Influence of leadership behaviours’ in enhancing employee performance with reference to work characteristics of virtual teams

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Abstract

For any organisation to be successful, employee performance is very crucial. The growing importance of leadership roles and behaviours in increasing virtual teams’ employee performance has been the catalyst of this study. The study is empiric in nature. Focus-group discussions and online survey using a questionnaire were done, yielding 180 replies from virtual groups of software professionals of Bengaluru. The data gathered is then analysed with the IBM SPSS 20 application utilising inference and descriptive statistics. The study indicated a positively significant correlation among the leadership behaviours and work characteristics, which leads to improved employee performance in the teams that are virtual. The analysis provides experiential data that reinforces the idea of leadership behaviours, which states that whenever leaders demonstrate greater levels of task and relations oriented leadership behaviour contributing to work characteristics in a simulated setting, employee performance can be optimised. The study’s managerial implications and potential possibilities for further research are mentioned at the end of the paper.
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Abstract: For any organisation to be successful, employee performance is very crucial. The growing importance of leadership roles and behaviours in increasing virtual teams’ employee performance has been the catalyst of this study. The study is empiric in nature. Focus-group discussions and online survey using a questionnaire were done, yielding 180 replies from virtual groups of software professionals of Bengaluru. The data gathered is then analysed with the IBM SPSS 20 application utilising inference and descriptive statistics. The study indicated a positively significant correlation among the leadership behaviours and work characteristics, which leads to improved employee performance in the teams that are virtual. The analysis provides experiential data that reinforces the idea of leadership behaviours, which states that whenever leaders demonstrate greater levels of task and relations oriented leadership behaviour contributing to work characteristics in a simulated setting, employee performance can be optimised. The study’s managerial implications and potential possibilities for further research are mentioned at the end of the paper.

Keywords: task and relations oriented leadership behaviour, and work characteristics; employee performance; virtual teams.


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1 Introduction

Due to the widespread implementation of business practices like outsourcing and globalisation with the availability of InfoTech, virtual teams are now more common. Virtual team members are people who work together but are not in the same place. They communicate to each other using technology instead of meeting in person. Many professionals are part of at least one virtual team. The COVID-19 pandemic made virtual teams even more common, and it is predicted that they will continue to be popular even after the pandemic is over. Despite the potential benefits, virtual teams still face numerous kinds of difficulties when employing technological tools to facilitate conversation, mentoring, as well as monitoring while working across time and space (Martins et al., 2004; Powell et al., 2004; Kirkman et al., 2012). The most significant organisational concerns nowadays are virtual work. The current situation in a global and digital setting, in which individuals have become progressively physically disconnected, posing unexpected and discerning barriers for workers and organisations, especially with regarding the establishment of remote work operations and the associated virtual leadership (Ferreira et al., 2023). Therefore, the researchers have explored that having good leaders is really significant for teams that work together online. Leaders can help the team member’s deal with the challenges that come up when working online.

Based on the literature reviews, several studies with regards to efficiency of different styles of leadership in teams working remotely have produced results that are inconsistent (Martins et al., 2004; Bell et al., 2019; Kirkman et al., 2012). Some argue for example, stating that since there are fewer physical encounters and a dearth of non-linguistic signs in online settings could potentially be a challenge for the leader of a team to engage in behaviours that build substantial relationships between teams and for the members of team to recognise those behaviours (Hoch and Kozlowski, 2014).

Whilst a few studies (Hambley et al., 2007) observed that both transformative and transactional leadership styles had any influence at all on how effectively virtual groups functioned, others (Huang, 2010; Joshi et al., 2009) found significant impacts. Therefore, it raises a question of whether conventional face-to-face behaviour of the leader works well in the virtual environments and there are still unanswered concerns about the leadership styles effectiveness in the virtual teams. For example, research on the efficacy of transformative versus transactional leadership styles for virtual teamwork has yielded inconsistent results (Hoyt and Blascovich, 2003).

Although knowing that these assessments have emphasised the discrepancies in results in the study of virtual team leadership, Bell et al. (2019) believe that ‘far more work is needed’ to appreciate the implications of leadership. The study uses this viewpoint in enhancing current research to evaluate assumptions about how various kinds of leadership behaviours fulfil team requirements which come about through virtual collaboration. The study concentrates on two distinct kinds of leadership behaviours that are often studied in team research: individual (relational)-focused leadership and task-focused leadership (Mathieu et al., 2008). Relationship-focused leadership is concerned with fostering teamwork, whereas task-focused leadership is concerned with facilitating task work. Furthermore, a thorough examination is required to determine how leadership virtually affects the effectiveness of virtual teams.

It’s widely recognised that the performance an organisation is heavily dependent on employee performance (Rachman, 2021); also, the relationship between leadership actions and performance of followers represents one of the older and arguably most
Influence of leadership behaviours in enhancing employee performance

Extensively investigated concerns in the field of organisational behaviour (Yukl, 2012). Performance is ‘a result of work in quality and quantity achieved by an employee in performing their job in accordance with the responsibilities given to him’ (Mendoza et al., 2018). The key factor that enhances the organisational performance is employee performance. The leadership style employed by particular the business’s leaders has an impact on how well a worker performs. On the one hand, the function of leaders cannot be split down from the performance of workers; leadership is an essential component to administration, which is critical that serves as a critical role in a company’s survival (Mendoza et al., 2018).

The primary goal of organisational leaders is to find ways to develop personnel as primary human resources, possess good behaviour at work and perform effectively in accordance with workplace demands, and comprehend the values that are in place that are followed in the organisation (Nurtjahjono et al., 2020). Many study papers, on the contrary, claim that work characteristics impact performance of workers (Duara, 2019; Nidaul Izzah et al., 2019; Senen et al., 2018).

In addition, the concept behind work characteristics holds that inspiring and improved work characteristics will lead to beneficial emotional, cognitive, and psychological environments for the job holders. According to the work characteristics model, positive emotional attitudes like affective commitment, job motivation, and satisfaction result from a positive state of cognition (Hackman et al., 1975). Ultimately, maintaining an optimistic attitude and impact at work promotes productive behaviour with an elevated level of performance on the job.

As a result, the study’s focus is on often researched relations-oriented and task-oriented leader behaviours (Mathieu et al., 2008), and research on the links between leaders’ behaviours and work characteristics is exceedingly restricted. Additionally, a leaders’ role as a participant in the development of the work characteristics of their staffs have not been incorporated into the metrics of virtual teams’ leadership behaviours.

Given the aforementioned, the study attempts to strengthen the field of e-leadership or hybrid leadership. According to our comprehension, it specialises in the influence of virtual leader behaviours contributing to work characteristics. Thus, this research provides a method in addressing discrepancies from preceding studies on virtual leadership and ensure if different behaviours related to leadership have been associated in improving and are effective in virtual teams’ performance (Ceri-Booms et al., 2017; Burke et al., 2006).

Secondarily, the study examines the link that exists among the leader behaviours and work characteristics impacting virtual teams’ employee performance. The study also attempts to analyse the relationships and the impacts of task and relationship oriented leadership behaviour on the employee performance of virtual teams. The investigation also makes an effort in proposing an integrated theoretical framework for leaders’ behaviour accounting for the impacts of work characteristics on the performance of virtual team members. In conclusion, the study helps in addressing the findings regarding the impact of leadership behaviours on the virtual team members’ performance. The study also offers directions and recommendations to the researchers, assisting them to comprehend the fields of virtual or hybrid leadership. The objectives of the study are as follows:

1. To explore the characteristics of leadership behaviours affecting virtual teams’ work characteristics.
2 Review of literature

Virtual teams are characterised in two ways: in-person or virtual (Balthazard et al., 2009). Nonetheless, the levels of simulation in teams have recently been defined as fluctuating along a spectrum (Raghuram et al., 2019; Gibson and Gibbs, 2006). Despite it being true that the term has numerous descriptions, the literature has noted only two prevalent features of virtuality:

1. the extent to which a team chooses direct contact to digital tools for working and communicating (Kirkman and Mathieu, 2005)
2. the extent to which the team members are distributed geographically as opposed to co-located (O’Leary and Cummings, 2007).

Leadership is crucial to assist virtual teams in overcoming challenges and produce successful results. According to Gilson et al. (2015), when analysing virtual leaders in leadership literature, two areas have attracted an overwhelming amount of academic consideration: leader behaviours and characteristics. From 1950s until the end of the 1970s, leadership research was primarily conducted using the traditional two-dimensional paradigm. The first of the two theories that have been of recent academic curiosity is task-oriented leadership; the other is relationship-oriented leadership behaviour. Aspects of task oriented leadership comprise defining roles as well as duties for the members of the team, offering guidance on business procedures, and identifying and fulfilling the goals of the task.

Task-oriented behaviours such as defining rules and establishing team structures are being linked to the virtual team member’s performance, according to the study (Batırlık et al., 2022). In accordance with Ceri-Booms et al. (2017), task-focused leadership aims in strengthening individual’s task commitment and task involvement, and it also defines the structure of tasks while offering the resources required for job accomplishment. Relational leadership behaviour seeks to encourage, motivate, and assist teammates in order to instil confidence in individuals in taking action that adds to the success of the team also to build a healthy work environment within colleagues (Liao, 2017; Fleishman et al., 1991). Relational leadership thus comprises behaviours that can be transforming (Hoyt and Blascovich, 2003; Purvanova and Bono, 2009), participatory (Surinder et al., 1997; Zhang et al., 2009; Kahai et al., 2004), supportive and facilitative as described by Thomas and Bostrom (2010) and Wakefield et al. (2008), along with those which promote a high level of leader-member exchange (Hoch and Kozlowski, 2014; Gajendran and Joshi, 2012).
Relationship-focused behaviours in leadership might be challenging for leaders in demonstrating as well as harder for teammates to notice and comprehend in virtual teams as opposed to teams that meet in-person due to diminished signals of information, i.e., non-verbal and situational cues. A virtual team’s lack of interpersonal interaction may limit a leader’s ability to execute successful relationship-driven behaviour.

Furthermore, the additional period of time necessary for communication via technology vs. in-person communication could restrict possibilities for leaders to participate in intellectually stimulations (Hancock, 2004), making relationship-driven leadership less effective in teams that are virtual. There is documentation, nevertheless, that leaders of virtual teams can participate in behaviours that teammates understand as relationship-focused, such as those connected to a leader’s written communications (Tyran et al., 2003). Furthermore, in electronic means of communication, individuals can impact how others feel (Cheshin et al., 2011). As a result, the study contends that relational driven behaviours continue to be conceivable and will influence the performance of virtual teams.

Employees are important assets to any organisation, according to Cetin et al. (2012), and a good leader encourages followers towards reaching the desired objectives. According to Hiller et al. (2011), leaders are capable of affecting emotions, particularly in followers, implying that leaders may exert a significant impact on staff performance. Ludwikowska (2022) investigated whether employee-oriented HR policies shapes the relationship among servant leadership and performance at work and discovered that employee-oriented HR policies may serve as a moderator among servant leadership and performance at work, thus enhancing this relationship. Incorporating HR policies and leadership is critical in gaining an in-depth comprehension of the ways that leadership and human resources impact employee performance.

There’s a strong, positive, and statistically significant link among a leader’s communication competence, task and relationship leadership behaviours and employee performance. The investigation also revealed that task with relational oriented leadership behaviour, along with communicating skills, has a positive impact on employee performance according to the findings of Ali and Siddiqui (2023). Likewise, Brown et al. (2021) examined the link between task and relational driven leader behaviour and virtual team performance and discovered that task and relational driven leadership associated positively with virtual team performance; however task-focused leader behaviour had been a less reliable indicator of the virtual team members’ performance.

Ceri-Booms et al. (2017) evaluated the impact of relational and task-oriented leader behaviours on team performance. According to the results, there was a moderate relationship among the team’s performance and both leadership behaviours. Bartsch et al. (2020) investigated the impact of group cohesiveness, autonomy, workplace stress, and leadership effectiveness on individual performance while working virtually because of COVID-19 and discovered that it necessitated task-and relationship-oriented leadership behaviour in maintaining the individual’s levels of productivity that is, performance at work in a virtual setting. Team cohesion, workplace stress, and individual job autonomy did not have any moderating effects on employee performance in the service sector.

Relationship driven leadership could improve performance of teams by mitigating the adverse impacts of virtual tools and geographical dispersion. Team leaders can lessen
team members’ confusion with regards to their value to the team by offering assistance and displaying regard for others on the team that boosts their sense of psychological connectedness to the team and desire for contributing (Hill et al., 2014; Gajendran and Joshi, 2012). Relationship-focused leadership may additionally foster positive interpersonal interactions that develop team identity and commitment (Purvanova and Bono, 2009; Joshi et al., 2009). As a result, we anticipate that relationship-focused leadership will have a beneficial impact on the performance of virtual team members.

The study also anticipates that task-focused leadership will improve the performance of virtual teams. The hypothesis relies on the function that task-focused leadership may have in assisting teams in dealing with carrying out tasks issues in a virtual setting. When virtual team members are dispersed in geography and time, they have fewer chances for impulsive interaction and synchronised contacts, which helps in real-time solution-finding and managing tasks (O’Leary and Cummings, 2007). Furthermore, teammates working at distinct job sites may encounter differing local work processes and priorities, making synchronisation problematic (Baba et al., 2004; O’Leary and Cummings, 2007). Lastly, remote members of team find it challenging in assessing overall team success and discover variables relating to team members’ local environments that may inhibit the growth of the team (Cramton, 2001).

2.2 Work characteristics and employee performance

Work characteristics – a job defines an individual’s beliefs and position within society as a whole and it influences the psychological identification and well-being of workers that invest the majority of their time working; therefore the kind of employment and workplace environment have a significant impact on employee life and job satisfaction. All workplace elements, including job features, are closely related to attitudes and behaviours of workers in the workplace (Hackman and Oldham, 1976).

According to Hackman and Oldham, work with more obstacles and complexity motivate people to develop their abilities and work dispositions. According to job characteristics theory (Hackman and Oldham, 1980, 1976), job characteristics are a system or situational circumstances that affect employees’ psychological conditions and attitudes.

Employee performance is determined by work connected to a company’s success or failure (Sopiah et al., 2020). Performance is one of the variables used to judge whether or not a task was completed satisfactorily.

Employees who are intrinsically motivated accomplish better on tasks, as stated by Hackman and Oldham (1980), since working well promotes pleasant affect. Employee job satisfaction is the crucial factor to take into consideration for successful performance in an organisation. For an organisation, it results into a resource when an employee is happy. When an employee is content with what they do, they’re more timely, self-driven, and inclined to take on additional responsibility for the task at hand (Moras, 2021).

Hackman and Oldham (1976) proposed work characteristics concept to articulate situations where individuals might feel intrinsically motivated while executing a specific assignment. It indicates that organisations may encourage favourable work attitudes and enhanced employment outcomes by improving jobs in five distinct domains. They are, skill variety – the extent to which a job/project that necessitates the skills and abilities; task identity – the extent to which a job/project requiring to complete ‘the whole’ portion of task from the start of its commencement resulting into apparent outcomes; task
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significance – is the extent to which a job/project has a substantial impact on the lives of others; autonomy – the job/project that gives significant liberty and opportunity; feedback – is how well the task yields the precise information regarding performance levels. According to the work characteristics model by Hackman and Oldham (1976), the five core work dimensions produce three psychological states: experienced accountability, experienced significance, and knowledge of outcomes, leading to in both professional and personal outcomes like satisfaction, high intrinsic drive, low turnover of staff, and performance.

Skill variety, job autonomy, task identity, job feedback, and task significance belong to the work characteristics that encourage successful performance and improve the results of performance, as stated by Hackman and Oldham (1980) and West and Farr (1990). Mendoza et al. (2018) investigated how job characteristics affect the performance of employees while Grobelna (2019) investigated the impacts of hospitality workers’ work characteristics on work engagement and performance results. As per the results, task significance showed a substantial impact on hospitality employees’ work engagement, enhancing their job performance.

A recent study by Pusparini (2023) discovered that work characteristics improve employee performance. Employee performance is affected by job characteristics; if job characteristics are well understood, employee performance improves (Senen et al., 2018). Task significance, a work attribute, influences individual performance at work (Lopez-Cabarcos et al., 2022). Dulara (2016) contends that an improvement in job characteristics leads to an increase in task and overall performance. Another study on the importance of task significance on work performance effects conducted by Grant (2008) discovered that correlational approaches and confounded interventions have prevented researchers from determining the contributing effect of task significance on performance at work.

A strong set of work characteristics shows the workforce members of the organisation possess moral obligations, carry out variety of tasks, as well as not having an excessive workload. As measured by productivity, honesty, commitment, creativity, leadership, skills, and teamwork, the work performance improved as a result (Farhah Umi et al., 2020).

A descriptive design was used in a study on skill variety, feedback, and employee performance by Kemboi et al. (2013). Job performance was found to be highly influenced by skill variety. Along with the other aspects of work characteristics, task identity has been shown to improve productivity and overall employee performance (Humphrey et al., 2007).

Senen et al. (2018) in their study found that job factors had a favourable impact on employee performance. And a scientific investigation by Nidaul Izzah et al. (2019) demonstrates there’s a favourable relationship between work characteristics and employee performance. A similar study (Dyah et al., 2021; Nurtjahjono et al., 2020) investigated the impact of work characteristics on employee performance and discovered that work characteristics had an important effect on employee performance. Johari and Yahya (2016) similarly explored if work attributes predict job performance and revealed that feedback and task significance influence job performance.
3 Research framework

Figure 1 is an illustration of the planned conceptual model including the hypothetical relationships.

Figure 1  Prepared by researchers (see online version for colours)

4 Hypothesis development

Below is the study’s hypothesis for examining the factors that are affecting virtual team members’ performance.

Hypothesis $H_0$  Task oriented leadership behaviour does not impact the virtual teams’ work characteristics.

Hypothesis $H_a$  Task oriented leadership behaviour positively and significantly impacts the virtual teams’ work characteristics.

Hypothesis $H_0$  Relation oriented leadership behaviour does not impact the virtual teams’ work characteristics.

Hypothesis $H_a$  Relation-oriented leadership behaviour positively and significantly impacts virtual teams’ work characteristics.

Hypothesis $H_0$  Task oriented leadership behaviour does not impact the virtual teams’ employee performance.

Hypothesis $H_a$  Task oriented leadership behaviour positively and significantly impacts the virtual teams’ employee performance.

Hypothesis $H_0$  Relation oriented leadership behaviour does not impact the virtual teams’ employee performance.
Hypothesis 4: Relation oriented leadership behaviour positively and significantly impacts the virtual teams’ employee performance.

Hypothesis 5: Work characteristics does not impact the virtual teams’ employee performance.

Hypothesis 6: Work characteristics positively and significantly impacts the virtual teams’ employee performance.

5 Research methodology

The study seeks to investigate and identify the relationship between a leadership behaviours contributing to the work characteristics that affect the virtual teams’ employee performance in the medium-sized software industries in Bengaluru. The study uses qualitative and quantitative methodologies to gather, examine, and then present the investigation’s outcomes. In-person interviews and web-based surveys are used to collect primary data. Databases including Springer, EBSCOhost, Business Source Complete, GoogleScholar, and pdfdrive are used to collect secondary data. An extensive digital search for relevant research that had been published was carried out for the study.

5.1 Sample and procedure

To answer the research questions for this study, software experts, i.e., \((n = 180)\) individuals that currently work for virtual teams in medium-sized software industries in Bengaluru City are recruited. The study uses convenience sampling technique to select the subset of population of interest. Data was collected from and September 30 to December 30, 2022. Demographic characteristics covered in the study comprise of gender, age, education, and years of experience.

5.2 Data tool development

A total of 37 questions were asked, eliminating the demographic ones, and each one is categorised on the Likert scale of 1 to 5. The questionnaire is based on Hackman and Oldham’s work in case of organisational work characteristics. In evaluating every aspect of the work characteristics model (Dulara, 2016; Prasad, 2020), a standard instrument identified as job diagnostic survey (JDS) by Hackman et al. (1975) has been utilised, and the survey responses utilised to measure the parameters of employee performance are adapted from an investigation by Oborn (2010) and Dulara (2016).

5.3 Constructs of the study

Four variables made up the current study: work characteristics, employee performance of virtual teams, task and relation oriented leadership behaviour.
6 Data analysis

6.1 ‘Validity and reliability of the instrument’

A pilot study is being done to improve the surveys’ validity and reliability. A pilot sample of 50 employees who worked for virtual teams of medium-sized software industries pretested the items of the study, and the average mean performance score is calculated. Cronbach’s $\alpha$ is used to assess reliability’s internal consistency. Following the pilot investigation, certain questions with CA values below 0.6% had low dependability. As a result, only 27 questions rather than 37 were included in the questionnaire. The Cronbach’s value for each construct is shown in Table 1.

Table 1 ‘Internal consistency’

<table>
<thead>
<tr>
<th>Reliability statistics</th>
<th>Cronbach’s alpha</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task-oriented leadership behaviour</td>
<td>0.816</td>
<td>4</td>
</tr>
<tr>
<td>Relation-oriented leadership</td>
<td>0.895</td>
<td>4</td>
</tr>
<tr>
<td>Work characteristics (skill variety)</td>
<td>0.742</td>
<td>3</td>
</tr>
<tr>
<td>Work characteristics (task identity)</td>
<td>0.784</td>
<td>3</td>
</tr>
<tr>
<td>Work characteristics (task significance)</td>
<td>0.655</td>
<td>3</td>
</tr>
<tr>
<td>Work characteristics (autonomy)</td>
<td>0.862</td>
<td>3</td>
</tr>
<tr>
<td>Work characteristics (feedback)</td>
<td>0.824</td>
<td>3</td>
</tr>
<tr>
<td>Employee performance</td>
<td>0.760</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 2 ‘Descriptive statistics’

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>128</td>
<td>71.1</td>
<td>71.1</td>
<td>71.1</td>
</tr>
<tr>
<td>Female</td>
<td>52</td>
<td>28.9</td>
<td>28.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20–29</td>
<td>80</td>
<td>44.4</td>
<td>44.4</td>
<td>44.4</td>
</tr>
<tr>
<td>30–39</td>
<td>86</td>
<td>47.8</td>
<td>47.8</td>
<td>92.2</td>
</tr>
<tr>
<td>40–49</td>
<td>14</td>
<td>7.8</td>
<td>7.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work experience in years</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–5 years</td>
<td>73</td>
<td>40.6</td>
<td>40.6</td>
<td>40.6</td>
</tr>
<tr>
<td>5–10 years</td>
<td>67</td>
<td>37.2</td>
<td>37.2</td>
<td>77.8</td>
</tr>
<tr>
<td>10–15 years</td>
<td>27</td>
<td>15.0</td>
<td>15.0</td>
<td>92.8</td>
</tr>
<tr>
<td>15–20 years</td>
<td>11</td>
<td>6.1</td>
<td>6.1</td>
<td>98.9</td>
</tr>
<tr>
<td>20 and above</td>
<td>2</td>
<td>1.1</td>
<td>1.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
6.2 Demographics of the respondents

The demographics’ descriptive statistics are summarised in Table 2. According to the demographic data, roughly two thirds of respondents are men, accounting for 72% of the population, i.e., \( n = 128 \), and the remaining respondents were women resulting 28% of the population, i.e., \( n = 52 \). Nearly 90% of the respondents were between the age group, i.e., \( n = 80 \), age of 20–29) and \( n = 86 \), age of 30–39), while remaining population was made up of those in the 40–49 age bracket. Nearly 80% of the respondents, i.e., \( n = 73 \) and \( n = 67 \) accordingly had employment experience ranging from 1 to 5 years to 5 to 10 years. The remaining populations \( n = 22 \) comprised 20% of the workers with 15–20 years of job experience.

7 Results and discussion

Pearson correlation and multiple linear regressions analysis are carried out to examine the hypothesis followed by bootstrapping process using 10,000 samples with 95% confidence interval. ‘Bootstrapping is a method of statistical analysis that produces numerous simulated samples from one/single dataset. It is the method most frequently employed for validating statistical results, such as when the data is untrustworthy or the sample size is small’. The outcomes of Pearson correlations and multiple linear regression analyses are shown in Table 3 and Table 4.

To investigate the relationship among leadership behaviours considering the characteristics and its impact on the performance of employees of the virtual teams’ of mid-size software firms in Bengaluru’s, Pearson correlation is used. With \( r \) values (0.5–0.6) and \( p = 0.000 \), the data interpretation suggested a moderate positive with statistically significant association among task oriented leadership and the work characteristics of virtual teams. However, on the other hand, relations-oriented leadership behaviour with its \( r \) values (0.6–0.8) and \( p = 0.000 \) indicated substantially a positive and statistically significant association with the work characteristics.

Job autonomy with relations-oriented leadership behaviour with \( (r = 0.806, p = 0.000) \) showed greater correlation and statistical significance followed by skill variety with \( (r = 0.768) \) and feedback with \( (r = 0.762) \) and \( p = 0.000 \) accordingly in impacting virtual team employee performance. Additionally, the research investigated the association among work characteristics and virtual teams’ employee performance. Employee performance indicated a positive and statistically significant association, according to the study.

According to the findings of the study, task-oriented leadership behaviour has a positive and substantial association with virtual teams’ employee performance. Nevertheless, work characteristics combined with relation-oriented leadership behaviour had significantly positive association with the employee performance of virtual team members.
Table 3  ‘Pearson’s correlations’

<table>
<thead>
<tr>
<th></th>
<th>( TOL )</th>
<th>( ROL )</th>
<th>( WCSV )</th>
<th>( WCTI )</th>
<th>( WCTS )</th>
<th>( WCAT )</th>
<th>( WCFS )</th>
<th>( EP )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( TOL )</td>
<td>1</td>
<td>0.698**</td>
<td>0.625**</td>
<td>0.678**</td>
<td>0.546**</td>
<td>0.649**</td>
<td>0.657**</td>
<td>0.540**</td>
</tr>
<tr>
<td>( ROL )</td>
<td>0.698**</td>
<td>1</td>
<td>0.768**</td>
<td>0.679**</td>
<td>0.610**</td>
<td>0.806**</td>
<td>0.762**</td>
<td>0.594**</td>
</tr>
<tr>
<td>( WCSV )</td>
<td>0.625**</td>
<td>0.768**</td>
<td>1</td>
<td>0.788**</td>
<td>0.645**</td>
<td>0.791**</td>
<td>0.731**</td>
<td>0.597**</td>
</tr>
<tr>
<td>( WCTI )</td>
<td>0.678**</td>
<td>0.679**</td>
<td>0.788**</td>
<td>1</td>
<td>0.717**</td>
<td>0.715**</td>
<td>0.738**</td>
<td>0.684**</td>
</tr>
<tr>
<td>( WCTS )</td>
<td>0.546**</td>
<td>0.610**</td>
<td>0.645**</td>
<td>0.717**</td>
<td>1</td>
<td>0.624**</td>
<td>0.661**</td>
<td>0.619**</td>
</tr>
<tr>
<td>( WCAT )</td>
<td>0.649**</td>
<td>0.806**</td>
<td>0.791**</td>
<td>0.715**</td>
<td>0.624**</td>
<td>1</td>
<td>0.755**</td>
<td>0.600**</td>
</tr>
<tr>
<td>( WCFS )</td>
<td>0.657**</td>
<td>0.762**</td>
<td>0.731**</td>
<td>0.738**</td>
<td>0.661**</td>
<td>0.755**</td>
<td>1</td>
<td>0.657**</td>
</tr>
<tr>
<td>( EP )</td>
<td>0.540**</td>
<td>0.594**</td>
<td>0.597**</td>
<td>0.684**</td>
<td>0.619**</td>
<td>0.600**</td>
<td>0.657**</td>
<td>1</td>
</tr>
</tbody>
</table>

- \( ** \) indicates statistical significance at the 0.01 level (2-tailed)
7.1 Testing of hypothesis

Table 4 depicts the hypothesis results. The task and relations oriented leadership behaviour predicted by hypotheses Ha1 and Ha2 will have a positive and significant impact work characteristics. The outcomes reveal that task and relationship driven leaders behaviour impacted work characteristics in a significantly positive way. Nevertheless, relational oriented leadership behaviour had the most positive and significant impact on the virtual teams’ work characteristics.

Table 4  Multiple linear regression analysis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Regression weights</th>
<th>Beta coefficients</th>
<th>$R^2$</th>
<th>$F$</th>
<th>$t$</th>
<th>$p$-value</th>
<th>Hypothesis supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ha1</td>
<td>TOL → WC</td>
<td>0.591</td>
<td>0.516</td>
<td>189.876</td>
<td>9.224</td>
<td>0.000</td>
<td>Yes</td>
</tr>
<tr>
<td>Ha2</td>
<td>ROL → WC</td>
<td>0.694</td>
<td>0.686</td>
<td>388.987</td>
<td>8.710</td>
<td>0.000</td>
<td>Yes</td>
</tr>
<tr>
<td>Ha3</td>
<td>TOL → EP</td>
<td>0.420</td>
<td>0.291</td>
<td>73.226</td>
<td>8.483</td>
<td>0.000</td>
<td>Yes</td>
</tr>
<tr>
<td>Ha4</td>
<td>ROL → EP</td>
<td>0.474</td>
<td>0.353</td>
<td>96.963</td>
<td>11.971</td>
<td>0.000</td>
<td>Yes</td>
</tr>
<tr>
<td>Ha5</td>
<td>WC → EP</td>
<td>0.677</td>
<td>0.513</td>
<td>187.288</td>
<td>13.685</td>
<td>0.000</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 5  Bootstrap for coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>$B$</th>
<th>Bias</th>
<th>Std. error</th>
<th>Sig (2-tailed)</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>1.360</td>
<td>-0.022</td>
<td>0.552</td>
<td>0.014</td>
<td>0.445 to 2.514</td>
</tr>
<tr>
<td>TOL</td>
<td>0.043</td>
<td>0.000</td>
<td>0.066</td>
<td>0.512</td>
<td>-0.084 to 0.179</td>
</tr>
<tr>
<td>ROL</td>
<td>-0.011</td>
<td>0.008</td>
<td>0.096</td>
<td>0.909</td>
<td>-0.173 to 0.199</td>
</tr>
<tr>
<td>WCs</td>
<td>0.650</td>
<td>-0.003</td>
<td>0.143</td>
<td>0.000</td>
<td>0.347 to 0.909</td>
</tr>
</tbody>
</table>

Note: *Unless otherwise noted, bootstrap results are based on 10,000 bootstrap samples.

Hypotheses Ha3 and Ha4 anticipated that task and relationship oriented leadership behaviour would have positive and significant impact on the performance of virtual team members. The outcomes of the study indicated a positive but lesser impact of task and relationship oriented leadership behaviour on the performance of virtual team members. Furthermore, the work characteristics showed significantly positive impact on the performance of virtual team members. Lastly, the virtual team’s work characteristics had a significantly positive impact on the performance of virtual team members of medium-size software firms of Bengaluru. Since work characteristics are important for measuring employee efficiency and satisfaction with work, establishing the organisation’s work characteristics enables employees for utilising a variety of abilities and skills to perform successfully and in accordance with the rapidly changing current scenario.

Finally, the bootstrap coefficient is used. Table 5 reveals that work characteristics are an accurate with $p = 0.000$, i.e., a value of less than 0.001 and 95% CI = [0.347, 0.909] for lower and upper bounds, accordingly and are strong indicators of virtual teams’ employee performance (EP).

In conclusion, the findings indicate that good employee performance in online teams necessitates a recognition of leadership behaviours with work characteristics. Both the
task and relation oriented leadership behaviour positively impacted the virtual teams’ employee performance. However, the investigation revealed that while combined with work characteristics such as feedback, job autonomy, and skill variety, relations oriented leadership behaviour showed higher overall impact on the virtual teams’ employee performance than task-oriented leadership behaviour.

The study demonstrates and supports the study by Dyah et al. (2021) that reveals that relational leadership behaviour and work characteristics have a significant impact on employee performance and it is critical to develop high-quality work. Work characteristics are critical to accomplishing organisational goals. The organisation believes that employees can spread performance through their initiatives that display autonomy in performing their responsibilities and duties.

Work characteristic, i.e., skill variety significantly influences employee performance. Where a diverse set of skills is necessary to optimise employee performance. Employees in significant occupations require a greater range of skills. As a consequence, professionals employ their expertise and skills across multiple fields. This increases the opportunities of the job while also providing possibilities for learning. Similarly, feedback also influences the employee performance significantly, therefore, working with continual feedback allows people to understand their own strengths and flaws ultimately leading to enhanced employee performance.

8 Managerial implications

Based on the findings, there are some major implications for the leaders of virtual teams. From a pragmatic standpoint virtual leaders in the Indian IT sector may benefit immensely by the results of this research as they strive to improve employee performance. To improve employee performance, virtual leaders ought to concentrate equitably on both the task and relationship-oriented leadership behaviour.

Furthermore, the investigation provides the virtual or e-leaders with the information of variable of work characteristics which must be considered for as well as leveraged to improve the employee performance from an individual approach. The virtual leaders should priorities work characteristics as well as include them in their plan of action.

Finally, the virtual team leaders must focus on developing jobs which are more interesting, fulfilling, and that provide a high level of job autonomy, feedback, and skill variety. It might serve as a useful foundation for increasing employee engagement, employee satisfaction, and organisational productivity in the virtual teams.

9 Research directions

The outcomes of this study point to future research directions and opportunities for the researchers. This study’s population is limited to software experts who work for virtual teams in medium-size software firms of Bengaluru city. This situation restricts the generalisation of the findings. As a result, future researchers must concentrate on sectors other than IT and investigate diverse geographic locations in order to generalise the results.
Additionally, future researchers are recommended to replicate this study by implementing it in non-virtual teams and compare the results among virtual teams and non-virtual teams.

Furthermore, the study is expected to help future researchers undertake research on work characteristics and employee performance by focusing on factors (e.g., types of leadership) from broader spectrum based on theoretical basis.

10 Conclusions

This investigation is significant and pertinent in light of the virtual team’s growing popularity in the current organisations as well as the surge of research in leadership with regards to virtual teams. The study’s outcomes support the idea of task and relationship oriented leadership behaviour having a vital influence in supporting the effective employee performance in virtual teams. It offers a substantial contribution in addressing the various discoveries from prior studies focusing on relevant importance of virtual leadership behaviours.

Relations oriented leadership behaviour has been observed to be effective when linked with work characteristics such as job autonomy, feedback, and skill variety and it has significant as well as greater impact on virtual team’s employee performance. This validates the findings of Liao (2017), which found that in virtual settings, relational leadership behaviours are appropriate for improving both individual and virtual team performance aspects. As therefore, the greater the levels of relational leadership behaviour combined with greater levels of work characteristics, the better will be the employee performance of virtual team members.

Originality

The present research is a pioneer empirical investigation demonstrating virtual leaders’ behaviours contributing to work characteristics. As a consequence, it contributes to a minimal numbers of investigations, i.e., the impact of leaders’ behaviours along with the work characteristics impacting the virtual team’s employee performance in medium-size software firms in Bengaluru City. The work is an original one and does not violate copyright.

References


Influence of leadership behaviours in enhancing employee performance


