



# The Linkage Between Virtual Team Leadership Towards Team Performance: A Study at Selected Companies

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**Abstract:** Since the outbreak of COVID-19, virtual teams have added significant presence in the workplace. Despite being unable to meet each other physically, virtual team members utilize various digital technologies to communicate with each another to carry out activities and achieve organizational goals. However, there are limited studies identifying the linkage between virtual team leadership and team performance despite its prominence. Therefore, this study aims to examine the link between virtual team leadership and team performance among work remote employees working in virtual environment. The survey was distributed to a sample size of 338 remote employees among selected companies that agreed to participate with a response rate of 27.6 percent (105 respondents). The collected data were analyzed using both descriptive and inferential statistics via IBM Statistical Package for the Social Sciences (SPSS). It is found that virtual team leadership have positive significant effect on team performance. In particular, virtual leaders who communicate well through virtual platform would affect the team performance. This indicates the need for existing leaders to be equipped with the latest know-how on digital communication.

**Keywords:** Team performance, virtual leadership, virtual teams, remote employees

## 1. Introduction

As many organizations have shifted to a teamwork-based structure to increase organizational effectiveness, team performance becomes imperative to gain a competitive advantage. Teamwork is believed to improve efficiency in carrying out entrusted tasks and activities which require high collaboration (Cohen, 1997). However, during the COVID-19 outbreak, many countries were forced to comply with Movement Control Orders (MCOs) as a precautionary measure against further virus spread (Tang, 2020). Subsequently, many companies have shifted their operation to virtual environments and allowing their employees to work from home. As a result, they rely more on digital technology to complete their tasks in challenging situations (Phil & Börjesson, 2021). Therefore, work-related activities such as meetings and exciting information have been done virtually and this also witnesses the emergence of virtual teams.

Virtual teams carry out activities and achieve organisational goals depending on digital communication channels or platforms to interact with each other (Chun, 2017). According to Dragusha (2012), using advanced technology requires good help and cooperation from team members and the manager's responsibility so that the team does not fall behind. Virtual teams could assist company finances in reducing costs and the need for business travel (Yukl & Lepsinger, 2006). Finally, they could also enable a sustainable global social and economic infrastructure (Solomon *et al.*, 2016).

One of the issues leading to this study is the increasing importance of virtual team performance. Despite the post-pandemic transition, many companies opted for hybrid working environments and maintaining virtual teams. According to Solomon *et al.*, (2016), more than 80 per cent of organizations are now opting for remote work. This implies the need for leaders to be able to communicate well with virtual teams in order to reduce misunderstanding and achieve task goals (Johnson, 2010). Moreover, differences in perspectives or opinions between leaders and team members could limit the group work activities and knowledge exchanges that require joint decision-making in a work environment (Xiaolong & Ko, 2021). Although virtual teams are claimed to suffer loss of face-to-face synergies, physical interaction, lack of communication and social engagement, the influence of virtual team leaders could indeed play a pivotal role.

In addition, there are insufficient studies on the effect of virtual team leadership on virtual team performance. Existing studies found that virtual leaders are still lacking the necessary competencies, which becomes a barrier to achieving a high-performing team in a virtual work environment (Hunsaker & Hunsaker, 2008). Moreover, according to Chun (2017), Malaysian companies' success in producing high-performing virtual teams has relied on the effectiveness of virtual leadership. Therefore, this study would determine not only the level of virtual leadership but also the linkage between virtual leadership and team performance.

## 1.1 Literature Review

This section discusses a general overview of virtual team leadership and team performance and presents a basis for hypotheses development. Lastly, the research framework was introduced.

### 1.1.1 Virtual Team Performance

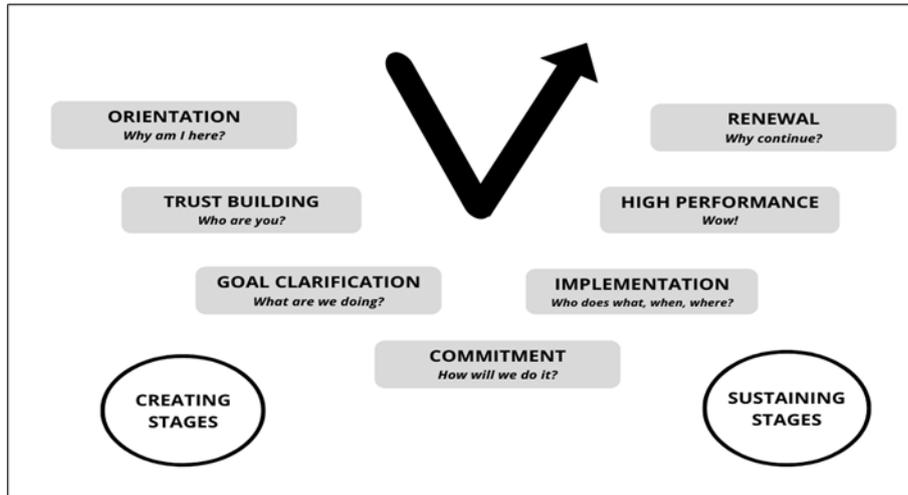
Team performance is the ability of a team to accomplish its output, such as the quality, functionality, and reliability of results, thus the member's expectations or its cost and time targets (Ancona & Caldwell, 1992). Team members must communicate information and resources while monitoring the coordination of their efforts and reshaping individual and team actions when coordination fails (Salas *et al.*, 1999). Guzzo and Dickson (1996) defines team performance as a team's effectiveness that can be measured when a team succeeds in producing superior output considering the team's performance "well-performing". It also implies how far a team can succeed in the anticipated goal, or targeted task quality can be distinguished (Faraj, 2011). In comparison, Salas *et al.* (2005) considered team performance as the valuation of the team's activities, regardless of how the tasks were accomplished. Every team member needs to achieve team goals using their specific experience and talents while navigating team processes to ensure successful team performance. Therefore, the efficacy of a team considers both how well the team worked and how it interacted to achieve a successful team performance (Kozlowski & Bell, 2013).

The major difference between virtual team is the interaction platform. A virtual team was a group of people who use information technology to complete tasks and achieve goals where they work geographically or organizationally (Zigurs, 2003). According to Ebrahim *et al.* (2009), virtual teams refer to growing reactions in a competitive marketplace to the need for fast, low-cost, and fast time-to-market solutions to complex organisational issues. By eliminating time and geographic boundaries, virtual teams allow enterprises to combine the talents and experiences of employees and non-employees (Ebrahim *et al.*, 2009). Virtual teams could help organisations solve competitive and complex future market issues by combining the experiences and talents of employees and non-employees.

### 1.1.2 Models of Team Performance

The Drexler and Sibbet Team Performance Model (1998) highlights that strong team relationships are imperative to improve team performance in achieving goals. There were seven phases which consist of the orientation phase, trust building phase, goal clarification phase, commitment phase, while the sustaining stages consist of implementation phase, high performance phase and renewal phase as shown in Figure 1.

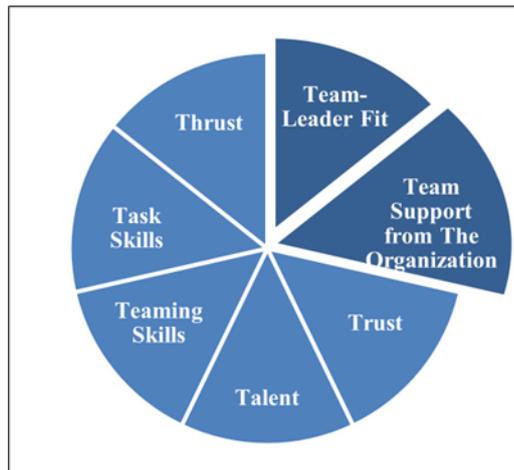
The first phase is orientation phase where an individual's willingness to work with others and a tendency to improve their performance by reflecting on task feedback, coordination, and evaluation from other team members. The second phase is trusting building. Factors that can strengthen trust in team relationships are open communication, giving employees a greater share in decision-making, sharing critical information, and sharing perceptions and feelings. The third phase is goal clarification which is defined as the extent to which work-related goal outcomes and objectives are adequately described and explained. Clear goals for the team help with performance evaluation and provide feedback so they can reflect on their own performance.



**Fig. 1 - The Drexler and Sibbet Team Performance Model**

The fourth phase is the commitment to improve the team's performance. Furthermore, the support and encouragement given to each other in a team encourage a sense of commitment to work. The fifth phase is implementation where planned work needs to be carried out before the date or time of work completion. Schedules, strategies, and processes can be implemented if the proposed workflow structure convinces the team to get a high-performance phase. The final phase is innovation in terms of the ability to review the performance of team members to produce learning and innovation. Thus, high renewal ability could overcome competitors.

Figure 2 shows the T7 Model by Micheael Lombardo and Robert Eichinger (1995) which identified five internal and two external factors that influence team performance. Seven factors of the 'T7' Model of Team High-level performance consist of trust, thrust, task skills, teaming skills, talent, trust, team support from the organisation and team-leader fit. However, no matter how intense the five internal factors are, they will not be able to achieve high levels of team performance unless they receive support from the organisation and leadership.



**Fig. 2 - The T7 Model**

The first internal factors of team performance are thrust. The 'thrust' was a shared goal regarding what should be completed or the team's objectives to achieve together. However, there were three dimensions that need to be emphasised from thrust to improve the team performance: thrust management, thrust clarity, and thrust commitment. The second factor was trust referred as a commitment to cooperate behaviour of individuals to be entrusted with confidence. There are also three dimensions of 'trust' that consist of truthful communication, trust in actions and trust inside the team. Building trust requires honest or truthful communication formed by containing facts, feelings, emotions, and images.

The third factor was talent which refers to the combination of abilities and efficiency of a group in performing work or tasks. The acquisition and improvement talent as well as the distribution and placement talent are two dimensions of 'talent' that management needs to focus on by hiring qualified employees in Human Resources to determine the success of an organisation. The fourth factor is teamwork skills that operate effectively and efficiently as

a team known as “teamwork”. Teamwork is a group of employees who work together or have collaborative skills for good evaluation and then achieve the organisation's goals.

The fifth factor was that task skills could be explained by how the team successfully performs a task or achieves a predetermined goal. Task skills consist of focus, flexibility, measurement, and delivery of goods. Finally, the team support factor from the organisation refers to the extent to which a team can perform according to the level of support from the organisation's leadership. For example, organisational support for employee creativity encourages them to feel valued when leaders accept ideas and suggestions.

### 1.2 Factors Affecting the Team Performance

Table 1 shows several factors affecting team performance that have been identified from studies conducted over the past ten years extracted from Scopus database.

**Table 1 - Factors affecting the team’s performance**

Factors affecting team performance	Frequency
Communication or trust	11
Supportive team behaviour	5
Performance feedback or goals	4
Leadership empowerment	3
Leadership styles	2

Table 1 shows the factors affecting team performance included communication or trust, leadership empowerment, supportive team behaviour, performance feedback or goals, and leadership styles. This literature scan provides evidence that study on virtual leadership and team performance is almost none existed. Majority of studies are still focusing on team performance is its conventional forms.

### 1.3 Virtual Leadership

Information and Communication Technology (ICT) has enabled individuals to work together even if they were geographically distributed (Larson, & DeChurch, 2020). This phenomenon has given a rise of new concept of leadership commonly referred to as virtual leadership or e-leadership.

Table 2 shows the evolving definitions of virtual leadership which highlight the importance of communication technology to manage team processes.

**Table 2 - Chronology of virtual leadership’s definitions**

Definition	Author, Year
A socio-technical system approach to coordinate communication with each other with the external environment that applies Advanced Information Technology (AIT).	Avolio <i>et al.</i> (2001)
A group of people who use information technology to complete tasks and achieve goals where they work geographically or organizationally.	Zigurs (2003)
Act as a liaison, establish and communicate team instructions, and coordinate team operations in a limited communications environment. In addition to developing effective interaction dynamics among e-team members, it creates a sufficient level of cohesion, trust, and motivation.	Zaccaro & Bader (2003)
Balanced employees or team members practice a flexible work arrangement even if they are far away from their workplace.	Bentley (2016)
Developing social skills to manage a variety of digital communication platforms.	Roman <i>et al.</i> (2019)
Needs collaboration through regular communication, transparency, and accountability.	Moore (2020)
The information and communication technologies enabled individuals to work jointly even though they were geographically distributed and more focused on collaboration, communication, and trust.	Borjesson <i>et al.</i> (2021)

According to Avolio and Khai (2013), the frequency of communication and a leader's responsiveness to inquiries and concerns are essential to prevent misunderstandings or inconsistencies is critical to virtual leadership. This is to ensure that the information sent was reliable and can be understood by the intended audience. Nonetheless, setting the direction, goals, and individual objectives to be achieved must be understood by all team members, where communication and follow-up could be carried out to evaluate their performance (Johnson, 2010). Hunsaker and Hunsaker (2008) claimed that the most valuable and potential virtual leadership competency was the willingness to listen the expressions from the team where it needed for leadership attitude. Zigurs (2003) recommend both virtual leaders and virtual teams to use current communication technology effectively and productively to enhance teamwork and communication.

Besides that, virtual leaders need to be clear on leader role and can lead to motivate the virtual team. These personal attributes were important to increase the quality of leaders to build trust among group members despite the obstacles of distance and diversity (Johnson, 2010). According to Kayworth and Leidner (2002), the dimensions of the leader's role were divided into several, namely the role of innovator, the role of broker, the role of producer, the role of director, the role of coordinator, the role of monitor, the role of facilitator and the role of mentor. A leader needs to be responsible in giving clear and correct direction in reviewing virtual team tasks to encourage progress. In addition, virtual leadership also required understanding to be empathetic to what was voiced by the virtual team. Effective virtual leadership competencies could understand the views and suggestions from all parties openly and then able to make good decisions.

According to Kozlowski and Bell (2002), virtual leaders experience difficulties training, monitoring, and developing work functions due to the limited communication process where teams were forced to work virtually. Thus, Kayworth and Leidner (2002) proposed four dimensions of virtual leadership effectiveness includes communication, understanding, role clarity, and leadership attitude. However, the major challenge in managing a team was a lack of a control system, technological issues, and members' motivation and behaviour. Firstly, communication between team members and the leader is necessary for performance. The leader must play a role in asking questions and providing work guidance to team members. Furthermore, the leader should respond quickly and convey web collaboration tools to enable discussion throughout a meeting if team members ask questions regarding the tasks. Secondly, understanding refers to a leader's empathy for their team members. Team members will feel valued if the leader compliments and pays attention to them. Thirdly, role clarity was defined as the leader's understanding of their job scope and responsibilities to be involved in team members' discussions. Thus, the leader must provide guidelines to their team members and follow up with the process. Finally, a leadership attitude was a person with the skills to communicate, understand and have role clarity. The reason for the circumstances is the virtual environment will go smoothly with this factor.

#### **1.4 Empirical Evidence on Virtual Leadership and Team Performance**

As mentioned earlier, previous studies focusing on virtual leadership and team performance for the past year has been lacking. However, several recent studies related to these constructs are used as basis for hypotheses development.

Chun (2017) studies the effect of leadership styles on the success of virtual project teams among multinational companies in Malaysia. Using Multifactor Leadership Questionnaire to 100 executives working for multinational corporations, it was found that a transformational leadership improved the overall performance of virtual project teams. This study indicates that leadership has significant influence on virtual team performance. Similarly, Udom (2017) investigated whether leadership styles, project management expertise and virtual team success were connected. They used an online survey of an unplanned random selection of 160 San Francisco Bay Area project managers. The results show a mix of leadership style and project management expertise might predict virtual team success.

Gadirajurrett *et al.* (2018) examined the impact of leadership on a team's performance. Similar to study by Chun (2017), they used Multi-Factor Leadership Questionnaire to measure leadership and distributed it to 262 respondents from 10 teams in each company to assess the leadership behaviour of their team leaders on the given questionnaire. The analyses showed a strong relationship between transformational leadership and performance measurement.

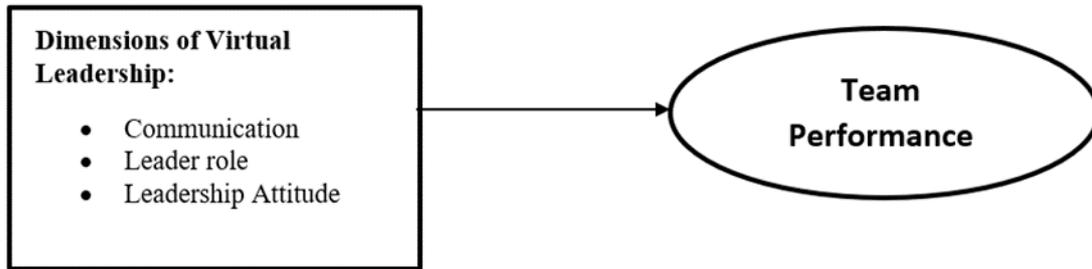
Perhaps, one of the most relevant studies is done by Soon and Salamzadeh (2021) who examined the impact of digital leadership competencies on virtual team effectiveness in MNC companies in Penang, Malaysia. A survey was conducted involving 150 respondents working in MNC companies in Penang with experience in a virtual team. According to the findings, e-communication competence and e-trust competency have significant positive link with virtual team effectiveness.

In addition, Belsom (2019) sought to identify the impact of a virtual leader's communication style on a virtual team's performance. This research used a purposive sample from virtual team supervisors and VT members for a minimum of 165 respondents. In addition, this study also evaluated characteristics of virtual leaders which include E-leadership, communication style, and motivational language. The results show a positive relationship between trust, knowledge sharing, and affective commitment on the performance of virtual teams.

Finally, Kayworth and Leidner (2002) examined the effectiveness of leadership in global virtual teams from various places in Europe, Mexico, and the United States. Each team was given a project leader and a project to accomplish. The findings indicate that highly effective virtual team leaders behave as mentors and demonstrate a high

empathy toward other team members without being labelled arrogant or rigid. Moreover, it is found that highly effective leadership was accountable for maintaining regular, comprehensive, and prompt communication with virtual team members.

In this study, virtual leadership is comprising of three dimensions namely communication, leadership role and leadership attitude following the model put forth by Kayworth and Leidner (2002).



**Fig. 3 - Research framework**

Consequently, the following hypotheses were developed:

H<sub>1</sub>: There is a significant between communication and team performance.

H<sub>2</sub>: There is a significant between leader role and team performance.

H<sub>3</sub>: There is a significant between leadership attitude and team performance.

## 2. Methodology

This study employed an explanatory research design using cross sectional survey as data collection strategies and questionnaires as data collection tool. As the number of remote employees could not be determined accurately and the use of probability sampling is far-fetched, the highest number of sampling size based on Krejcie and Mogan (1970) was selected which is 384. Companies listed in GICS sector which practiced remote working was invited to participate in this study. However, only ten companies agreed to participate with total 105 employees. These employees were selected subjected to the requirements that they must belong to virtual teams and have virtual leaders.

Table 3 shows details of the instruments used in this study. Virtual leadership was measured using items adapted from Kayworth and Leidner (2002). A total of 16 questions were included in this study with reported reliability of 0.90 (Kayworth and Leidner, 2002). On the other hand, items measuring team performance were adopted a study from Alsharo *et al.*, (2016). The reliability of the items was reported to be good at 0.92.

**Table 3 - Research instrument questionnaire**

Section	Category	No of Items	Sources
A (Demographic)		4	-
B (Virtual Leadership)	• Communication	6	Kayworth & Leidner (2002)
	• Leader role	15	
	• Leadership attitude	5	
C (Team Performance)		25	Alsharo <i>et al.</i> (2016)

Table 4 shows the actual reliability values of the data collected in this study. All variables showed high reliability whereby all values exceeded 0.7 (Sekaran, 2012). Cronbach’s Alpha scores of overall virtual team leadership was 0.969 while the value for team performance was 0.984.

**Table 4 - Reliability analysis**

Item	Cronbach’s Alpha	N of Items
Virtual Leadership		
• Communication	0.822	6
• Leader role	0.979	15
• Leadership attitude	0.964	5
Team Performance	0.984	25

Data analysis was conducted on data collected in compliance with the research objectives. Two types of analyses were done, which included descriptive analysis and correlation analysis. Moreover, demographic variables were tabulated in a frequency table with respective percentages. Data were analyzed using Statistical Package for Social Software Science (SPSS) 26.0.

The descriptive analysis consists of a measure of dispersion and measures of central tendency. In this study, mean and standard deviation are determined to examine the level of virtual leadership and team performance. Table 5 provides a range for determining the mean levels.

**Table 5 - Descriptive analysis range**

Descriptive Analysis Range	Level of Tendency
1.00 - 2.33	Low
2.34 - 3.67	Moderate
3.68 - 4.33	High

Correlation analysis is used in this study to understand how to measure the level of correspondence between variables, where a high correlation indicates a strong relationship between the two variables and vice versa as shown in Table 6. Normality test was also conducted prior to correlation analysis.

**Table 6 - Correlation coefficient value**

Correlation Coefficient Value	Level of Reliability
$r \geq 0.39$	Weak
$0.40 \leq r < 0.59$	Moderate
$0.60 \leq r < 0.79$	Strong
$0.80 \leq r < 1$	Very Strong

### 3. Results and Discussion

The response rate for this survey was 27.6%. After the data collection, data were subjected to data cleaning, editing and transformation. Normality test was also conducted prior to correlation analysis. In terms of gender, majority of respondent was female (58%) while highest age group was between 18-24 years old (37.1%). Most of the respondents were Malay (87.6%) and had bachelor's degree (58.1%). Most respondents were from the banking and financial sector 25.2% and the majority respondents who had experienced 2 years of remote working (37.8%).

**Table 7 - Descriptive statistic**

	Mean ( $\mu$ )	Std. Deviation ( $\sigma$ )	Level of Tendency
Independent Variables			
• Communication	3.889	0.715	High
• Leader role	3.939	0.758	High
• Leadership attitude	3.925	0.853	High
Overall VTL	3.937	0.642	High
Dependent Variable			
• Team Performance	5.442	0.971	High

Table 7 shows the descriptive statistic showing the mean and standard deviation of each variable and its dimensions. Among dimensions of virtual leadership, leader role has the highest mean of 3.939 (SD=0.758), followed by leadership attitude and communication. There were 6 items measuring communication variable. The highest mean in communication's items was 'When you had important questions about the project, your VTL responded' with  $\mu = 4.13$  ( $\sigma = 0.721$ ). Meanwhile, item with the lowest mean was 'In terms of the regularity of communication with your VTL, how would you rate this?' with  $\mu = 3.79$  ( $\sigma = 0.906$ ). This shows that VTL prioritizes immediate feedback although in terms of frequency, they might not communicate frequently. Besides, there are 15 items to measure leader role dimension which recorded 'My VTL is well-qualified' as the highest mean level ( $\mu = 4.04$ ,  $\sigma = 0.876$ ) while 'I could rely on my VTL' the lowest mean level with  $\mu = 3.76$  ( $\sigma = 0.878$ ) in evaluate the level of virtual leadership. The analysis above shows that the virtual team does not depend too much on the role of a virtual leader in completing their tasks. There were five items to measure leadership attitude revealed item 'I would rate the overall managerial effectiveness of my virtual team project leader as' was the highest mean level with  $\mu = 3.99$  ( $\sigma = 0.925$ ), meanwhile item 'My virtual team project leader's performance was' was the lowest level ( $\mu = 3.87$ ,  $\sigma = 0.910$ ).

Based on table 7, the overall mean for descriptive analysis to measure team performance ( $\mu = 5.442$ ) contains 25 items in questionnaire. The highest mean level with  $\mu = 5.64$  ( $\sigma = 1.084$ ) was recorded for item ‘My team members and I respect each other’. However, the item ‘I’m rewarded individually for my work effort’ noted as the lowest mean with  $\mu = 5.09$  ( $\sigma = 1.394$ ). This means that both VTL and the virtual team prioritize relationships with respect for each other to maintain the harmony of the work environment.

The normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) were used to identify whether the data were normally distributed or not. Based on table 8, the data was non-normal distribution since the significant value was less than 0.05 ( $p < 0.05$ ) for respective variables. Therefore, Spearman Correlation Coefficient Analysis was used because the data was not normal.

**Table 8 - Tests of normality**

	Kolmogorov-Smirnov			Shapiro- Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
VTLCom	.183	105	.000	.912	105	.000
VTLRole	.173	105	.000	.893	105	.000
VTLAttitude	.206	105	.000	.877	105	.000
TP	.124	105	.000	.872	105	.000

Table 9 shows the correlation analysis from overall results of the Spearman Correlation Coefficient used to identify the correlation between the communication leader role, leadership attitude of virtual leadership and team performance among employees or teams who work virtually in the listed GICS companies.

**Table 9 - Correlations statistics between virtual team leadership and team performance**

Variable	Spearman’s rho			
		VTLCom	VTLRole	VTLAttitude
Team Performance	Correlation Coefficient	.326**	.264**	.377**
	Sig. (2- tailed)	.000	.000	.000

**\*\* Correlation is significant at the 0.01 level (2-tailed)**

Based on Table 9, leadership attitude reaches the highest correlation value between team performance ( $r = 0.377^{**}$ ,  $p < 0.01$ ). The significant value was 0.000. There were a positive coefficient value means the result was perfect positive relationship between leadership attitude of virtual leadership and team performance. The value of correlation was then followed by the value of the communication ( $r = 0.326^{**}$ ,  $p < 0.01$ ) and leader role ( $r = .0264^{**}$ ,  $P < 0.01$ ). Thus, all hypotheses were accepted in this research.

#### 4. Conclusion

The results illustrate the significant linkage between virtual team leadership communication and team performance although moderate. As claimed by Avolio and Kahai (2001), the role of communication was very important for the leader’s responsiveness to any questions or problems that occur to avoid confusion and efficiency losses due to multiple information sources. It is to ensure that the information received was easy to receive, transform and understand. This study also identified there was a significant and positive relationship between the leadership role and team performance which is supported by Zaccaro and Bader (2003). Virtual leadership required the role of the leader as an operational supervisor in identifying and analyzing appropriate resources thus implementing the problem-solving strategies to carry out the virtual team performance There is also a significant and positive relationship between leadership attitude and team performance. An effective leadership attitude is when the leader can maintain a caring attitude either during or outside of working hours yet firm and assertiveness towards team members during working hours (Kayworth & Leidner, 2002). Moreover, when a leader shows the ability to be firm and authoritative while maintaining understanding and empathy towards team members, virtual team performance improves (Kayworth & Leidner (2002).

The most important implication of this study is that leadership matters regardless of the work settings. In particular, both conventional and virtual work settings require leadership that exemplify good work ethics and effective communications. Although virtual leadership physical presence might be absent, the frequent interactions via the ICT platforms are not only necessary but key defining feature of virtual leadership. Development of leadership programs should consider various technology-based communication platforms that can increase communication and visibility of team leaders.

However, there were several limitations of this research that should be considered. Firstly, due to the current epidemic in Malaysia, the total number of return responses from respondents that have been collected did not reach the required targeted sample size. In addition, due to some restrictions set by companies in terms of confidentiality, the

respondents were from several companies who were willing to answer the survey. Nonetheless, this study could be used to provide much needed empirical support on the importance of virtual leadership in the emerging hybrid working environment. Thus, future research could increase the number of respondents in different industries or using mixed method design or multiple levels of respondents.

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