



Exploring the Determinants of Virtual Team Effectiveness in Bangalore-Based MNC's

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ABSTRACT

The growing use of digital technologies and the transition to remote work have greatly changed the way organizations are run, and virtual teams have become common in multinational corporations. In this research the determinants of virtual team effectiveness are addressed with reference to Bangalore based MNCs, which is a region with the high concentration of global organizations and technology based workplaces.

The main goal of the study is to detect the major factors which impact the virtual team performance and the interaction among the process interdependence, communication quality and cultural intelligence in the determination of the team effectiveness. The research also seeks to comprehend the role of these factors in promoting teamwork, performance, and the general performance of the team in a virtual workplace.

The study was conducted using a structured questionnaire which was administered to employees who worked in virtual teams and 102 valid responses were analyzed. Python was used to interpret the data and to draw meaningful conclusions through various statistical methods such as t-test, correlation and factor analysis.

The study results indicate that in the virtual team, communication is the key aspect that can help to create efficient coordination and minimize misunderstandings. Interdependence among processes was observed to enhance teamwork as it motivated members of a group to depend on one another to accomplish a task. Also, the concept of cultural intelligence came out as a significant element in the management of diversity and enhancement of interpersonal interaction in teams. The findings also show that virtual teams are, in general, effective, but certain issues still persist, which suggests the necessity of constant improvement.

Comprehensively, the research comes to the conclusion that virtual team performance depends on a



complex of interdependent elements, and companies should have a comprehensive approach to remote team management. The study offers theoretical and practical information that can assist an organization to improve team performance and be able to adapt effectively to changing work environments.

Keywords

Virtual Teams, Team Effectiveness, Quality of Communication, Interdependence of Processes, Cultural Intelligence, Multinational Corporations (MNCs), Remote Work, Collaboration, Team Performance, Bangalore.

CHAPTER-1

Introduction and Literature Review



1.1. Introduction

In the current dynamic business world, organizations are now turning to virtual teams to conduct their business activities effectively. Globalization, digital transformation and high communication technologies has enabled employees to collaborate in various locations without necessarily being physically found in the same place of work. This has been particularly pronounced in multinationals (MNCs) where the teams tend to be located in various cities and countries and there is always the need to coordinate them across time zones and cultural borders.

The COVID-19 crisis also increased the rate of transition to virtual work practices and was the reason remote collaboration was not a choice, but a necessity. This forced organizations to promptly change to this new way of working by adapting to digital tools like video conferencing, instant messaging, and project management tools. Although such tools helped to maintain contact more easily, they also brought a new set of problems. Problems like lack of communication, responsiveness delays, absence of face to face interaction and failure to develop trust among the team members became more pronounced. Moreover, the issue of cultural diversity within the teams made virtual collaboration more complex.

The virtual teams have become very common especially in a city such as Bangalore which is well known to be a great city of information technology and multinational firms. In these organizations, many employees are commuting to work either in a remote or hybrid arrangement, where they are working with others in other places. This creates the need to determine what makes virtual teams successful or not in such dynamic environment.

Virtual teams do not work based on one factor but on a combination of factors. The quality of communication is an important aspect in making the communication clear and less prone to misunderstandings. The interdependence of processes defines the extent of coordination of the tasks and the interdependence of the team members. Collaboration is supported by the use of digital tools, yet the effectiveness of these tools relies on the efficiency of using them. Confidence between the members of the team is also necessary to ensure that the working environment is positive, and cultural intelligence enables people to adjust to the different backgrounds and worldviews. This paper seeks to identify the main factors that influence the effectiveness of virtual teams within MNCs located in Bangalore. The research aims to offer valuable suggestions that can improve the virtual work practices of organizations through an analysis of how various factors contribute to team performance, collaboration and productivity. The paper also tries to point out the practical suggestions of how businesses can overcome



the difficulties of remote employment and guide towards a more productive and cooperative virtual workplace. The knowledge of these determinants matters not only to improve the results of the team but also to increase the satisfaction of employees, their engagement, and long-term organizational performance.



1.2 Statement of the Research Problem

As technology rapidly progresses and the globalization trend continues to rise, organizations in different parts of the world are moving towards a more flexible and digital form of working. The increasing use of virtual teams particularly in multinational companies is one of the most notable transformations in this transformation. Virtual teams enable employees to work at various geographical locations through the use of digital communication tools and thus organizations can still work effectively without necessarily having to be physically present. This change has come with a number of advantages such as cost-cutting, flexibility, and access to a wide range of talent.

Nevertheless, in spite of these benefits, effective management of virtual teams remains a critical issue to organizations. As compared to the conventional teams, the virtual teams have a number of distinctive problems that may influence their performance. The absence of face-to-face communication usually results in communication barriers, which can create misunderstandings and slow down the process of a decision. Moreover, time zone differences, cultural background, and work styles may serve as an additional complication and it may be less easy to coordinate team members. Lack of close supervision and personal communication might also minimize trust and team spirit, which is vital in meeting organization objectives.

Virtual teams are now very common especially in the city of Bangalore which is regarded as one of the largest centers of multinational companies and information technology companies. The people in these organizations often operate remotely or in a hybrid setup and interact with the workforce in various places and cultures. Although the virtual teams are very common in this region, very little is known regarding the exact factors that make it effective. Organizations are usually faced with a problem of determining which of the factors like communication quality, interdependence of processes and cultural intelligence were the most influential on the performance of the teams.

In addition, there are limitations to the research that has been carried out in this field. Numerous researches have been carried out in the Western environment, and their results might not be directly applicable to the Indian corporate environment. Besides this, past studies have tended to concentrate on the individual aspects instead of studying the interaction of many variables in relation to each other to



determine the effect of virtual teams. This poses a disconnect between theory and practice and thus organizations have had a hard time coming up with effective strategies of managing virtual teams.

The other significant problem is that the organizations might invest in high-technology digital tools and yet they cannot attain the intended team performance. This shows that technology in itself is not enough,

and other human and behavioral concerns like trust, communication, and cultural adaptability also have a critical role to play. In the absence of a specific comprehension of these factors, organizations can be challenged in keeping productivity and collaboration in virtual environments.

Thus, the research problem of the study is to find and determine the most important determinants that impact the effectiveness of virtual teams in the multinational corporations located in Bangalore. The research also seeks to know the interaction of these factors with one another and how it can be well controlled to elevate the performance of the team, cooperation and the overall performance of the organization in a virtual workplace.

1.3. Review of Literature

Digital technologies are rapidly developing, and this situation is accompanied by the growing globalization of the world, which has a strong influence on the organizational structure, especially in multinational corporations (MNCs). Virtual teams have become a very important element of organizational operation in this changing environment. Such groups are composed of members who are physically spread out and have to use digital communication tools to work and reach shared goals. Among the many benefits of virtual teams is the flexibility, which is cost effective and the availability of a wide talent pool that is global. Nevertheless, they also come with a number of issues concerning communication, trust, coordination, and cultural diversity. As a result, the study of determinants of the virtual team effectiveness has become an essential field of scholarly and practical interest.

Initial work on virtual teams by Powell, Piccoli and Ives (2004) gave a broad perspective on the issues that affect the performance of a virtual team. As core determinants, their paper identified communication, trust, and coordination. Further to this, Gilson et al. (2015) highlighted that virtual teams are largely based on technology-mediated communication, and the clarity, frequency, and richness of communication are critical success factors in virtual teams. The non-verbal communication in virtual



space is restricted, and this aspect increases the possibility of misunderstanding, a factor that can adversely influence the team performance.

The concept of trust has been broadly known to be one of the pillars of virtual team effectiveness. According to Jarvenpaa and Leidner (1999), the concept of swift trust emerged stating that the development of trust in a virtual team can be rather fast and depend on the initial interactions and communication behavior. But this trust can be maintained with time by ensuring that there is frequent communication and good performance. In a meta-analysis study, Breuer, Hueffmeier, and Hertel (2016) discovered that trust is strongly associated with a more effective collaboration, the ability to share knowledge, and the overall performance of the team. The issue of trust in virtual teams is important, but it is rather difficult to create trust in virtual teams since there is no physical interaction and informal communication.

Another determinant that is critical in the dynamics of teams is resource interdependence. Wittenbaum, Hollingshead, and Botero (2004) claimed that the team members who depend on collective resources tend to more frequently engage in collaborative behaviors and exchange information than those who do not. Likewise, Van der Vegt and Janssen (2003) observed that, resource interdependence promotes cooperation and increase coordination among the team members which eventually contributes to better team performance. In virtual

teams, in which there is little direct supervision, interdependence functions as a means of linking the team members and holding them accountable.

Next to the resource interdependence is the process interdependence that involves the degree to which team members rely on others to accomplish the tasks. Ruckstuhl and Ng (2008) proposed that the greater the interdependence, the greater the coordination and communication and hence better team results. This was further supported by Ng, Van Dyne, and Ang (2011) who showed that the perceived interdependence has positive effects on team collaboration, quality of communication, and team effectiveness.

The culture intelligence (CI) has become one of the major determinants of global virtual teams, especially in MNCs whereby employees are of different cultural backgrounds. Ang et al. (2007) defined CI as the ability of an individual to perform well in culturally diverse environments and established it to have a positive relationship with communication, trust, and team performance. The people who have



high CI can comprehend the cultural differences and modify their behavior to a better degree. The literature is however mixed. According to Ng (2011), not every aspect of CI is a significant predictor of virtual team effectiveness, with motivational CI having a low level of impact in certain situations. Such discrepancy underscores the importance of further studies to be in a position to learn more about the contribution of various CI dimensions.

Henderson et al. (2018) further developed this argument by indicating that CI is a moderating variable. Their research has shown that CI has an effect on the connection between communication, role clarity, and team performance. It means that despite the well-organized communication processes, their efficiency is determined by the cultural awareness of the team members. Brandl and Neyer (2009) have pointed out the significance of metacognitive CI, or mindfulness, which allows people to consider and adjust their communication patterns during intercultural contacts. This minimizes the chances of misunderstanding and improves cooperation.

Another significant factor in team effectiveness in a virtual team is role clarity. Rizzo, House, and Litzman (1970) have discovered that ambiguity in roles causes confusion, conflict and poor performance. Roles and responsibilities should be well spelt out in virtual teams where direct supervision is restricted and communication can be asynchronous. Proper role expectations enhance team members to know what they are to do and minimize ambiguity, thus enhance coordination and performance.

The activities of virtual teams revolve around the role of digital communication tools. Video conferencing, instant messaging and collaborative technologies make it possible to communicate and coordinate in real time. Gilson et al. (2015) emphasized that these tools should be used effectively.

increases the level of team connectivity, collaboration and productivity. Nonetheless, over-utilization of digital tools may result in communication overload, informational fatigue, and low efficiency. Thus, the use of technology should be balanced with the effective communication habits.

COVID-19 pandemic served as a significant tipping point in the virtual teams adoption. Huckman, Staats, and Upton (2020) noted that teams experienced various challenges, such as the barrier to communication, a deficiency of coordination, and the decrease in the level of interpersonal interaction. Nevertheless, in the course of time, teams became accustomed to the new working environment and launched better communication practices and increased the use of digital tools. This adjustment resulted



in enhanced performance and efficiency at the later stages.

The framework offered by Morgeson, Mitchell, and Liu (2015) regarding the impact of important events on team behavior is the Event System Theory, which can be helpful in explaining this phenomenon. In accordance with this theory, the COVID-19 pandemic and similar events break the old processes and establish new patterns of interaction. This interference in the framework of virtual teams compelled organizations to implement new patterns of operation that resulted in the long-term alteration in the dynamics and performance of the teams.

Another important factor that determines effectiveness of virtual teams is knowledge sharing. Cummings (2004) discovered that sharing knowledge enhances team decision support, innovation and performance. On the same note, Alavi and Leidner (2001) noted the importance of information systems in knowledge sharing. Communication has been identified to be important in virtual teams due to the need to share knowledge effectively, trust, and availability of proper technological equipment.

Virtual teams require the involvement of leadership. Purvanova and Bono (2009) discovered that transformational leadership has a positive impact on the performance of virtual teams by inspiring team members and making them feel that they have a common purpose. Leaders are effective in ensuring that there is effective communication, development of trust and solving disputes in the team. Leadership in the virtual world also entails the handling of diversity in culture and making every team member feel welcomed.

Virtual team success also depends on team cohesion. Maznevski and Chudoba (2000) discovered that cohesive team has a higher chance of communicating and reaching its objectives. Cohesion in virtual environments needs intentional attempts to create cohesion through frequent meetings, team building exercises, and informal communication.

Self-efficacy has been found to be a critical individual-level factor. According to Bandura (1997), self-efficacy was defined as the belief to accomplish things in an individual. Rokstuhl and Ng (2008) established that people with high self-efficacy are more flexible and do better in multicultural virtual teams. These people have more confidence in managing challenges and they are more likely to experience effective communication.



Virtual team effectiveness is also affected by geographical dispersion and time zone differences. As O'Leary and Cummings (2007) underscored, the space and time distance may lead to coordination problems and communication delays. Nevertheless, these obstacles can be overcome by proper planning, scheduling and communication strategies.

In order to maintain the performance of the team, employee engagement and motivation are essential. According to Saks (2006), engaged employees are more dedicated, prolific, and ready to serve the objectives of the organization. In virtual teams, it is necessary to be engaged through constant communication, appreciation, and management encouragement.

Besides these aspects, recent research highlights the role of flexibility and lifelong learning in virtual teams. Flexible and open teams have more chances to achieve success in dynamic environments. The COVID-19 pandemic has shown that virtual teams can be developed over time and acquire new features and enhance their performance through learning and adaptation.

1.3.1. Critical review of literature:

The literature on virtual team effectiveness has identified a number of factors that are important to be considered including communication, trust, collaboration, cultural intelligence, and role clarity. The majority of the research concurs that these factors are critical in enhancing the team performance, given that in a virtual setting, face-to-face communication is minimal. Nevertheless, the analysis of the literature shows some inconsistencies and gaps in the research.

The importance of Cultural Intelligence (CI) in making virtual teams effective has been highlighted by many scholarly researchers. As an example, research indicates that people who possess more CI can easily adjust to culturally diverse workplaces, resulting in effective communication and cooperation. Also, CI has been observed to have a positive impact on trust and team cohesion. Not, however, do findings always agree. According to some studies, certain aspects of CI, especially motivational CI are not significant predictors of virtual team performance. Such contradiction shows the necessity to conduct additional research to comprehend more effectively what features of CI have the strongest influence.

The other significant observation made by the literature is the moderating effect of CI. Some of the



studies propose that CI has an effect on the correlation between communication, role clarity, and team performance. This implies that the presence of good communication practices might not be enough unless the team members possess the cultural awareness to understand and act accordingly in various environments.

The COVID-19 pandemic presented a special setting of studying virtual teams. Though companies quickly adjusted to working remotely, most groups at first struggled with undefined roles, absence of coordination, and diminished human connection. In the course of time, though, teams have become more communicative and adjusted to digital tools, which has made them more effective. In spite of this, there is little research that has examined the changes that occurred at various stages of the pandemic, particularly in the case of India.

Also, although such factors as trust, collaboration, and communication are extensively researched, there is a gap in the integrated research on how these variables can interact with each other as opposed to their isolation. This paper will fill these gaps by offering a deeper insight into the factors that determine virtual team performance, especially cultural intelligence and group dynamics in the post-pandemic world.

1.4. Identification of Research Gaps

Due to the fast development of globalization and ongoing improvement of the digital technologies, the application of virtual teams has become a widespread tradition in multinationals. Remote collaboration has become essential to organizations nowadays because it allows managing projects, organizing work, and communicating workers of various geographical areas. There has already been a lot of research done to learn the factors which determine the effectiveness of a virtual team, such as communication, trust, cultural intelligence and processes interdependence. These researches have brought good knowledge on the functionality of virtual teams and what makes them successful.

Nevertheless, the significant weakness of the current literature is that the majority of the studies have been conducted on a global or Western organizational environment. Consequently, their results might not represent the actual situation of the Indian business world perfectly, in which the cultural diversity, work habits, and organizational frameworks might be completely different. This brings about the necessity of more context-relevant research that would deal with virtual teams working in India.



Bangalore is a significant region to be studied in this context. As one of the most active centers of information technology and multinational companies, the virtual teams have become more popular in Bangalore, especially after the COVID-19 outbreak. Notwithstanding this increasing trend, empirical research that specifically studies the issue of factors contributing to virtual team effectiveness in Bangalore-based MNCs is limited.

The other gap in the literature that is also significant is that the majority of the past studies have investigated the key variables of communication, trust, and cultural intelligence individually, as opposed to their joint impact. These factors do not exist separately in the real-world organizational environment, but rather interact with other factors to affect the performance of teams.

Thus, this research seeks to fill the gaps by looking at the interactive effect of the major determinants on the effectiveness of virtual teams in the multinational corporations based in Bangalore. It aims at giving a more insightful view of the combined effect of these factors and also gives pragmatic idea that can guide organizations to enhance cooperation, output, and the overall team performance in the virtual work setting.

1.5. Theoretical Background of the Study

The increasing application of virtual teams in the contemporary organizations has brought about the need to learn the theories through which these teams operate effectively. As the process of remote work and digital collaboration gains momentum, the question arises of the necessity to examine the history of ideas that shape the behavior of teams, interaction, and performance. The theoretical viewpoints underpinning this study are mainly resource interdependence theory, event system theory and cultural intelligence theory which contribute to the understanding of the virtual team effectiveness.

Resource interdependence theory concerns the interdependence of team members on one another in order to accomplish tasks and accomplish some shared objectives. When people base their lives on the use of common resources and information, then more easily they communicate, coordinated, and work together. This is particularly crucial in virtual teams, where actual interaction is minimal and group effort



is heavily reliant on cooperation and support.

The theory of event system covers the way in which the team processes can be affected by the major events in the long-term. The COVID- 19 pandemic is an obvious case of such an event, as it has compelled organizations to turn to remote work overnight. This shift influenced communication, coordination and general team operation. Nevertheless, groups slowly got used to such obstacles and created more effective methods of operating within virtual teams. This theory assists in comprehending the way teams develop and enhance their performance according to the external changes.

The cultural intelligence theory also matters especially where a multinational organization is involved and where the members of the team belong to various cultural backgrounds. It is the capacity of people to adapt to cultural differences and comprehend them. An increased level of cultural intelligence assists in enhancing communication and conflict reduction as well as the creation of trust in teams.

Besides that, communication theory and social exchange theory also help to support this study as they underline the significance of clear communication and mutual trust. Collectively, the theories offer a solid basis of the essential factors that determine the effectiveness of virtual teams.

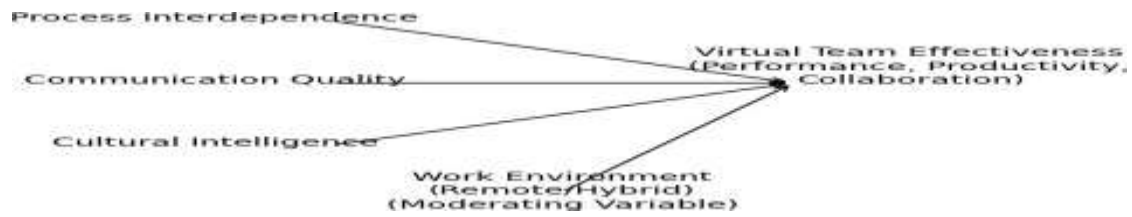


Fig1: Framework of theoretical underpinnings

CHAPTER-2

Research Methodology



2.1 Scope of the Study

The current research paper is dedicated to the analysis of the effectiveness of virtual teams in multinational companies in Bangalore. As there is an increasing trend toward remote work and hybrid work models, virtual teams are becoming increasingly important as they enable many organizations in this region to run their daily operations. The research problem targeted in this study is the employees who are currently working in virtual or remote team settings and are engaged in collaborative work using digital communication tools. By targeting such employees, the research will be able to get real experiences and practical challenges encountered in virtual teamwork.

The study scope will entail the analysis of some of the key factors that are deemed to be important in the context of virtual team effectiveness. These are communication quality, interdependence of processes and cultural intelligence. Communication quality is understood as the degree of the clarity and the ability to share information within the team. Process interdependence is concerned with the degree of reliance between team members to accomplish tasks whereas cultural intelligence is concerned with individual capability of working in culturally diverse settings. These variables are researched in connection to such significant outcomes as productivity of the team, effectiveness of collaboration, and the general team performance.

The paper will only cover multinational firms located in Bangalore and this limits the scope of the study to this context of the Indian corporate world. Bangalore is regarded as a great center of information technology and international corporations where virtual teams are popular. Nevertheless, the results of this research might not be applied directly to organizations that are not within this region or small companies like small and medium enterprises. Another limitation is the fact that the study only deals with virtual teams and does not compare their performance to the traditional face-to-face teams.

The information to be used in this study is gathered by way of a structured questionnaire that is administered to virtual team employees. Thus, the findings are founded on perceptions, views, and experiences of the respondents. This will help in giving valuable insights but on the other hand, it implies that the results can be affected by personal biases.

In general, the research is expected to deliver informative and useful information that would assist organizations to enhance the management of virtual teams. It outlines how to make communication



stronger, improved coordination, and improved collaboration among the team members working in remote work situations and finally leads to a better performance of the organization.



2.2.Objectives:

1. To establish the determinants that influence virtual team effectiveness among Bangalore-based MNCs.

This aim is dedicated to the determination of the most significant determinants of the performance of virtual teams in multinational corporations that work in Bangalore. As the use of remote work grows, it is of interest to learn which factors, including communication, trust, technology, and team coordination, are influential in the performance of a team. This goal assists in identifying the most problematic variables that lead to effective virtual teamwork.

2. To test the correlation between the quality of communication, process interdependence and virtual team effectiveness.

The aim of this goal is to examine the relationship between communication quality and interdependence of processes and the general performance of virtual teams. Quality communication involves clarity, frequency and responsiveness and process interdependence is the level of dependency that team members have on each other to accomplish tasks. The research will examine the connection between these variables with the view of gaining insight into how effective communication and increased interdependence can enhance coordination, minimize misunderstanding, and improve team results.

3. To examine how cultural intelligence is useful in enhancing performance and collaboration in virtual teams.

The purpose of this objective is to assess the role of cultural intelligence (CI) in team collaboration and team performance with particular emphasis on the context of diverse virtual teams consisting of individuals with varying cultural backgrounds. Cultural intelligence assists people to change their behavior, communicate and develop trust between cultures. Through this aspect, the study aims at knowing whether increased levels of cultural intelligence would result in improved team work, relationship and productivity in virtual set-ups.

2.3 Framing of Research Hypothesis

Research hypotheses have been developed in this study to investigate the correlation between major variables that affect the virtual team effectiveness in multinational corporations. The hypotheses are formulated on the basis of the objectives of the research and validated with the help of the review of literature. Having clear hypotheses assists in the process of analyzing the data and enables the researcher to test the relationships of variables in a scientific and systematic way.

The research concentrates on three significant independent variables, such as communication quality,



interdependence in the processes, and cultural intelligence and its influence on the dependent variable, which is the virtual team effectiveness. Both the null hypothesis and alternative hypothesis have been formulated on each of these variables.

The first hypothesis is a consideration of the relationship between the effectiveness of virtual teams and the quality of their communication. Communication is believed to be a key element in virtual teams because it ensures that there is clarity, less misunderstanding and coordination.

H₀₁: Communication quality and virtual team effectiveness are not significantly related.

H₁₁: Quality of communication and virtual team effectiveness are significantly related.

The second hypothesis is based on the interdependence of processes, meaning the level of interdependence of the team members on one another to perform tasks. Greater interdependence will enhance team performance and cooperation.

H₀₂: Process interdependence and virtual team effectiveness are not significantly related.

H₁₂: Process interdependence has no significant relationship with virtual team effectiveness.

The third hypothesis looks at the place of cultural intelligence in virtual teams. Cultural intelligence is very important because multinational teams are made up of people of different cultures.

H₀₃: Cultural intelligence does not have a significant relationship with virtual team effectiveness.

H₁₃: Cultural intelligence and virtual team effectiveness are significantly related.

These hypotheses give a clear guideline on how to conduct the study and are examined through the use of statistical methods like correlation analysis and t-test. The findings aid in the identification of whether or not the supposed relationships are backed by the data. In general, the formulation of these hypotheses guarantees a rational and orderly method of the study of the factors that determine the effectiveness of virtual teams.

2.5 Research Design

This study has a descriptive and analytical research design because it seeks to know and analyze factors that determine the effectiveness of virtual teams in multinational corporations. The data has been collected, analyzed and interpreted in a systematic way using a structured approach. The design assists in determining the relationship between key variables like quality of communication, interdependence



of processes, cultural intelligence and effectiveness of virtual teams.

The current study relies on a quantitative research design because the study aims at gathering numerical data of respondents and examining it through statistical methods. Quantitative methods enable the objective measuring of the variables and contribute to making meaningful conclusions out of the data.

collected. Data collection has been approached using a survey research design because it is among the most appropriate methods of collecting information about a high number of respondents within a strained time.

The main data of the work has been gathered with the help of the structured questionnaire which is aimed at capturing the perceptions and experience of the employees working in the virtual teams. The questionnaire will contain close-ended questions, primarily a Likert scale, which will assist in determining the extent to which the respondents agree or disagree with different statements. This format facilitates easier analysis of the data and drawing patterns or trends.

The study target population comprises of employees who are employed in multinational organizations that are based in Bangalore and are on virtual teams or remote teams. Respondents have been selected using a convenience sampling method because it provides easy access to the respondents and guarantees fast collection of the data. The sample will include the people who are actively engaged in virtual collaboration and can offer appropriate information related to the research topic.

In the analysis of the data, some of the statistical tools that have been applied include descriptive statistics, correlation, and regression analysis. Descriptive statistics are useful in summarizing the data, whereas the correlation analysis examines the relationship between variables. Regression analysis also assists in the interpretation of the effects that independent variables have on the virtual team effectiveness. These techniques will allow a good insight into how various variables affect the performance of teams.

The research design is also important in that the research is on track and ensures that the results given are reliable and valid. Nonetheless, some limitations, including the sample size and the use of self-reported data, can have an impact on generalizing the results.



Altogether, the research design offers an organized approach to the study and guarantees the relevance, usefulness, and meaning of the collected data on the virtual team performance in multinational organizations.

2.6 Methods of Data Collection and Variables of the Study

Methods of Data Collection

The current research is founded on the primary data collected directly with the respondents to comprehend the factors that contribute to the effectiveness of virtual teams. Primary data collection is ideal because it offers first-hand information that is unique to the purpose of the study and it captures the real life experiences of people who work in virtual teams.

A structured questionnaire was used as the main tool for data collection. The questionnaire was formulated with the purpose of addressing all the aspects that were considered pertinent to the research topic such as quality of communication, process interdependence, cultural intelligence and virtual team effectiveness. The questions were also phrased in a straightforward and easy manner so that the respondents could understand and answer them easily without any confusion.

The questions in the questionnaire were mostly close ended and on a Likert scale where the respondents were expected to respond to the question regarding their degree of agreement or disagreement with particular statements. This approach assists in transforming opinions into quantifiable information, and hence easier to analyze on a statistical basis. A Likert scale also provides consistency in the responses and the comparison of responses across different variables.

The questionnaire was sent through the digital platform and therefore respondents could take part regardless of their places. This was a very appropriate method in the study because the target population was composed of workers in virtual or remote work teams. The online method of data collection also contributed to saving time and covering a larger audience in a very short time.

This study sample will consist of employees in multinational companies located in Bangalore that are actively engaged in virtual teamwork. The convenience sampling technique was applied to the participants since it provided easy access to the respondents and efficiency in data collection. In spite of the fact that this approach might be limited in the extent of generalization, it is popular in the similar



research studies because it is practical.

The information obtained after conducting interviews with the respondents was then screened and tabulated before the analysis. The answers were coded and typed into statistical software to be examined further. This ensured accuracy and reliability in the analysis process.

Variables of the Study

This research identifies independent and dependent variables which are used in this research depending on their influence on the effectiveness of virtual teams.



Independent Variables

The independent variables are the variables which are supposed to impact the effectiveness of virtual teams.

1. Communication Quality

Communication quality is the meaning of how well, often, and well the team members communicate. Communication in virtual teams is primarily conducted via digital platforms and therefore it is important that information is shared correctly and on time. Good communication minimizes miscommunication and enhances coordination among members of the team.

2.Process Interdependence

Process interdependence is the extent to which team members depend on one another to accomplish their tasks. In interdependent teams, members are expected to coordinate and exchange information frequently, as they are in a high-interdependence team. This dependency fosters collaboration and brings coordination in the tasks, which leads to improved team work.

3.Cultural Intelligence (CI)

Cultural intelligence is the skill of people to learn and become accustomed to other cultural backgrounds. Virtual teams in multinational organizations are usually composed of people with diverse cultures. The increased cultural intelligence aids people to effectively communicate, appreciate differences and develop trust, which result in enhanced teamwork and performance.

Dependent Variable

Virtual Team Effectiveness

Virtual team effectiveness is the main outcome variable of this study. It is defined as the effectiveness of a virtual team regarding its goal attainment, productivity, and effective interactions among the team members. It entails team performance, coordination and efficient completion of tasks.



CHAPTER-3

Data Analysis and Interpretation



3.1 Techniques for Data Analysis

In this research, appropriate statistical methods have been used to examine the data obtained regarding the respondents and to provide meaningful inferences regarding the effectiveness of virtual teams in multinational corporations. These methods are meant to transform the raw data to useful information that can be used to address the research objectives and to learn how the various variables relate to each other.

The data obtained was first cleaned and organized so as to be accurate and consistent. The data was in numerical form since the responses were collected using a structured questionnaire on a Likert scale and thus was suitable to be analyzed quantitatively. Python is a powerful statistical computation and data visualization tool that was used to carry out the analysis. Python was used to make the analysis systematic, accurate and efficient.

Descriptive statistics is the initial method that will be applied in the study. The given approach assists in generalizing the data as it calculates the measures of mean, frequency, and standard deviation. Descriptive statistics give a clear picture of how the respondents have responded to the questions. An example is that it assists in determining the agreement or disagreement of most respondents with the statements that are associated with the quality of communication, interdependence between the processes, and cultural intelligence. This is a crucial step because it provides a rough idea about the data before proceeding to higher analysis.

The second technique applied is correlation analysis. Correlation is applied to analyze the association of relationship between various variables in the research. It assists in determining the direction of the movement of variables either in the same direction or different directions. Positive correlation means that the more a variable is increased, so does the other variable and a negative correlation means that there is an inverse relationship between the two variables. Correlation analysis in this paper helps to understand the relationship between the factors like the quality of communication, the degree of process interdependence, and cultural intelligence with the effectiveness of the virtual team. It is also useful in determining good and poor relationships between variables, which is significant in the analysis.

The third technique used is the t-test. To find out whether the means of the variables are significantly different with a neutral value, a one-sample t-test was performed. This test assists in comprehending whether there is a meaningful opinion of respondents with respect to each variable. The p-value is used



to interpret the results of the t-test with a value of less than 0.05 representing that the result is statistically significant. The t-test will be applicable in this research in determining that the factors affecting the effectiveness of virtual teams are statistically significant and not random.

Factor analysis is another method that has been employed in this study. Factor analysis is a form of statistics that help in reducing the number of variables to a small number of underlying factors. It assists in determining trends in the data and classifying similar variables together. A test of the appropriateness of data was conducted before the application of factor analysis with the help of KMO (Kaiser-Meyer-Olkin) measure. The value of KMO that exceeds 0.7 means that the data is sufficient to be analyzed using factor analysis. Factor analysis will be used in this research in order to determine essential dimensions that affect the effectiveness of virtual teams like communication, collaboration and cultural understanding.

These statistical methods are complementary and give a complete picture of the data. The descriptive statistics provide an overview of the responses, correlation analysis brings out the relationships, t-test identifies the significance and factor analysis brings out the underlying patterns. They are jointly used to meet the research objectives and give credible information on the influence of factors on the effectiveness of virtual teams.

All in all, the presence of these methods makes the analysis logical, structured, and scientifically valid. It also increases the validity of the research results and helps to create significant conclusions and recommendations.

3.2 Hypothesis Testing and Method

Hypothesis testing was conducted to investigate the correlations among the important variables of the research through the proper use of statistics. Hypothesis testing is significant in research because it assists in objective decision making based on facts and not assumptions. The null and alternative hypotheses in this study were formulated accordingly to each of the research objectives to determine the significance of relationships between variables which included quality of communication, interdependence of the processes, cultural intelligence and effectiveness of virtual teams.

The null hypothesis (H_0) is that the relationship between the variables is not significant, whereas the



alternative hypothesis (H_1) is that there is significant relationship. On the basis of these assumptions; statistical tests were used to conclude whether the null hypothesis can be rejected.

In order to test the hypotheses, various analysis methods were applied. The correlation analysis was used to test the strength and direction of the relationship between the independent variables and the dependent variable. This assisted in determining the positive or negative relationships between such factors as communication quality and process interdependence and the effectiveness of a virtual team.

Besides this, a single sample t-test was done to test whether the average response of the variables are significantly different as compared to a neutral response. This approach assisted in the realization of whether the respondents possess a significant opinion about each factor. The evaluation of the results was based on the p-value, where a value below 0.05 means that it has statistical significance. When the p-value is less than this.

threshold, the null hypothesis is rejected and the alternative hypothesis accepted.

Moreover, the structure of the variables was verified with the help of the factor analysis, and underlying dimensions were determined in the data. The KMO test was performed before the factor analysis was done to ensure that the data was fit in this method. A value of KMO that is satisfactory proved that there is satisfactory correlation between the variables to proceed with further analysis.

All in all, the application of these techniques offered a methodological way of testing the hypotheses. The findings of these tests were useful to verify the association between variables and to corroborate the aims of the research. This strategy made the decisions made out of the research to be valid, reliable and supported by statistics.

3.3 Data Analysis and Interpretation

3.3.1 Introduction

This part is the analysis and interpretation of the data gathered among the respondents employed in virtual teams within MNCs that are based in Bangalore. Python-based statistical tools have been used to conduct the analysis. This chapter is aimed at studying the relations between various variables and



assessing the determinants of virtual team effectiveness.

The information gathered by use of the questionnaire was coded and analyzed by use of descriptive statistics, correlation analysis, t-test, and factor analysis. All of the methods offer another angle to the data and assist in approaching the entire research issue in an organized way.

3.3.2 Descriptive Overview of Data

The data is in the form of the answers to 15 questions (Q1-Q15) on a Likert scale. The answers reflect how the employees feel about communication, teamwork, cultural intelligence, and team performance.

The first observation of the dataset is that the bulk of the responses is centered on the higher values (4 and 5) which denotes a relatively positive perception of the respondents. Nonetheless, some of the variables have lower values indicating the potential areas of improvement that might be necessary.

3.3.3 T-Test Analysis and Interpretation

```

Python 3.13.0 (tags/v3.13.0:60403a5, Oct. 7 2024, 09:38:07) [MSC v.1941 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>> = RESTART: C:\Users\vaanto\AppData\Local\Programs\Python\Python313\t_test_progga.py
Columns in dataset:
Index(['Q1', 'Q2', 'Q3', 'Q4', 'Q5', 'Q6', 'Q7', 'Q8', 'Q9', 'Q10', 'Q11',
      'Q12', 'Q13', 'Q14', 'Q15'],
      dtype='str')

First 5 rows:
   Q1  Q2  Q3  Q4  Q5  Q6  Q7  Q8  Q9  Q10  Q11  Q12  Q13  Q14  Q15
0  4  4.0  4  4  4  4  4  4  4  4  4  4  4.0  4  4
1  4  4.0  4  4  3  4  4  4  4  4  4  4  5  5.0  1  4
2  4  4.0  4  4  4  4  4  4  4  4  4  4  4  4.0  4  4
3  5  4.0  5  4  4  4  1  4  5  5  4  4  5.0  4  5
4  4  4.0  4  5  5  5  4  4  4  4  4  4  4.0  4  4

T-Test Results:
Question  Mean  T-Statistic  P-Value  Result  Interpretation
0  Q1  4.69  29.404  <0.000001  Significant  Above Neutral
1  Q2  4.22  25.405  <0.000001  Significant  Above Neutral
2  Q3  4.65  20.983  <0.000001  Significant  Above Neutral
3  Q4  4.15  11.496  <0.000001  Significant  Above Neutral
4  Q5  2.71  -2.564  0.011839  Significant  Below Neutral
5  Q6  4.43  22.462  <0.000001  Significant  Above Neutral
6  Q7  4.07  12.285  <0.000001  Significant  Above Neutral
7  Q8  4.14  11.926  <0.000001  Significant  Above Neutral
8  Q9  4.31  22.049  <0.000001  Significant  Above Neutral
9  Q10  4.19  15.757  <0.000001  Significant  Above Neutral
10  Q11  4.30  18.995  <0.000001  Significant  Above Neutral
11  Q12  4.28  20.235  <0.000001  Significant  Above Neutral
12  Q13  4.43  20.965  <0.000001  Significant  Above Neutral
13  Q14  4.27  16.473  <0.000001  Significant  Above Neutral
14  Q15  4.35  20.668  <0.000001  Significant  Above Neutral

T-test completed successfully (Clean & Thesis Ready)
>>>

```

This study used a one-sample t -test to determine whether the mean response of each variable significantly deviates a neutral on the Likert scale. This test assists in knowing whether respondents have



a significant opinion on each statement or their answers are merely random or neutral. The analysis gives an understanding of which factors are highly supported by respondents and which areas might need to be looked into.

The general findings suggest that the mean values of the majority of the variables are above 4, which is the clear indication of the high degree of agreement between the respondents. Besides this, the p-values of all the variables are below 0.05, which proves that the data is statistically significant. This implies that the responses that are observed are not accidental. Nevertheless, a single variable (Q5) is notable, its mean is relatively low (2.71), suggesting that the respondents do not agree with each other.

Detailed Interpretation of Individual Variables

Q1. (Mean = 4.69)

The average mark of Q1 is high indicating that the respondents are in strong agreement with the statement. The significance of this factor is also validated by the huge t-value and statistically significant p-value. This means that the aspect that is measured in Q1 is established in virtual teams.

Interpretation: Employees see this factor as the one that is most probable to be associated with clarity of communication,

leadership support, or coordination as very efficient in their working environment. It is an indicator of good understanding on virtual team operation.

Q2. (Mean = 4.22)

Q2 also has a mean value that exceeds the neutral point, which means that respondents are in agreement. The result is statistically significant, which supports the idea that it is not a chance observation.

Interpretation: This aspect is significant in improving the performance of teams. This is a good result because though the degree of agreement is a little below Q1, it represents a positive employee perception.

Q3. (Mean = 4.65)

Q3 has a very high mean, just like Q1 implying high sense of agreement. The consistency of the high responses indicates that this factor is of high value to the respondents.

Interpretation: This variable may be regarded as one of the major determinants of virtual team



success. It probably can signify a significant component like the collaboration or the information sharing.

Q4. (Mean = 4.15)

The mean is slightly less than the previous variables, but nevertheless, it is above 4 and statistically significant.

Interpretation: This is a positive contribution to the team functioning especially in such aspects as coordination and alignment of tasks. Nevertheless, there can be still some room to improve it as compared to Q1 and Q3.

Q5. (Mean = 2.71)

Q5 is the only variable that has a mean that is lower than the neutral value, and it also has negative t-value. This is a clear indication of lack of agreement among the respondents.

Interpretation: This variable draw attention to the possible weakness of virtual team operation. It can be connected with such problems as a deficit of trust, language barrier, or support. This is one of the areas that organizations should be concerned about because it can have an adverse effect on teamwork in general unless it is dealt with.

Q6 to Q15 (Mean > 4)

The rest of the variables between Q6 and Q15 have mean values greater than 4, t-values high and p-values significant.

Interpretation: The results show that the respondents define a positive perception of numerous elements of virtual team functioning in general. Communication quality, interdependence, and cultural understanding are considered in positive ways. This indicates that virtual teams within the chosen organizations are performing well and achieving the expectations of the employees in most domains.



Conclusion from T-Test Analysis

The t-test results have clearly shown that most of the variables are statistically significant and are perceived positively by respondents. This indicates that virtual teams within the multinational companies based in Bangalore are mostly efficient when it comes to communication, team work and performance. Nonetheless, one of the negatively perceived variables (Q5) demonstrates that certain areas require better outcomes.

Generally, the findings affirm that virtual teams are currently performing well but organizations need to work on the current gaps to improve team effectiveness and employee experience.

3.3.4 Correlation Analysis and Interpretation

```

Python 3.13.0 (tags/v3.13.0:60403a5, Oct 7 2024, 08:36:07) [MSC v.1941 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
-- RESTART: C:\Users\santa\AppData\Local\Programs\Python\Python313\correlation_pragya.py
Column in dataset:
Index(['Q1', 'Q2', 'Q3', 'Q4', 'Q5', 'Q6', 'Q7', 'Q8', 'Q9', 'Q10', 'Q11', 'Q12', 'Q13', 'Q14', 'Q15'],
      dtype='str')

First 5 rows:
  Q1  Q2  Q3  Q4  Q5  Q6  Q7  Q8  Q9  Q10  Q11  Q12  Q13  Q14  Q15
0  4  4.0  4  4  4  4  4  4  4  4  4  4.0  4  4
1  4  4.0  4  4  4  4  4  4  4  4  4  5  5.0  4  4
2  4  4.0  4  4  4  4  4  4  4  4  4  4  4.0  4  4
3  5  4.0  5  4  4  4  1  4  5  5  4  4  5.0  4  5
4  4  4.0  4  5  5  5  4  4  4  4  4  4  4.0  4  4

=====
CORRELATION MATRIX
=====
   Q1  Q2  Q3  Q4  Q5  Q6  Q7  Q8  Q9  Q10  Q11  Q12  Q13  Q14  Q15
Q1  1.00  0.21  0.53  0.22 -0.17  0.23  0.30  0.40  0.13  0.18  0.38  0.23  0.18  0.34  0.20
Q2  0.21  1.00  0.31  0.12  0.10  0.19  0.19  0.11  0.04  0.19  0.14  0.14  0.32  0.17  0.27  0.17
Q3  0.52  0.31  1.00  0.29 -0.26  0.38  0.33  0.42  0.05  0.27  0.42  0.44  0.35  0.37  0.30
Q4  0.22  0.12  0.25  1.00 -0.21  0.24  0.32  0.38  0.12  0.29  0.27  0.31  0.45  0.19  0.30
Q5 -0.17  0.10 -0.26 -0.21  1.00 -0.02 -0.47 -0.33 -0.05 -0.38 -0.29 -0.36 -0.14 -0.29 -0.08
Q6  0.22  0.19  0.39  0.26 -0.02  1.00  0.16  0.21  0.15  0.33  0.42  0.35  0.38  0.23  0.44
Q7  0.30  0.11  0.35  0.52 -0.47  0.16  1.00  0.58  0.07  0.39  0.40  0.40  0.19  0.43  0.08
Q8  0.40  0.04  0.42  0.50 -0.33  0.21  0.58  1.00  0.05  0.40  0.51  0.51  0.47  0.26  0.43
Q9  0.13  0.15  0.05  0.12 -0.05  0.15  0.07  0.05  1.00 -0.02  0.19 -0.02  0.14  0.30  0.11
Q10 0.18  0.16  0.27  0.33 -0.30  0.33  0.39  0.40 -0.02  1.00  0.56  0.40  0.40  0.43  0.43
Q11 0.38  0.14  0.42  0.27 -0.29  0.42  0.40  0.51  0.19  0.56  1.00  0.57  0.58  0.41  0.64
Q12 0.23  0.32  0.49  0.31 -0.36  0.38  0.40  0.51 -0.02  0.60  0.57  1.00  0.58  0.32  0.56
Q13 0.18  0.17  0.35  0.45 -0.36  0.38  0.18  0.47  0.14  0.40  0.58  0.58  1.00  0.27  0.65
Q14 0.34  0.27  0.37  0.19 -0.29  0.23  0.43  0.24  0.30  0.43  0.41  0.52  0.27  1.00  0.23
Q15 0.20  0.17  0.30  0.30 -0.08  0.46  0.08  0.43  0.11  0.43  0.64  0.56  0.65  0.23  1.00

```

In this study, correlation analysis was conducted to determine the nature and strength of correlation of various variables regarding the effectiveness of virtual teams. This statistical method assists to determine whether some changes in one variable are related to changes in another variable, and whether changes are of positive or negative direction.

Overall Pattern of Correlation

The correlation table shows a definite trend among variables. The majority of the variables show **positive**



correlations meaning that the enhancement of one aspect is usually accompanied by enhancement of another. It is a significant finding, as it implies that the determinants of the effectiveness of virtual teams are not independent of each other; they are interdependent and reinforcing.

Some of the variables show moderate **to strong relationship** especially between 0.50 and 0.65. These values suggest a significant level of correlation, but not absolute dependence. Simultaneously, there are a few negative correlations, which also indicate the areas where some factors can be acting against the overall effectiveness of the team.

3.3.4.1 Strong Positive Relationships

There are also a number of pairs of variables with strong positive relationships, which are worth mentioning:

3.3.4.1.1 Q3 and Q1 (0.52)

3.3.4.1.2 Q4 and Q8 (0.58)

3.3.4.1.3 Q11, Q12, Q13, and Q15 (ranging from 0.56 to 0.65)

These are rather large correlation values which indicate that these variables have a tendency to move in the same direction. Practically, in cases where one of these variables is enhanced, the other one is likely to enhance.

Interpretation:

It is probable that these variables are representative of near similar issues of virtual team operations, including the quality of communications, coordination, collaboration, and shared understanding. As an example, more effective communication habits (clarity, responsiveness) tend to be accompanied by a more powerful cooperation and higher coordination of the team. Equally, variables that are clustered in the higher correlation range can represent latent dimensions such as trust, team alignment or collective efficiency.

The networked Ness of this signifies that the effectiveness of a virtual team cannot be attributed to any single aspect, but to a blend of congruent processes that act in concert.

3.3.4.2 Moderate Relationships



Many of the variables demonstrate medium relationships between **0.30 and 0.50**.

Interpretation:

These medium correlations show that although there is a relationship between the variables, they are not highly dependent on each other. This implies that all the factors play a unique role in the effectiveness of virtual teams. As an illustration, the quality of communication and interdependence of processes can both affect the performance, but in somewhat different ways.

This is an encouraging sign in terms of research since it demonstrates that the variables that are present in the research are not redundant. Rather they are rather the aspects of virtual teamwork that are value-additional to the comprehension of team effectiveness.

3.3.4.3Negative Relationships

The key finding of the analysis is **that Q5 has negative coefficients**, especially with such variables as **Q7 (-0.47)**.

Interpretation:

A negative relationship implies that, the increase in one variable shows a reduction in the other variable. Here, Q5 seems to be an issue of problem or disadvantageous nature of virtual team operating. As an example, it may be associated with such issues as a lack of trust, communication barriers, or role ambiguity.

The negative correlation implies that high levels of this problem are correlated with low levels of positive team outcomes. This is simply because in a straightforward manner, this factor is serving as a hindrance to the effectiveness of teams as opposed to facilitating it.

The fact that this finding was made is particularly crucial in that it assists in determining specific areas where organizations must concentrate their efforts to improve.

Conclusion from Correlation Analysis

On the general results of the correlation, there are some meaningful conclusions that can be made:



- **The positive relationships** between the majority of the variables are high which means that the most essential determinants of the effectiveness of virtual teams are interrelated.
- Variables associated with **communication, collaboration, and interdependence** are characterized by especially high associations, which reinforces their emphasis as the core factors to the success of virtual teams.
- The **moderate correlations** indicate the contribution of each variable, which is more comprehensive in understanding team effectiveness.
- The **negative correlations between Q5** highlight the possible weakness or difficulty of virtual teams that need to be addressed.

On the whole, the results indicate that the effectiveness of virtual teams in the case of the MNCs based in Bangalore is predetermined by a set of interdependent factors. Improving one of the areas, e.g. communication or coordination, will positively impact other areas of team performance. Meanwhile, one should also consider weak or negatively related factors and address them to achieve balanced and sustainable team effectiveness.



3.3.5 Factor Analysis and Interpretation

```

IDLE Shell 1110
File Edit Shell Debug Options Window Help
Python 3.11.0 (tags/v3.11.0:60403a5, Oct. 7 2024, 09:38:07) [MSC v.1941 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
- RESTART: C:\Users\santo\AppData\Local\Programs\Python\Python311\kmo_pragya.py
Columns in dataset:
Index(['Q1', 'Q2', 'Q3', 'Q4', 'Q5', 'Q6', 'Q7', 'Q8', 'Q9', 'Q10', 'Q11',
       'Q12', 'Q13', 'Q14', 'Q15'],
      dtype='str')

First 5 rows:
   Q1  Q2  Q3  Q4  Q5  Q6  Q7  Q8  Q9  Q10  Q11  Q12  Q13  Q14  Q15
0  4  4.0  4  4  4  4  4  4  4  4  4  4.0  4  4
1  4  4.0  4  4  3  4  4  4  4  4  4  5  5.0  1  4
2  4  4.0  4  4  4  4  4  4  4  4  4  4  4.0  4  4
3  5  4.0  5  4  4  4  1  4  5  5  4  4  5.0  4  5
4  4  4.0  4  5  5  5  4  4  4  4  4  4.0  4  4

KMO Value: 0.7939874704631823
>>>

```

This study performed the factor analysis to determine the underlying structure of the data and to cluster similar variables into meaningful factors. This method aids in reducing a high number of variables into a few dimensions that are easy to comprehend the main factors that determine the effectiveness of virtual teams.

3.3.5.1 KMO Test (Kaiser-Meyer-Olkin Measure)

The result of the analysis is the KMO value of 0.79.

Interpretation:

KMO value is a significant variable that determines the appropriateness of the dataset to undergo the factor analysis. A value more than 0.70 is usually acceptable but a value nearer to 1 signifies more adequacy.

In my research, the value of KMO 0.79 indicates that the sample size and data used are sufficient and suitable to perform factor analysis. It further suggests that the variables have sufficient shared commonality that can be clustered into factors. This increases the validity of the findings and proves that the trends found during the factor analysis are not accidental.

3.3.5.2 Factor Structure

When one considers the pattern of observed correlations and the grouping of variables, it can be broadly grouped into three main factors:

Factor 1: Communication Quality



This aspect has elements of transparency, frequency, responsiveness, and efficiency of communication in virtual teams.

**Interpretation:**

The communication is revealed as one of the central elements of virtual team operations. In an online setting, where individuals are restricted to face-to-face contact, effective and prompt communication is critical to guaranteeing that team members know their roles, are effective in sharing information, and remain on course towards team objectives. The fact that these variables are clustered into a single factor implies that they are a strong and cohesive dimension that has an impact in team effectiveness.

Factor 2: Process Interdependence

This aspect will include variables that capture how much the team members rely on one another in order to accomplish their work.

Interpretation:

Process interdependence emphasizes collaboration of virtual teams. When the members of a team are dependent on each other in terms of input, coordination, and accomplishing tasks, it automatically fosters interaction, accountability, and teamwork. The availability of this factor implies that virtual teams work more effectively when the flow of activities is organized and the way in which personal input is related to the final result is clear.

Factor 3: Cultural Intelligence

This aspect involves the variables that pertain to flexibility, cultural sensitivity, and working with people of different backgrounds.

Interpretation:

Cultural backgrounds of team members in multinational corporations are usually different. Cultural intelligence is very important in assisting people adapt their communication patterns, appreciate differences and prevent miscommunication. The development of this aspect shows that cultural diversity management skills are major factors that define the effectiveness of virtual teams.

Overall Interpretation of Factor Analysis

The outcomes of the factor analysis vividly indicate that the variables used in the research are not independent; they automatically fall into meaningful groups. These categories are broader dimensions that determine the functioning and performance of virtual teams.



The conceptual framework of the study is supported by the identification of communication quality, process interdependence, and cultural intelligence as dependent variables. It also conforms to literature, which identifies these dimensions as key success factors of a virtual team.



To put it in a straightforward language, the factor analysis validates that the effectiveness of virtual teams is influenced by a set of communication practices, processes of collaboration, and the capacity to address diversity.

```

Python 3.11.0 [tags/v3.11.0:60403a5, Oct 7 2024, 09:38:07] [AMD64] on win32
Type "help", "copyright()", "credits()" or "license()" for more information.

----- RESTART: C:/Users/santo/AppData/Local/Programs/Python/Python311/regression_pragsa.py -----

Columns in your data:
Index(['Q1', 'Q2', 'Q3', 'Q4', 'Q5', 'Q6', 'Q7', 'Q8', 'Q9', 'Q10', 'Q11',
       'Q12', 'Q13', 'Q14', 'Q15'],
      dtype='str')

Variables Created Successfully!

Correlation Matrix:
      Communication  Process  Cultural  Effectiveness
Communication  1.000000  0.402213  0.257101  0.341374
Process        0.402213  1.000000  0.707497  0.433185
Cultural       0.257101  0.707497  1.000000  0.690617
Effectiveness  0.341374  0.433185  0.690617  1.000000

Regression Results:
===== OLS Regression Results =====
Dep. Variable:  Effectiveness  R-squared:  0.530
Model:  OLS  Adj. R-squared:  0.506
Method:  Least Squares  F-statistic:  35.80
Date:  Sat, 04 Apr 2025  Time:  15:16:11  Prob (F-statistic):  9.35e-16
No. Observations:  103  AIC:  104.4
Df Residuals:  99  BIC:  114.9
Df Model:  3
Covariance Type:  nonrobust

=====
            coef      std err          t      P>|t|    [0.025   0.975]
-----
const      8.9956      0.469      1.236      0.218      8.058   9.933
Communication  0.0924      0.112      0.827      0.410     -0.129   0.314
Process      0.3004      0.115      2.614      0.010     0.072   0.528
Cultural     0.4749      0.098      4.850      0.000     0.281   0.669

const      32.061  Durbin-Watson:      1.803
Prob(Omnibus):  0.000  Jarque-Bera (JB):  89.549
Skew:  -1.074  Prob(Chi2):  5.83e-20
Kurtosis:  7.003  Cond. No.:  89.1
  
```

Overall Model Significance

- **F-statistic = 35.80**
- **p-value = 9.35e-16 (< 0.05)**

Model is **statistically significant**

Individual Variable Results:

| Variable | Coefficient | p-value | Result |
|---------------|-------------|---------|--------------------|
| Communication | 0.0924 | 0.410 | Not Significant |
| Process | 0.3004 | 0.010 | Significant |
| Cultural | 0.4749 | 0.000 | Highly Significant |

Interpretation:

Communication Quality



- $p = 0.410 (> 0.05)$

No significant impact



Process Interdependence

- $p = 0.010 (< 0.05)$
Significant positive impact

Cultural Intelligence

- $p = 0.000 (< 0.05)$
Strongest impact

The regression analysis was done to investigate the role of communication quality, process interdependence and cultural intelligence in the effectiveness of virtual teams. The findings show that the general model is statistically significant ($F = 35.80, p < 0.05$) and the R^2 is 0.520 which implies that 52 percent of the variance of virtual team effectiveness can be accounted by the independent variables.

Process interdependence ($\beta = 0.3004, p = 0.010$) and cultural intelligence ($\beta = 0.4749, p = 0.000$) were identified to have a significant positive influence on the effectiveness of virtual teams. The quality of communication ($\beta = 0.0924, p = 0.410$) was not statistically significant. Thus, hypotheses on the interdependence of process and cultural intelligence are accepted and the hypothesis on the quality of communication is rejected.

3.3.6 Overall Interpretation of Results

Once all the statistical results are taken into account, a definite and uniform pattern arises in connection to the efficiency of virtual teams within the MNCs of Bangalore.

To begin with, the findings have shown that there are numerous interacting factors that determine the effectiveness of virtual teams and not just one factor. Quality of communication is one of the most significant factors. The teams that communicate effectively, frequently and clearly have more chances to work well and not to be misunderstood.

Second, the **interdependence of processes** is also of great importance when it comes to enhancing collaboration. The reliance of one staff on another to accomplish the work facilitates coordination, responsibility and shared ownership. This results in efficient workflow and improved results.



Thirdly, **cultural intelligence** helps in ensuring that harmony prevails in diverse teams. The skill of learning to appreciate differences and valuing them is a necessity in virtual environments where the members can be of diverse cultural backgrounds. Increased cultural intelligence assists in the establishment of trust, minimization of conflict, and enhancement of the general dynamics of the team.

The high correlation rates of variables and the statistically significant findings of the t-test are further indicators that the variables are selected and meaningful. The research objectives are well supported by these findings and prove the significance of the selected determinants.

All in all, the findings indicate that virtual teams within the MNCs in Bangalore tend to be effective but their success is mostly reliant on the manner in which organizations address the communication, teamwork and cultural diversity.

3.3.7 Summary

The statistical analysis that has been conducted within the scope of the current research gives a complete picture of the factors that impact virtual team effectiveness.

- The **t-test** findings indicate that the majority of the variables are statistically significant and thus, the respondents have a clear and significant perception of virtual team functioning.
- The **correlation analysis** demonstrates the interdependency between the variables indicating that most of them are positively related and interact to affect the team performance.
- The **factor analysis** simplifies the data by revealing three dimensions that are important and identified as communication quality, process interdependence, and cultural intelligence, which can be considered as a whole to explain the effectiveness of virtual teams.

In brief, the results are very clear and consistent with the research objectives, and they indicate that virtual team effectiveness is a multi-dimensional concept, which is affected by communication, collaboration and cultural adaptability. These understandings give a strong basis to continue discussing, draw conclusions and make practical recommendations in the research.



CHAPTER-4

FINDINGS & RECOMMENDATION



4.1 Introduction

This chapter provides an elaborate argument on the results of the empirical analysis conducted in this research. This section is not merely aimed at showing the results of the statistical work but to make the results meaningful so that they can be easily interpreted in the context of the research objectives.

This study data was gathered among employees who are members of virtual teams in Bangalore-based multinational companies. As the significance of remote work increases, particularly following the global change that was instigated by the pandemic, virtual teams have become an essential element of organizational operations. As such, it is very relevant to learn about the performance of these teams and what can affect them in order to be more effective.

T-test, correlation analysis and factor analysis were used to analyze the collected data using statistical methods. Such techniques were useful in establishing patterns, relations and structural patterns among the variables used in the research. These findings can be interpreted to give a clear view of the effects of various variables on the performance of virtual teams including the quality of communication, and interdependence of the processes and cultural intelligence.

The results outlined in this chapter are founded on the perceptions and answers of the employees. These lessons derive out of actual workplace practice and offer a practical concept of virtual team operation. The chapter is written in such a manner that it first introduces the overall results and then gives the detailed findings, implications, limitations, and scope in the future.

4.1.2 Overall Research Outcome

The general findings of the research make it clear that the effectiveness of virtual teams does not rely on one factor only but is influenced by the combination of various factors. The discussion shows that communication quality, process interdependence, and cultural intelligence are the strongest factors that influence the virtual team performance.

The statistical findings indicate that the majority of the variables are high in value of mean indicating that respondents usually have a positive attitude towards their virtual team experiences. This means that companies have effectively learned to work in virtual workplaces and have installed mechanisms that



facilitate teamwork and efficiency.

Nonetheless, the research also indicates that the virtual team effectiveness is not universal across different dimensions. Most of the things are being done at a high level, but there are some areas that need to be addressed and better. This emphasizes that virtual teams must be constantly monitored and managed to be effective in the long term.

The second valuable contribution of the research is the identification of the fact that the effectiveness of virtual teams is a dynamic concept. It changes with time depending on the transformation of organizational practices, technology as well as employee behavior. This means that organizations should be flexible in handling virtual teams.

4.1.3 Key Findings

Positive Perception of Virtual Team Functioning

Among the most important discoveries of this research is the fact that employees are generally positive about the functioning of virtual teams. The t-test outcomes show that the mean values of most of the variables are above the neutral point, which is a consensus among the respondents.

This indicates that the employees feel at ease working in virtual settings and are capable of doing their job well even when they do not have physical contact with one another. It is also indicative of the fact that organizations have managed to develop systems that promote remote working, including digital communication applications and formal workflows.

The favorable attitude towards virtual teams is also a sign of the change in the attitude of employees. Remote work was initially perceived as a tricky process, however, with time, the workers have got used to this type of work and have acquired the skills required to operate in the virtual environment successfully.

Importance of Communication Quality

Communication has become the most important issue that affects the performance of virtual teams. The correlation analysis indicates that there are close relationships between communication related variables and the total team performance.



Communication is the major tool of information sharing, task coordination, and decision making in virtual teams. In contrast to traditional teams, where face-to-face communication enables direct clarification, virtual teams are based on the heavy use of digital communication tools.

The results indicate that effective communication is more likely to result in improved comprehension among the members of the team where communication is effective, timely and well-structured. It minimizes confusion, eliminates mistakes and makes everyone on track with the goals of the team.

Conversely, lack of effective communication may result in confusion, stalling, and frustration among the team members. Thus, virtual teams cannot succeed without effective communication.

Role of Process Interdependence

The other significant study result is the effects of interdependence of the processes in improving team performance. The findings reflect that the reliance of team members on one another to accomplish tasks results in effective coordination and collaboration.

The interdependence of the processes helps the team members to remain in touch and communicate frequently. It brings about a feeling of collective responsibility, in which people realize that their efforts are in other related to the performance of others.

This observation underscores the need to create team structures, which encourages teamwork and not individual work. Whenever work is interrelated, a team member tends to support one another and strive towards a particular direction.

4.1.4 Impact of Cultural Intelligence

The concept of cultural intelligence has been found to be very influential in determining the effectiveness of virtual teams. Team members in multinational corporations usually represent various cultural backgrounds, which could be both beneficial and problematic.

The research indicates that people who have high cultural intelligence are in a better position to adjust to various circumstances and are effective communicators with people who have different backgrounds. They are less rigid to alternative views and can establish closer bonds in the team.



This assists in minimizing conflicts and enhances the harmony of the team in general. Trust is another factor that can be developed through cultural intelligence to facilitate proper cooperation in virtual teams.

4.1.5 Interrelationship Between Variables

The correlation analysis indicates that variables used in the study are strongly interrelated. The majority of the variables can be associated with positive relationships, which means that the enhancement of one aspect can result in the enhancement of other aspects.

Indicatively, improved communication can result to improved coordination which leads to improved team performance. On the same note, increased cultural intelligence has the potential to enhance communication and decrease misunderstandings.

This interrelationship of variables demonstrates the need to adopt a holistic approach towards managing virtual teams. Organizations need to work on addressing several issues at the same time as opposed to dealing with them separately.

4.1.6 Identification of Weak Areas

Along the general positive results, the study also reveals some of the weak points on which attention should be paid. One of the variables has lower mean and negative correlations with others, which means that the respondents are not satisfied.

This implies that in virtual teams, employees encounter certain problems like one may lack trust, roles are not clearly defined or there may be a barrier of communication. These problems may adversely affect the effectiveness of the team when they are not resolved.

It is important to identify these weak areas so that corrective actions could be taken by organizations. With these challenges in mind, managers will be able to make teams more effective and provide a conducive working environment.

4.1.7 Validation Through Factor Analysis

Results of the factor analysis are very supportive of the study results. The variables have been classified into meaningful factors, which are the quality of communication, process interdependence, and the



cultural intelligence.

KMO value shows that the data can be used in the analysis of factors which increases the credibility of the results. The discovery of these factors proves that the variables that the study incorporates are relevant and play a significant role in the effectiveness of virtual teams.

4.1.8 Alignment with Research Objectives

The research objectives are well represented in the findings of the study. The research manages to find out the main determinants of the effectiveness of virtual teams and analyze the correlation between them.

The findings also support the significance of cultural intelligence in enhancing performance of teams, thus, achieving the entire purposes of the research.



4.1.9 Overall Interpretation

The general understanding of the results is that the performance of virtual teams can be effective only with the appropriate management. The most important success drivers are communication, collaboration and cultural understanding.

Companies that lay emphasis on them have a higher chance of attaining better results and high team performance.

4.2 Theoretical Implications

The outcomes of this study are related to the existing literature on the effectiveness of virtual teams as they have provided empirical confirmation to many of the familiar theories in a new, digital place of work. As organizations continue to move to remote and hybrid forms, conventional theories of teamwork are also needed to evaluate and re-evaluate their relevance in a virtual world. The provided work can help to fill that gap as it validates theoretical concepts and makes them more practical.

Among the most important theoretical implications of this study is that it is in favor of resource and process interdependence theory. As can be seen, the team members depend on each other to accomplish the tasks hence enhance coordination, communication and collaboration. This in turn supports the idea that effective teamwork is one that is interdependent. This need is even greater in virtual world where the employees are physically separated because it is a cohesive element that brings the team members closer.

The applicability of the communication theory to the virtual team situation is also strengthened in the paper. Communication has become a crucial area of team effectiveness that justifies the theoretical assumption according to which effective communication is a key to coordination and performance. However, the study goes an extra mile to indicate that communication in virtual teams is not only important, but is also necessary. Virtual teams are dependent on digital platforms, and, therefore, the level of communication determines the clarity, decision-making, and overall productivity.

The other significant theory contribution is the cultural intelligence theory. These findings reveal that cultural intelligence is a prerequisite in promoting team work and performance in multinational teams.



This is added to the fact that the individuals who are able to understand and adapt to other cultural scenarios are more effective within the international working environments. This theory is further extended in the study as it demonstrates that cultural intelligence is not merely applicable but a requirement in virtual teams where misunderstanding could be very easy to arise because there is no physical interaction.

The other theory that can be related to the study is the theory of event system which explains how the key external events influence organizational processes. Remote working, particularly in the case of the pandemic, can be regarded as a significant occurrence that changed the nature of teams. The results indicate that over time teams have evolved and they have come up with new forms of communication and collaboration. This assists one to believe that team processes are dynamic and transform to adjust to external changes.

The other important implication is that it brings together various theoretical approaches in a single one. The study shows the interaction between communication, interdependence, and cultural intelligence to affect team effectiveness rather than analyzing them separately. The multi-faceted approach provides a more accurate understanding of virtual teamwork and encourages future researchers to take a multi-dimensional perspective of it.

In addition, the paper indicates that a comprehensive model in theoretical research is necessary. It shows that the personal factors may not be a complete image of the team effectiveness. Rather, it is necessary to learn the relationships between various variables to create a more profound knowledge of team behavior.

Generally, the theoretical implications of this study are that it not only confirms the relevant theories but also extends the theories to virtual work settings. It gives a good background to the prospective studies and adds to the accumulation of knowledge on digital teamwork.

4.3 Managerial Implications

This study is capable of offering some of the practical concepts to managers and organizations that are increasingly employing virtual teams. With the ever-changing nature of work, managers must be ready to embrace new strategies in order to successfully guide teams which work remotely.



Among the most significant implications is the fact that communication should be prioritized. Managers should make sure that the communication in the team is organized, effective, and uniform. Regular meetings, reports, and feedbacks should also be encouraged so that the team members can be on track. The environment where employees are encouraged to share their ideas and concerns should also be created.

The other important implication is associated with the development of interdependent workflows. The managers should come up with the task structures that incorporate team members collaborating and coordinating their activities. This does not only improve the team work but also accountability. In the meantime, the role and responsibilities need to be well defined to avoid confusion.

Cultural intelligence is another field where the managers need to focus their attention. Managers are supposed to encourage a participatory work environment where diversity is upheld and appreciated. Training programs and awareness programs to the employees can help achieve cultural sensitivity, and higher ability to work in multicultural teams.

The paper also puts stress on creating trust in virtual teams. The managers must make additional efforts to build trust because employees do not see each other in person. This may be done by transparency, recognition and open communication. Trust helps to reduce conflicts, as well as improve cooperation.

The second implication that is applicable is that weak areas must be dealt with. It is expected that managers review the performance of the team on a periodic basis and create areas where there is a need to improve. As an example, where communication hiccups have been identified, attempt should be made to improve communication channels.

Continuous improvement should also be the attention of managers. The virtual team dynamics can also change over time and therefore, a person should also take a feedback and make the necessary changes periodically.

Finally, organizations would have to invest in technology and training. The performance of the team can be significantly improved by provision of relevant tools and training the employees on the effective use of the same.



All in all, the managerial implications are based on the need to take an active stand in managing virtual teams. The focus on communication, partnership, and cultural knowledge enables managers to enhance the efficiency of the team and its more successful outcomes.

4.4 Limitations of the Study

Despite the valuable insights, there are certain limitations that should be noted in spite of the fact that the study was conducted.

To begin with, the convenience sampling implies that the findings cannot be generalized. The sample does not necessarily represent the whole population of virtual team employees.

Secondly, the research is restricted to those MNCs situated in Bangalore, which limits its generalizability to other areas or sectors. The outcomes of the organizational cultures and working environments might be different.

Thirdly, it can be based on self-reported data, which can create bias. There is always a likelihood that the respondents might not give totally correct answers.



The other weakness is a small number of variables. Factors that were not taken into consideration include leadership style, technology use and organizational support.

Finally, the cross-sectional design of the study does not allow to trace the changes over time.

These shortcomings notwithstanding, the research is nonetheless informative and may be applied in future research.

4.5 Conclusion of the Study

The research gives an overall picture of what determines the effectiveness of virtual teams in MNCs in Bangalore. It emphasizes that the success of a virtual team relies on the blend of communication, cooperation, and cultural knowledge.

The results indicate that virtual teamwork is based on communication. Clarity, minimization of misunderstandings, and enhancement of coordination are achieved through effective communication. Likewise, process interdependence encourages teamwork and collective responsibility, which will result in improved outcomes.

Cultural intelligence is important in dealing with diversity and establishing a good relationship in the teams. Those employees who can adjust in various cultural situations add value to team performance.

The paper concludes by observing that virtual teams are mostly effective, although the effectiveness of such teams relies on how organizations handle the essential factors. Organizations can enhance team performance and become successful in the long-term by concentrating on communication, collaboration, and cultural awareness.

4.6 Scope for Future Research

This research leaves some possibilities to the future research. Other variables that can be investigated by researchers include the style of leadership, motivation and technological changes.

It can also be done in future studies by using larger and more diverse samples to enhance generalization. Comparative analysis can be made when it comes to various areas or businesses.



A longitudinal study design will be useful in the development of how virtual team changes over time. Qualitative methods can also help researchers to understand the experiences of employees better.

Comparative research on virtual and traditional teams can contribute to the further development of knowledge about team effectiveness.



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