Internet of Things and Its Application in the Field of Social Sciences: Prospects and Challenges from a South Asian Context

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Abstract

Recently, researchers are seeking attention towards Internet of Things as in near future everything is going to be connected using the internet and intelligent communication system will be developed. Several virtual components will be attached with the physical aspects to produce several smart objects facilitating the lives of human beings. The current research will focus on the applications of Internet of Things (IoT) in two industries namely Retail and Hospitality and Tourism Industry running in India and China, about the benefits and challenges faced by Internet of Things.

The aim of the current research is evaluating the application and challenges of IoT in the field of social science in South Asian countries. IoT was investigated in two industries mainly the Retail Industry and the Tourism and Hospitality Industry in India and China. The data was collected using the quantitative survey method having close ended questionnaire which were sent to the Senior and Top Level Mangers via Email of both the industries.

The questionnaire included questions related to the smart devices, smart apps, and usage and handing of internet of things regarding the physical objects, perception and customer's viewpoint, etc. The demographic profiles from the analysis determined that maximum employees were males having bachelors' education with the occupation of junior IT manager having experience of 1-2 years. 50% of the respondents defined IoT as a wireless connection and about 42.5% of the respondents were involved with the projects related to IoT.

The main limitation of this research is that it is limited to two industries i.e. Retail and Hospitality and Tourism and is also dependent on the internet services for the inter-communication. Seven Hypotheses were tested and all null hypotheses were accepted except one.

Keywords: Internet of Things, Retail, Hospitality and Tourism, Quantitative research, Random Sampling.

Introduction

The network through which the physical objects or things are connected with electronics, software, sensors connectivity of networks and facilitating the objects in collection and exchanging of data is defined as Internet of Things (Mann, 2015). According to Rouge and Wigmore, 2017, it is a system in which computing devices are interrelated provided with unique identifiers along with the data transfer ability through a network acquiring an interaction which is human to human or human to computer and a thing in internet of things refers to any object which is natural or man-made, an IP address is provided to it along with the ability of data transference over network. He also state that unique identifiers are provided to any objects, people, animals or any machines being mechanical and digital.

Review of Literature

The physical objects are connected with each other using the sensors and actuators which are inter-linked using the wired or wireless network using same IP through which it is connected to internet. IoT is huge network of things including people (Morgan 2014). This incorporates all the devices connected to the on and off switch to internet as well as each other. These things could include any electrical or electronic devices having on and off switch like coffee makers,

mobiles, fitbits, TV, ovens, car engines etc. He further stated that all the things having the ability to be connected will be connected in near future. Quoting an example he said that if you are going for a meeting, then the car could access your calendar and acknowledge the best route for the same and if you find traffic then it will automatically send a message to the other party of being late due to heavy traffic (Morgan, 2014). Applications of IoT are very common in several fields like chemical, transportation, energy, healthcare etc. The IoT is being used and developed significantly and an increase in such devices is exhibited. There are various IoT devices which have been especially designed for consumers and their comfort like smart cars and houses, smart retail outlets several wearable devices for entertainment, health and fitness etc. there is a communication problem amongst them as there are several devices and applications which are inter linked with each other without sharing speaking protocols with each other. Therefore, people are unable to contact or communicate with each other. Big IT firms are aware of such problems and are trying to maintain and develop communicating standards amongst the devices (Rouse and Wigmore, 2017).

The tracking behaviour of the products and the customers is another successful application of IoT. Now-a-days, companies as well as customers both can track their orders and their movements, they can also interact with them as they are embedded with sensors. This behavioural data can be an asset for the business models. For example there is an offer of installing location sensors in the cars of the customers which is offered by some of the insurance companies. These sensors will help the companies to extract information regarding driving, its places of travelling which will accompany the pricing policies of cars and the actual risks while operating cars can be customised rather than the proxies like the place of residence, the age of the driver, the gender etc.(Chui et al., 2010).

There is an automatic adjustment of inventories and the product can be easily tracked from receiving to delivery in the warehouses. This is performed using the sensor which tracks the tags comprising of Radio-Frequency Identification (RFID) placed over the products. In the retailing industry, the profile data of shoppers is observed and noted by sensors which helps in purchasing further as additional information like extra discounts etc. is provided by them during the time of sale (Chui et al., 2010).

The adoption of IoT is slow in hospitality and tourism industry. There are many systems which are used in hotels like energy use, the security, safety and the locking system, inventory control and also they can track the behaviour of the customers but in spite of using such technologies their potential and benefits has been limited as the systems are unable to communicate with each other. There is just one exception which is the magic band made and developed by Disney World. These are colourful wrist bands which are used for entering the park, opening the doors of the room in hotel, helps in the fast selection and also helps in food and merchandise purchase (Disney, 2017a; Disney, 2017b).

The magic band comprises of the HF radio frequency device which transmits, receives and sends the RF signals using antenna which is inside the band and enables it to read by long range readers. These bands also incorporate the RFID chip and the battery of the band lasts for two years (Croslin, 2015). These bands have been introduced by many tourism and hospitality industries, which even serve as room keys and navigators which help them in finding their rooms and the way to their room (Barnesjan, 2017).

The IT sector is advancing rapidly during from last few decades and hence increasing demand of IoT can be easily observed in daily life. Defining IoT is still in investigating stage but the objects and everyday things are connected with technology enabling them to communicate with other devices as well as internet services by equipping them with several capabilities like identifying, sensing, networking and processing abilities so that the objectives can be accomplished (Whitmore, Agarwal, & Xu,2015). This technology is a combination of several

technologies and not any single novel technology. The gap amongst the real and the virtual world is filled or bridged using the combination of various complementary technologies (Hoffman & Novak, 2015).

IoT is applicable in many fields but its prominence can be seen in the retail industry (Pantano& Timmermans,2014). In the retail industry, smart objects are networked and tagged using the RFID or quick response codes which are the unique object identifiers capable of identifying as well as providing information using smart devices. Like a smart shopping cart is used by grocery retailer named Dohle. These smart carts can provide various information about the products which are available in the store. The smart carts are also capable of storing and retrieving the information, answering the queries of the customers and without even waiting in the line it can enable the checkout process. Additional information is related to the products provided by the jewellery retailer named Bauble Bar by utilizing interactive displays incorporating sensors and unique identifiers. This technology of IoT can be effectively used by the retail industry and an enhanced and improved ecosystem of retail conjointly with IoT technology can permit better customer interaction.

According to Chen, 2014; Gregory, 2015, the process of decision making of the customers can be better assisted combining the two i.e. retail and IoT technology and their overall shopping experience will be improved. A report presented by Jupiter Research presumes that the major portion of the investment in retail industry incorporating IoT will be sponsored in accordance to the individual necessities and choices of the customers or consumers (Girish, 2016). For the purpose of understanding and acknowledging the perception of the consumers regarding the IoT technology in the retail industry some of the research has been conducted as revealed by Gao and Bai, 2014. Subsequently, Madhani 2015 indicated that there is lack or deficiency or inadequacy of literature with respect to the perception of the customers regarding the usage of IoT in retail industry. Consequently, there is a requirement of future research for understanding and determining the factors which affect and persuade the acceptance of customers for IoT (Evanschitzky, Iyer, Pillai, Kenning and Schütte, 2015).

According to Vargo and Lusch, 2008, the value according to the S-D logic is co-created with the customers as their experience with the services determines it. The experiences of the consumers related to IoT in the retail industry can be given more accurately with the S-D logic rather than the traditional assessment. The value is co-created when customers during their retail shopping, experience and interact using internet of things and are further motivated for using the same (Vargo&Lusch, 2016). A study presented by Al-Kassab, Blome,Wolfram, Thiesse, and Fleisch (2011) exhibited that the RFID technology has immense potential for retail companies as it can help in enhancing their control of inventory, layout of store along with management of the category.

The features and the characteristics of IoT are discussed related to the retail industry by Pantano and Timmermans (2014). The technology acceptance models are utilised by several researchers for the identification and determination of the factors which influence the acceptance of customers related to IoT in the retail industry (Huang & Liao, 2014;Pantano & Servidio, 2012; Tsai, Lee, & Wu, 2010). The aforementioned research gives us some understanding and adoption of internet of things by customers, its future business model, challenges faced by them etc. Still this field needs essential research in accordance with the perception and viewpoint of the customers (Huang & Liao, 2014; Pantano&Servidio, 2012). For the evaluation of value co-creation, it should be according to the technology viewpoint of customers (Breidbach& Maglio, 2016).

The important issue in China currently is quality improvement of urbanisation. So, regarding urban development China has implemented the concept of smart cities incorporating the

physical, virtual and the intelligent world of internet of things (Yang,2011). According to Ashton, 2009, IoT refers to the development of intelligent and smart appliances and devices and is connected to the internet. In the urban development of China, this concept of smart city with IoT creates innovative and inevitable opportunities in future (CESI,2009).
To improve the urban panning management and level of services in China, they have integrated IT with intellectual economy. The convergence of industrialization, informatization and urbanization can be exhibited relevantly and significantly. Thus, industrial informatisation has changed to social intellectualization and media foundations and this change has been produced by the application of strategies (Wang, Xing andLi,2010). Smart city incorporates integration of the technology, convergence of the industry and intelligent services and enhancing the features of the social urban model. The National Experience Centre of Smart City is being built by China so that various models for the construction of smart cities and also the needs of the existing smart cities will also be satisfied. There are several industries covered under smart city and tourism and hospitality is one of them. This industry is an inevitable part of strategies of smart city (McCartney, Butler and Bennett,2008). Previously there were 18 cities which were selected by China for National Smart Tourism Cities and in 2012 the ratio and number increased to 33 cities coming under smart tourism cities determined by the National Tourism Administration of China. The main purpose here is combination and integration of IoT with smart tourism industries and cities. Using the two technologies like IoT and cloud computing, the intelligent perception is applied to several information of tourism such as resources, economies, activities and the participants and the information of tourism using the internet of terminal equipment or of mobile (MacKayandVogt, 2012; ChoandJang,2008). Thus, amongst the strategies of smart cities of China smart tourism forms an important and significant component. The technology of IoT will be mainly responsible for carrying the information system of smart tourism.

In 2014, tourism theme was officially announced by the National Tourism Administration of China as “Beautiful China -2014, Year of Smart Travel”. There are a lot of opportunities of development in future for smart tourism. Further, Gao et.al in 2014 stated the potential development of Chinese Tourism defining the new ideas of smart tourism with IoT and they have also recommended their applications in China.

Problem Statement

Significant increase in the development of IoT technology and devices is exhibited as smart cars, homes, various wearable devices for health, entertainment and fitness, smart outlets etc. Several devices are developed each day but the main problem faced by them is that hundreds of devices are interconnected with hundreds of applications without sharing protocols for speaking and communicating with one another. The unsuccessful communication with each other of the devices is similar to the scores of the people also because of the differences in the languages. Further, there are several devices inter-linked with several applications hence traffic congestion and communication is also another problem faced by them. Various standards are under development for resolving the problem and communication amongst the devices.

Research Objectives

Aim

The main aim of our research is evaluating the application and challenges of Internet of Things (IoT) in the field of social science in South Asian countries.

Objectives

1. To investigate and assess the adoption and the current scenario of application of Internet of Things in two industries Hospitality and Tourism and Retail Industry.
2. To evaluate the opportunities and challenges of Internet of things in both the industries regarding two South Asian countries i.e. India and China.
3. To accentuate the perception and acceptance of consumer and managers regarding IoT in both the industries in both the South Asian countries.

Research Hypothesis

1. **$H1_0$ -** IoT benefits in increasing connection between the customers and suppliers and solve queries in the retail and tourism industries.
   $H1_A$ - IoT does not benefit in increasing connection between the customers and suppliers and solve queries in the retail and tourism industries.
2. **$H2_0$ -** Firms cannot integrate analytics, sensing and automated control on the business models.
   $H2_A$ - Firms can integrate analytics, sensing and automated control on the business models.
3. **$H3_0$ -** IoT helps in proper analysis and monitoring of the products till it reaches the customers.
   $H3_A$ - IoT does not help in proper analysis and monitoring of the products till it reaches the customers.
4. **$H4_0$ -** There is no security or data governance issue when IoT connects physical environment to cloud.
   $H4_A$ - There rises a security and data governance issue when IoT connects physical environment to cloud.
5. **$H5_0$ -** On the receivable of sensor data through the cloud, the firms may face several issues.
   $H5_A$ - On the receivable of sensor data through the cloud, the firms may not face several issues.
6. **$H6_0$ -** Due to GPS system, the customers can avoid the traffic and travel through alternative routes.
   $H6_A$ - Though, there is the GPS system, the customers cannot avoid the traffic and travel through the alternative routes.
7. **$H7_0$ –** The managers can extract data and understand the demands for innovations.
   $H7_A$ - The managers cannot extract data and understand the demands for innovations.

Research Methodology

After reviewing the literature and various findings of other researcher's, their viewpoint, understanding, methodology and design, the research methodology to be adopted for the current research was decided. The current research assisted in understanding the internet of things applied to both the industries with respect to India and China.

The current research incorporated the quantitative research method approach as the data collected is large and inculcates many figures and numerical data. The data was collected from different top level managers, senior level managers of the retail and the hospitality and tourism industry.

The data was collected using the quantitative survey method using close ended questionnaires which were sent via E.mail. The developed questionnaire is incorporated in the Appendix. The questionnaire included questions related to the smart devices, smart apps, and usage and handling of internet of things regarding the physical objects, perception and customer's view point etc.

Data Collection

The method of data collection deployed both primary as well as secondary data for the establishment and the accomplishment of the objectives of the research. The main objectives of the research were fulfilled by primary data collections from the top level and senior level managers of the retail and tourism and hospitality industries of India and China, which was conducted using the close ended questionnaires via surveys. The secondary data was collected using various research journals, papers and reports for comparing the current research with the findings of the others.

The size of the sample chosen was 80 respondents form both the industries i.e. Retail and Hospitality and Tourism Industry in India and China. 40 respondents from both the industries were studied and investigated. The sampling technique used was random sampling.

Data Analysis

The data collected was analyzed using the SPSS software performing the factor analysis and ANNOVA test. The demographic profiles of the respondents were found to be as follows: From the analysis it was found to be that the maximum respondents were males contributing about 62.5% and the female respondents corresponding to about 37.5%. The age of the respondents was found to be comprising of 38.8% between the age group of 18-25 years, 42.5% constituted between the age group of 26-35 years, 17.5% of the respondents belonged to the age group of 36-45 years and about 1.3% respondents were above the age group of 46 and above.

The educational status of the respondents was that about 7.5% of the respondents were having higher secondary degree, 47.5% of the respondents were having Bachelor's degree and about 43.8% of the respondents were having Master's degree and about 1.3% of the respondents were having higher degree than Master's like Ph.D. About the occupation it was found to be that amongst the respondents about 2.5% were working as Top level IT Managers. Further, 42.5% of the respondents were working as a Senior IT Manager. Then, 46.3% of the respondents were working as Junior IT Managers and about 8.8% of the respondents were working as Trainers. The work experience of the respondents was found to be that about 33.8% of the respondents were having the experience between 0-6 months. About 6.3% of the respondents were having experience between 6 months-1year.

Further, about 21.3% of the respondents were having experience between 1-2 years and 38.8% respondents were having the experience of more than 2 years. Further using the questionnaire, we also assessed the adoption and the current scenario of the application of Internet of Things in both the industries in both the countries. First, IoT was defined and about 33.8% of the respondents defined IoT as an inter-connection through the internet of the computing devices, 12.5% of the respondents defined IoT as a system that transfers data through network without the help of human-to-computer interaction, about 50% of the respondents defined IoT as a wireless communication and about 3.8% agreed to the view IOT as a combination of all the above three statements i.e. IoT is an interconnection through the internet of the computing devices, a wireless technology and a system which transfers the data through network without any help of the human to computer interaction.

To acknowledge about the involvement of the respondents with the Internet of Things projects about 37.5% of the respondents were involved in the project of Internet of things for about 0-1 years, about 15% of the respondents were involved with the Internet of things projects between 1-2 years, then about 42.5% of the respondents were involved with the projects related to Internet of Things from 2-3 years and about 5% of the respondents were not at all involved with any projects related to the Internet of Things. To acknowledge about the role of the respondent in the Internet of things projects about 32.55 of the respondent were working as a Project Manager, about 8.8% of the respondents were working in Product development, about 45% of the respondents were working in Software development about 2.5% of the respondents were

working in the Services department and about 11.3% of the respondents were working in the logistics section of the Internet of things projects.

To determine about the industries in which the respondents were working, it was acknowledged that 50% of the respondents were working in the retail Industry and another 50% of the respondents were working in the Hospitality and tourism Industry.

To determine about the skills which were necessary for becoming a successful manger in the Internet of Thing field, about 38.8 % of the respondents stated that having the skills of the circuit design is needed to be successful as a manager, then about 2.5% of the respondents stated Computing controlling skills to be necessary for successful manager in IoT field, then about 43.55 of the respondents stated that Cloud computing skills were needed to be a successful manager in the field of Internet of Things, then about 2.5% of the respondents said that skills of networking communication technology was needed to be successful manager and finally about 12.5 % of the respondents exhibited that there were other skills which were not mentioned on the list which were according to them are needed to be a successful manager in the field of Internet of Things.

To determine about the experience of the respondents regarding the applications of Internet of Things in the Hospitality and tourism industries, it was observed through the statements "Every data can be accessed from a wearable device and no need for any change in networks or devices" exhibited a high mean value of 3.72 with a standard deviation of 1.29 and the statement "Helps in integrating multiple devices into the Wi-Fi platform" exhibited low mean value of 3.15 with a standard deviation of 1.47. Whereas the statement, "IoT helps in collecting the customer data to create new customer experiences" also exhibited a high mean value of 3.64 with a standard deviation of 1.26. To determine the experience of the respondents regarding the Internet of things in the Retail industries, the following observation of the statements were observed, "Increasing the customer experience as the customers can use the smartphones to scan and gather product information" had a high mean value of 3.44 with a standard deviation of 1.36 and statement "Retailers can use GPS as a part of IoT to track and monitor the routes of the vehicles" had low mean value of 2.9 with a standard deviation of 1.41. The statement "Helps in tracking and managing the inventory through the smart technologies" exhibits a high value of 3.44 with a standard deviation of 1.30.

Regarding the reasons for which IoT has gained buzz in the retail and tourism industries of India and China, it was observed that 22.5% of the respondents expressed that IoT creates rich data set and an automated analytical tool to optimize the operational efficiencies and 27.5% expressed their views that IoT delivers efficiency in cost optimization and processes, then 15% expressed their views that IoT can enable industries to provide better customer services in real time and finally about 35% agreed with the views that all the aforementioned points are agreeable to them and IoT contributes to all the above described points.

When the respondents were asked about their perceptions regarding the benefits of IoT in the retail and tourism industries or any other industries from India and China, it was observed that the statement, An increased connection between the customers and suppliers solve their queries exhibited a high mean value of 3.50 with a standard deviation of 1.16, further the statement Allows a proper analysis of the product performance exhibited the mean value of 2.66 and standard deviation 1.22.

It was also observed that the statement "Companies can provide end-to-end support and services" had a high mean value of 3.89 with a standard deviation of 0.981 and statement "Firms can integrate analytics, sensing and automated control on the business models" had low mean value of 2.45 with a standard deviation of 1.33. When the respondents were asked about their perceptions regarding the challenges of IoT in the retail and tourism industries or any other industries belonging from India and China, it was observed that the statement "Firms may face

cost constraints while implementing IoT in their industries with a high mean value of 3.40 along with a high standard deviation of 1.40, and the statement "users can face technical risks during the development process" exhibits a high mean value of 3.65 along with a low standard deviation of 1.29.

For the acknowledgement of the future impacts of IoT in the services and industries, it was observed that 38.8% respondents expressed that the service and product suppliers under IoT can earn more revenue in the upcoming years, can estimate business – to business in retail and tourism industries and drive more business excellence and through customer satisfaction and organizational performance.

For the determination of the facilities of IoT that the customers can get by implementing the system in your firm, it was observed that 11.3% of respondents exhibited that customers can receive product and services anywhere, 21.3 % of the respondents exhibited that Due to GPS system, consumers can avoid traffics and travel through alternative routes, 23.8% of the respondents exhibited that Customers can interact with the providers easily, and about 43.8% of the respondents indicated towards the other facilities.

To determine that IoT can change the customer service into a smarter way by meeting the customer demands effectively, about 52.5% respondents they thought that IoT can change the customer service into a smarter way by meeting the customer demands effectively and about 47.5% of the respondents were of the different opinion i.e. they did not agree to the same. To determine about the facilities of IoT that the managers can receive in your firm, about 8.8 % of the respondents indicated that the managers can supply better services and products as per customer needs, about 7.5% of the respondents displayed that they can extract data and understand the demand for innovations, about 15% of the respondents exhibited that the managers can plan the trips online, about 38.8% of the respondents exhibited that They can communicate with the customers online for choosing retail products and about 30% agreed to all the aforementioned points given.

Seven hypotheses were also tested using the SPSS software. The analysis exhibited that for the first hypothesis, the T value corresponding to the mean difference between the mean value for an increased connection and a fixed mean value of 3 was 3.825 and its corresponding p value is $0.000<0.05$. Since the p value is less than 0.05, we can conclude that IoT benefits in increasing connection between the customers and suppliers and solve queries in the retail and tourism industries as exhibited in Table 1.

Table 1: One-Sample Test for First Hypotheses

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
An increased connection between the customers and suppliers and solve their queries	3.825	79	.000	.500	.24	.76

For the second hypothesis the T value corresponding to the mean difference between the mean value for firms can integrate analytics, sensing and automated control on the business models and a fixed mean value of 3 was 0.464 and its corresponding p value is 0.644>0.05. Since the p value is more than 0.05, we can conclude that firms cannot integrate analytics, sensing and automated control on the business models as exhibited in Table 2.

Table 2: One-Sample Test for Second hypotheses

	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Firms can integrate analytics, sensing and automated control on the business models	.464	79	.644	.063	-.21	.33

For the third hypothesis, the T value corresponding to the mean difference between the mean value for helps in better monitoring of the products of the products till it reaches the customers and a fixed mean value of 3 was 6.32 and its corresponding p value is 0.000<0.05. Since the p value is less than 0.05, we can conclude that IoT helps in proper analysis and monitoring of the products till it reaches the customers as exhibited in Table 3.

Table 3: One-Sample Test for Third Hypotheses

	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Helps in better monitoring of the products till it reaches the customers	6.320	79	.000	.750	.51	.99

For the fourth hypothesis, the T value corresponding to the mean difference between the mean value for security and data governance issue when IoT connects physical environment to cloud, one may access from outside world and a fixed mean value of 3 was 0.721 and its corresponding p value is 0.112>0.05. Since the p value is more than 0.05, we can conclude that there rises a security and data governance issue when IoT connects physical environment to cloud as exhibited in Table 4.

Table 4: One-Sample Test for Fourth Hypotheses

	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Security and data governance issue when IoT connects physical environment to cloud, one may access from outside world	.721	79	.473	.112	-.20	.42

For the fifth hypothesis, the T value corresponding to the mean difference between the mean value for when sensor data is sent to the cloud, firms may face issues of latency, security risks and drive costs and a fixed mean value of 3 was 2.177 and its corresponding p value is 0.032<0.05. Since the p value is less than 0.05, we can conclude that on the receivable of sensor data through the cloud, the firms may face several issues as exhibited in table 5.

Table 5: One-Sample Test for Fifth Hypotheses

	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
When sensor data is sent to the cloud, firms may face issues of latency, security risks, and drive costs	2.177	79	.032	.337	.03	.65

For the sixth hypothesis, the T value corresponding to the mean difference between the mean value for retailers can use GPS as a part of IoT to track and monitor the routes of the vehicles and a fixed mean value of 3 was 6.464 and its corresponding p value is 0.000<0.05. Since the p value is less than 0.05, we can conclude that due to GPS system, the customers can avoid the traffics and travel through alternative routes as exhibited in Table 6.

Table 6: One-Sample Test for Sixth Hypotheses

	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Retailers can use GPS as a part of IoT to track and monitor the routes of the vehicles	6.464	79	.000	.800	.55	1.05

For the seventh hypothesis, the T value corresponding to the mean difference between the mean value for data collected through IoT can sometimes be used for the discriminatory purpose and a fixed mean value of 3 was 2.474 and its corresponding p value is 0.015<0.05. Since the p value is less than 0.05, we can conclude that the managers can extract data and understand the demands for innovations as exhibited in table 7.

Table 7: One-Sample Test for Seventh Hypotheses

	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Retailers can use GPS as a part of IoT to track and monitor the routes of the vehicles	6.464	79	.000	.800	.55	1.05

Research limitations

The main limitations of the research are:

1. The research is limited to the Retail and the Hospitality and Tourism Industries related to Internet of Things in two countries India and China.
2. The research is limited to the internet services and technologies as systems are unable to communicate with each other.

Conclusion

From the above discussions and the data analysis it can be concluded that, maximum respondents were males which were predominating in both i.e. Retail and the Hospitality and the Tourism Industry. Then, the maximum respondents were of the age between 26-35 years having an educational background of Bachelor's Degree with an occupation of Junior IT Managers having the maximum experience between 1-2 years. Further, more than half of the respondents defined IoT as a wireless technology, and many of them were involved in the projects related to IoT from 2-3 years working in the field of Software development. Most believed that having the skill of cloud computing, one can be a successful manager in the field of IoT.

The experience of the respondents regarding the application of IoT in the hospitality and tourism industry they exhibited that "Every data can be accessed from a wearable device and no need of any change in networks or devices" had a high mean value of 3.72 with a standard deviation of 1.29 and statement "Helps in integrating multiple devices into the Wi-Fi platform" had low mean value of 3.15 with a standard deviation of 1.47. Then, asking for the experience of the applications of IoT in the retail industry, "Increasing the customer experience as the customers can use the smartphones to scan and gather product information" had a high mean value of 3.44 with a standard deviation of 1.36 and statement

"Retailers can use GPS as a part of IoT to track and monitor the routes of the vehicles" had low mean value of 2.9 with a standard deviation of 1.41. The results exhibited that about 35.0% respondents expressed that the reasons for which IoT has gained buzz in the retail and tourism industries of India and china were creates rich data set and an automated analytical tool to optimize the operational efficiencies, delivers efficiency in the cost optimization and processes and the industries can provide better customer service on real time.

The future impacts of IoT came out to be the service and product suppliers under IoT can earn more revenue in the upcoming years, can estimate business – to business in retail and tourism industries and drive more business excellence and through customer satisfaction and organizational performance which was agreed by many of the respondents. Maximum were of the view that IoT can change the customer service into a smarter way by meeting the customer demands effectively.

The results from the analysis exhibited that the all the hypothesis accepted were the null hypothesis except the fourth hypothesis. The null hypothesis states that "IoT benefits in increasing connection between the customers and suppliers and solve queries in the retail and tourism industries", "firms cannot integrate analytics, sensing and automated control on the business models", "IoT helps in proper analysis and monitoring of the products till it reaches the customers", "on the receivable of sensor data through the cloud, the firms may face several issues", "due to GPS system, the customers can avoid traffic and travel through alternative routes", and " the managers can extract data and understand the demands for innovations".

The fourth hypothesis was the only hypothesis which accepted was the alternative one stating that "there rises a security and data governance issue when IoT connects physical environment to cloud".

Future Recommendations

1. This technology can be applied for the further development of highly advanced large scale wireless sensor network for enhanced security.
2. This technology can also be applied for developing smart grid and metering services for the Hospitality and Tourism Industry.
3. Smart tags can be developed for the Retail Industry for the management of logistics and vehicles.

References

1. Barnesjan, B., (2017). Coming to Carnival Cruises: A Wearable Medallion ThatRecords Your Every Whim, New York Times, January 4, 2017, Retrieved on February 11, 2017 from: www.nytimes.com/2017/01/04/business/media/coming-to-carnival-cruises-a-wearable-medallion-that-records-your-every-whim.html? r=0.
2. Chui, M., Löffler, M., Roberts, R., (2010). The Internet of Things, McKinsey Quarterly, March 2010, Retrieved from: www.mckinsey.com/industries/high-tech/our-insights/the-internet-of-things on February 7, 2017.
3. Disney, 2017a. Unlock the Magic with Your Magic Band or Card. Retrieved onFebruary 7, 2017 from: https://disneyworld.disney.go.com/plan/my-disney-experience/bands-cards/.
4. Disney, 2017b. Magic Bands& Cards −Frequently Asked Questions. Retrieved on February 7, 2017 from: https://disneyworld.disney.go.com/faq/bands-cards/understanding-magic-band/.
5. Mann, J., (2015). The Internet of Things: Opportunities and Applications across Industries, International Institute for Analytics, Enterprise Research Service, December 2015. Retrieved on February 4, 2017 from: www.sas.com/content/dam/SAS/en us/doc/research2/iia-internet-of-things-108110.pdf.
6. Morgan, J., (2014). A Simple Explanation of the Internet of Things (Retrieved on February 7, 2017 from:)www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#6dd049376828.
7. Rouse, M., Wigmore, I., (2017). Internet of Things (IoT) (Retrieved on February 7,2017 from:)http://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT.
8. Croslin, B., (2015). Disney's $1 Billion Bet on a Magical Wristband (Retrieved onFebuaray, 7 2017 from: www.wired.com/2015/03/disney-magicband.

9. Gao, L., & Bai, X. (2014). An empirical study on continuance intention of mobile social networkingservices: Integrating the IS success model, network externalities and flow theory. Asia PacificJournal of Marketing and Logistics, 26(2), 168–189. doi:10.1108/APJML-07-2013-0086.
10. Hoffman, D. L., & Novak, T. P. (2015). Emergent experience and the connected consumer in the smarthome assemblage and the Internet of things. The Center for the Connected Consumer; TheGeorge Washington University School of Business. doi:10.2139/ssrn.2648786.
11. Girish, D. (2016), 4 Innovative Internet of things examples in retail. Retrieved May 10, 2015, fromhttp://blog.beaconstac.com/2015/10/4-innovative-internet-of-things-examples-in-retail.
12. Gregory, J. (2015). The Internet of things: Revolutionizing the retail industry. Accenture Strategy.Retrieved March 28, 2016, from https://www.accenture.com/_acnmedia/Accenture/Conversion Assets/DotCom/Documents/Global/PDF/Dualpub_14/Accenture-The-Internet-Of-Things.pdf.
13. Chen, C.-C, (2014). RFID-based intelligent shopping environment: A comprehensive evaluation framework with neural computing approach. Neural *Computing and Applications, 25(7–8),* 1685–1697. doi:10.1007/s00521-014-1652-7.
14. Madhani, P. M. (2015). Enhancing customer lifetime value in fast fashion retailing with RFID initiatives. *International Journal of Business and Globalisation, 15(2),* 205–237. doi:10.1504/IJBG.2015.071171.
15. Pantano, E., & Timmermans, H. (2014). What is smart for retailing? Procedia EnvirWhitmore, A., Agarwal, A., & Xu, D. L. (2015). The Internet of things—A survey of topics and trends. *Information Systems Frontiers, 17(2),* 261–274. doi:10.1007/s10796-014-9489-2onmental Sciences,22, 101–107. doi:10.1016/j.proenv.2014.11.010.
16. Evanschitzky, H., Iyer, G. R., Pillai, K. G., Kenning, P., &Schütte, R. (2015). Consumer trial, continuoususe, and economic benefits of a retail service innovation: The case of the personal shoppingassistant. *Journal of Product Innovation Management, 32(3),* 459–475. doi:10.1111/jpim.12241.
17. Ashton, K. (2009). That “Internet of Things” Thing, *RFID Journal,22*(7), 97-114.
18. Yang, B. (2011). Smart City Connotation and Prospect in China. *China's Urban Planning and Construction Peak Forum,* 1-5.
19. Wang, S., Xing, X., & Li, W. (2010). Ubiquitous Network Service Architecture, Standards and Key Technical Problems. *Communication Technologies and Standards,1*, 44-48.
20. MacKay, K., & Vogt, C. (2012). Information Technology in Everyday and Vacation Contexts. *Annals of Tourism Research, 39*(3), 1380-1401.
21. McCartney, G., Butler, R., & Bennett, M. (2008).A Strategic Use of the Communication Mix in the Destination Image-Formation Process. *Journal of Travel Research, 47*(2), 183-196.
22. Yang Guo, Hongbo Liu, Yi Chai, The embedding convergence of smart cities and tourism internet of things in China, an advance perspective,*Advances in Hospitality and Tourism Research (AHTR),* 2(1): 54-69, 2014.
23. Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science, 36(1),* 1–10. doi:10.1007/s11747-007-0069-6.
24. Vargo, S. L., &Lusch, R. F. (2016). Institutions and axioms: An extension and update of servicedominantlogic. *Journal of the Academy of Marketing Science, 44(1),* 5–23. doi:10.1007/s11747-015-0456-3.
25. Al-Kassab, J., Blome, P., Wolfram, G., Thiesse, F., &Fleisch, E. (2011). RFID in the apparel retailindustry: A case study from GaleriaKaufh. In D. C. Ranasinghe, Q. Z. Sheng, & S. Zeadally (Eds.),Unique radio innovation for the 21st century (pp. 281–308). Berlin: Springer.
26. Huang, T. L., & Liao, S. (2014). A model of acceptance of augmented-reality interactive technology:The moderating role of cognitive innovativeness. *Electronic Commerce Research, 15(2),* 269–295.doi:10.1007/s10660-014-9163-2.

27. Pantano, E., &Servidio, R. (2012). Modelling innovative points of sales through virtual andimmersive technologies. *Journal of Retailing and Consumer Services, 19(3)*, 279–286.doi:10.1016/j.jretconser.2012.02.002.
28. Tsai, M. C., Lee, W., & Wu, H. C. (2010). Determinants of RFID adoption intention: Evidence fromTaiwanese retail chains. *Information & Management, 47(5)*, 255–261. doi:10.1016/j.im.2010.05.001.
29. Breidbach, C. F., & Maglio, P. P. (2016). Technology-enabled value co-creation: An empirical analysisof actors, resources, and practices. *Industrial Marketing Management, 56*, 73–85. doi:10.1016/j.indmarman.2016.03.011.