Adoption of blockchain technology in hospitality and tourism industry and sustainability performance: impact of technological turbulence and senior leadership support

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Abstract

Purpose – The rapid increase of use of online platforms by the customers in the hospitality and tourism industry has invited the needs for using digital platforms by the concerned industry. In such a scenario, the purpose of this study is to examine how adoption of blockchain technology in hospitality and tourism industry could impact the sustainability performance of the organizations under the moderating influence of technological turbulence and senior leadership support.

Design/methodology/approach – With the help of existing literature, stakeholder theory and dynamic capability view (DCV), a theoretical model is proposed. It was validated using the PLS-SEM technique with 311 respondents who have different managerial positions in the hospitality and tourism industry. The proposed theoretical model is unique and effective as it has high explanatory power.

Findings – The study demonstrates the importance of adopting BCT in the hospitality and tourism sector and how it could improve the sustainability performance of organizations in that sector. This study also finds that there is a significant moderating impact of technological turbulence and senior leadership support on such organizations that adopt BCT.

Research limitations/implications – This study provides valuable inputs to practitioners in the industry by showing how adopting BCT can improve their sustainability performance. The study also demonstrates that leaders and the managers should support adopting BCT in their organizations and they can help to overcome any technological challenges that might come up while adopting it.

Originality/value – The present study proposes a unique theoretical model which was also validated using a statistical approach. Moreover, both stakeholder theory and dynamic capability view were integrated to propose the theoretical model, which is a novel attempt so far as adoption of BCT in hospitality and tourism industry is concerned.

Keywords Blockchain technology, Technological turbulence, Leadership support, Sustainability, Hospitality and tourism, Structural equation modelling

Paper type Research paper

1. Introduction

The hospitality and tourism (H&T) industry has been experiencing fierce competition to digitalize their day-to-day business operations. Such competition has pushed the industry to develop innovative products and practices (Magovan, 2017). The rapid increase of digital

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customers, increasing demand for travel, as well as the rapid change in the concept of security, have brought about the idea of virtual payments (intelligent automation) and the dominance of digital platforms (World Economic Forum, 2017; Chaudhuri et al., 2021). It is seen that even now, in the context of functions of the H&T industry, third party platforms still control considerable volumes of data on customers’ travel purchases, package tours and so on (Kowalewski et al., 2017). Third party involvement invites some challenges. Whenever a person looks to book a hotel in a place they intend to travel to, the individual usually goes through a third party. This process is not cost effective, and it indirectly impedes growth in the tourism industry (Pilkington et al., 2017). From this perspective, blockchain technology (BCT) can help to eliminate some of these issues. That is because BCT has no centralized authority and is permission-less, leading to a paradigm shift in the context of the H&T distribution landscape (Kizildag and Ozdemir, 2017; Vrontis et al., 2022). Hence, implementation of BCT helps to create multiple centers for guest operations and can provide better customer service (Dike et al., 2023).

In the H&T industry, travelers book airline tickets through online platforms. However, there is a risk of cyber-attacks or fraud in the monitory transactions on these platforms, which gives rise to different challenges to the travelers. Here, applications of blockchain technology can help by protecting people from cyber-attacks and by ensuring transparency in financial transactions done online. BCT can be used in the H&T industry to improve online evaluations and review technologies that ensure reliable rating systems (Önder and Gunter, 2020). Basile et al. (2021) and Denter et al. (2022) demonstrated that H&T organizations find that BCT has helped them in their financial, environmental and social performance, which affects their overall sustainability.

However, their sustainability performance can be impacted by technological turbulence, which is explained as the rate of change and unpredictability of technology that could help organizations to strengthen their competencies (Song et al., 2005; Chatterjee, 2020). The use of different applications of emerging BCT in the H&T industry will enhance employees’ skillsets (Song et al., 2005; Chillakuri and Attili, 2022), expertise and motivation, which they must have for the successful adoption of different applications associated with BCT. For this, the senior leaders of organizations need to encourage and motivate the employees and to ensure they have appropriate training so that they do not have any constraint to use this groundbreaking technology (Thakur et al., 2016; Chatterjee, 2022).

However, there are limited studies which examined how the adoption of blockchain technology can influence the sustainability performance of H&T organizations. Moreover, there are no studies which investigated how leadership support and technological turbulence can both impact the relationship between H&T organizations’ adoption of BCT and their sustainability performance. To address this research gap, this study aims to address the following research questions (RQs).

RQ1. Does the adoption of blockchain technology by organizations in the hospitality and tourism industry improve their sustainability performance?

RQ2. Are there any moderating impacts of technological turbulence and senior leadership support on the relationship between hospitality and tourism organizations’ adoption of blockchain technology and their sustainability performance?

The above RQs have been addressed by analyzing the responses of 311 respondents who work in the H&T industry. After the analysis, a theoretical model was developed which was then validated with the factor-based PLS-SEM approach. To theoretically substantiate the empirical findings, the present study has integrated stakeholder theory (Freeman, 1984) and dynamic capability view (DCV) (Teece et al., 1997), because neither of these theories alone could interpret how BCT adoption that is moderated by technological turbulence and senior leadership support could impact the sustainability performance of H&T organizations.
2. Literature review and theories
Organizations in the H&T industry always try to find innovative solutions to enhance their competitive advantage, elevate customer satisfaction and improve their bottom-line performance (Galati et al., 2021; Ranjan et al., 2021). To achieve these goals, BCT can be used by food and beverage companies, tourism organizations, hospitality organizations and so on (Willie, 2019). Yaga et al. (2018) and Nguyen (2021) observed that the fundamental features that distinguish BCT from other technologies are openness, decentralization, transparency, pseudonymity and immutability abilities. The need for H&T organizations to quickly communicate with their customers and partner organizations has increased their usage of emerging technologies like Internet of Things (IoT), artificial intelligence (AI), big data analytics (BDA) and so on (Serravalle et al., 2019; Li et al., 2021; Jabeen et al., 2022). Using the Delphi process, a study assessed the opportunities and challenges in applying blockchain technology in the tourism industry (Dadkhah et al., 2022). Another study conducted in north Cyprus highlighted how blockchain technology could help achieve sustainable tourism (Ozgit and Adalier, 2022). In the context of the nexus between applications of blockchain technology and tourism, Rana et al. (2022) and Jain et al. (2023) have demonstrated how blockchain technology could ensure sustainable tourism practices. Another study has also demonstrated how applications of blockchain technology could help the tourism industry to become successful (Treiblmaier, 2022). Some studies have highlighted that technological diffusion in the H&T industry presents several opportunities as well as challenges (Galati et al., 2021; Vo-Thanh et al., 2022; Chouaibi et al., 2022; Ozdemir et al., 2023). Various examples exist of how the extension of information technology has wasted firm resources (Kizildag et al., 2020; Marttonen-Arola et al., 2022; Hassi et al., 2022).

Song et al. (2005) defined technological turbulence as the rate of change of technology and its unpredictability. An organization that is scheduled to adopt new technology needs to manage technological turbulence by using its technology-related knowledge resources (Autry et al., 2010). Thus, it is evident that H&T employees’ knowledge and skillsets must be developed before an organization adopts BCT to derive better outcomes. Hence, a technologically turbulent environment may tighten the relationship between organizations’ intention to adopt technology and organizational performance (Autry et al., 2010; Cai et al., 2021; Santos et al., 2021; Irannezhad and Mahadevan, 2021). Moreover, studies have suggested that interpersonal beliefs, leadership support and knowledge sharing activities are critical factors for an organization to successfully adopt new technology (Hui et al., 2018; Yang et al., 2018; Sheshadri et al., 2021). In the dynamic business environment, to ensure that their business activities succeed, organizations need active support from suppliers, local communities, creditors, employees and other key stakeholders. This can be done through knowledge exchange among the stakeholders, which could eventually help to improve their employees’ expertise and skillsets (Zhang et al., 2018; Le and Lei, 2018). This concept is in consonance with the stakeholder theory (Freeman, 1984). To react and respond to the rapidly changing market, H&T organizations must improve their dynamic capabilities, which is the concept of dynamic capability view (DCV) (Teece et al., 1997).

To improve their business profitability, it is essential for H&T firms to efficiently use emerging technologies such as BCT, which also improves the collaborative business practices among their stakeholders (Palas and Bunduchi, 2021; Yadlapalli et al., 2022). Stakeholder theory deals with sustainability, business ethics and people related to the business such as suppliers, local people, management and employees of an organization, creditors, government agencies and others. The stakeholder also focuses on improving the corporate social responsibility, market economy, organizations’ profitability, environmental and societal commitments, which can enhance their sustainability performance (Hald and Kinra, 2019; Bag et al., 2022a). Stakeholder theory integrates resource-based and market-based views. A common application of stakeholder theory is to define the specific
stakeholders of a given organization and how its management behaves with those specific stakeholders of the organizations (Yadlapalli et al., 2022). In other words, stakeholder theory aims to enhance the efficiency of the organizations by upholding organizational responsibilities. This theory helps organizations to develop strategies by considering broader stakeholder networks and enhancing their interactions, from which they could derive more successful results and improve organizational efficiency, including profit maximization (Jamali, 2008; Bag et al., 2022b).

Studies have observed that organizations do not benefit from the technologies if they have not planned how to use them (Kakumanu et al., 2016; Temel and Durst, 2020; Kraus et al., 2022). Such issues are also pertinent to H&T organizations. Thus, to efficiently use the adopted technologies, H&T organizations need to concurrently build their abilities to appropriately exploit newly seized external resources. Organizations need to revive their existing inhouse resources to address the dynamic volatile market situation by developing their sensing, seizing and reconfiguring abilities (Teece et al., 1997; Agbim and Idris, 2015; Kaur and Mehta, 2016). In this context, Winter (2003) interpreted the dynamic capability view as a “high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization’s management a set of decision options for producing significant outputs of a particular type” (p. 991). This implies that the organizations must have the capability to sense appropriate external opportunities, seize those sensed opportunities and then integrate them with in-house resources to successfully develop the competencies to use the adopted new technology. The idea corroborates the extended concept of DCV (Teece et al., 1997). A summary of different studies related to blockchain technology applications along with their sources and explanation is provided in Table 1.

3. Development of hypotheses and the conceptual model
With the existing literature and theories, we have identified how adopting BCT in the H&T industry could impact organizations’ sustainability performance and how such impact could be influenced by technological turbulence (TT) and senior leadership support (SLS).

3.1 Adoption of BCT in the H&T industry (ABHT) and sustainability performance (SUSP)
The use of blockchain technology (BCT) and its various applications in business operations to improve sustainability performance has been enhanced exponentially since the data mining algorithms were first introduced and cryptocurrency became popular (Anderson, 2016). BCT in the H&T industry has developed the payment transaction process, which has been successfully facilitated with cryptocurrencies like Bitcoin. Such development has attracted a new generation of travelers who are attuned to using such a form of virtual payment. These virtual payment systems do not use natural resources (like paper-based currencies do), ensuring better environmental sustainability. Blockchain technology offers new opportunities to meet sustainability targets by improving tracking systems and verifying emissions. By using blockchain technology, organizations can track the origin of materials, monitor their supply chain flow and can reduce carbon emission through more efficient process as well as can engage in sustainable practices. Besides, blockchain technology is helpful for pollution monitoring and could help to accelerate the deployment of renewable energy in developing countries (Sheivachman, 2018). The immunity, transparency and accountability of blockchain technology have made it possible to track carbon balances along with other environmental matrices, holding organizations accountable for their sustainability claims (Jayawardhana and Colombage, 2020). Moreover, organizations may use a blockchain-based reputation system. This system could give each industry and product a score based on the carbon footprint of the products which are sold. The process makes
production more transparent and could discourage organizations from implementing environmentally unfriendly practices (Akinradewo et al., 2022). Not only can sustainability be developed, but the hash function and cryptocurrency abilities of blockchain technology could also improve security issues (Pilkington et al., 2017). The hash functions and cryptocurrency abilities of BCT could protect against information fraud and could improve security issues (Pilkington et al., 2017; Chatterjee, 2019).

Effective customer management, service excellence and guest experience are important business activities of H&T organizations, which emerge from travelers’ needs, wishes and preferences (Pilkington et al., 2017; Thees et al., 2020; Chatterjee et al., 2021; Ranjan et al., 2022). Moreover, the disintermediation of BCT is considered one of the most important attractions for H&T organizations to invest in (Garcia, 2017). Organizations in the travel eco-system and their intermediaries prefer to use BCT because the disintermediation rebalances power...
dynamics between travelers, suppliers and the intermediaries (Sheivachman, 2018; Nguyen, 2021; Chaudhuri et al., 2022).

Another primary innovation of BCT is smart contracts which could contain legal agreements between the hoteliers and online travel agents (Laurence, 2017; Thees et al., 2020). This process is also considered environmentally friendly since it takes place through an online medium. To extract the best potential of BCT, employees need to be enriched with appropriate skills and expertise to address dynamic environments, which supports the extended concept of DCV (Teece et al., 1997). Thus, adoption of BCT is perceived to impact the sustainability performance of the H&T organizations. Accordingly, it is hypothesized as follows:

**H1.** Adoption of BCT in the H&T industry (ABHT) positively impacts sustainability performance (SUSP).

3.2 Moderating roles of technological turbulence (TT) and senior leadership support (SLS)

Technological turbulence is interpreted as “the rate of technological change in an industry” (Jaworski and Kohli, 1993, p. 57). Technological turbulence is also considered a part of an organization’s external environment along with market turbulence that emerges from the rivalry between the competitors (Lichtenthaler, 2009; Bhattacharjee et al., 2021). Technological turbulence has the capacity to create both entrepreneurial opportunities and challenges for established organizations (Hall and Rosson, 2006; Bhattacharjee, 2019; Thrassou et al., 2021). Li et al. (2019) and Chaudhuri and Vrontis (2021) demonstrated that technological turbulence also helps to improve innovation, resulting in the creation of new knowledge, novel relationships, along with a new causality system that helps organizations to be more sustainable.

The emergence of new technologies creates new components, new phenomena and innovative connections among the stakeholders, making the organizations more environmentally and socially focused (Allarakhia and Walsh, 2011; Sheshadri, 2020). Technological turbulence can improve organizations’ abilities, and better results could be expected if the stakeholders are also brought on board to help the organizations fulfill their commitments to society. That concept is supplemented by stakeholder theory (Freeman, 1984). Thus, sustainability through innovation initiatives can be considered as a response to technological turbulence (Li et al., 2019). In terms of the above discussions, the following hypothesis is presented.

**H2.** Technological turbulence (TT) has a positive influence on the relationship between adoption of BCT in the H&T industry (ABHT) and sustainability performance (SUSP).

Whenever an organization initiates the adoption of a new emerging technology, employees are sometimes reluctant to accept it and they try to adhere to the existing system (Wu, 2016). In such scenarios, the senior leaders of the organizations should motivate the employees to align themselves with management’s decision favoring adoption of the new technologies (Thakur et al., 2016; Ranjan, 2022). If the other stakeholders of an organization also actively support the leaders in motivating the employees to use modern technologies, the efforts of the senior leadership team will be more successful. This is also embedded in the concept of stakeholder theory (Freeman, 1984).

A senior leadership team demonstrating moral attributes, including fair decision-making and trustworthiness, needs to encourage employees to participate in innovative work (Sheshadri, 2019; Asif et al., 2020; Sharma et al., 2021; Maheshwari et al., 2022). Leadership support plays a critical role in establishing trust in the system that could motivate the employees to establish an eco-friendly environment and to be fully aligned to adopting the
new technology (Sheshadri, 2015; Le and Lei, 2018; Thrassou et al., 2022). All these inputs led us to formulate the following hypothesis.

**H3.** Senior leadership support (SLS) has a positive influence on the relationship between adoption of BCT in the H&T industry (ABHT) and sustainability performance (SUSP).

The above discussions help to develop a theoretical model, which is provided in Figure 1.

4. **Research methodology**
   This study has developed a conceptual model, shown in Figure 1. It was validated by testing the hypotheses. For this purpose, a survey was conducted to obtain responses from respondents to a prepared set of structured questions (questionnaire) in the form of statements. The responses were then quantified on a standard, 5-point Likert scale with anchors at Strongly Disagree (SD) as 1 and Strongly Agree (SA) as 5.

4.1 **Preparation of questionnaire**
   The questions were prepared by referring to existing literature. Slight modifications were made to the wordings of the questions in terms of the context of our study. The questionnaire was duly pretested by 11 experts. Seven of them came from the H&T industry with immense professional experience of more than 10 years. The remaining four experts were selected from academia and possess more than 12 years of research experience in the domain of the present study. The opinions of these 11 experts were carefully reviewed and necessary corrections were made to the questions to make them more readable as well as understandable.

   After the pretest stage, the pilot test was conducted by analyzing the responses of a small sample of 30 respondents selected through the convenience sampling process. These respondents were a diverse group, and the selection criteria we used to choose them were the same that we used to select respondents for the main survey. These 30 respondents were not included in the main survey. The responses from these 30 participants in the pilot test were then examined, and some of the questions were edited and some of the formats were reconciled to improve their readability, understandability, as well as comprehensiveness. In this way, 11 questions were finally prepared. The list of the instruments along with the source(s) have been duly provided in the appendix.

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**Figure 1.** Conceptual model (adopted from stakeholder theory and DCV)
4.2 Data collection

To collect data, H&T organizations in India were selected because some of the authors are based in India. Here, convenience sampling techniques have been applied to target the organizations. Moreover, we selected India-based H&T organizations, because India is considered the fifth largest economy in the world, and it belongs to BRICS group of countries and has many organizations in the H&T industry. The Bombay Stock Exchange (BSE) was contacted to collect lists of organizations. BSE is involved in promoting appropriate initiatives in the domain of corporate social responsibility and sustainability (Spulbar et al., 2019). From the BSE information, we initially selected a list of 700 H&T related organizations at random. It was then observed that out of the 700 H&T organizations, only 422 have either contemplated adopting or have adopted blockchain technology to improve their overall performance.

Since the study unit is the organization, one top executive from each of these 422 H&T organizations was selected to represent their organization. These top executives were invited to participate in the survey, and they were pleased that the purpose of this study was purely academic. They were also assured that their identity would not be disclosed so that they could provide unbiased responses. After much persuasion, only the top executives of 362 organizations agreed to participate in the survey. They were then provided with response sheets that contained the 11 questions and a guideline describing how to complete it. They were requested to return their response sheets within two months (January–February 2023). Within the scheduled time, 323 top executives, representing 323 H&T organizations, responded. We then carefully checked these response sheets and found that 12 were incomplete, so they could not be considered. Therefore, analysis was done on the responses of 311 organizations against 11 questions. The details of the 311 organizations are provided in Table 2.

Of the organizations that participated in the survey, 55% were mid-sized and small organizations, whereas 45% were large organizations. Also, 41.8% were older organizations and 58.2% were middle-aged and younger organizations. The descriptions of these organizations are provided in Table 2. The most feedback was obtained from the hotel segment (24.1%) and the least feedback was received from the food and beverage category (9.9%).

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Category</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizations size</td>
<td>Large Organizations (&gt;10,000 employes)</td>
<td>140</td>
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<tr>
<td></td>
<td>Midsized Organizations (5,000–10,000 employees)</td>
<td>77</td>
<td>24.7</td>
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<tr>
<td></td>
<td>Small Organizations (&lt;500 employees)</td>
<td>94</td>
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<td>Older Organizations (&gt;25 years of establishment)</td>
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<tr>
<td></td>
<td>Mid-aged organizations (10–25 years of establishment)</td>
<td>108</td>
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<tr>
<td></td>
<td>Younger Organizations (&lt;10 years of establishment)</td>
<td>73</td>
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<tr>
<td>Organization type</td>
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<td></td>
<td>Tourist transportation</td>
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</tr>
<tr>
<td></td>
<td>Hotels</td>
<td>75</td>
<td>24.1</td>
</tr>
<tr>
<td></td>
<td>Food and beverage</td>
<td>31</td>
<td>9.9</td>
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<tr>
<td></td>
<td>Tourism financial organizations</td>
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<td></td>
<td>Tour operators</td>
<td>65</td>
<td>21.0</td>
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</table>

Table 2: Details of the respondents (N = 311)  
Source(s): Table created by Author
5. Analysis of data with results

To analyze the data, the PLS-SEM (partial least squares structural equation modeling) technique was used. This technique can provide accurate results even when analyzing a complex model (Becker et al., 2012). This process has been adopted using the bootstrapping procedure with consideration of 5000 resamples to estimate different path coefficients along with other relevant parameters (Ringle et al., 2015). This technique analyzes data, which is not normally distributed, which is not allowed in the CB-SEM (covariance-based structural equation modeling) technique (Hair et al., 2016). This technique is also used to analyze exploratory studies like this (Akter et al., 2017).

5.1 Measurement properties along with test of discriminant validity

The convergent validity of the items was estimated through computation of each item’s loading factor (LF). Average variance extracted (AVEs) for all the constructs was estimated to ascertain the validity of the constructs. The internal consistency reliability of the constructs was assessed by estimating the composite reliability (CRs) and Cronbach’s alpha ($\alpha$) for each. The results highlight that the estimated values are safely within the allowable range. The results are provided in Table 3.

The square roots of the AVEs were computed, and it was found that the value of each square root is more than the corresponding bifactor correlation coefficients. The results satisfy the Fornell and Larcker criteria (Fornell and Larcker, 1981). This confirms discriminant validity of all the constructs. Table 4 presents the results.

5.2 Common method bias (CMB)

Since the study results are based on data which were obtained from surveys, the possibility of there being CMB can hardly be ignored. To mitigate the severity of CMB, initially, some post

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<table>
<thead>
<tr>
<th>Constructs/Items</th>
<th>LF</th>
<th>AVE</th>
<th>CR</th>
<th>A</th>
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<td>SUSP</td>
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<td>0.75</td>
<td>0.81</td>
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Source(s): Table created by Author

Table 3. Measurement properties

<table>
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<th>SUSP</th>
<th>AVE</th>
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<tbody>
<tr>
<td>ABHT</td>
<td>0.93</td>
<td></td>
<td>0.87</td>
</tr>
<tr>
<td>SUSP</td>
<td>0.29</td>
<td>0.86</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Source(s): Table created by Author

Table 4. Discriminant validity (Fornell and Larcker, 1981 criteria)
hoc measures were taken. During the survey, the respondents were assured that their anonymity and confidentiality would be strictly preserved. This was done to obtain unbiased responses from the respondents. Through the pretest and the pilot test, the questionnaire was simplified so that the respondents could easily understand the questions and respond correctly. Even after that, to confirm that there was no CMB, Harman’s single factor test (SFT) was conducted. The results indicate that the first factor accounted for 21.69% of variance. This is less than the highest recommended value of 50% (Podsakoff et al., 2003). However, since Harman’s SFT is criticized as not being a robust test for CMB (Ketokivi and Schroeder, 2004), we also conducted the marker correlation ratio test. The results of this test did not indicate any evidence of CMB either. Hence, it is inferred that CMB did not distort the data.

5.3 Moderating effects of technological turbulence (TT) and senior leadership support (SLS)

The present study has considered the impacts of technological turbulence (TT) and senior leadership support (SLS) acting as moderators on the linkage ABHT→SUSP (H1). We conducted the multigroup analysis (MGA) using the bootstrapping procedure with consideration of 5000 resamples. To analyze the effects of TT and SLS on the specified linkage (H1), we categorized the effects of TT into two groups – Strong TT and Weak TT. Similarly, the moderator SLS was divided into High SLS and Low SLS. With MGA, we found that the \( p \)-value difference for the effects of the two categories of the moderator TT on H1 is 0.04, whereas the \( p \)-value difference for the effects of the two categories of the moderator SLS is 0.01. Both these estimated values are less than 0.05 confirming that the effects of these two moderators on the linkage H1 are significant (Hair et al., 2016).

5.4 Hypotheses testing

To test hypotheses, the bootstrapping procedure was followed using 5000 resamples. Taking into consideration separation distance 7, we estimated the cross-validated redundancy for the endogenous constructs by computing the \( Q^2 \) value to be 0.059 (positive). Hence, the model can be construed to have accurate predictive relevance. To examine the model fit, we applied the standardized root mean square residual (SRMR) as a standard index (Henseler et al., 2014). The values of SRMR are 0.062 and 0.033 for PLS and PLSc, respectively. Both these values are less than the highest threshold value of 0.08, as opined by Hu and Bentler (1999), which tells us the model is in order. The structural equation modeling technique computed the path coefficients and other necessary parameters. The results are provided in Table 5.

With all these inputs, the validated model is shown in Figure 2.

6. Results and discussion

The present study has formulated three hypotheses and developed a theoretical model. Statistical verification has ascertained that all the hypotheses have been supported. The results demonstrate that adoption of blockchain technology in the H&T industry has a direct impact on sustainable performance, as the concerned path coefficient is 0.36 and the level of significance is \( p < 0.001(***\) (H1). The other two hypotheses H2 and H3 are concerned with

<table>
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<td>H1</td>
<td>0.36</td>
<td>( p &lt; 0.001(***)</td>
<td>Supported</td>
</tr>
<tr>
<td>(ABHT→SUSP) × TT</td>
<td>H2</td>
<td>0.17</td>
<td>( p &lt; 0.01(**)</td>
<td>Supported</td>
</tr>
<tr>
<td>(ABHT→SUSP) × SLS</td>
<td>H3</td>
<td>0.14</td>
<td>( p &lt; 0.05* )</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Table 5. Structural equation modeling (SEM)

Source(s): Table created by Author
the moderating effects of TT and SLS on the same linkage H1. The results show that the moderator TT impacts H1 significantly and positively, as the path coefficient is 0.17 with level of significance $p < 0.01^{(**)}$. It also appears that SLS significantly and positively impacts H1 because that path coefficient is 0.14 with level of significance of $p < 0.05^{(*)}$. The study results show that SUSP is predicted by ABHT to the extent of 67%, which is the explanatory power of the proposed theoretical model.

The present study demonstrates that technological infrastructures facilitate, embolden, and, in some specific cases, act as the foundation of multiple aspects of H&T business operations inside and outside the physical boundary of the organizations. This study also finds that the H&T industry is gradually becoming smarter as it uses various emerging technologies in airports, hotels and restaurants, transportation and in other areas of the sector. BCT-embedded voice activated systems have been installed in hotel guest rooms to improve the guests’ experiences (Nicolau et al., 2020). The present study shows that TT and SLS facilitate the adoption process of BCT in the H&T industry, which has received support from other studies (Autry et al., 2010; Lei et al., 2019). Earlier studies have investigated the contributions of blockchain technology in the hospitality and tourism industry (Rana et al., 2022; Jain et al., 2023). However, they have not examined the role of leadership support in promoting blockchain technology. The present study has extended those studies by highlighting the necessity of leadership support in adopting blockchain technology in H&T organizations. Dadkhah et al. (2022) analyzed the opportunities and risks of using blockchain technology in the tourism industry, but it did not examine the issue of technological turbulence. That study has been extended here to demonstrate the significant role of technological turbulence in adopting blockchain technology in the H&T industry. Ozgit and Adalier (2022) also examined how blockchain technology could impact sustainability in the tourism industry. But it assessed neither the role of technological turbulence nor the role of leadership support in adopting blockchain technology for improving sustainability performance in the H&T industry. The present study has discussed the impacts of this by focusing on the roles of technological turbulence and senior leadership support.

Below, we will explain the impact of the moderators through simple graphical analysis. Here, the effects of Strong and Weak TT on H1 have been analyzed. Similarly, the effects of Strong and Weak SLS on H1 have been analyzed. The graphs are provided in Figures 3 and 4, where the continuous and dotted lines represent the strong aspect of the moderators and weak aspect of the moderators respectively.

Source(s): Figure created by author.

Figure 2. Validated model (SEM)
Analysis of the graphs demonstrates that as ABHT increases, the rate of increase of SUSP is more from the effects of Strong TT or Strong SLS compared to the effects of Weak TT or Weak SLS, because, in both figures, the gradients of the continuous lines have steeper inclines than the gradients of the dotted lines.

6.1 Theoretical contributions
The present study provides various theoretical contributions to the body of extant literature related to the hospitality and tourism industry and the adoption of blockchain technology in the sector. This study highlighted that a distributed ledger system using blockchain technology can provide a platform which H&T organizations could use for improving their...
various online business activities (Helo and Hao, 2019). It was also revealed that by using the blockchain technology related hash function and cryptocurrency abilities, it would be possible to secure travelers’ data which can also reduce the menace of information fraud in the travel and tourism industry. Moreover, the present study highlights that the moderating influence of technological turbulence and senior leadership support could facilitate the successful adoption of blockchain technology in the hospitality and tourism industry and improve the sustainability performance of the organizations. No other studies are known to have investigated all these salient points simultaneously.

The results indicate further benefits to adopting blockchain technology. For example, it has helped to decentralize information, thereby controlling different levels of organizations exhibiting excessive power, thus preventing unhealthy competition. Another positive aspect of applying blockchain technology is that it could also restrict the misuse of resources to improve organizations’ sustainability performance.

This study has extended the applicability of stakeholder theory (Freeman, 1984) and DCV (Teece et al., 1997) by arguing that stakeholder-oriented management could improve the sustainability performance of organizations by improving their social, environmental and financial performances (Freeman et al., 2010). Also, by improving the dynamic capabilities, hospitality and tourism-related organizations could improve their employees’ skillsets so they can react and respond to the dynamic environment by successfully applying blockchain technology in their organizations, which could eventually improve sustainability performance. The present study has considered senior leadership support as a moderator for organizations that adopt blockchain technology to improve their sustainability performance. It is demonstrated that leadership could support employees to align with the organizational decisions to adopt blockchain technology. It was also considered that technological turbulence is a moderator that facilitates organizational sustainability performance when blockchain technology is adopted. The rate of technological change in society, known as technological turbulence (Jaworski and Kohli, 1993), can create both business opportunities and challenges for organizations, which could help them to create new knowledge leading to more sustainability. Thus, consideration of these two moderators makes the proposed theoretical model more efficient and effective to achieve such high predictive power (67%). This is also construed as a unique theoretical contribution of this study.

A study by Jaeger et al. (2021) highlighted that the primary challenges of ensuring sustainability performance of an organization emerges mainly from inadequate tracking ability in the supply chain, weak inventory management systems and non-standard products. By extending the idea of that study, the present study has demonstrated that successful adoption of blockchain technology could help hospitality and tourism organizations enhance their tracking capabilities of the supply chain process to ensure transparency and to achieve better immutability and a flawless distribution system. This idea has been duly supported by a study of Helo and Hao (2019), which demonstrated that applications of blockchain technology could help the supply chain system. Another study of Ozgit and Adalier (2022) analyzed how applications of blockchain technology could help the small islands for achieving sustainable tourism, especially in north Cyprus. The idea of this study has been expanded in the present study by generalizing this idea to highlight how applications of blockchain technology in hospitality and tourism industry could improve sustainability performance especially under the simultaneous moderating influences of technological turbulence and senior leadership support. Such inputs could enrich the extant literature.

6.2 Implications to practice
The present study provides several implications to practice. In general, the results demonstrate that adoption of blockchain technology in the hospitality and tourism industry
significantly and positively impacts the sustainability performance of organizations. This implies that the leaders and managers of hospitality and tourism organizations should be aware that applications of blockchain technology possess enough scope to impact employees’ behaviors, which could help the organizations ensure transactions are transparent and are protected from fraud (Upadhyay et al., 2020).

Another implication is that the rapid change in technologies has facilitated the relationship between adoption of blockchain technology in the hospitality and tourism industry and sustainability performance. This implies that the leaders and managers of hospitality and tourism industry should take full advantage of technological turbulence to make employees more innovative so that they can extract the best potential from BCT, which could eventually improve the sustainability performance of organizations.

Moreover, this study has demonstrated that the senior leadership support also moderates the effect that adopting blockchain technology has on improving the sustainability performance of hospitality and tourism organizations. This implies that to make the organizations more sustainable, employees need training to efficiently and appropriately use blockchain technology. Moreover, the leadership team should allocate an adequate budget for periodic training to upskill employees of hospitality and tourism related organizations. The leaders and managers of the H&T organizations should ensure disintermediation so that prospective travelers can directly contact hotels to make reservations for easier travel planning. Before adopting blockchain technology, leaders must ensure that the employees are ready to adopt blockchain technology efficiently. They could be evaluated by the leaders through an online assessment before they use the various applications of blockchain technology. This will eventually facilitate ensuring successful adoption of blockchain technology in the hospitality and tourism industry, thereby increasing organizations’ sustainability performance.

6.3 Limitations and future scope
The present study has several limitations. First, the study results depend on cross-sectional data, which creates defects of causality among the relationships between the constructs, giving rise to endogeneity defects. To correct this problem, it is suggested that future researchers should conduct a longitudinal study. Second, this study has used DCV, which suffers from context insensitivity, as opined by Ling-Yee (2007). DCV cannot identify the optimum conditions under which adoption of blockchain technology in the hospitality and tourism industry can ensure the best sustainability performance (Dubey et al., 2019). Future researchers need to explore which conditions would be the best. Third, the results of the present study depend on the responses from respondents in India. This invites external validity issues. It is suggested that future researchers should collect data from different parts of the world to arrive at more generalizable results. Fourth, the results come from analyzing the responses of 311 respondents, which does not portray the entire hospitality and tourism industry ecosystem. It is suggested that future researchers should collect data from more respondents so that the results could possess an outcome with more generalizability. Fifth, the explanatory power of the proposed theoretical model is 67%. It is recommended that future researchers should consider more constructs and other boundary conditions to examine if the explanatory power of the model could be enhanced.

References


Willie, P. (2019), “Can all sectors of the hospitality and tourism industry be influenced by the innovation of Blockchain technology?”, Worldwide Hospitality and Tourism Themes, Vol. 11 No. 2, pp. 112-120.


Further reading

### Appendix

<table>
<thead>
<tr>
<th>Items</th>
<th>Source</th>
<th>Statements</th>
<th>Response [SD] [D] [N] [A] [S] A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABHT1</td>
<td>Anderson (2016), García (2017), Helo and Hao (2019), Dadkhah et al. (2022), Jain et al. (2023), Treiblmaier (2022), Denter et al. (2022), Chillakuri and Attili (2022)</td>
<td>Blockchain technology is getting popular in the hospitality and tourism industry</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>ABHT2</td>
<td></td>
<td>The disintermediation feature of blockchain technology is the most important attraction for hospitality and tourism related organizations</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>ABHT3</td>
<td></td>
<td>I believe that various applications of blockchain technology can be used in hospitality and tourism industry</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>ABHT4</td>
<td></td>
<td>To my understanding, the operating cost of blockchain technology applications is not much</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>ABHT5</td>
<td></td>
<td>There is a lack of trained manpower in the hospitality and tourism industry who can use blockchain technology in an efficient manner</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>ABHT6</td>
<td></td>
<td>I believe that blockchain technology can help to secure data in hospitality and tourism industry</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>SUSP1</td>
<td>Dubey et al. (2019), Jayawardhana and Colombage (2020), Galati et al. (2021), Akinradewo et al. (2022), Özgit and Adalier (2022), Rana et al. (2022), Bag et al. (2022b)</td>
<td>Improvement in sustainability practices is important to make better profit in sustainability in hospitality and tourism industry</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>SUSP2</td>
<td></td>
<td>I believe that effective customer management and service excellence are the two most important areas for sustainability in hospitality and the tourism industry</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>SUSP3</td>
<td></td>
<td>I think that the adoption of blockchain technology by the hospitality and tourism organization can improve their operational efficiency</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>SUSP4</td>
<td></td>
<td>I think the sustainability in hospitality and tourism related organizations should use environmentally friendly products to protect nature</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
<tr>
<td>SUSP5</td>
<td></td>
<td>I believe that applications of blockchain technology can overcome the challenges of fraud resulting in better sustainability in the hospitality and tourism industry</td>
<td>[1] [2] [3] [4] [5]</td>
</tr>
</tbody>
</table>

Note(s): SD = Strongly Disagree; D = Disagree; N = Neither disagree nor agree; A = Agree; SA = Strongly Agree  
Source(s): Table created by Author

Table A1. Summary of questionnaire
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