

INVESTIGATING THE IOT APPLICATION INFLUENCE IN DOMESTIC & FOREIGN TOURISM**Dr Ayaz Ahmad**

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Abstract

The resource integration system of the industrial clusters, which is powered by the internet of things, has gradually transitioned into a research centre over the course of time. The Internet of Things platform has also been fast cementing itself as the foundation for the cluster that is developing in the tourism sector. This article develops the paradigm of industrial clusters by making use of the platform provided by the Internet of Things, beginning with the concept of conducting specialised research inside the tourism sector cluster. The Internet of Things tourism industry cluster now has its own resource integration mechanism as a result of the merger of the resource integration game model. The simulation research is carried out with the assistance of SPSS, and the information platform for industrial clusters is constructed with the assistance of the information management paradigm that is used in the Internet of Things industry. According to the findings, the method of resource allocation that is utilised by the platform for the Internet of Things generates an overall greater amount of industrial revenue than the conventional method of resource allocation and also discusses Connected Devices in Worldwide. Furthermore, this mechanism for resource allocation integrates the resources of the tourism industry cluster in an effective manner. The theoretical framework is presented in such a fashion as to seem like this. The fourth industrial revolution will have an immediate and considerable influence on the tourist industry, which is often regarded as one of the most dynamic businesses in the world. This point is driven home by the role that the internet has had in the development of this sector as an economic sector. It is essential to have the Internet of Things (IoT)

and other disruptive technologies in order to regulate and comprehend this business, particularly the supply and demand dynamic. The wide variety of applications for the Internet of Things that can be found in the travel and tourism industry is a key factor in determining how competitive the private businesses that are involved are, as well as the areas that are evolving into Smart Destinations as a logical progression from Smart Cities. These areas are shaped by the travel and tourism industry, and Smart Destinations are a logical progression from Smart Cities.

Keywords: Internet of Things Technology, Tourism Industry Cluster, Information Platform.

1. Introduction

The rapidly developing Internet of Things, which is more often referred to as "the Internet of Things," is becoming aware of the possible disruptions that might occur in the leisure industry. The tourism industry is a dynamic system that consists of many different actors and supporting firms that collaborate to improve the experience of tourists. It depicts local industry, craftsmanship, festivals, religion, culture, and a whole bunch of other things in an elegant and compelling way. It includes topics such as the administration of the host country, its people, local attractions, travel, hotels, cuisine, and drinks [1]. The traveller is the last kind of consumer, and he or she is searching for an experience while also trying to justify it based on who they are as a person. People's thoughts may conjure up quite different pictures of the cape even when they are thinking about the same spot at the same time. The purpose of destination management companies is to increase the number of tourists who visit a certain place by preserving, enhancing, or altering the impression that visitors already have of that site. Thanks to the Internet of Things (IoT), Big Data, and blockchain technology, the location will soon be able to continuously track the behaviour of visitors, including purchase habits, visits to specific attractions, the amount of time spent there, and the amount of money incentives produced. This will become possible in the near future. The reports will make it possible for reasonable judgments to be made about the management of vacation destinations, the growth of the tourism sector, and ultimately the expansion of GDP [2].

It is essential for businesses in the tourism and travel industries to embrace new forms of disruptive technology, such as the internet of things (IoT), artificial intelligence (AI), and distributed ledger technologies. Doing so will allow these industries to increase their levels of productivity and efficiency (DLTs). The ability to collect data from a wide variety of sources, transport that data to platforms where it can be analysed, and make use of big data to improve decision-making procedures is the first step in highlighting the significance of IoT in smart cities. This is followed by the capability to analyse that data. This is a result of smart cities making use of Big Data in their operations. The majority of this information has been automatically converted into vacation spots, which led to the creation of what we now refer to as Smart Destinations. It is essential to keep in mind that Smart Destinations are essentially Smart Cities with an extra layer of management complexity added to them, which can be summed up as activities associated with tourists [3]. Therefore, all applications based on the Internet of Things (IoT) and any other technology-based applications for Smart Cities are instantly relevant to Smart Destinations. In addition, the fact that tourism-related activities take place in smart cities raises the level of urgency for the development of

disruptive technology and places an even heightened focus on the significance of the person. In addition, just as the goal of smart cities is to improve the quality of life for the people who live there, the objective of smart destinations is to achieve the same goal for those who are vacationing there or considering moving there permanently. The undertaking as a whole would be doomed to failure if it did not take into consideration the importance of converting traditional tourists into digital tourists [4].

The integration of industrial cluster resources that are based on the technological platform of the Internet of Things (IOT) has lately come to the attention of a significant number of researchers, who have found that it is one of the most fascinating subjects that can be researched. This is because more and more apps are being built for the Internet of Things (IOT). The Internet of Items (IOT) is the name given to the network that is produced when actual things are connected to one another. It serves two purposes: first, as the central nervous system and underlying structure of the Internet; second, as an extension and expansion of the user end of the Internet, making it possible for all goods and articles to communicate with one another and share their expertise. The same item is responsible for each of these responsibilities. The term "industrial clusters" refers to the processes by which industrial agglomerations form and grow, the ways in which technological innovations are implemented in practise, the ways in which virtual industrial clusters are used and their corresponding industrial policies, as well as the relationships between virtual industrial clusters and economic development. Industrial clusters and IOT have been the subject of a significant amount of investigation on both a global and regional scale. Virtual communication plays in the management of knowledge, the dissemination of information, and the development of clusters of non-central industrial businesses. These businesses are at the forefront of non-central industrial clusters in the modern era [5].

2. Review of literature

The tourism industry encompasses a diverse collection of players and has a considerable impact on economies all around the world. When it comes to developments in Internet of Things (IoT) technology for the commercial sector, the top goals of the tourism industry are the quality of the customer experience and the customization of itineraries [6]. This is only possible if the local infrastructure allows for the installation of devices that offer information and the critical data that is required to make choices in real time, as well as information that facilitates the execution of simulations with the goal of anticipating probable future situations. If the local infrastructure does not allow for the installation of such devices, then this is not feasible. As a result, it is of the utmost importance for tourist destinations to set up comprehensive information collection, analysis, and dissemination systems that include all of the partners in the value chain of the destination [7].

Because of this, each of them will be able to arrive at choices more rapidly. Before a site can be referred to be a "smart destination," A former president of SEGITTUR, asserts that it is necessary for such area to first put into action a strategy to increase its value via the use of innovation and technology [8]. In order for the process to become more competitive, it may be helpful to make use of renewable energy sources, to streamline the marketing and production processes, and to make

better use of the resources that are made available to visitors.

Everything that is done must be centred on encouraging sustainable development in tourist areas based on three factors (environmental, economic, and sociocultural components), and after that, improving the quality of the experience that tourists have there as well as the quality of life of the locals who live there [9]. This is the only way to ensure that sustainable development will occur in tourist areas. This will have a beneficial influence on the processes of marketing and production in the near term, as well as an increase in employment and tax collections, and most importantly, it will have a substantial positive impact on the levels of customer satisfaction [10].

One of the most important benefits that comes from using the Internet of Things in the hospitality industry is the ability to personalise the services that are provided in response to the information that is gathered and obtained from the connections that are made by guests [11]. If a company can determine the sorts of things that consumers enjoy and hate, it will be in a better position to meet the needs of customers by providing them with information that is "custom-made" for them, surpassing the expectations that they have of the company, and earning their business. If we find out that one of our clients has a preference for vegan food, we may give them with information on other vegan restaurants in the area or suggest that they enrol in vegan cooking lessons [12].

In point of fact, with the assistance of the Internet of Things, we are able to send them a notification informing them of the nearby restaurants, assisting them in booking a table for themselves, and providing them with directions; all of this can be done without the recipients even being aware that any of these things are taking place. If we knew that they liked to dine at a certain time, and they happened to be wandering near one of these restaurants, we may try to accommodate their favourite dining hour [13].

3. IOT Applications in the Tourism Sector

Some of the most important IoT examples in the travel industry are the following:

Personal Control

The ability to provide a higher degree of personalization in hotels and on flights is one of the applications of internet of things technology in the travel industry that has up until now seen the most widespread acceptance. This is one of the applications that has seen the most widespread acceptance. This is primarily accomplished by providing customers with the option to control a greater number of devices or services via a centralised device, such as a tablet or even their own smartphone. Another method that can be used is to provide customers with the ability to control all of their devices simultaneously [14].

Customers have the ability to operate their home's heating, lighting, and television from anywhere in the world using equipment that is configured for internet connection. They could even be able to choose a certain temperature and amount of light, which the devices would then automatically maintain based on the preferences that they have set. It is possible that aeroplanes will utilise a system that is somewhat like to this one in order to control the temperature of the seats and the air conditioning.

Seamless Travel

One of the many conceivable applications for the Internet of Things is to improve the overall quality of the customer experience in the travel sector in as many ways as possible. One illustration of this would be the placement of sensors at airports that alert passengers' mobile devices when their luggage is nearby, making it possible for them to locate it more quickly and saving them time [15].

When guests check in using the electronic key cards that the hotel has already sent to their mobile devices, the process of checking in may be streamlined to the greatest extent feasible. Customers won't have to bother going to the front desk since they won't need to in most cases. In addition, sensors might inform employees of the restaurant when clients reach the area, at which point the appropriate table number could be brought to the patrons automatically.

Smart Energy Saving

The Internet of Things may be responsible for making personalization feasible, but it also has the potential to help businesses save money by automatically or intelligently reducing the amount of energy they use. For instance, internet-connected gadgets and sensors in hotels may permit continuous temperature adjustments, which would guarantee that heating would be used only when it was really required to do so.

The concept of lighting may be thought of in a like manner. The Internet of Things (IoT) is already being put to use in certain hotels to control when the lights turn on and off in the rooms. Because high-powered lighting is only used in situations when it is absolutely essential, and the wattage of the light bulb is automatically adjusted depending on the quantity of natural light available in the room, there is minimal energy waste [16].

Location Information

The travel industry may make use of the Internet of Things in a number of different ways, such as gathering and supplying customers with location-specific information along with other helpful data. Combining the capabilities of smartphones with beacon technology or other types of sensors makes it possible for visitors to get messages that are relevant to their location at certain times and locations. It may be possible to reduce the number of employees required by sending messages and alerts to staff members based on the number of guests using certain hotel services at different times of the day. For instance, messages may be given pointing out nearby choices for public transportation or identifying local attractions together with information on the times of day during which they see the least amount of foot traffic [17].

Maintenance and Repairs

IoT devices may also get rapid help from the Internet of Things in the form of valuable, real-time data sent directly to them on their current status and performance. This component of the Internet of Things offers the fewest benefits compared to the others. This may be of essential significance for a huge number of individuals who work in the travel and tourist business since it makes it possible to repair or replace critical components before those components fail completely.

In the event that a radiator or light bulb starts to malfunction, for instance, a member of the hotel staff may be notified. The Internet of Things (IoT) has the potential to be used by hotels and airlines to improve the efficiency of refuelling planes or repairing broken components. In any situation, the primary goal should be to reduce one's financial outlays. An increase in revenue, while

simultaneously preserving a high degree of safety, would be the most ideal result that could be envisioned.

The Internet of Things will eventually include the procedure of linking everyday items and household appliances to the internet so that they may communicate with one another. This will happen in a very short amount of time (IoT). Those who work in the travel business have direct access to a range of benefits as a direct result of this fact. These benefits include the chance to increase the efficiency of internal operations as well as the quality of the experience that is provided to customers [18].

4. Research Methodology:

These are the Systematic Reviews and Meta-analyses Preferred Reporting Items. The execution of Systematic Literature Reviews (SLRs), which are divided into three main stages: the search, the decision of eligibility, and the collecting and analysis of data, is described in protocols. This study used these techniques to perform an SLR.

Table 1: Descriptive statistics

Year	Connected Devices Worldwide	Growth Percentage
2,019	8.6	1.1
2,020	9.7	1.2
2,021	11.3	1.6
2022*	13.1	1.6
2023*	15.1	1.7
2024*	17.1	1.2
2025*	19.1	2
2026*	21.1	2.1
2027*	23.1	2
2028*	25.2	1.4
2029*	27.3	1.8
2030*	29.4	2.1

Hypotheses

Null hypothesis	Alternative hypothesis
There is no significant difference between the groups of the first factor connected devices worldwide and Growth percentage	There is a significant difference between the groups of the first factor connected devices worldwide and Growth percentage

(measurement repetition) in relation to the dependent variable.	(measurement repetition) in relation to the dependent variable.
There is no significant difference between the groups of the second factor Forecasts from 2022 to 2030 in relation to the dependent variable.	There is a significant difference between the groups of the second factor Forecasts from 2022 to 2030 in relation to the dependent variable.
There is no interaction effect between the factor connected devices worldwide and Growth percentage and Forecasts from 2022 to 2030	There is a interaction effect between the factor connected devices worldwide and Growth percentage and Forecasts from 2022 to 2030

Table 2: Model

	Coefficient B	Standard error	z-Value	p-Value	Odds Ratio	95% conf. interval
connected devices worldwide	-0.07	0.21	0.34	0.73	0.93	0.62 - 1.4
Growth percentage	-1.73	3.87	0.45	0.65	0.18	0 - 346.75
Constant	1.74	4.51	0.39	0.7	5.68	

5. IoT and Smart Nature Destinations

According to the concept of Urban Eco Islands, the islands of Vasikkasaari in Helsinki and Aegina in Tallinn will each develop into new types of eco-friendly tourist attractions in the form of well-designed natural settings. These new types of eco-friendly tourist attractions will be built on well-designed natural settings. Islands are the most likely place to find them. These brand new tourist attractions that are beneficial to the environment. The development of the islands will take place in line with the principles of sustainable tourism, with the precarious nature of the archipelago being taken into consideration at every stage of the process. In addition, the programme will investigate innovative digital marketing tactics in an attempt to promote ecotourism that places a greater focus on experiences rather than scenery. It is predicted that the local economy would flourish in tandem with the influx of visitors, and it is hoped that this will be accomplished by piquing the interest of both residents and tourists alike in the natural environment and the resources that it has to offer. The information that was gathered from the sensors is given further processing, and then the results of that processing are presented, with the goal of providing visitors with a more in-depth comprehension of the area's attractiveness [19]. The software that is based on the Internet of Things that is being deployed in these instances has the capability of transforming underdeveloped places into innovative tourism destinations:

- Intelligent Internet of Things solutions may be of use to those who like spending time outdoors and who are committed to the local and global efforts to preserve the natural environment.

It is feasible to offer advice for clothing and personal protection based on measurements of the weather, such as the speed of the wind, the temperature, the humidity, and the intensity of the sun's ultraviolet (UV) radiation.

- It is quite possible that the installation of aural and visual sensors in sensitive natural areas will offer members of the scientific community as well as tourists with complete and up-to-date information about the biodiversity and natural features of the place. It is possible to lessen the impact that tourism has on the surrounding environment if visitors are given the opportunity to investigate a fascinating location via digital means. You may be able to make a positive contribution to the conservation of the environment if you provide this opportunity to visitors, for instance in a rural part of the country in which the nesting of birds is a delicate issue. Using photographs captured by drones and other forms of unmanned aerial vehicles, it is feasible to keep track of the impact that tourists have on a particular area (UAVs). Photographs collected over the course of time may reveal how the erosion caused by tourists has led to the formation of new pathways.

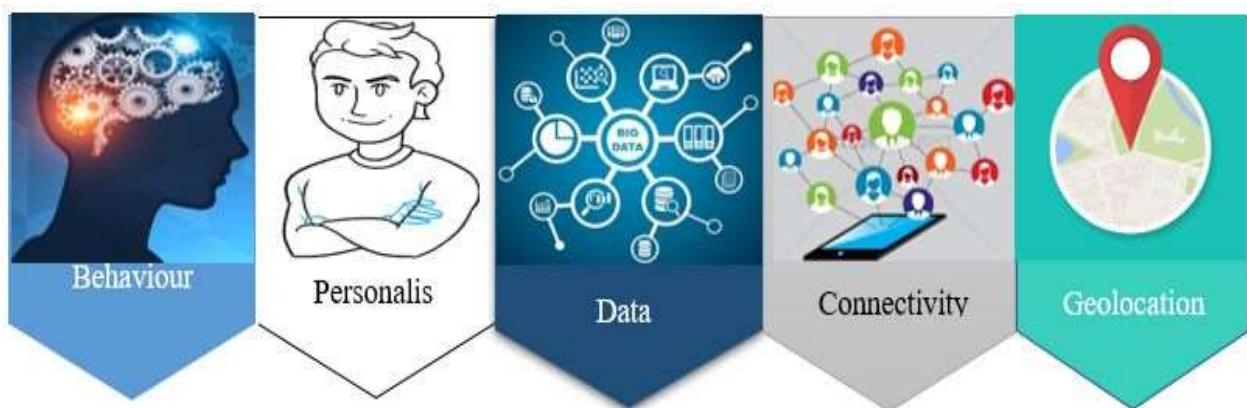


Figure 1: Service customization in a Smart Tourism destination

6. Improvement of industrial cluster mode under the influence of IOT

When companies are members of a virtual corporate cluster, they may discover, with the assistance of the Internet of Things, how much more equipped they are to collect and exchange information with one another. There can be no doubt that the value of the several items that a firm offers must in some way be tied to one another. The degree to which this requirement is satisfied is directly inversely related to the amount of time that the IOT is being put to use. As the IoT extends its scope of influence, the costs that all organisations are required to bear will, over time, become progressively more affordable. Because of the increasing depth and breadth of knowledge and experiences that can be shared, businesses may be able to obtain even larger benefits as a result. Early adopters of new technologies, such as those related to the Internet of Things, are often rich people with high incomes who pay little attention to the price of the product when it is initially brought to the market. With more time passing, the product's commercial potential will continue to improve [20]. However, as the number of people who use the product continues to increase, a greater number of people will become aware of the contribution that the product's benefits make to the entire worth of the product.

In order to effectively complete the leapfrog development process, the product won't be made accessible to the broader public until after the user base has reached a specific critical capacity. (Figure 2).



Figure 2: Internet of Things-influenced industrial cluster mode

Just a few instances of these kinds of implications include changes in consumer behaviour, the level of company competition, and the configuration of corporate clusters. The boundaries of the scale effects for these impacts will be established based on the IOT space. 12 According to Metcalfe's law, the expansion of a network's value is directly proportional to the rise in that network's total number of nodes. That is to say, the value of the Internet of Things (IOT) will increase as a greater number of people have access to it, which will ultimately result in the IOT's growing scale effect. The element of IOT scale is added to the consumer utility function, which causes a rise in the U (A, P, and N) function, as a direct result of how the IOT's scale effects customer utility. In this instance, "N" refers to the size of the IOT, but it might also be used to describe the total number of customers it serves. The relationship between equilibrium pricing and network expansion is established when businesses optimise their own profit margins based on increasing consumer utility in order to decide how best to expand their networks. This link is impacted by the overall size of the network. Some scholars believe that the efficiency of a virtual company cluster is best measured by how well it accounts for the long-term impacts of a declining average cost curve, how well it accounts for how market demand restricts innovation, and how well it accounts for the cluster effect (V_g). Assume that a "virtual enterprise cluster" is in charge of the manufacturing and distribution of a product that is composed of E pieces, each of which is created by j firms, some of which are situated within the cluster and some of which are not ($I = 1, 2, \dots, n$). This product is comprised of a product that is manufactured and distributed by a "virtual enterprise cluster." Given these circumstances, reducing the cost of individual parts and components via innovation is a geometric challenge. You may calculate the unit cost that you want for the product by using the formula that is presented below.

$$C_y = \sum (C_i - \overline{R/M})V_g \rightarrow \min$$

s.t. Q \leq M_{max}*

If the letter "e," which serves as a stand-in for the standard deviation in the calculation, is changed, then the cost decrease will become more obvious. The value of R in the computation represents the biggest variance in the cost that j different companies have to bear in order to produce component I. The difference between the numbers that are the most severe and the numbers that are the least extreme in R is representative of the actual or expected cost of manufacturing component I for the companies that are members of the cluster. This formula takes into consideration all of the nuances of the virtual firm cluster, such as differences in management level, cost, cost difference, cost fluctuation amplitude (R), and discrete situation (e), with the upper limit being the ability of the market to meet demand. The cluster of virtual enterprises enjoys the advantages of economies of scale since it also makes use of efficient ways to lower the product's per-unit cost throughout society and the global community.

7. Conclusion

The Internet of Things will have a huge influence on the travel and tourist industries as a whole, but there is still a long way to go before it reaches its full potential. The Internet of Things will make things much easier to understand. We will be able to accomplish a great deal more, such as automatically check in and out of hotels, locate our destination much more quickly, monitor the operation of aeroplane engines, and do a great deal more besides. The Internet of Things may result in greater levels of client loyalty as well as increased levels of money and improved levels of customer service. Because of the Internet of Things, we will have access to a large quantity of data; nevertheless, this data will need to be processed and comprehended before it can be utilised. As a direct result of this, adequate financial expenditures in technology are necessary before practicable solutions can be put into action. If companies operating in the tourist industry want to capitalise on upcoming advancements, they must start the process of incorporating Internet of Things technology into their existing infrastructure as soon as possible. Both customers and management are adjusting to this new era as the travel and tourism industry reaps significant advantages from the Internet of Things (IoT) technology. This is very important because customers are beginning to expect the Internet of Things (IoT) more and more, which is likely to take over the whole operational cycle of the travel industry sooner than we now believe it will. This will rapidly become something that is not just what people expect, but also something that is vital and demanded. People will require and require that this occur.

Despite this, appropriate connectivity and data management infrastructure would be necessary for IoT adoption in locations frequented by tourists. The tourist business will have access to a large amount of data; but, in order for that data to be properly used, they will first need to be analysed and grasped. In a scenario like this one, having efficient data management abilities as well as information quality control systems would be absolutely necessary. One of the primary objectives will be to create a structure that allows for the collaboration of public and private organisations in the development

of an environment that is conducive to the manufacturing and distribution of Internet of Things platforms. If companies in the travel industry want to profit from impending advances, they will need to begin incorporating IoT into their systems as soon as it is technically practicable for them to do so. Technology like the internet of things is very important to the tourist industry. Guests and management are already adapting to the new era much more quickly than was originally predicted.

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