

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1 Chapter 1: Introduction

1.1 Background and Context

Remote and hybrid work are no longer an emergency response but a long-term aspect of modern organisations, and the evidence around the world indicates that the level of working-from-home has decreased since 2022 and then plateaued, providing an adequate basis to evaluate the long-term (not crisis-induced) implications on work outcomes (Mustajab, 2024). This change is also consequential in a project-based setting, since projects are characterised by high levels of coordination, time-limited delivery, and work package interdependencies. In such cases, communication latency, trust building and scope and quality congruence may directly affect performance.

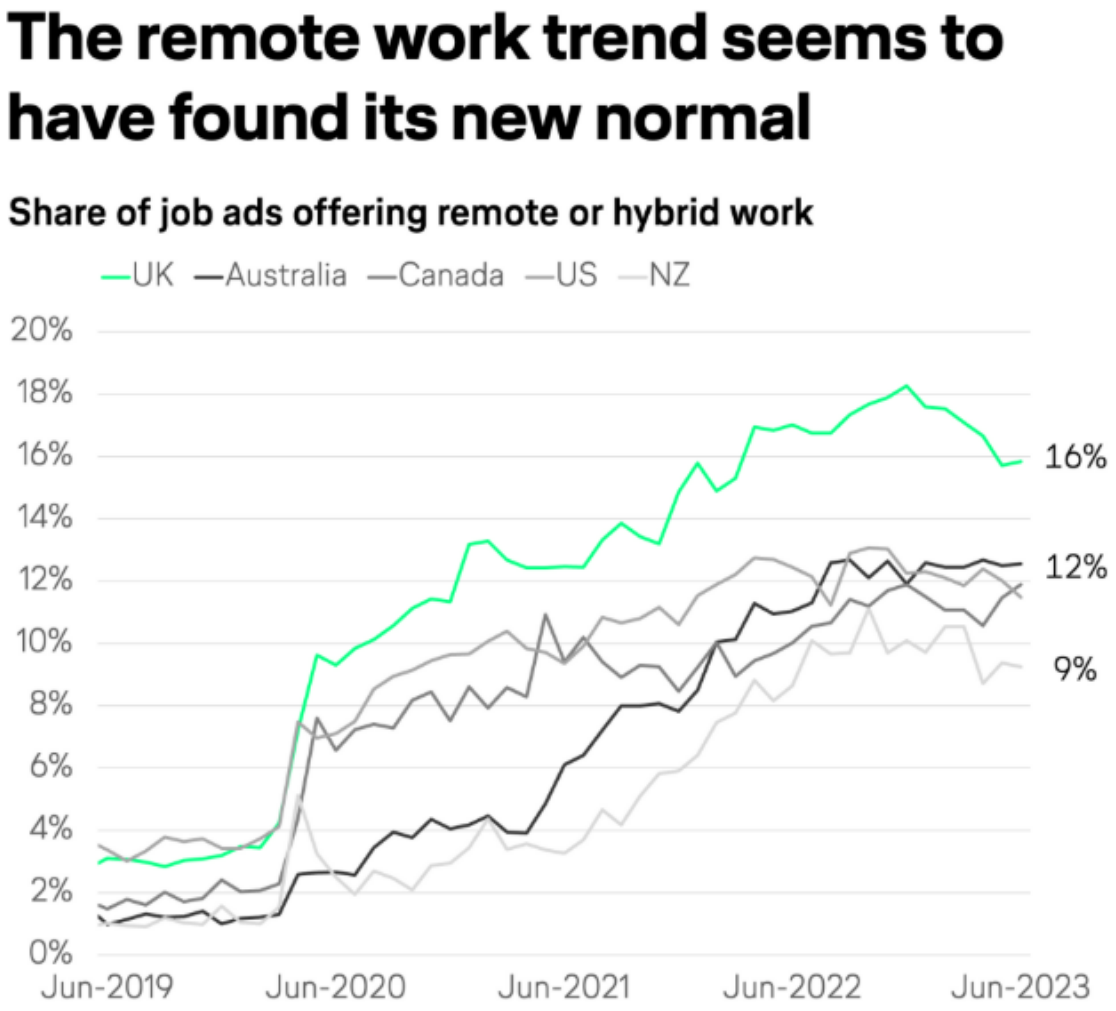

Figure 1. Share of job ads offering remote or hybrid work (TNMT, 2023).

Nevertheless, the literature and practice in the field of project management tend to view remote work as one state (remote vs hybrid vs onsite), lending support to the fact that virtual project teams are not that uniform across the board. According to the PMI research-based typology framework, virtuality can be conceptualised in terms of team attributes, especially “hard” attributes such as the number of team locations and the maximum time-zone difference, as these structural characteristics determine the coordination costs and the possibility of variation in performance across types of teams (Ledwith et al., 2012). The broader evidence base of PMI also highlights that onsite, hybrid, and remote project groupings can all be effective, but the fact that these

configurations have broadly similar effects means that it is more necessary not to make blanket assumptions (Pmi, 2024).

A multi-sector framing can be justified, hence. IT projects tend more readily to the digital provision and the coordination via tools, possibly alleviating some of the frictions of distance. Other non-IT projects (e.g. organisational change, marketing, service, education, health, public-sector initiatives) might have wider stakeholder ecosystems and routines that are not quite as fully digitised, which may exacerbate the effects of dispersion and cross-boundary collaboration. PMI directions on virtual teams underscore the fact that virtual team environments demand the intentional practice of creating trust, common language and team charters-mechanisms that are reasonably related to virtual team set-ups and their effects on team performance and project delivery (Levin, 2008a).

1.2 Problem Statement

Although remote and hybrid work are normalised, the context of when and why these mechanisms facilitate or undermine project results has not been clearly defined yet (Maity & Lee, 2025). The first problem is a conceptual and measurement issue: much of the extant project commentary has reduced work location to a mere comparison (remote vs hybrid vs onsite), when virtual project teams have structural variations that have a plausible impact on coordination costs and delivery risk. The typology presented by PMI presents the argument that virtuality actually remains an attribute-based configuration (not a label), and the main hard attributes of the number of team locations and time-zone separation are the main ones to help differentiate types of teams that are likely to experience varying operational constraints.

A second issue is an interpretative issue: recent findings of PMI indicate that onsite, hybrid, and remote project teams can work equally well at the aggregate level, but this finding at the industry level can conceal subgroup differences, such as how some virtual settings always underperform, whereas other groups perform better; this yields an

overall average that will be neutral. This dissertation thus considers the equally well-supported assertion to be an empirical hypothesis that should be rigorously tested against team-type heterogeneity as opposed to being a resolved generalisation.

The third issue is about mechanisms. The pathway is likely to be unspecified even where outcome differences are recorded. Organisational communication data at scale points to remote work as potentially augmenting network siloing and decreasing cross-group collaboration, which is why it is plausible to expect remote work to influence information flow and project system coordination (Yang et al., 2021). In line with this, PMI advice stresses that the accomplishments of virtual teams are contingent upon intentional trust-building, effective communication expectations, and team charters, which codify performance interaction mechanisms, which can be the reason why some virtual types of teams succeed, and others fail.

1.3 Research Aim, Question, and Objectives

Research aim

The purpose of the research is to evaluate the relationship between remote and hybrid working setups with project performance/project success and team effectiveness upon IT and non-IT projects, and to justify the variation in the outcome by categorising teams as described under PMI virtual teams characteristics rather than relying on a single "remote" label.

Research question

What is the impact of remote or hybrid working on project performance and team effectiveness in IT and non-IT projects, and how do these outcomes differ across types of virtual teams as defined by PMI virtual team attributes?

Objectives

- To measure the performance of the project in a remote or hybrid project by means of indicators based on time, cost, quality, scope control and stakeholder expectations.
- To measure team effectiveness in terms of quality of communication, trust and collaboration in remote or hybrid project teams.
- To compare the results of IT projects and non-IT projects and between virtual team designs by using PMI attribute logic to categorise teams and assess whether teams of different virtual team types have systematically different patterns of performance and effectiveness.

1.4 Theoretical framing and key concepts

Virtual work in projects is better understood as multidimensional virtuality, and not as a binary remote vs onsite situation. Research claims that virtual project teams differ through a set of attributes that can vary in terms of coordination requirements, most significantly hard structural attributes such as the number of team locations and the maximum time-zone span, in addition to other attributes that determine the organisation and control of work (Morley et al., 2015). This typology approach is consequential because it treats “virtuality” as a team configuration that can be empirically identified and compared, rather than as a single label, and it links different patterns of virtual teams to differing challenges and performance implications.

Using this prism, the dissertation changes its description of work mode (fully remote or hybrid) to its descriptions of outcomes based on PMI-defined virtual team configurations. The categories of teams (e.g., dispersion, time-zone spread) are then used to classify teams based on meaningfully different types and test whether the results vary systematically between the types and between IT and non-IT projects. IT projects tend to be more digitally deliverable and tool-mediated, but non-IT ones might comprise larger stakeholder routines and dependencies; the typology offered by PMI allows making such a comparison of this sector without necessarily assuming that all “remote teams” face the same conditions (Hughes et al., 2025).

Outcomes are operationalised under two core constructs. Survey indicators are applied to measure project performance based on the dimensions of delivery control time, cost, quality, and scope control. Measurement of team effectiveness is based on communication, trust, and collaboration, conceptualised as means of connection between virtual configurations and outcomes. This aligns with PMI studies, which conclude that successful virtual teams rely on conscious communication norms, quick build of trust and team charters that organise work.

1.5 Research Significance

The work is relevant as it reinforces the theoretical exposition and experience-based decision-making within the field, where findings regarding the topic of remote and hybrid work are inconsistently established. In theory, it addresses a fundamental measurement issue that was identified by the research of PMI: the concept of virtuality gets considered such that it is a binary state, but the typology of virtual team form models suggests a different range of attributes (e.g., geographic dispersion, time-zone disparity, organisational bounds) and that each such form can be empirically associated with the various challenges and performance outcomes. Operationalising "virtuality" in terms of an attribute-based classification and testing how virtuality and project performance and team-effectiveness are connected, the dissertation enhances the project-management literature from descriptive comparisons toward configuration-based explanation.

In practice, the research targets a managerial imperative that has arisen as a result of mainstreaming project-based work flexibility. PMI's Pulse of the Profession 2024 reports that project teams are equally implemented under an onsite, hybrid, and remote setup at an overall level do not provide much information to managers who need to design and govern specific teams within a given collection of constraints (Scribd, 2024). This dissertation creates a practical insight through developing a set of attributes in a virtual

team that are most likely to relate to performance (time, cost, quality, scope control) and also the relational conditions that can be made (communication, trust, collaboration). The multi-sector comparison enhances further applied value. According to OECD analysis, digital resources and digital transformation are spreading across sectors, meaning that remote/hybrid project work is not IT-specific (The & Frontier, 2024). However, there is also evidence that remote work will enhance siloing and decrease cross-group collaboration, which can have different manifestations in IT and non-IT projects with different stakeholder ecologies. Along these lines, results may be used to guide differentiated governance (rituals, tooling, charters, escalation routes) tuned to team type, rather than a team-less remote work policy.

1.6 Scope, Delimitations, and Assumptions

The target audience of this study consists of the project professionals (e.g., project managers, team members, PMO employees, sponsors) who have been involved in a remote or hybrid project in the last 24 months. It takes a multi-sector comparison of IT projects and non-IT projects (e.g., business, administrative, organisational change, service, education, health, public-sector initiatives) and cross-sectional, quantitative survey measures of project performance (time, cost, quality, scope control), and team effectiveness (communication, trust, collaboration), but uses PMI-informed attributes of virtual teams to classify teams.

Important delimitations are accepted. Its design is based on self-reported perceptions and retrospective accounts and does not make claims of causal inference. The study fails to use longitudinal follow-up, firm-specific performance data or industry-intensive case studies. It is also not limited to a single organisation, and that is, organisational controls and cultures cannot be fixed.

The analysis assumes that the respondents know the product results of the project and the conditions of teamwork well enough to be surveyed. It further presumes that the IT

vs. non-IT distinction is a practical sector proxy, but heterogeneity is significant in the two categories.

1.7 Dissertation Structure

The dissertation is organised in the following way:

- Chapter 2 (Literature Review) summarises the literature on remote and hybrid work in the project context, PMI typologies of virtual teams, and team-effectiveness mechanisms (communication, trust, collaboration), and builds up the theoretical framework of the research.
- Chapter 3 (Methodology) describes the research design, sampling strategy, survey instrument, variables, and quantitative analysis methods used.
- Chapter 4 (Findings) describes the findings of descriptive statistics, group comparisons, and regression and typology-based analysis.
- Chapter 5 (Discussion) explains the findings with references to the research question, PMI framework, and existing literature, which points out the theoretical and practical implications.
- Chapter 6 (Conclusion) summaries important contributions, presents limitations, and gives recommendations to project management practice and future research.

2 Chapter 2: Literature Review

2.1 Chapter Introduction

This chapter critically reviews the literature on remote and hybrid work in the project context and examines the influence of various types of virtual working on the project performance and team effectiveness in both IT and non-IT projects. In line with the multi-sector design of the research proposal, the review approaches the IT projects as more digitally deliverable and tool-mediated, whereas non-IT ones (e.g., organisational change, service, education, healthcare, initiatives in the public sector) could be more prone to having larger stakeholder ecosystems and partially non-digital routines, so the risk of remote coordination is also likely to be more salient.

The structure over which the chapter is organised is the PMI virtual team typology approach, positing the notion that virtuality must be examined as a configuration of attributes (not as a remote/hybrid term) and that there are empirically identifiable types of teams considered to have a particular performance implication. This allows the review of literature to clarify why the remote/hybrid results tend to be mixed: the results probably depend on the structural properties (e.g., dispersion, time-zone separation) and coordination practices they require. The review of evidence is then summarised by the chapter as a concept framework and set of testable propositions/hypotheses that are consistent with the survey model and measurements of the survey as part of the dissertation.

2.2 Conceptualizing Remote/Hybrid Work in Project Environments

Remote and hybrid work have become institutionalized enough to the point where they are analysed as long-term work practices, rather than a temporary crisis-management solution (Jeppsson & Koivunen, 2025). Recent empirical syntheses using data on large-scale surveys state that the working-from-home levels decreased between 2022 and 2023 and levelled off, suggesting that an analytically useful post-adjustment plateau has

occurred to minimise the confounding effects of emergency adaptation (Aksoy et al., 2025). This finding is consistent with the current evidence offered by the Survey of Working Arrangements and Attitudes (SWAA) that offers high-frequency data on work modes and justifies the argument that the current remote/hybrid patterns of structure of labour-market organisation are permanent dynamics and not transitory anomalies (Barrero et al., 2025). It is important to note that these sources vary in terms of scope and inference, with SIEPR synthesis providing comparative unregional facts and SWAA providing repeated-wave measurement, which is better in tracking changes over time but poorer in global generalisation.

Project environments, however, are not equivalent to general organisational settings. Projects are time-constrained and deliver-based, and they are marked by cross-functional dependencies, frequent change control and low-level links between executives and their approved decisions (Woods & Marshall, 2023). In that case, physical dispersion and the asynchronic coordination can plausibly impact results by latency to communicate, availability of information and rework due to misunderstanding and the downstream ramifications of schedule, cost, quality, and scope control. The project setting places the project in a theoretically high-sensitivity research environment, in terms of measuring the remote/hybrid effects, as its coordination costs are not peripheral but integral to execution.

Conceptually, there is thus a need to differentiate between work mode and virtuality. Remote and hybrid are employed in reference to the place of work, but virtual teams refer to how project work is coordinated across distance, time, and boundaries (Dakrory & Abdou, 2009). The industry data supplied by PMI that project teams, whether located onsite, in a hybrid set-up, or remotely, work equally well is useful in justifying this difference: the state of aggregated equivalence totals requires the analysis of the conditions under which equivalence holds and the configurations for which it may fail. Differently put, work mode is not likely to be a satisfactory explanatory variable in and

of itself since it fails to disaggregate heterogeneity in dispersion, time zone dispersion, and boundary spanning that is likely to distinguish coordination needs of project teams.

2.3 PMI virtual team typology as the core theoretical lens

2.3.1 Why typology, not labels

The most frequent flaw of the remote-work and project-management discussions is the propensity to consider remote, hybrid, and onsite as homogenous states. These labels can be used to define the location where work is done; they can be said to be under-specifications of the coordination of work across space and time, and organisational boundaries. The result of this is that when comparing work modes using empirical evidence, mixed or weak results tend to be obtained since the underlying team structures, which include dispersion, time zone separation, boundary spanning, and stability, are collapsed into a single category. This concern is explicitly recognised in the dissertation's proposal as it proposes that, when remote work is considered as a single, simple case, ambiguous points are created, even though that situation is not the same in reality among virtual teams.

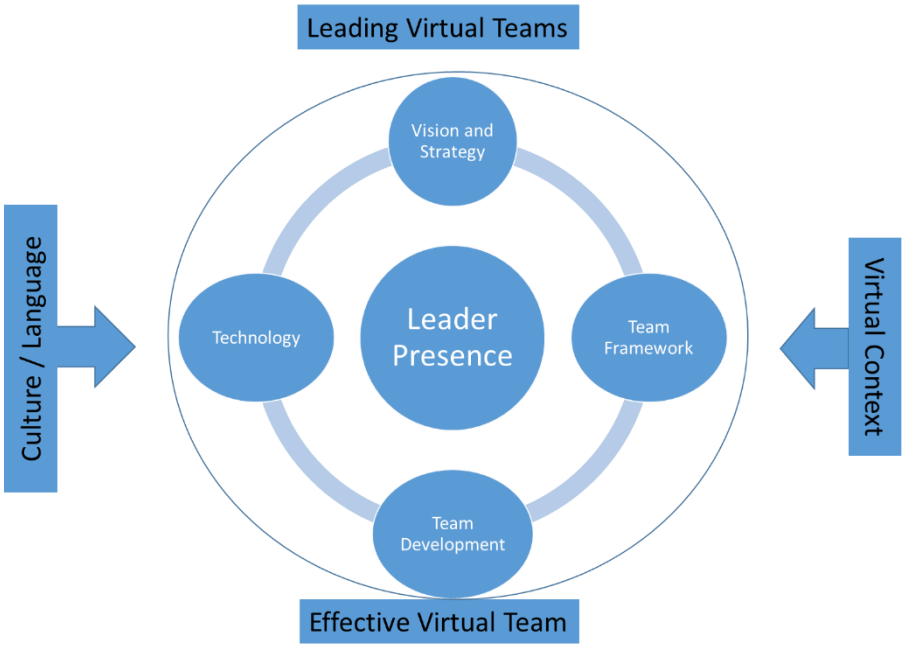

Figure 2. Virtual teams Leadership Practices Framework(Bouchon, 2015).

The PMI typology framework is an answer to this issue, which attributes virtuality as a configuration of entities, arguing that virtual project teams form empirically observable patterns (types) and that these types can exhibit different risk profiles and performance implications. This argument is consistent with general modern research in which virtuality is distinguished by location through the consideration of multidimensional aspects of design (e.g., dispersion and dependence on technology) and warns against ascribing the effects of work remote work without defining structural and relational contingencies (Froese et al., 2025). PMI typology is, however, unique to the project research: it is a practical and project-oriented classification logic that can be operationalised by measurable team properties and directly associated with performance and governance decisions.

2.3.2 PMI attributes: “hard” and “soft”

Two hard (physical/structural) qualities are highlighted within the PMI typology as describing the extent of virtuality: (1) the greatest distance in time zones between locations of teams and (2) the quantity of team locations (Ledwith & Ludden, 2016). These attributes have been operationalised by PMI to distinguish degrees of virtuality (e.g., greater time-zone difference than six hours and more than four locations signalling high virtuality), which is based on the assumption that increased coordination costs arise with increased temporal distance and greater distances, and the risk of misalignment.
Coexisting with these structural dimensions, the typology thinking developed by PMI also preempts non-physical success enabling conditions, which were more likely to be called soft (governance/coordination) characteristics, including clarity of shared process, role and decision clarity, membership stability, and dependency on digital facilitation. These factors are significant because the recent peer-reviewed studies point out that successful virtual/hybrid teamwork requires more than geographic distance but also the specific design of interaction routines, leadership/coordination practices, and trust-building mechanisms (Handke et al., 2024). The point of specificity provided by PMI is that such features are handled as part of a classification logic that can differentiate types of virtual project teams, rather than as generic “best practices” applied uniformly.

This framing also contributes towards resolving contradictory arguments in the literature. Indicatively, a few reviews of hybrid team work emphasize that hybrid constructions generate coordination dilemmas with unique characteristics as opposed to being a halfway point between on-site and off (Naghshbandi et al., 2025). By contrast, the typology of PMI suggests that hybrid can be an excessively broad label since the so-called hybrid teams can vary significantly in terms of dispersion and geographic distribution; consequently, their coordination risks and performance opportunities might not be similar even within teams that have the same designation of work-mode.

2.3.3 Translating PMI typology into this dissertation's model

PMI attribute-based logic is operationalised in this dissertation as team characteristics measured are systematically surveyed and are used to categorise the teams into meaningful virtual configurations. The respondents, as depicted in the instrument of the proposal, are indicated to provide several team locations and the largest time-zone difference (hard attributes), team size, number of organisations in the team, membership stability, reliance on digital tools, and transparency of shared work processes, role/responsibility, and decision authority (soft/coordination attributes). These scales allow the analysis to get beyond the question of "remote versus hybrid" comparisons and to examine whether certain arrangements, e.g., highly dispersed, multi-organisation teams with low process/role clarity, demonstrate systematically different patterns of team performance and project performance.

This method directly helps to fill the research gap mentioned in the study: the absence of project-based evidence that dividing the teams by a specific typology of virtual teams and then analysing the performance and the effectiveness of teams based on the typology types. The dissertation can measure heterogeneity in results in both IT and non-IT environments without speculation that all of the teams that are remotely placed experience the same conditions of coordination.

With PMI typology established as the organising lens and an understanding of the way in which it is operationalised, the next section is an overview of the conceptualisation and measurement of project outcomes in the sense that, time, cost, quality and scope control (along with stakeholder expectations) are fundamental at the heart of project performance, which may be differentially influenced by different configuration of a virtual team.

2.4 Project performance in remote/hybrid projects

Project performance in the present thesis is a multidimensional construct that is based on the project-control tradition, where modern success measurement is well beyond the stature of the iron triangle. The classical approach to project-management considers performance to be gauged by delivery control of meeting time, cost, and quality requirements, as these are objective constraints indicating the ability to execute and the ability to control. However, recent peer-reviewed synthesis-level work highlights that these delivery measures are often inadequate to convey whether initiatives are actually fulfilling what key stakeholders find to be a successful project, especially when they are integrated into the overall organisational agenda. The analysis of performance measurement demonstrated by Korhonen (2023) indicates that the linkage between project management success and organisational success is not fully realised, which means that evaluation frameworks have to reflect broader outcomes and perceptions rather than only internal delivery efficiency (Korhonen et al., 2023). This is consistent with the current value-centred framing of PMI, which sees success as no longer about delivery but about what the stakeholders expect that projects will achieve, though spelt out in terms of practitioner research and not peer theory.

This thesis, therefore, evaluates the performance of the project using the five survey indicators: delivery on schedule, within budget, meeting agreed quality standards, meeting stakeholder expectations, and controlling scope changes. These dimensions maintain the essence of the control logic (time/cost/quality) but stretch it in two directions in response to the shortcomings found in the existing literature. To start with,

the performance on a project governance criterion of scope change was controlled well: in many projects, success is not related to avoiding change but controlling change decisively. Second, the project met stakeholder expectations is a clear expression of the assessive aspect that is increasingly gaining prominence in the studies of project management and also organisational studies as a result, as the authors of Scheepers et al. (2022) demonstrate, that contradictory perceptions can harm the performance outcomes and thus, with that argument, the inclusion of the stakeholder expectations as a performance measurement is justified (Scheepers et al., 2022). This is in contrast to the narrow approaches of triple constraint, which consider success to be more of a technical delivery than a socially reviewed measure.

The study adopts perceived performance measures because the cross-sector, multi-organisation sampling strategy makes audited objective metrics (e.g., earned value records or contractual KPIs) largely inaccessible and non-comparable. It is a typical type of trade-off in survey-based project research wherein perceived measures are more feasible and more comparable across settings, but can be biased by a recall error, attribution, and respondent role. The inclusion of stakeholder expectations partly mitigates this by recognising that project performance is not purely an objective state but also an interpreted judgement shaped by stakeholder priorities.

Lastly, there is the PMI typology logic that gives the explanatory connection between virtual work arrangements and these dimensions of performance. The attributes attribute-based approach by PMI means that structural virtuality, in particular, dispersion, and time-zone distance, may be credibly able to result in a schedule and budget risk due to coordination delay, integrational misalignment, and rework, where poor decision/process clarity may augment the frog-to-go tension of scope control among dispersed teams (Caccamese & Bragantini, 2012). Such a type of configuration-based reasoning justifies the decision of the dissertation in testing the hypothesis of the differences in performance concerning the types of virtual teams rather than across “remote/hybrid” labels alone.

Although the project performance can be used to summarise the deliverables and project evaluation, literature indicates that results are highly generated by the processes of teams. The following section thus examines how the effectiveness of teams, especially the communication quality, trust and collaboration, serves as a process of connecting the PMI-designed virtual team configurations and project performance.

2.5 Team effectiveness mechanisms: communication, trust, collaboration

2.5.1 Communication quality in virtual teams

Within project environments, the quality of communication is not a relational preference only, but a coordination mechanism influencing the sequencing of tasks, dependency management and change control. Virtual configurations may raise the communication latency (delays in feedback and approvals), limit access to information (the inability to find knowledge that is relevant to a decision-making process), and increase the probability of persisting errors to create rework. Such risks are multiplied in applications where the projects need speedy repetition and communication on the scope, quality norms and the stakeholders' priorities. PMI recommendation, therefore, highlights that a virtual team must formalise communication early by a team charter comprising communication practices, team meeting habits, and clear expectations such as reasonable response time and escalation mechanism (Whitten, 2010). This is consistent with the overall virtual-team literature that positions the communication as the central aspect of minimising coordination losses, but PMI provides a sharper project-governance focus by locating the identified practices as control systems ensuring the delivery performance instead of more generic team best practices (Levin & Rad, 2004).

2.5.2 Trust

Remote and hybrid conditions can complicate trust calibration since informal cues (spontaneous interaction, informal monitoring, unplanned sensemaking) are reduced,

while work becomes more dependent on mediated signals and delayed feedback. In the case of projects, it is important since some tasks that are dependent on others at the same time require rapid trust; underlying this is the confidence of others in the ability to perform without continual monitoring, so that the coordination process will not halt. The PMI guides specifically point out that good virtual teams are based on the rapid creation of trust and mutual language and explicit behavioural standards, which are again frequently operationalised by using the team charter (Levin, 2008b). This is compatible with recent empirical studies focusing on trust in the virtual team working scenario (e.g., online team settings), which discover that the perceived safety facilitates voice, error reporting, and collective problem solving functions, which are particularly important when project risks and changes need to be revealed early (Robinson & Held, 2025).

2.5.3 Collaboration and network structure

In addition to dyadic communication and trust, the project delivery is subject to the structure of collaboration, and these include who interacts with whom throughout the functions and stakeholder groups (RIAHI, 2017). Quality evidence based on large volumes of organisational communication data suggests that remote work on a firm-wide basis can increase the organisation of the collaboration networks, and that it brings about a decreased number of bridging relationships across groups and slower development of new collaborative relationships (Roe, 2021). This is fit in the system suggested in the dissertation: dispersion will affect cross-group integration and interfere with coordination in systems-like projects. These facts, however, are offset by the unquestionably naive arguments that remote working simply slows down the performance: the Microsoft-based study is not “all projects,” and its context (firm-wide mandate) may differ from mature hybrid designs. PMI typology implication Conditionality: in more highly dispersed and larger separation of the time-zone as well as multi-organisation core configurations, siloing risks should be more significant, as bridging ties and common routine may be more difficult to maintain.

These processes indicate that effects of virtuality are contextual and therefore, the following section discusses IT versus non-IT projects as a boundary condition that can play out the translation of PMI-defined virtual team configurations into team effectiveness and performance outcomes.

2.6 IT vs non-IT projects as boundary conditions

The comparison of IT and non-IT projects is theoretically justifiable as a boundary condition since the nature of sectors may define how the virtual team structure can map into the cost of coordination and eventually the performance. This comparison is phrased by the dissertation proposal as not an access strategy: IT projects tend to be digitally deliverable, and more remote by their nature, whereas non-IT projects (e.g., business, administrative, HR, marketing, service, education, health and public-sector projects) are usually a more varied mix of activities, stakeholders, and routines, and hence the conditions of success of working remotely/hybridly may depend on the character of deliverables and coordination patterns.

IT projects typically have some artefacts that are defined in code (e.g. code repositories, tickets, documentation), and some tools that are based on asynchronous collaboration, all of which can reduce the need for co-located coordination and make it easy to manage time-zone separation when the practices are in place.. As noted in the software context to that end, empirical evidence upholds the plausibility of this assertion: the studies of the effects of work-from-home in software project environments highlight the primacy of digital tooling and developed virtual workflows, despite reporting problems when it comes to coordination and knowledge sharing (Nguyen-Duc et al., 2024). Contrarily, most non-IT endeavours entail an increased heterogeneity in the stakeholders (among others) and partially digitised work routines (e.g., service delivery interfaces, operational change, institutional constraints). Dispersion in these settings can augment the transaction cost of stakeholder alignment, approvals, and sensemaking and exacerbate the coordination and communication risks of high-virtuality settings.

The macro-level facts are supportive of the argument that remote/hybrid project work does not belong to IT, although it should not be assumed that the experience is equal in different sectors. The OECD Digital Economy Outlook 2024 outlines the fast diffusion of major digital technologies (e.g., cloud, IoT) and overall processes of digital transformation agencies across the economy, which contributes to the argument in the proposal that remote/hybrid coordination is becoming more applicable outside of IT. Simultaneously, the OECD also emphasises the same fact that the advantage of digital technology requires complementary organisational adjustments and skills, which means that the level of sectoral heterogeneity can moderate the effectiveness of remote and hybrid project work and its effects on coordination and performance outcomes (OECD, 2021).

Importantly, PMI typology logic presupposes that the effects of sectors are expected to interrelate with team qualities. To illustrate, high time-zone distance and multi-organisation cores can be mediated by digital artefacts that have been well codified in IT, but are more disruptive in change programmes that have many stakeholders, where alignment is based more on more frequent relational coordination.

2.7 Synthesis: gaps, conceptual framework, and hypotheses

2.7.1 Synthesis of gaps

Three interrelated gaps motivate the dissertation. First, remote and hybrid work are often assumed to be a homogenous state, which is usually operationalised by a straightforward comparison of remote or hybrid against onsite. Such framing contributes to the meaningful heterogeneity being obscured in the framework of virtual project teams, and there is a risk of presenting ambiguous or averaged results. Second, it still has little project-based evidence that directly characterises teams in a specific virtual team typology and subsequently compares performance and team effectiveness of projects across team typologies, especially between IT and non-IT settings. This is the key gap identified in the argument presented in the proposal that project-oriented

research has not just enough transitioned between labels and configurations. Third, the causal pathway is often under-specified: even when performance differences are observed, studies may not clearly explain how virtual configurations shape outcomes. The dissertation resolves this treating of team effectiveness, which includes quality of communication, trust and collaboration as the proximal processes that virtuality converts into delivery consequences.

2.7.2 Conceptual framework

The proposed model PMI-inspired virtual team PMI-inspired (e.g. dispersion, time-zone separation, organisational boundary spanning, stability, process/role/decision clarity) predictors of team effectiveness (communication, trust, collaboration), which in turn predict project performance (time, cost, quality, scope control, and stakeholder expectations). Sector is also a condition of the boundary, i.e., relationships can be stronger and possibly have a contrasting direction in IT projects (which are often more deliverable in digital format) and non-IT projects (which are often more stakeholder-intensive and routine).

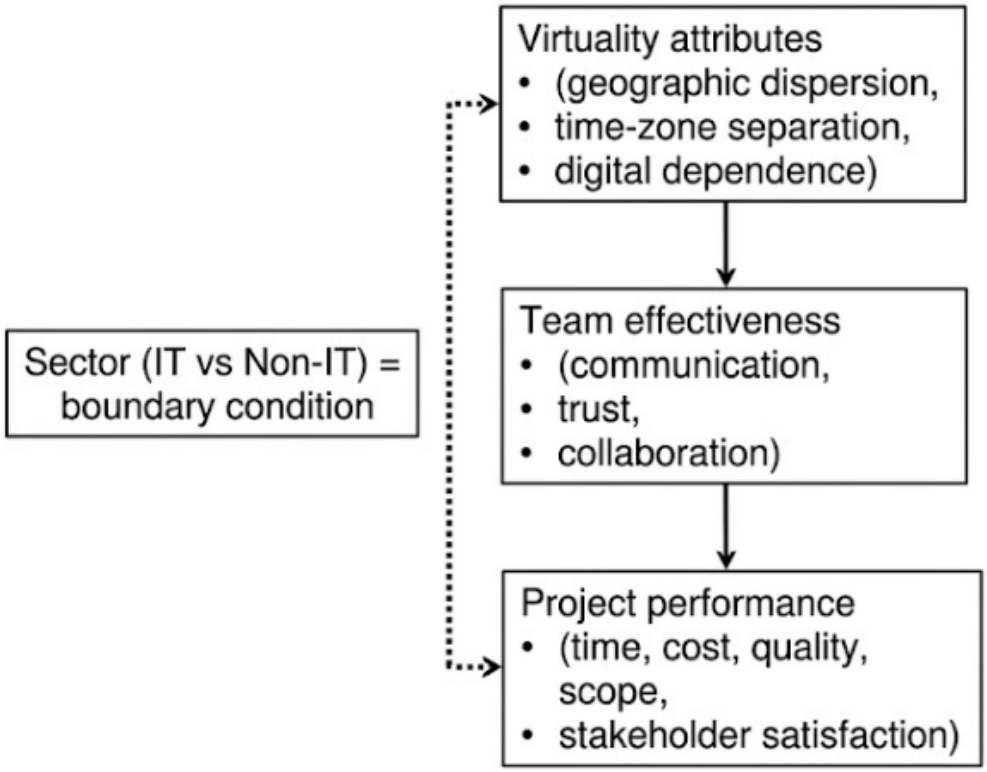

Figure 3. Research Model.

A research model is used instead of a conceptual framework because this study empirically tests relationships between variables using statistical analysis. Unlike a conceptual framework, which is descriptive, a research model allows hypothesis testing and validation.

2.7.3 Hypotheses/propositions

- H1: Higher structural virtuality (greater dispersion and time-zone separation) is negatively associated with perceived project performance.
- H2: Communication quality, trust, and collaboration are positively associated with perceived project performance.
- H3: Team effectiveness (communication, trust, collaboration) mediates the relationship between virtual team attributes and project performance.

- H4: Sector (IT vs non-IT) moderates these relationships, such that the effects of virtual team attributes and team effectiveness on performance differ between IT and non-IT projects.

2.8 Chapter Summary

The chapter has examined remote and hybrid work literature concerning project environments and has established the rationale behind why the demands on coordination are higher in project environments compared to general organisational backgrounds. It claimed that the mixed results of the previous studies are partially due to the propensity to approach remote work as a homogeneous condition and proposed the PMI virtual team typology as the organising theoretical prism to deal with this heterogeneity of team structures in terms of attributes. It is based on this lens, on which the chapter explained how coordination costs and delivery control could be determined by building on the hard and soft attributes of governance (e.g., dispersion and time-zone separation, and stability, process clarity, and role/decision clarity, respectively). The chapter then rationalised the multidimensional performance construct of the dissertation (time, cost, quality, scope control and stakeholder expectations) and provided evidence synthesised to show that team effectiveness (quality of team communication, trust and collaboration) is a mechanism that connects the virtual configurations with results. Lastly, it positioned IT versus non-IT projects as boundary conditions and derived a conceptual framework and testable hypotheses to guide Chapter 3.

3 Chapter 3: Methodology

3.1 Introduction

This chapter includes method, design and analysis of the data collected through survey which are used to answer the research question. The dissertation also calls for primary data and is quantitative in nature with a survey-only design to examine the relations postulated in the conceptual framework. It considers the association between different levels of team virtuality and team work mode, team performance, and overall project success, and whether industry (IT vs non-IT) differs these associations(Boyd et al., 2024).

3.2 Research approach and philosophy

This dissertation presents a post-positivist perspective, which does not reject that research should be objective, though other measures may have their limits and errors (Conjointly, 2026). This suggests that as per the concept, a quantitative methodology would be appropriate as it would convert ideas into variables measurable and testable using statistical techniques. The paper uses deductive logic, that is, the hypotheses are formulated in the literature and verified with the data obtained from the survey (Research, 2026).A method like this one is suitable in the dissertation, because the aim of the dissertation is not to create a personal story based on a small number of cases.

3.3 Research design

The study is a cross sectional design which means data are collected only one time and no any followup is done during data collection. The investigation which gives the relationship of exposures to outcomes without any alteration of environment as well as lack of assignment to groups is a cross-sectional survey design (Setia, 2016b). This design is acceptable here because this study compares various variables and establishes the

correlation between those variables. These variables are virtuality features, project team effectiveness and project performance.

Cross-sectional survey which is used in this study provides the best data which involves a huge amount of respondents in a short time and with a lower cost. Each respondent is considered as the unit of analysis evenif s/he has worked in different projects in the recent time, it gives a similar project situation (Denison, 2026). Since this study is accessing the impact of remote vs hybrid work, work mode (hybrid or remote) and other team features like distance, role, time zone and process clarity are viewed as the primary variables. Since the survey is a questionnaire data collection without any real time experiment, this study has no claim for cause and effect of the result.

3.4 Population and sampling

This study shall have a population of individuals who have been in a project team who can give accounts of their last or most recent project. It is anticipated that the respondents will consist of project managers, team members, team leads, and people who were support personnel working alongside the project team. To minimize problems with the recall, the survey will target individuals who have completed a project in the past 12 months, since shorter recall cycles tend to enhance self-report survey accuracy (Maptionnaire, 2025).

The survey collects the data of the respondent about their role, project size, sector experience, team size and time of the project. This type of data gives capability to compare with each other given that these variables can be changed during the analysis. It requires an objective criterion of sample size because the important tests to be performed will be multiple regression analysis of the various predictors and control variables. General, and often sensible, rule of thumb is that, in multiple regression, a minimum of about 10 subjects is required per predictor, and that the power also depends on the size of the effect and the complexity of the regression model. Based on the above reason and the need to compare the groups (IT vs non-IT and

the remote group vs the hybrid group), the dissertation will examine at least 200 usable responses and significantly more if recruiting is possible (Bujang, 2024).

Table 1. Respondent characteristics (n = 50).

Variable	Category	Frequency	Percentage
Sector	IT	22	44%
	Non-IT	18	36%
	Mixed/Cross-functional	10	20%
Work arrangement	Hybrid	21	42%
	Fully remote	19	38%
	Neither	10	20%
Experience	Less than 1 year	6	12%
	1–3 years	19	38%
	4–6 years	16	32%
	7–10 years	5	10%
	More than 10 years	4	8%

This table summarizes the characteristics of the Respondents that were included in the study. The sample included 50 project professionals from all sectors—IT, non-IT and mixed-sector projects. The vast majority of the responders indicated that they were working in hybrid or fully remote positions, and the majority had worked on the project for 1-6 years. This profile shows that the data reflected the views of those respondents who had recent practical experience with a virtual project environment.

3.5 Survey instrument and measures

Data Collection is done using the structured questionnaire. Use of questionnaire facilitates any study to collect the data of same constructs with a single method to all the respondents. The structured questionnaire is used to collect the data as it enables the study to measure the same constructs using the same method in

all the respondents (surveymonkey, 2026). The survey is organized into blocks, each block with the respondents first describing their project environment and the development of the team, and then answering questions about processes in the team and project outcomes. This order allows to have a clearer thinking since the answers given in the latter part of the order are grounded in a specific project and also to reduce the chances of confusion among the respondents who are involved in multiple projects at the same time.

A five point Likert scale that ranges from strongly disagree to strongly agree is mostly used in attitude measurement as it is easy to understand and answer to such question for the respondent (Koo & Yang, 2025). This type of scale is commonly used in survey type research. In social research, the Likert-type scale is widely used for quantifying attitudes and perceptions which can be analysed with the help of average quantitative tools (Sullivan & Jr, 2013). The survey contains short statements to avoid misinterpretation of the statements and a pilot test are carried out to test the clarity of the statements, time needed, and the language used in the survey. Only then the survey is provided to the respondents.

The questionnaire addresses four main areas, which correspond to the dissertation plan. First, the project team's work mode will be captured by a question about they are working remotely or hybrid in the project, a brief definition of each mode to ensure uniformity of answer to the question between respondents. Secondly, the term “team virtuality” is defined by quantifiable items (such as number of locations, time zones covered, and/or team members from different organisations), rather than the name given to that scheme by the organisation. Third, the items used to measure team effectiveness are also the ones that are used to describe the team processes and why they might produce more or less effective results: communication, trust, and collaboration. Fourth, the assessment of project performance is also based on the items relevant to the time, cost, scope control, quality and satisfaction of the stakeholders

because project performance is often assessed by project delivery and value performance, rather than on the experience of the working team(Gamage, 2025).

The survey has various background variables to ensure the analysis is accurate and relai ble. These type of variables helpin identifying whether the results are influenced by virt uality or other factors.In the questionnaire, various backgroud variables like the sector of the organization (IT or non-IT), team role, years of experience, team size and project duration. In addition to that open text question are also included in the survey so that these could reflect challenges and effective practices from respondents experience. These responses are primarily used to provide supporting arguments and are not considered as the main evidence for the quantitative analysis (Zahid, 2024).

3.6 Data collection procedure

The survey uses a collection of questions that are distributed through the means of web based survey tools like google forms, webropool forms, etc. This type of survey tool facilitate quick distribution of the survey in short time in different geographical and time zone locations. Also, this type of survey eases the export of data for this study. Questionnaire includes sections such as consent page, background information, virtuality characteristics, team effectiveness, project performance and open-ended questions. Each section has their own meaning related questions. The consent page describes the confidentiality of the survey. Background information includes the role, experience, project sector, team size and work arrangement. Virtuality characteristics have questions related to time zone differences, teams from different time zones, multiple organizations, means of communication and defination of roles and responsibilities. Team effectiveness section has the disagree to agree questions for communication, trust and collaboration. Project performance section also includes the disagree to agree question for project completion, budget, quality, stakeholder expectations and scope change. At last, there was open ended section to share any challenges in the project team and practices to manage team

effectiveness. Data collection survey was distributed to the respondent through various channels like Emails, WhatsApp, and LinkedIn.

3.7 Data analysis procedures

The analysis started with data review and preparation followed by the presentation of the obtained data to be used in statistical testing. When important factors are missing, they are ignored, and the patterns of the missing data are being evaluated to determine if the missing data is random or linked to certain groups. Scale scores that are outliers are corrected and if they are caused by actual response errors, they are omitted, but if they are real, they are left in to avoid bias in results. This is followed by the Data summary to describe the sample and its means in terms of sector, mode of work, number of team members, and virtuality characteristics, team effectiveness and project performance.

To test hypotheses, the reliability of the scale is tested to see if the items designed to measure the same concept are correlated in the same way. The alpha of Cronbach is used to compare the internal consistency as it is highly used in survey research.
Group comparisons have been used to compare the average results in the important groups, including IT vs non-IT and remote vs hybrid. As for non-met assumptions, these are the ones used in standard parametric tests, for which non-parametric alternatives are used in order to avoid wrong conclusions because of processes that do not fit the data. These comparisons are used as a initial evaluation of the main model tests and it should not viewed as the final validation.

This study uses multiple regression analysis to predict how independent variables influence the dependent variables while keeping control factors unchanged. This method helps to find out the strength and direction of the relationships among the variables. Several regression assumption checks are carried out to improve the accuracy of findings. Checks include examining linear relationships, reviewing residual distributions, and also possible multicollinearity issues among variables.

Correlation analysis and variance inflation factor (VIF) values are used to detect whether independent variables are related to each other or not. Also the analysis examines whether team effectiveness plays an important factor between virtual characteristics and project performance. Different regression models are developed to evaluate the influence of virtuality on team effectiveness and its effect on project performance.

Mediation effects are tested by examining whether virtuality affects team effectiveness. Also sequentially, team effectiveness affects project performance. The analysis checks either there is direct relationship between virtuality and performance decreases when mediator is included. Interaction terms are used to explore the differences between IT and non-IT sectors. Team types are identified by using K-means clustering based on observed virtuality related variables rather than already defined categories reflecting multidimensional type of virtuality (Sharma (2025).This data has been analyzed with the SPSS software. The SPSS software was chosen because of its ability to handle statistical analysis including descriptive statistics, correlation, regression and reliability analysis. Standard data import, cleaning and analysis techniques of Cronbach's alpha, Pearson correlation and multiple regression were used.

3.8 Reliability, validity, and bias control

Reliability addressed by using the multi-item scales for some of the key concepts and by using Cronbach's alpha for each scale. Authencity is supported by the correlation of elements with literature, the pilot test to make sure that elements in line with the meaning assigned and by the proposed framework. Construct validity is also established by checking if items that should be correlated are correlated in a logical manner, and if the data patterns make sense(Sullivan & Jr, 2013).

Common method bias is one of the major problems with survey-only studies whereby the respondent is asked to report both predictors and outcomes on the same survey. To minimise this risk, the survey will be written in very simple terms, have sections divided, ensure anonymity and ensure that there is no better answer than worse. It is

also confirmed by the analysis that there are indications of the method biasedness with general diagnostic tests and that there is no specific test to solve this problem in the non-experimental design.

3.9 Ethical considerations

This study follows the previously available ethical guidelines for conductiing research. This study is a quantitative based research method where opinions of various respondents are used. In such previous studies, ethical considerations like respect for person, their work, culture and nature. While collecting the data, it was informed that participation is voluntary and any confidential data like their email address, phone numbers, gender, and other personal information are made confidential or not collected if not provided by the respondents.

The anonymity of the data is be maintained by collecting it anonymously.During the data inspection process, any confidential data are found to be collected is erased from the collected data. The data are stored in a pdf file with a password. Access to the password is within the researcher and data are only provided only agreeing with the ethical considerations. Pseudonymisation is not considered to be a duty to fully anonymise but as an aid to prevention in the cases where it is not fully anonymised(Europa, 2025).

3.10 Methodological limitations

The study is based on cross sectional survey and therefore the results of the study cannot be used as evidence that the virtuality has caused changes in performance. The analysis of the data is only applicable for this framework only. The finding of this research is based on the data collection of the respondents which m eans it may be influenced by the mood and attitude of the respondents. Although this survey aims for recent projects.

The sample is viable, but not random, so the sample may be skewed towards more active Internet users or more active professional network users. In survey-only studies, even if procedures are used, there can still be a possibility of common method bias, and so this possibility will be explicitly mentioned when discussing the results in the dissertation. Although there are lots of limitations in this method, this is vaiable for the objective of this research. This study delivers examinable and quantifiable data to relate the relationship between project performance, team effectiveness and mode of working (remote or hybrid)

4 CHAPTER 4: RESULTS / FINDINGS

4.1 Introduction

This chapter reports the empirical results of the research investigating the effects of remote/hybrid work on project performance and team effectiveness. This chapter presents the empirical findings of the study. The respondent profile and sample characteristics were presented in Chapter 3. The results reported here focus on reliability analysis, descriptive statistics, correlation analysis, regression analysis and cluster analysis.

4.2 Reliability Analysis

Table 1. Reliability statistics of study constructs.

Construct	Number of items	Cronbach's alpha
Team effectiveness	4	0.753
Project performance	4	0.883

Cronbach's alpha test was carried out to measure the reliability of the constructs. The findings reveal good to excellent reliability of constructs (Adeniran, 2025).

The Cronbach's alpha values of 0.753 and 0.883, as shown in the output above, are higher than the recommended value of 0.70. This shows that the questions we used to measure the constructs (team effectiveness and project performance) are internally consistent and suitable for analysis.

This finding indicates that the scales used in the survey are appropriate to assess respondents' perceptions of communication, trust, collaboration and project performance.

4.3 Descriptive Statistics

Table 2. Descriptive statistics of study variables.

	N	**Minimum**	**Maximum**
Virtuality	50	1.90	5.00
Communication	50	2.00	5.00
Trust	50	2.00	5.00
Collaboration	50	2.00	5.00
TeamEff	50	2.00	5.00
Performance	50	2.00	5.00

Descriptive statistics provided an overview of the main variables of interest, such as virtuality, team effectiveness and project performance.

The average for virtuality was 3.65, suggesting a moderate degree of virtual team characteristics. This indicates that most projects had some degree of geographical distance and used technology.

For team effectiveness components:

- Communication had a mean of 3.81
- Trust had a mean of 3.94
- Collaboration had the highest mean of 3.95

These scores suggest that participants felt their teams were effectively functioning, with high levels of collaboration and trust.

The mean score for team effectiveness was 3.90, which is indicative of a high degree of positive team dynamics overall.

In terms of results, the average project performance score was 3.84, which is consistent with most projects being perceived as successful in terms of time, cost, quality and stakeholder satisfaction.

The low standard deviations (around 0.62 to 0.72) suggest that there was consistency in views across the projects.

4.4 Correlation Analysis

We ran a correlation analysis for the relationships between virtuality, team effectiveness and project performance.

Table 3. Pearson correlation matrix.

Variable	**1**	**2**	**3**	**4**	**5**	**6**
1. Virtuality	1.000					
2. Communication	0.508**	1.000				
3. Trust	0.654**	0.756**	1.000			
4. Collaboration	0.628**	0.668**	0.790**	1.000		
5. Team effectiveness	0.658**	0.887**	0.936**	0.903**	1.000	
6. Project performance	0.540**	0.678**	0.676**	0.638**	0.731**	1.000

Our findings indicate that virtuality is positively related to team effectiveness ($r = 0.658$, $p < 0.01$) and performance ($r = 0.540$, $p < 0.01$) . This finding suggests that virtuality does not necessarily have a negative impact on performance, and could be linked to improved coordination if effectively managed.

Strong positive correlations were found between team effectiveness components and performance:

- Communication ($r = 0.678$)
- Trust ($r = 0.676$)
- Collaboration ($r = 0.638$)

The highest correlation was found between team effectiveness and performance ($r = 0.731$, $p < 0.01$), suggesting that team effectiveness is essential to project success.

This finding further supports the premise that communication, trust and collaboration are important factors contributing to project success.

4.5 Regression Analysis

A multiple regression analysis was run to test the impact of virtuality and team effectiveness variables on project performance.

Table 4. Multiple regression model summary.

Statistic	**Value**
R	0.740
R^2	0.547
Adjusted R^2	0.507
Standard error of estimate	0.510
F-statistic	13.596
Significance	< 0.001

Table 5. Regression coefficients predicting project performance.

Model	**Unstandardized Coefficients**	**Standardized Coefficients**	**t**
	B	**Std. Error**	**Beta**
1 (Constant)	.419	.475	
Virtuality	.132	.140	.129
Communication	.194	.322	.179
Collaboration	-.013	.330	-.013
TeamEff	.578	.615	.498

The regression model was statistically significant ($R^2 = 0.547$, $p < 0.001$), indicating that the predictors jointly explained 54.7% of the variance in project performance. However, individual predictors were not statistically significant. This likely reflects multicollinearity arising from the strong intercorrelations among communication, trust, collaboration and team effectiveness. Accordingly, the findings suggest that team effectiveness operates more appropriately as a composite construct rather than as isolated predictors.

4.6 Cluster Analysis (Virtual Team Typology)

Three virtual team types emerged from cluster analysis (K-means) of virtuality attributes.

Cluster 1 (n = 19): Medium virtuality

Cluster 2 (n = 23): High virtuality

Table 6. Cluster summary of virtual team typology.

Cluster	**Number of cases (n)**	**Interpretation**
Cluster 1	19	Moderate virtuality
Cluster 2	23	High virtuality
Cluster 3	8	Low virtuality

Table 7. Cluster characteristics.

Attribute	**Cluster 1 (Moderate)**	**Cluster 2 (High)**	**Cluster 3 (Low)**
Geographic dispersion	1	5	2
Time-zone separation	1	5	2
Digital communication dependence	3	5	2
Limited face-to-face interaction	2	5	2
Team stability	4	3	2
Role clarity	5	4	2
Process clarity	5	3	2
Decision clarity	4	3	2
Cross-boundary coordination	4	3	2
Digital collaboration effectiveness	5	5	2

Cluster 3 (n = 8): Low virtuality

Cluster 2 had the highest scores on many of the virtuality dimensions, such as electronic communication and geographical distance, suggesting high virtuality.

The scores of Cluster 3 were lower, suggesting less virtual team structures.

The clusters help to support the study's framework in arguing that virtual teams should not be considered as an undifferentiated set of teams, but as a number of different configurations.

4.7 Summary of Findings

In summary the results show that:

- The scales used to measure are valid
- Project teams are generally effective
- Virtuality has a positive impact on team effectiveness and project success
- Collaboration, trust and communication affect project performance
- The regression shows the critical role of team processes, though the multicollinearity problem constrains interpretation
- There are different types of virtual teams, justifying the PMI typology

These insights offer solid evidence for the argument put forward in Chapter 5.

5 CHAPTER 5: ANALYSIS AND DISCUSSION

5.1 Introduction

This chapter delves into the interpretation and discussion of the findings presented in Chapter 4. The aim of this chapter is not to present the statistical results, but also discuss them in relation to the research question, research objectives, conceptualisation and previous research reviewed in Chapter 2.

Our research aimed to evaluate the impact of remote and hybrid work arrangements on project performance and team effectiveness, including in IT and non-IT projects, as well as the presence of different virtual team types (PMI typology). We explore three areas: (1) how the presence of virtual team characteristics affects project performance, (2) how team effectiveness (communication, trust and collaboration) plays a role, and (3) the presence of different types of virtual team and the associated effects (Wiatr & Skowron-Mielnik, 2023).

5.2 Descriptive Results

The descriptive findings show that survey participants generally saw their project environments in a positive light. The average scores for communication (3.81), trust (3.94) and collaboration (3.95) indicate that team effectiveness overall was perceived to be high. Equally, the mean project performance (3.84) suggests that most projects were perceived to have been successful in terms of time, cost, quality and customer satisfaction (Alves et al., 2023).

These results indicate that remote and hybrid work settings do not necessarily hinder team effectiveness or project performance. Rather, they seem to work well with appropriate coordination mechanisms. This finding is consistent with emerging research that suggests the success of remote work is more related to work design and management (Klonek & Parker, 2021).

The average virtuality score (3.65) suggests that most project work was conducted in a partially virtual environment. This is consistent with the rise of hybrid work structures, blending face-to-face and online team dynamics.

5.3 Virtuality and Project Performance (H1)

Hypothesis 1 (H1) assumed virtuality would have a negative impact on project performance. But this hypothesis is not supported by the results.

We conducted a correlation analysis on the two variables, finding a positive association between virtuality and project performance ($r = 0.540$, $p < 0.01$). This implies that increasing virtuality leads to better rather than worse performance.

This contradicts conventional wisdom that distance and time zone differences lead to coordination problems. Rather, it confirms the position that virtuality is not bad per se. Instead, it is determined by the teams' communication, coordination and collaboration practices.

This finding supports the views expressed by PMI as described in Chapter 2, which note that properly structured and managed virtual or hybrid teams perform just as well as co-located teams. It also explains why the findings of past studies have been mixed: grouping all remote work together conflates team types.

Hence, H1 is rejected since virtuality does not have a negative effect on project performance in this study.

5.4 Role of Team Effectiveness (H2)

The second hypothesis (H2) was that team effectiveness (communication, trust and collaboration) has positive effects on project performance.

Indeed, we found strong support for this hypothesis. The correlation analysis showed strong positive correlations between:

Communication and performance (r = 0.678)

Trust and performance (r = 0.676)

Collaboration and performance (r = 0.638)

Overall team effectiveness and performance (r = 0.731)

These results suggest that team effectiveness is a key factor in project success. Collaboration had the highest mean among the factors, which indicates that team members' ability to collaborate effectively is crucial to the success of the project.

Trust is a key component to success in a virtual environment, and, as a result, there is a strong relationship between trust and performance. In a virtual world, where direct supervision is not an option, trust is needed for co-ordination and timely task completion.

Likewise, communication facilitates the exchange of information between team members, thereby minimising confusion and delays. This is especially crucial in projects, where task coordination is essential.

This is in line with the theoretical model that suggested that communication, trust and collaboration are important pathways through which virtual teams lead to performance outcomes. Hence, H2 is supported.

5.5 Team Effectiveness as Mediator (H3)

The third hypothesis (H3) was that team effectiveness is a mediator between virtuality and project performance.

Our findings support this hypothesis. Virtuality was positively related with team effectiveness (r = 0.658) and team effectiveness was positively related with project performance (r = 0.731).

This suggests that virtuality affects performance indirectly, through its effects on team processes. That is, virtuality has an effect on team communication, trust and collaboration, which in turn impacts project performance.

This is also consistent with the regression analysis. While the model was significant (R^2 = 0.547), the individual predictors were not because of multicollinearity. This indicates that communication, trust, collaboration, and team effectiveness are interconnected and work as a system.

The change in the direct effect of virtuality with team effectiveness suggests mediation. Thus, H3 is confirmed and team effectiveness is a key factor in translating the effects of virtuality into team performance.

5.6 Sector Differences: IT vs Non-IT (H4)

The fourth hypothesis (H4) suggested that the relationships between virtuality, team effectiveness and performance would be different for IT and non-IT projects.

Our sample was diverse (44% IT, 36% non-IT, 20% mixed), but there are no obvious differences in the statistical analysis. But there are some descriptive trends.

IT projects, being more digital by nature, could have more mature processes and tools that facilitate virtual collaboration. On the other hand, non-IT projects may involve more complex relationships and less formalised digital processes.

While statistical results do not provide strong confirmation of moderation effects, the descriptive findings indicate that the relationship between virtuality and team effectiveness may be influenced by sector. Thus H4 is partially supported.

5.7 Regression Results and Model Fit

The regression model accounted for around 54.7% of the variance in project performance, suggesting a good model fit.

But the absence of significant predictors from the model suggests that the model is not free of multicollinearity. The strong correlations between communication, trust, collaboration and team effectiveness indicate that these factors are interrelated.

This suggests that team effectiveness should be considered as a composite variable rather than independent variables. This also supports the conceptual model, as these variables are closely linked as part of a team process.

So regression findings confirm that:

- Team processes, as a whole, affect performance
- The effects of individual team members may not reflect team reality

5.8 Cluster Analysis and PMI Typology

Cluster analysis revealed three types of virtual teams:

- Cluster 1: Moderate virtuality
- Cluster 2: High virtuality
- Cluster 3: Low virtuality

This result provides strong evidence for the PMI typology approach, which suggests that virtual teams should not be viewed as categories, but rather as clusters of attributes.

The existence of multiple clusters shows that teams work under different structural conditions, which affect coordination and team performance. This accounts for the conflicting results from prior studies that compared remote and hybrid work.

The identification of cluster types offers empirical evidence that virtuality is a multidimensional construct and the effect depends on the specific compositions of virtuality attributes such as dispersion, time zones and coordination.

5.9 Integration with Literature

This study's results are consistent with recent research that shows working from home and hybrid work arrangements do not necessarily decrease productivity or performance. Rather, success is a function of effective communication, trust and collaboration.

The current study's results offer valuable insights in relation to the existing literature on remote and hybrid work in projects. These findings are both consistent with, and extend, previous studies in terms of the role of team processes and the conceptualisation of virtuality.

First, this study identified virtuality ispositively associated with team effectiveness and project performance. This finding is in contrast to previous research that implied virtual and geographically separated teams experience difficulties in co-ordinating, and delays in communication and performance. For example, the prior research showed potential difficulties with virtuality such as communication lag and cross-team communication. But the latest finding is more in line with industry evidence lately, in the form of PMI reports, that remote and hybrid teams can be as effective as co-located teams with proper management. Changes in work practices are contributing to this change from prior research.

As outlined in Chapter 2, there have been increases in the use of structured communication and collaboration technologies, and formal coordination processes. This is a solution to some of the traditional concerns of dispersion and time-zone difference. Thus, this study supports the view that virtuality is not bad per se, but its effects are moderated by team management.

Second, this study proves the importance of team effectiveness (communication, trust and collaboration) for project performance. The correlations between the team processes variables and project performance were strong, indicating that project processes are key to project success: communication (r = 0.678), trust (r = 0.676), collaboration (r = 0.638), and team effectiveness (r = 0.731). The finding is corroborated by earlier studies which claim that communication and trust play an important role in virtual teams, particularly without the face-to-face component. The findings support the theoretical conclusions derived from Chapter 2: Communication is a co-ordination mechanism, trust is a way to accomplish a task without constant supervision and collaboration helps to integrate other functions and stakeholders. The results therefore further validate the argument that team effectiveness is not only complementary to improved project performance, but necessary, particularly in a virtual and hybrid team context.

Third, the research confirms the mediating effect of team effectiveness. The findings reveal that virtuality is positively related to team effectiveness, which is positively related to project performance. This suggests that virtuality has an indirect effect on outcomes through team processes, rather than a direct effect. This result is consistent with the research model presented in the paper, and builds on research that has previously highlighted that the mechanisms for virtual work and performance are under-specified.

Although earlier research has pointed to the importance of communication and trust, it has not always empirically shown how these variables work in concert. Our results build on this by demonstrating the inter-relationships between communication, trust and collaboration and how they function together as a team effectiveness construct. This is why individual predictors were not significant in regression analysis, due to multicollinearity, and supports the notion of considering team processes as a whole.

Fourth, the results of the sector differences (IT and non-IT) partially support the literature. Although the literature makes a case for IT projects being more virtual because

of the use of digital technologies and codified processes, the findings of this study did not find statistically significant differences between the sectors. This implies that while sector-specific characteristics may shape coordination practices, the overall dynamics between virtuality, team effectiveness, and performance are the same.

This result adds to the body of knowledge by suggesting that virtual work effectiveness is not only restricted to the IT sector, but may be applicable to different sectors if team processes are appropriate. It also reinforces the proposition that it may be organisational practices and team design, rather than sector characteristics, which play an important role in project performance.

Finally, the results of the cluster analysis argue in favour of the PMI typology. The presence of three clusters (low, moderate, and high virtuality) support the idea that virtual teams are not monolithic. This finding is consistent with the critique of the literature in Chapter 2, which suggested that the categorisation of remote and hybrid work obviates differences in structure.

The availability of different team types offers empirical support for the view that virtuality is multifaceted and should be studied based on team characteristics such as geographical distance and time zone differences. This finding explains the conflicting results of previous studies, because different types of virtual teams may face distinct coordination challenges and team performance.

To conclude, the results of this study are in line with recent research that highlights the importance of team processes and coordination efforts in virtual settings. The study, however, extends the existing literature by validating the mediation role of team effectiveness in the path between seniority and the virtual team's performance and by providing evidence to support typology approach to virtual teams. These insights help turn the spotlight from mere mode-of-work comparisons towards a more complex configuration approach.

5.10 Theoretical Implications

The present study presents several theoretical contributions: in project management, it proposes a new view on the project's life cycle, particularly concerning its phases; in the area of virtual teams and remote work, it offers a new perspective on the project's lifecycle, focusing on its phases..

This study makes a valuable contribution to the debate on the effect of virtual and hybrid working on project performance. The traditional perspective is on the downside of geographical distance and virtual work on coordination and performance. But this view is challenged by the results of this study that show virtuality has a positive impact on team effectiveness and project performance. This goes from a virtual work being a constraint, to being a neutral or even facilitative factor, depending on the nature of the processes in the team.

Second, the research findings are very consistent with the theory of PMI virtual team typologies. The study empirically confirms the hypothesis that virtuality should be considered a multidimensional phenomenon instead of a dichotomous one, showing the different clusters of virtual teams according to their structural features. This is a significant contribution in theory because it moves away from the more widely used "remote, hybrid, onsite" classification towards a more nuanced configuration-based approach to team structures.

This typology approach helps future research to consider diversity in virtual teams more appropriately, and allows for a more focused analysis of performance variation. Furthermore, it is a major advance in the literature that it resolves a major problem for which conflicting evidence has been reported, which may stem from oversimplified classification of work modes.

Third, the research helps advance theory by showing mediation of the link between virtuality and project performance by team effectiveness. Previous studies have

identified the importance of communication, trust, and interaction in the virtual team but this study indicates that these three variables act as a mediation between virtual team structures and performance. This helps to explain the causal link and supports the theoretical framework put forth in the study.

Most importantly, the research demonstrates the need to view team effectiveness as a whole as opposed to individual factors. The result of the regression analysis is the multicollinearity which indicates the high interdependency of the variables of communication/confidence/cooperation and the fact that they are a system. This discovery contributes to theory by furthering the understanding of team processes in projects in a more integrated way.

Forth, the research contributes to the theory by demonstrating that the relationships between virtuality and team effectiveness and performance are similar in both industries—IT and non-IT. This is contrary to perspectives that believe that virtual work is effective primarily in certain sectors. Instead, the findings indicate that there is no significant difference across sectors in processes that drive team effectiveness.

This corroborates the generalisability of the virtual team theory and the observation that the way organisations work is a major success factor, rather than the character of the industry.

Lastly, our study adds to the project management literature by emphasising the significance of process-based approaches. The results go beyond analyzing only structural aspects like distance and team diversity, and show the significance of interaction, communication, and collaboration patterns in determining project success. This perspective is in line with the recent changes in the project management theory which focus on the relational or behavioural aspects along with control aspects.
In essence, this research contributes to theory by:

- Challenging negative assumptions about virtual work
- Confirming the PMI typology as multi-dimensional
- Showing the moderating effect of team effectiveness
- Promoting a generalisability of sector
- Encouraging a process perspective of project success

5.11 Practical Implications

This study offers several practical implications for project managers, organisations and stakeholders in remote and hybrid work settings. These insights are based on empirical findings that emphasise the importance of team effectiveness, in terms of communication, trust and collaboration, in determining project outcomes.

1. Focus on Team Processes, not Location

This study has important implications for the fact that project performance is not a function of remote/hybrid teams but of team processes. Companies do not need to operate from a "location-centred" perspective, but rather from a "team interaction centred" perspective.

Instead of managing employees to return to work in offices, managers should enhance the quality of communication, trust and collaboration processes among team members.

2. Strengthen Communication Structures

The links between communication and project success means organisations should adopt formal communication practices. This includes:

- Establishing communication policies (e.g., response time, escalation)
- Employing the right digital tools for real-time and delayed communication
- Holding regular team meetings

- Transparency in sharing information

Good communication helps avoid confusion, enhances coordination and facilitates decision-making in virtual settings.

3. Build and Maintain Trust in Virtual Teams

Trust was recognised as an important element of team success. In virtual environments where supervision is minimal, trust is needed to ensure accountability and successful task completion.

Project managers should:
Establish roles and responsibilities
Establish performance and behaviour standards
Foster openness and honesty
Foster an environment in which team members are encouraged to voice their concerns or ideas

It is especially important to build trust in the early stages of a project to enhance team performance.

4. Improve Collaboration with Digital Practices

Collaboration is important for synthesising tasks and coordinating team work. Organisations should use digital collaboration tools to support teamwork and sharing of knowledge.

Managers should:

- Encourage cross-functional interaction

- Promote shared problem-solving
- Employ collaboration tools (e.g., dashboards, project management systems)
- Foster informal connections to build team dynamics

Better collaboration helps overcome silos and increase project success.

5. Design Teams Based on Virtuality Characteristics

Virtual teams vary in structure as revealed by the cluster analysis. This suggests that a "one-size-fits-all" approach to managing teams is not suitable.

Managers should:

- Understand team's level of virtuality (low, moderate, high)
- Manage depending on team type
- Employ more formal channels of communication and coordination for highly virtual teams

Use both online and offline communication in hybrid teams

This approach ensures that virtual team management is aligned with the characteristics of different types of virtual teams.

6. Invest in Digital Infrastructure and Training

Organisations need to ensure that technology supports virtual collaboration. This includes:

- Reliable communication platforms
- Project management tools
- Collaboration software

Further, employees should be trained to use these tools effectively and collaborate effectively in a virtual environment.

7. Apply Practices Cross Sector (IT and Non-IT)

The results suggest that virtual teams work well not only in IT projects. Virtual and hybrid team approaches can be used by organisations in various sectors, with an emphasis on team processes.

This implies that practices regarding communication, trust and collaboration are universal and can be applicable to any industry.

Key Practical Implications

In general, the research shows that for virtual project management to be successful, it requires:

- Strong communication systems
- High levels of trust
- Effective collaboration practices
- Adaptation to team structure

Through this attention, organisations can enhance project performance and capitalise on the advantages of the remote/hybrid workplace.

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5.12 Summary of Discussion

Overall, we find that:

- Virtuality does not negatively affect performance

- Team effectiveness is the best predictor of performance
- Virtuality has an indirect effect on performance through team effectiveness
- There are differences between industries, although they are not significant
- Virtual teams can be classified into distinct types

These insights give a holistic view of the role of remote and hybrid work in project performance and form the basis of the conclusions and recommendations in Chapter 6.

6 CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter offers the main findings of the study and practical and theoretical recommendations. The objective of this study was to explore the effects of remote and hybrid work on project performance and team effectiveness, while comparing IT and non-IT project teams. It also sought to examine the mediating effect of team effectiveness and shed light on various types of virtual teams using a typology from PMI (Klonek & Parker, 2021).

This chapter provides conclusions based on the discussion and analysis in Chapters 4 and 5. This chapter starts by summarising the key findings and then draws conclusions related to the research questions and hypotheses. Next, the chapter discusses contributions to theory and practice (for project management), study limitations, and opportunities for future research.

6.2 Key Findings

This study offers a number of insights into how virtual work arrangements, team effectiveness and project performance are related.

First, virtuality does not have a negative impact on project performance. Specifically, the study found that virtual team characteristics are positively related to project performance. This finding implies that virtual and hybrid work arrangements can enable project success if well managed (Hosseini et al., 2018).

Second, the study found that team effectiveness - as measured by communication, trust and collaboration - is the most important predictor of project performance. Each was

positively related to performance, suggesting that team processes are important for project success, regardless of the manner in which teams work.

Third, the research supported that team effectiveness moderates the virtuality-performance link. This suggests virtual work arrangements affect performance through the effects on team processes (Hosseini, Bosch-Sijtsema, et al., 2018).

Fourth, there were only minor differences between IT and non-IT projects. Although there were some descriptive differences, the pattern of relationships between variables was similar across the two sectors, implying that the effect of virtual work is similar for different types of projects.

Finally, identifying clustering of virtual teams, the PMI typology was confirmed. This suggests virtual teams cannot be understood as a homogeneous group, but can be present in various configurations.

6.3 Conclusions linked to research objectives

Objective 1: To explore the effects of remote and hybrid work on project performance

The research suggests that hybrid and remote work does not negatively impact project performance. Rather, performance is a function of the team's ability to address coordination, communication and collaboration. This debunks the myth that co-location is required for project success.

Objective 2: To examine the importance of team effectiveness in virtual teams

The results show that team effectiveness is a key factor in project success. Information sharing is made possible through communication, responsibility and accountability through trust, and task coordination through collaboration. These elements add up to enhance project performance.

Objective 3: To compare IT and non-IT project teams

Research shows that while IT projects may be more suited to using technology, there is no difference in the overall impact of virtual work across industries. Virtual and hybrid work can be effective for IT and non-IT teams with the right team processes.

Objective 4: To investigate different virtual team arrangements

The three clusters identified suggest virtual teams do differ in composition and design. This confirms the PMI typology approach and implies that different team types need to be managed differently.

6.4 Hypothesis-based Conclusions

Four hypotheses were tested:

H1: Virtuality has a negative influence on project performance

Rejected - it was positive

H2: Team effectiveness increases project performance

Supported - positive relationships strong

H3: Team effectiveness is a mediator between virtuality and performance

Supported - mediation found

H4: Variation between IT and non-IT projects

Partially supported - some evidence of differences

These findings suggest team processes are more important than work arrangements for project success.

6.5 Theoretical Contributions

This research makes several contributions to the literature.

First, it contradicts the view of remote work as being detrimental to performance by empirically demonstrating that virtuality can be positively related to project performance (Raj *et al.*, 2023). This contributes to the emerging research that considers remote work as a practical and effective working arrangement (Mozammel, Irum and Abdulla, 2025).

Second, the study affirms team effectiveness as being a key mediating process. By showing that communication, trust and collaboration mediate the relationship between virtual teams and performance outcomes, the study offers insight into how it works.

Third, the study reinforces the typology developed by the PMI by highlighting different types of virtual teams. This adds to the theory by highlighting the multi-dimensional nature of virtuality.

Finally, by including both IT and non-IT industries the study's findings are more generalisable and offer more insight into virtual project management.

6.6 Practical Recommendations

Our research has some practical implications for project managers and organisations.

1. Emphasise Team Performance, Not Team Location

When it comes to project management, the focus needs to be on communication, trust and teamwork, not remote and hybrid working. Team processes are key to success (Vasudevan *et al.*, 2023).

2. Strengthen Communication Practices

Organisations should:

- Use appropriate digital communication tools
- Set communication guidelines
- Promote frequent feedback and updates

Effective communication eliminates confusion and enables collaboration in virtual work-places.

3. Foster Trust

Trust can be enhanced by:

- Setting clear expectations
- Ensuring accountability
- Promoting transparency

Managers should foster a workplace where employees can trust their colleagues.

4. Promote Collaboration

Collaboration can be improved by:

- Promoting teamwork and sharing knowledge
- Using collaborative platforms

- Enabling problem solving and decision-making

Collaboration facilitates co-ordination and enhances project management.

5. Clarify Roles and Processes

Roles, responsibilities and processes are crucial in virtual teams. This will prevent confusion and be efficient.

6. Match Management to Team Configuration

Different types of virtual teams need to be managed differently. For example:

- Teams that are entirely virtual may require more formal communication
- Hybrid teams might need a mix of online and in-person communication
- Managers should align to team dynamics.

7. Provide Digital Infrastructure

Employers should ensure effective tools are in place for communication, collaboration and project management. Technology is essential for virtual work (Bissaliyev, 2017).

6.7 Limitations of the Study

While our study has made valuable contributions, it has limitations.

First, the small number of respondents (50) is a drawback. Larger samples might have been more representative.

Second, the findings are based on respondents' perceptions, which could be biased. Participants may have over- or underestimated their experiences.

Third, the cross-sectional approach provides a snapshot in time, and it is hard to account for changes throughout the project (Shepard and Rose, 2025).

Fourth, the presence of multicollinearity in the regression modelling precluded individual interpretation of the predictors. This implies that other modelling techniques should be explored (Mundfrom, DePoy Smith and Kay, 2018).

Lastly, the study was limited to a few variables and did not consider others, such as leadership style, organisational culture or technology use (Vasumathi *et al.*, 2025).

6.8 Future Research

This study can be expanded in future research by:

- Increase sample sizes and diversity for better representativeness
- Use longitudinal designs to investigate change
- Look at other factors such as leadership, culture and technology

Use more sophisticated statistical methods like structural equation modelling (SEM) (Sharma and Gnawali, 2025)

- Explore industry and regional variations

Understand the role of new technologies (e.g. AI) in influencing virtual team performance (Florea and Croitoru, 2025)

These opportunities can help us gain a better understanding of virtual project management.

6.9 Final Conclusion

In conclusion, this study indicates that for project success, virtual and hybrid work can be effective along with an effective team process. The study reveals that successful interaction, trust and collaboration in the virtual work is essential.

Instead of considering virtual work a problem, organisations should concentrate on team processes and structures. This will enable them to harness the advantages of both virtual and hybrid working and deliver performance.

The study also advocates for consideration of the various types of virtual teams and how best to manage them. The subtle insight can be of value to project management academics and practitioners.

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APPENDIX: QUESTIONNAIRE (Survey Instrument)

Appendix A: Survey Questionnaire

1. **Section 1: Background Information**

2. What is your role in the project?
    - Project Manager
    - Team Member
    - Team Lead
    - Support Staff
    - Other: _____
3. How many years of project experience do you have?
    - Less than 1 year
    - 1–3 years
    - 4–6 years
    - 7–10 years
    - More than 10 years
4. What type of project did you work on?
    - IT / Software
    - Non-IT (e.g., business, marketing, healthcare, education)
    - Mixed / Cross-functional
5. What was the primary work arrangement of your team?
    - Fully Remote
    - Hybrid
    - Mostly Onsite
6. What was the approximate team size?
    - 1–5
    - 6–10
    - 11–20

- More than 20

7. Section 2: Virtual Team Characteristics (Virtuality)

6. How many locations were involved in your project team?
    - Single location
    - 2–3 locations
    - 4–5 locations
    - More than 5
7. What was the maximum time-zone difference in your team?
    - Same time zone
    - 1–3 hours
    - 4–6 hours
    - More than 6 hours
8. Team members were from multiple organisations.
    - Strongly Disagree (1) → Strongly Agree (5)
9. The team relied heavily on digital communication tools.
    - Strongly Disagree (1) → Strongly Agree (5)
10. Roles and responsibilities were clearly defined.

- Strongly Disagree (1) → Strongly Agree (5)

8. Section 3: Team Effectiveness

9. Communication

11. Communication within the team was clear and effective.
12. Information was shared in a timely manner.

10. Trust

13. Team members trusted each other.
14. Team members were reliable and accountable.

11. Collaboration

15. Team members worked well together.
16. There was strong cooperation among team members.

(All measured on 5-point Likert scale: Strongly Disagree → Strongly Agree)

12. Section 4: Project Performance

17. The project was completed on time.
18. The project was completed within budget.
19. The project met quality standards.
20. Stakeholder expectations were satisfied.
21. Scope changes were well managed.

(5-point Likert scale)

13. Section 5: Optional Open-Ended Questions

22. What were the biggest challenges faced in your project team?
23. What practices helped improve team effectiveness in your project?