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BLOBDTBM : Blockchain-based structure for decentralized tourism business model

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Abstract

Given the nation's current economic prosperity, the tourism sector is flourishing. Tourism is the term used to describe travel to a place that is different from your native country or hometown for a multitude of reasons. Identity theft, middlemen, unsuccessful payments, fraudulent reviews, transparency, settlement, overbooking, regulation, and—above all—safety concerns brought on by the COVID-19 pandemic, omicron, SARS-COV-2, JN.1, and the industry's traditional architecture are some of the issues the tourism sector has been facing. This research study presents BLOBDBM (Blockchain Based Decentralized Business model in Tourism sector), a blockchain framework for eliminating third-party middlemen in the tourism sector as a more affordable and user-friendly alternative to hotel listing, booking, and secure payment. In the travel and tourism industry, the proposed work

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provides a decentralized way to book and pay for hotels. The experimental outcomes of the Proposed Model outperform those of the most sophisticated Blockchain designs.

Subject Classification: *J28, R580, J21, O380.*

Keywords: *Blockchain, COVID-19, Smart contracts, Tourist, Contact tracing, Ethereum, Metamask, Truffle framework, Ganache, Node JS.*

1. Introduction

Tourism is described as the leisure, business, or professional travel of people to countries or places that are not typically their home [1]. The tourism industry is flourishing in the current phase of the country's economic expansion [2]. Information and communication technology have become more and more important in the tourism industry in recent years [3]. Consequently, with every new wave of technological advancement, significant changes have been brought about in sectors such as reservations and hospitality operations. The tourism industry has been significantly impacted by the Internet since the 1990s, which has resulted in the creation of new reservation systems and methods for communicating with clients directly. Consequently, e-tourism has been defined as the digitization of all value chains and business activities in the travel, hotel, and catering industries, allowing for more effective and efficient operations for businesses [4]. A relatively recent trend is the transition from e-tourism to smart tourism, which makes it easier to transition from the digital world to one that blends it with the real world. The gradual replacement of internet sites by sensors and smartphones, the transition from information to big data, the replacement of the primary paradigm of interaction with technology-mediated co-creation, and the shift from B2B and C2C exchanges to public-private-consumer partnerships are all examples of this shift [1]. Customers typically experience issues with third- party providers in terms of failed payments, exorbitant costs, and other issues. After referring to previous approaches, this study work developed a solution named Blockchain technology [2] to address the aforementioned shortcomings. A blockchain is a group of linked blocks that are connected by cryptography and contain a sequence of transactions. The blockchain is merely the most recent development in this protracted technical process, and it not only creates new opportunities but also poses a serious danger to a number of established interests. [4]. Since blockchain technology will enhance security, safety, data integrity, intermediary elimination, decentralized business models, immutability, transparency, and precise

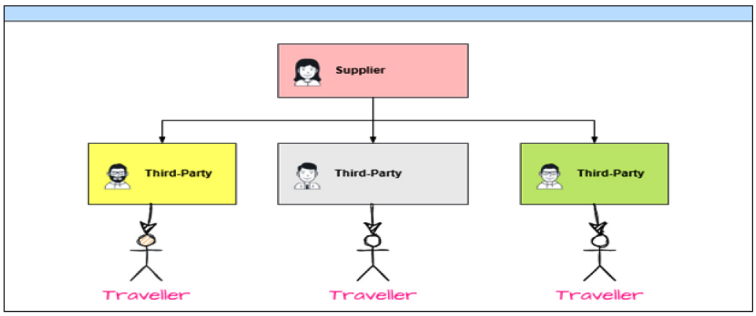


Figure 1

Conventional Tourism Service Architecture [1][2]

contact tracing to important touch points, it is highly advantageous for the tourism industry. Model) aids in overcoming challenges in the travel and tourism sectors. Our next study paper will go into great detail on how BLOBIM (Blockchain-Based Integrated Model) assists the travel and tourism sectors in overcoming challenges. Our suggested architecture improves security, safety, trust, transparency, and other characteristics of the Blockchain Enabled Hotel Booking System (Decentralized model) while doing away with third-party meddling.

Tourism

Tourism is a crucial economic factor, with the internet revolutionizing the sector since the 1990s. It has transformed the travel, hospitality, and catering industries by enabling direct communication and digitalization of processes. The internet has improved the booking process, eliminating the need for travel agency offices [refer Fig. 1]. This digitization has led to increased efficiency and competence in the tourism, travel, and food sectors, impacting the economy, employment, and national development. Travelers can book hotels and tourist services online using conventional architecture, but this can lead to issues like identity theft and wallet hacking. Blockchain, a decentralized system, could help address these issues. The tourist sector aims to integrate technology, knowledge, and funding to create a cutting-edge platform that meets customer needs [5] [6]. Blockchain technology enhances corporate disintermediation, transforming the corporate market structure. This literature review aims to predict long-term adoption of blockchain by industry intermediaries, using a low-cost approach and semi structured analysis for a commerce industry framework.

Blockchain

Blockchain is a distributed ledger consisting of blocks with encrypted transactions, enhancing safety and transparency by distributing accountability across the entire network. A similar effect can be seen in international transactions, where it increases confidence between all participants [7]. Blockchain technology can significantly change the travel and tourism sector by enhancing trust and facilitating interoperable collaboration [8], [9]. Its attributes like immutability, transparency, programmability, and decentralization enable the creation of unique organizational structures and workflows. However, it also poses challenges like wallet account takeover, identity theft, and payment clearing attacks. Decentralised technologies like blockchain, which increase efficiency and confidence across numerous stakeholders, including banks, travel agencies, airports, hotels, restaurants, and local taxis, can alleviate these issues [10], [11].

Related work

Innovative technologies like IoT, AI, and edge-fog cloud computing are at the heart of Industry 4.0. To fully realize the promise of IoT, however, cross-company cooperation is required due to data fragmentation [12]. Concerns including data security, privacy, and collaborative research in the healthcare industry are being addressed by the rising integration of FL, blockchain technology, and healthcare data sharing. The nation's tourism industry is expanding quickly and is essential to economic growth [13], [14]. The internet has significantly impacted the industry since the 1990s by facilitating direct communication between participants and introducing e-tourism [15]. The economy, jobs, and national growth are all greatly impacted by this digitalization, which has also increased the efficiency of businesses in the food, travel, and tourism sectors [16], [17]. Below Table 1 shows the tourism industry impact areas with the traditional architecture [1], [22], [18]. Table 2 shows the forecasted increase in India's tourist arrivals during and after the epidemic [1].

Table 1

Tourism Industry Impact Areas [18]

The source	Areas	Description.
[5][1]	Transparency	The traditional architecture that is currently in place lacks transparency.
[1][2] [19]	Settlement	Problems with financial transaction settlement faced by stakeholders
[20][21]	Loyalty	Not true ratings and reviews
[7]	Fraud	With a centralized server, the architecture is not secure.
[2]	Identity	Identity theft is a concern
[5][22]	IoT	Despite the fact that the current architecture makes use of the IoT, it is not a full model.
[2][23]	Overbooking	Problems with the traffic flow are caused by the centralized character
[2][24]	Policy	Lack of confidence in the cost and control
[8][25]	No Reliable Contact Finder App	An accurate contact tracing tool is desperately needed to prevent the COVID-19 pandemic from spreading further.

Table 2

Forecasted increase in India's tourist arrivals [26][5][30]

INDIA	Jan_2020	Feb_20	Apr-20	Jul-20	Oct-20	Jan-20	Apr-21	Jun-21	Aug-21	Sep_21	
%	9	7	-100	-98	-96	-92	-91	-96	-78	-70	4

Table 3

Global tourist arrival growth projections [1][26][31]

World	Jan-20	Feb-20	Apr-20	Jul-20	Oct-20	Nov-20	Dec-20	Jan-21	Apr-21	Jun-21	Aug-21	Sep-21	Jan-22
%	1	-14	-97	-79	-82	-85	-89	-86	-85	-77	-63	-63	9

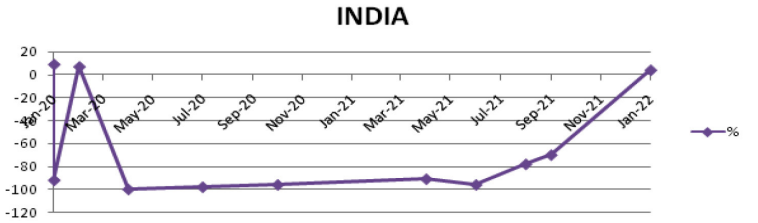


Figure 2

Number of visitors to India in comparison to 2020, the year before the pandemic [25]

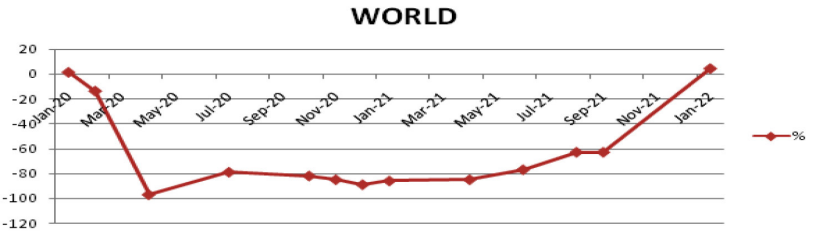


Figure 3

Global tourist arrivals as compared to 2020, the year before the epidemic [26]

The above Table 3 shows the global tourist arrival growth projection on monthly basis. The above Figure 2 shows the total number of visitors to india before the covid-19 pandemic. Figure 3 shows the global tourist arrivals before the pandemic[22], [23]. Blocks of encrypted transactions make up a distributed ledger called blockchain, which increases transaction security and transparency. Despite its drawbacks, it boosts trust in cross-border transactions and is crucial to comprehending how it is used in the travel and tourist sector.

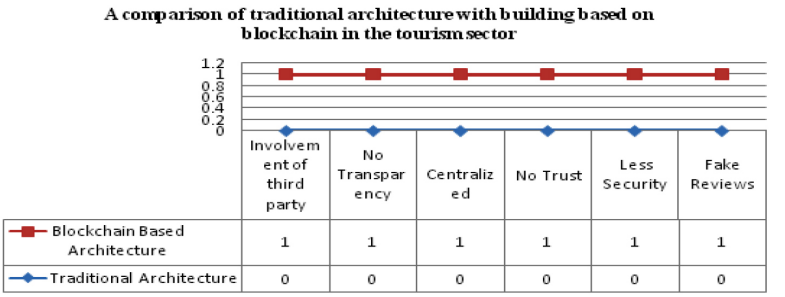


Figure 4

Comparative Chart (0 denotes "Yes," 1 denotes "No") [27]

Table 4

Benefits and Features of Blockchain [5][3][28]

Regions	Description
Safe Transaction	A range of encryption methods are supported by blockchain technology to enable safe transactions and reduce the risk of data fraud.
Disintermediation	In several industries, blockchain technology reduces the need for middlemen.
Data integrity	No data change will occur.
Decentralization	Since blockchain technology does not rely on a centralized server, the identity of every user is not required.
Immutability	Every user linked to the chain can see the data contained in a blockchain, and they will all see it in the same way.
Transparency	On the blockchain network, users can trade comparable master records, encouraging high user accuracy and consistency.
Trust	The blockchain platform makes it possible for payment distribution to be secure and reliable.
Accurate-Contact Tracing App	Blockchain-based contact tracing software can help prevent the COVID-19 virus from spreading further, which will increase travel.

The above Figure 4 shows the comparison between the traditional tourism architecture and our proposed blockchain based architecture used for tourism industry [1], [2]. Table 4 shows the benefits of using the blockchain technology for tourism industry [22].

Research and Findings

Now is the moment to integrate our study findings with our ideas by taking the following actions:

1.1 *Bits and Pieces together*

In this manner, I've compiled all of our research findings into a research paper [2]. As a starting point for my study, I used a reference to previously completed work as a starting point.

1.2 *Jump Start*

This method works best for us when we get the help of other researchers. In this, I have consistently received or requested input from previous projects.

Table 5

Evaluation between Traditional architecture and Blockchain-Based architecture in Tourism [29]

Regions	Conventional Building Design	Architecture Based on Blockchain
Middlemen	participation of a third party	The exchange of information among peers
Openness	There is no transparency.	Openness
Buildings	Centralized	Decentralized
Have faith	No Faith	There will be trust.
Security	Decreased Protection	Greater Security
Loyalty	phoney evaluations	Authentic Reviews

In Table 5 shows the text provides expert opinions and updates on the difference between traditional and blockchain-based architectures in the tourism industry, evaluating existing work and preparing for drafting a paper [29]. Table 6 shows the software and hardware needed for implementation of our proposed statement.

Materials and Methods

Table 6

Tools/Techniques used

S. No	Software/Hardware	Useful
1	Node JS	Is a Blockchain framework
2	Truffle Framework	Is a Demo Blockchain network. It is used for testing purposes
3	Metamask	Is a wallet to confirm the transaction and check the balance of the gas
4	Ganache	It is a Blockchain account

Methodologies

Algorithm 1: To Install the aforesaid simulation programme, follow the steps below

Step1: Install the Node JS through the Google

Step2: Install the NPM (Node Package Manager) through command prompt

Step3: Install the Ganache through Google

Step4: Install/run the Truffle Framework through the command prompt

>npm install -g truffle

Step5: Install Metamask from Metamask.io website

The algorithm 1 demonstrate the installation of software for decentralized transactions, including Node JS, Node package Manager, Ganache, truffle framework, Metamask, and decentralized transactions. They also provide instructions on quick start and installation of npm through command prompt.

Algorithm. 2 also gives the method to compile the truffle and steps to create Metamask account. Finally gives the procedure to run the npm development to start the blockchain enabled website.

Algorithm 2: Procedure to create the decentralized transactions

Step 1: Start the Ganache with quick start

Step 2: Open the Command Prompt and paste the complete path of the project.

Eg: >cd G:\SU\Code\hotel booking system using blockchain\Final year project

Step 3: Next install the npm through command prompt

Step 4: Compile the truffle

Eg: >truffle compile

Step 5: Next run the truffle migrate to deploy the smart contract

Eg: >truffle migrate –compile –all –reset –network development

Step 6: Login to Metamask account

Step 7: Run the npm development to start the Blockchain enabled website

Eg: >npm run dev

Results and Discussion

Blockchain technology could remove the negotiation layer from the commercial market by doing away with middlemen in the hotel sector. This study aims to develop a corporate trade framework that results in higher levels of disintermediation, benefiting other businesses. Blockchain

technology has numerous benefits and potential growth, including reducing intermediaries and addressing different issues. However, it must consider three factors: its diverse implementations, constant evolution of fundamental elements, and potential for divisive technology. Public and permissionless blockchains face unique challenges, while decentralized frameworks in the tourism industry can help eliminate intermediaries and third parties, allowing tourists to provide access policies [30][31].

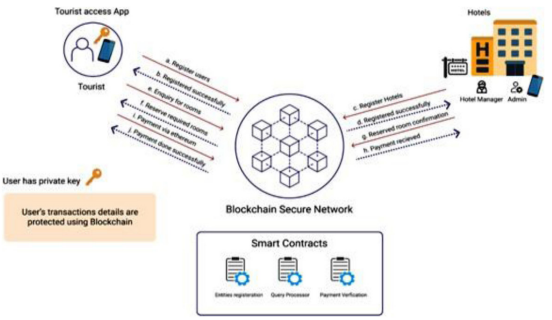


Figure 5

BLOBDBM (Blockchain Based Decentralized Business Model) Architecture [25][26]

Compilation and Deployment of Smart Contracts

Smart contracts can be processed using blockchain technology, which removes middlemen and reduces processing expenses. This technology can benefit operators, service providers, and OTAs by facilitating payments for cash and commissions. The research aims to create a new blockchain in the financial payment system, construct smart contracts, and build the blockchain framework. The study used content analysis to examine specific smart contract projects in the travel and tourist industry[25][29].

```
C:\Users\student>cd C:\Users\student\Desktop\hotel booking system using blockchain\Final year project

C:\Users\student\Desktop\hotel booking system using blockchain\Final year project>npm install

C:\Users\student\Desktop\hotel booking system using blockchain\Final year project>truffle compile
The system cannot find the file specified.

1_Compiling your contracts...
=============================
√ Fetching solc version list from solc-bin. Attempt #1
> Compiling .\contracts\Booking.sol
> Compiling .\contracts\Migrations.sol
√ Fetching solc version list from solc-bin. Attempt #1
> Compilation warnings encountered:
C:\Users\student\Desktop\hotel development booking system using blockchain\Final year project>truffle migrate -compile -all -reset
-network
```

```
2_deploy_contract.js
====================

Replacing 'Booking'
-------------------
> transaction hash:    0x33c434d041e17c724e41f9074f2e664517a2c37163a60fae62a669320709b968
> Blocks: 0            Seconds: 0
> contract address:    0xa8371Fbe2d3cdCa6A1e20B50C9CB114551493F3B
> block number:        3
> block timestamp:     1638339789
> account:             0x0abC907424Fc56E093d0e76dFD6Fa7c497283791
> balance:             99.98504046
> gas used:            467035 (0x7205b)
> gas price:           20 gwei
> value sent:          0 ETH
> total cost:          0.0093407 ETH
> Saving migration to chain.
> Saving artifacts
-------------------------------------
> Total cost:          0.0093407 ETH63

Summary
=======
> Total deployments:   2
> Final cost:          0.01411258 ETH
```

Snapshots of Interfaces



Figure 6

Meta Mask wallet

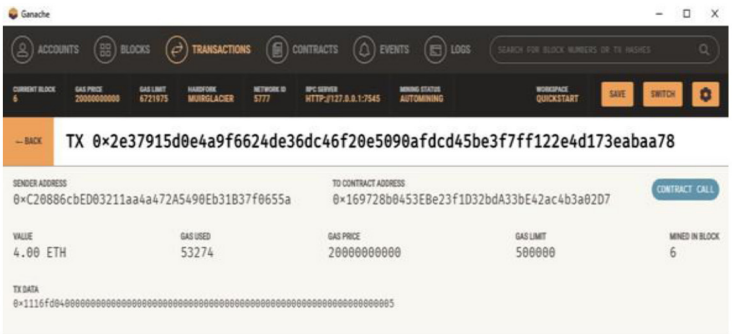


Figure 7

Transaction details containing hash

Conclusion and Implications

This research proposes a Blockchain-based framework for the travel and hospitality sector, called BLOBDBM [refer Fig.5]. The system uses Ethereum smart contracts and a centralized application called Ganache

and a wallet called Metamask [refer Fig.6]. Tourist stakeholders must register on the Metamask wallet before making payments. The framework is run in the Truffle environment and uses smart contracts from the smart contract layer [refer Fig.7]. The ultimate goal is to eliminate intermediaries and provide secure payment systems in the tourism industry.

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Showing His Holiness Sri Sri Shivakumara Maha Swamiji is our aim. I would want to sincerely thank my family, my mentors, Professors Parma Nand and Vikram Bali, as well as everyone else who assisted me in finishing this research project.

Declarations

Conflict of interest/Competing interests:

1. There are no pertinent financial or non-financial conflicts of interest or competing interests for the writers to declare.
2. Regarding the subject matter of this essay, the writers have no conflicting interests to disclose.
3. Each author certifies that none of the groups or organizations that have a financial or non-financial interest in the subjects or resources discussed in this book are associated with or involved with them.
4. None of the content covered in this article is the subject of any financial or proprietary interests of the writers.

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