Scope of IoT in Business Applications for Sustainable Development in India

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Abstract. In the Digital Age, the IoT is entering many industries. It is easy to gather and analyze system data to enhance personal and professional goods. This technological transformation is revealing new IoT weaknesses, notably in business intelligence. Computer hardware, embedded system devices, networking devices, display devices, control devices, and software upgrades have helped IoT progressively promote Business Information Systems. This chapter discusses how network agility, unified Intelligence, and large-scale deployment can revive the Business Internet. It will also be discussed how the Internet of Things (IoT) will shape future business models. It is about connecting billions of devices and using many useable data to construct Business Information Systems with some practical examples. This chapter includes various instances.

Keywords: Internet of Things (IoT), Business Information System, Business Management, Smart Environment, Cloud Computing, RFID, Wireless Sensor Networks.

1 Introduction

The Internet of Things (IoT) is a network of physical objects that may be connected to the Internet [1]. These objects feature built-in technology that allows them to interact with internal states and the outside environment. When these things detect and communicate, it impacts how and where decisions are made, as well as who makes them. It is a modern wireless communication technology having applications in a variety of fields. The basic idea behind this concept is the pervasive presence around us of a variety of things or objects – such as Radio-Frequency Identification (RFID) tags, sensors, actuators, mobile phones, and so on – that can interact with each other and cooperate with their neighbours to achieve common goals through unique addressing schemes [1]. It alludes to the ever-present-expanding network of physical things with IP addresses assigned to them in terms of internet access and address, as well as the interaction that takes place between these things and other Internet-enabled devices and systems that enable few methods of decision-making for applications such as monitoring of health care,

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assembly line scheduling, and so on. In other words, The Internet of Things (IoT) is a network of networked computing devices, digital systems, machines, sensors, and objects, animals, or individuals, each with a unique identification and the capacity to send data over a network without requiring human-to-computer or human-to-human contact IoT is a type of technology that has emerged as a result of the convergence of different technologies such MEMS (micro-electromechanical systems) and wireless communication, Wireless Sensor Networks, and Mobile Communication. This disembogue has proven to exist as critical because it has resulted in the convergence of operational technology (OT) and information technology (IT) on a single platform, allowing unstructured machine-generated data to be further examined to trigger additional advances in the automated decision-making process.

The term "operational technology" refers to both hardware and software combinations that dredge up or generate change in a business by directly monitoring and/or controlling physical equipment, processes, and events [1]. It covers, among other things, the equipment, sensors, and software required for controlling and monitoring plants and machinery. On the other hand, IT incorporates all of the technology needed for information processing.

Computers are used to hoard, salvage, transfer, and, furthermore, alter information in the setting of a company or additional activity. Information technology (IT) is a subdivision of information and communication technology (ICT). In traditional systems, computers and the Internet rely on humans for information. In traditional systems, computers and the Internet rely on humans for information. The vast majority of data available on the Internet today was initially gathered and created by people, likewise at categorizing or using an extrinsic precipitate circumstance, either by some other method. The concerns include that individual have a time constraint and are sure to make mistakes while creating data, i.e., gathering Data will have inaccuracies. With fresh technological breakthroughs, the internet is growing increasingly popular and broadly accessible. The price is decreasing, alternative gadgets are coming into existence with Wi-Fi connectivity and sensors are crafted in technology, prices are decreasing, and smartphone adoption is skyrocketing. Because of these elements, the potential for IoT-based applications has reached unprecedented heights, opening up new avenues for advancement. As a result, there has been significant growth in the number of IoT applications, including healthcare, telecommunications, oil field maintenance, transportation, etc. When selecting IoT-based applications, there are a few major emphasis areas that must be considered:

- *Leveraging Ease, Connect and Scale*: Connect any asset, device, or investment that is vital and valuable in your day-to-day applications, which could also range from human-robot interaction to minimal devices throughout several architectures or operating systems. Scale effortlessly from a few to a few million devices.
- *Examine and act on vast untapped data*: Information, as well as alarms by each of you globally, linked treasures. Identify concerns in managing a diverse variety of accessible before they become operational challenges and data must be collected. Make use of the supplied data in applicable application areas. Use sophisticated to use automated reasoning to improve the dependability and your processes' endurance. Prescriptive maintenance might help you avoid costly interruptions and repairs. And, rather than focusing just on the "what" and "why" of a forecast, take proactive steps.
- *Consider the following*: Create complex dashboards and reports that may show anything from the high to the lowest layers of the protocol stack. Customize depiction so that the right people have real-time exposure to the information that matters to them.

Data and reports may be retrieved and generated out of any platform, at any anytime, and from any destination.

At the core, the Internet of Things refers to the deployment of multiple diverse apps for particular reasons, and the information from various items, machine components, as well as things being surveilled is given access to 3rd application domains. It may be used for even further continuous integration or strategy of the business.

1.1 The following are several common notions of IoT:

The Internet of Things (IoT) is a system of interconnected things that includes unique component recognition, cross-platform application cognition, actuators, and ubiquitous Internet access. The Internet of Things allows products and devices can transmit data with the maker, operator, and/or additional wearable technology through the use of the Internet's communications infrastructure. It makes it possible for objects to be somehow detected (and hence provide exact information) and remotely piloted through the Internet, enabling far more seamlessly integrating between the actual world and machine systems, leading to enhanced efficiency, precision, and economic benefit. Every item is uniquely recognized by its integrated computing platform and can interact with the existing Internet infrastructure [2].

The fundamental idea behind IoT is to securely touch any of it (e.g., solenoid valves, equipment, machinery, individuals, creatures, plants) or operations via the World wide web for surveillance and/or control. Links are not only for websites; they are also substantial and practical links that enable people to access "stuff" and seize command when necessary. As a result, connecting items is not an end goal in and of itself. However, collecting knowledge from this product to enhance products and services is not [3].

We feel that a more thorough description must include "Standards" and "Processes" that allow "Things" to include being linked via the "Internet" and can interchange "Data" employing industrial "Standards" which assure compatibility while also permitting beneficial and are mostly automated "Processes [4]."

Some organizations, such as Cisco, refer to IoT as the IoE (Internet of Everything), which consists of 4 crucial Individuals, Procedures, Electronic information, and Stuff are components. Looking at this scenario, IoE links [4]:

1. *Humans*: Bringing individuals together in more meaningful ways.

2. *Facts:* Transforming information into insight to provide recommended judgments.

3. *Procedure*: Remitting the appropriate facts to the appropriate individuals or computational machine at the appropriate rhythm.

4. *Entity:* Operational gadgets and items linked to the Wireless Communication afterward to one another for intuitive results-making, often known as IoT.

2 Literature Survey

According to Miorandi et al. (2012), Devices and sensors (or "things") are components with something like a living manifestation, computational capabilities, this same skill to be like a

piece of contact information, some processing capability, its ability to discern actual tangible anomalies, and the possibility to stimulate activities which have an impact on physical existence. The emergence of the Internet of Things (IoT) involves accelerometers, a navigation and transmission gadget, and an internet application. The IoT concept of Things (IoT) consists of various tracking and monitoring implementations that refer to the interconnection of monitoring and configuration, which can be self-configured and controlled independently through the Internet. (Li et al., 2011; Solima et al., 2016).

Gartner indicates that the number of electronic objects used in home automation would hit N1 billion in 2017, with many construction inhabitants adopting IOT-based digitalization (source: Gartner, March 2015). Future intelligent dwellings, communities, and regions will be a matrix of many "objects," such as transceivers, sophisticated pervasive computing, and monitors, including astute cloud computing. (Nam and Pardo, 2011).

IoT, an innovative Internet uprising, is fast acquiring traction because of the healthcare industry's top interdisciplinary research subject. With the introduction of several intelligent gadgets and smartphones/devices, the varied IoT-enabled gadgets are altering and updating traditional healthcare practices and a system into one that is smarter and more individualized. As a result, Today's healthcare system is recognized as the Individualized Medical System (IMS). IoT devices combined with cloud computing will allow better patient-focused diagnosis care while also lowering overall expenses owing to increased sustainability. Many attempts have been made in recent years to explore and create 'Smart Wearable Devices (SWH)' for health monitoring (Chan et al., 2012). Because of rising healthcare expenditures and recent advancements in micro and nanotechnologies, the devices used in SWH have been downsized, steadily transforming the future of the healthcare industry by offering personalized governance and regular monitoring of patient's well-being.

Bendavid et al. (2009) investigate the effects of RFID technology in a 5-tier supply chain in the galvanism industry. RFID, based on their research, makes the supply chain more intact and conjunct, witnessing coherence throughout the whole procedure. IoT enables the connection of humans, computational machines, and operations via the worldwide conjunction of wearable objects. On the client side, the supplications are such as tech homes, artificial watches, and intelligent refrigerators; on the supply side, business processes accelerating Technology adoption and paving the way for sophisticated tracking and management services optimization (BPO) with the use of modish tags and agile objects appears to be (Del Giudice, 2016). By merging intelligent equipment, expert systems, and connectivity, the Internet of Things (IoT) improves market competitiveness. Technology and science (Gubbi et al., 2013). RFID is projected to cause a secrecy invasion in consumer scenarios, but customers will approve its use when the worth it produces is adequate to overcome the risk they feel.

At the moment, this corporate strategy is still in its infancy notion, having emerged primarily in the hawk throughout the later decagon of the twentieth century. As the empirical impacts prove to be more powerful, it is garnering a rising amount of interest in the domain of scientific inquiry. Though several Description is examples of a marketing strategy, practicality, and viewpoints, are developed and implemented. However, there is no one-size-fits-all description of a business model. The market strategy is the substitution or application of the conventional business analytical process in the traditional business system [11].

As a succession of new technologies arose, particularly from the E-business system, they completely flipped all frameworks and ideas of the previous business model [12]. For example, in [13], the author methodically analyses conventional management models and builds a set of enterprise models based on Internet properties to ensure the model is appropriate for the E-business environment. The focus of the study then shifted to using the components technique to elaborate on each component portion of the management model [14]. A business plan is built on four central pillars: product innovation, infrastructure management, customer relationships, and financial aspects. However, when new technologies emerge, and market demands shift, some scientific studies concentrate on developing the foundation of the classic Economic-business model.

3 Concept Behind Technology

3.1 Monitor and Control Things

Firstly, the most basic inquiry. The essential criteria for IoT are idiosyncratic identification of "thing" (for example, an IP address), the capacity to liaise among devices (for example, wireless communications), and the capacity to perceive particular data of the object (sensors). With these three conditions, one should be capable of keeping an eye on things from anywhere on the globe. Another essential for a solid foundation is a means of communication. A telecommunications network is generally in charge of such a demand.

3.2 Need for Monitoring and Controlling

There are several reasons to monitor and operate items via the Internet remotely: continuous professional monitoring (e.g., a customer's temperature or hypertension while the client is at home); having to learn about things by indicating a device at something of intrigue, for instance; seeking for things that browsers (e.g., Google) do not currently provide (e.g., where are my car keys); enabling officials to manage things securely. All of these are instances of enormous commercial and service prospects to increase the economic effect for customers, corporations, governments, hospitals, and various other entities.

3.3 Who will be in charge of monitoring and controlling?

In general, observing and controlling IoT services may be performed by any human or computational machine. For instance, a house owner may use a mobile device to monitor his or her own house working on security software that the house owner has downloaded and set up. The house owner can also modify the lights, switch off the air conditioner, turn off the heating, etc. Another case in point is a network operator using a network operations centre to monitor and control services for its clients (NOC).

Security is a crucial concern to prevent unauthorized access and, more critically, to stop a hostile hacker from obtaining control over the system and broadcasting previous results to the house owner while a burglar tries to enter. Control zones are crucial for enterprise-sensitive applications such as patient observation in healthcare and financial appliances.

3.4 Security Guarantee?

Securing IoT is, and will continue to be, the most critical opportunity for technology businesses. Before the Internet of Things, IT reliability experts operated in a chimera since they essentially

held and managed their whole network. All gadgets were protected at the back of firewalls. Info will be captured via an outside source, generally, devices and sensing installed in local places (e.g., city, streets) with IoT, permitting individuals to communicate dangerous information to any portal. Another example is bringing your device (BYOD), in which Third-party devices, and hence non-corporate data sources, are included and permitted to access the network [4].

The following IoT areas are thought to be the most endangered:

• Information access while in transit (security of networks and transportation). Information will be transferred continually in IoT networks, for illustration, from senses to access points and from processors to corporate data centres, or from sensing to convergent boundaries for supported accommodation such as television from such a household tracking system to the landlord's smartphones while he's still in a coffee house. The man in the middle may sniff this data unless the transport protocols are appropriately protected and encrypted.

• Control of IoT devices (administration of APIs) allows unscrupulous parties to have complete control, including whole connections. Turning off home security cameras and hospital surveillance systems are two examples.

• Having ingress to the actual IoT data. Is the information freely incredible? Is it is encrypted while it is stored? Another issue is shared cloud storage, where individual a might come in as person B and view his information. Another typical issue is Bluetooth data spoofing. Most firms include Bluetooth capability in their gadgets, proving it more accessible for illegal individuals to use the computational device's data.

• Taking a person’s official user or networking identity (theft user or network credentials). Many websites offer supplier user passwords.

4 Present Applications

Among various applications in the present scenario some of the possible applications are listed below in the above context:

1. Smart Home

IoT enables the establishment of home automation by regulating appliances, power and gas use, burglar alarms, crisis recognition, as well as other related applications.

2. Intelligent Teaching Infrastructure:

College graduate and faculty registration, lecture hall and exam arena monitoring, bookshop tracking, lab equipment recognition, school safety, and emergency warning are all just a couple of minor uses that may be available and be included in an innovative educational environment.

3. Smart Health Care:

The Internet of Things (IoT) will allow existing applications in different fields of health care. Patient health monitoring, doctors, employees, and diagnosis are just a few of the applications in this area.

4. Smart Security and Emergency:

A few of the technologies utilized in safety and crises include surveillance of people, places, and moveable and immutable possessions, pinpointing odd utensils and persons, and exigency vigilant through guarding.

5. Smart Agricultural and Whether Monitoring:

A range of sensors in agriculture form will sense data such as water consumption level, animal alerting service, soil condition based on fertilizers, and crop status monitoring, to name a few applications invented in the agriculture sector [5].

6. Smart Traffic Surveillance:

The Internet of Things (IoT) can follow cars using RFID tags and detectors. Screening of automobiles that break traffic regulations, urgent care identity and alarm, pavement condition warnings, posted speed notifications, zone management, space registration, and no parking forewarning are a few applications that may be employed [5].

7. Smart Disaster and Emergency Predictor:

With the aid of simulators, the sensors will notify calamities such as fire and various natural calamities such as landslides, earthquakes, and floods. Some possible uses are emergency alerts, ambulance alerts, and SoS alerts.

8. Intelligent Corporate Management:

Sensors and RFID tags installed in the business environment will make it run more efficiently. Inventory control, products, and commodities identification, purchase or sales billing, business surveillance, customer identification, and business venues such as shops, malls, and hotel identifications alerts are just a few examples of business applications.

9. Smart Banking System:

Banking System is a large area with much support for bunches. Several supplications may be used to prove the bank system industry is more refined than the previous system. Customer recognition, transaction alerts, certainty alerts, e-services, ATM location, RFID-enabled debit and credit cards, smart cheque and insisting draught favour, and Fingerprint business cards are available for usage at PoS are some of the additional applications brought to the banking management industry by IoT.

10. Intelligent Municipal Distribution Mechanism:

With the aid of the IoT environment, it may be able to regulate the public distribution system. RFID-integrated Ration Cards, Person's identity, stock observant, reliability tracking, Human vigilance for product delivery, intelligent billing, and quality control estimations are a few examples of PDS uses.

5 The Internet of Things in the Corporate Environment

IoT devices collect and send bytes to track critical operations, provide current leads, boost accuracy, and allow businesses to make educated choices. Businesses would not have to depend

on them for projections since they may see what will occur in real-time. IoT may be utilized in a market to help Technological Transition in several ways [6].

1. Obtaining company information and customer experience across sectors via linked devices to better understand merchandising functioning to see the consumers utilize their goods or services.

2. Lessen expenses and unavailability by obtaining current data on the production system in plants or other manufacturing sites utilizing tabs, AR truly wireless earphones (TWS), tech goggles, and other networked equipment.

3. You may improve efficiency and productivity by integrating critical company operations.

4. Asset monitoring and waste reduction based on real-time or near-real-time process flow and material consumption data.

5. Developing new business models due to readily available information on fulfilling or failing to satisfy client demands and criteria.

IoT also helps enterprises to abandon traditional corporate paradigms and move toward additional income sources. The information acquired is frequently precious in and of itself, permitting clients to be given facilities depending upon the kind of product connections and frequently offsetting the original cost of admission.

5.1 Impact of the Internet of Things on Corporate Business in India

According to IoT Analytics statistics, worldwide payout on corporate Internet of Things (IoT) increased around 12.1 percent ($128.9 billion) between 2019 and 2020. Furthermore, this analysis predicts that worldwide IoT spending will expand at a 226.7 percent annual pace after the year 2021. Proven to be such a demanding trend, implementing IoT towards corporate operations might show critical signs for driving business modifications in the year 2022. This notion has been issued to assist organizations in recording data, increasing the outcome of operational productivity, and making well precise and deliberate resolutions [7].

According to recent predictions, around 1 trillion IoT devices may come into existence in the world by 2035. On the reports, the IoT market is supposed to reach $520 billion by the end of the year 2021. To join this modification, people must first grasp the five ways IoT will change the market in 2022.

5.2 Decent Business Analysis

If in production or agriculture, IoT improves businesses by enabling better business insights through findings in instantaneously collecting. Due to the aid of linked Computational devices like cameras, GPS trackers, and mobile devices, businesses now see a more significant flood of real-time data. IoT solutions may incorporate a variety of such devices, providing enterprises with continuous visibility into their business activities. Furthermore, an IoT network might integrate Enterprise.

Resource Planning (ERP) software, which may serve as a data and information warehouse and aid in tactical business choices [10].

For instance, putting IoT-enabled devices into a farming firm specializing in animal husbandry would dramatically enhance various ingredients. Reduced animal upkeep expenses might result in a business shift for such a company. Putting cameras, sensor detectors, pandemonium discoverers, and heat detectors in livestock shelters may substantially assist in tracking cattle movement patterns and health issues. It has the potential to enable ranchers to respond swiftly to cattle health issues.

5.3 Enhanced Client Service

One of the most visible ways in which IoT may affect consumer happenings quickly is through boosting data inputs from customers themselves. Companies may now create more intuitive customer experiences by continually monitoring client activities and reactions via different IoT-enabled devices. Furthermore, booming technologies like artificial intelligence (AI) and machine learning (ML) have aided in the commercialization of such massive data. Amazon's IoT ecosystem, which includes interfaces such as the Echo, Echo Dot, and Alexa, is one of the most well-known examples of this.

Amazon Web Services (AWS) has its particular own cloud-based systems that own and access such real-time data and information generated by IoT devices and machines. AWS employs cloud Computing storage to create better customer experiences since it is freely available through the internet and does not require a physical location. Furthermore, Amazon's powerful AI and ML software examine this data to provide personalized networked purchasing events to its consumers.

5.4 Price and Leisure Time Savings

Consider a scene in which a critical part of paraphernalia in a production plant fails, and it takes days to trace down and diagnose the cause. This may lead to a significant monetary dropping and days, if not limited to the period, of downtime. Because IoT has invaded various humongous industrial businesses, free time due to such equipment failures will be greatly reduced by 2022. Businesses will be able to monitor the health of industrial equipment over the internet in 2022 thanks to IoT solution providers such as SAP [8].

Samsung has been incorporating IoT-enabled temperature devices, toing and froing trackers, and a variety of other articles health sensors into their smart factories driven by 5G since 2020. With the introduction of Industry 4.0 technologies in 2022, such IoT applications are expected to grow fast. Industry 4.0 (also known as the Fourth Industrial Revolution) is coined by self-driving machines linked through the Industrialization of the Internet of Things (IoT). As a result, the year 2022 will see unwrinkled adaptation to independent industrial impediments interacting through IoT systems.

5.5 Expanding Performance and Efficiency

On the report of studies, usage of IoT in the integration of various sects of a company is being expected to result in a massive $154 million income gain. Because IoT-enabled Computational devices give continuous real-time on-the-spot data and information on the environment within a plant or even all thru the distribution network, identifying snags in company operations has become easier. While this improves operating efficiency, it also improves productivity by allowing for significant automation. As a result of IoT connection, organizations are expected to have greater productivity in 2022.

Valencia Automobile Auto Plant in Spain is owned by Ford, which demonstrates an intriguing approach to IoT in aiding workforce performance and productivity. Workers at this facility wear a bodysuit with Locator for activity and physical examination embedded in it. The data in real-time acquired by such swimsuits is utilized to provide workplaces with reliable and as well as effective for employees.

5.6 Procurement

Because a chain of supplies involves the resources of natural resources as well as the delivery of completed items, there is always the possibility of things going missing throughout the vast line of activity. Monitoring products (commonly known as assets) may be a very time-consuming task for warehouses and logistics partners. Companies can decrease overhead expenses associated with missing assets by utilizing technology such as RFID and GPS tracking of each item. These trackers are linked within a broader connection, and it gets difficult for businesses to maintain track of their virtue as they show sharp increases and decreases in the supply chain.

Whilst firms such as Siemens have used these IoT technologies to help with benefit observation and Mapping, SAP's Enterprise Resource Planning (ERP) system might help with inventory management in general. ERP software aids in the synchronization of data and information across all areas of a business, allowing for greater efficiency and production. SAP, a provider of corporate resource planning software, has allowed enterprises to access the new world of IoT [8].

6 Discussion on Future Perspective of the Internet of Things

As the Internet environment evolves at a rapid speed, the entire globe is moving toward IoT, which is going to have a significant influence on our daily routines in the next coming months and years. Computers, laptops, smartphones, and tablets are no longer the only devices that can connect to the internet; there will soon be a plethora of smart gadgets that can connect to the internet as well as each other. Starting with domestic items such as refrigerators, microwave ovens, and doors and progressing to large industrial gear. Everything will become intelligent. Some analysts refer to it as the 'Next Digital Revolution,' while others refer to it as the 'Next Generation of Internet.' IoT has a lot of potential in the future. It is projected that about 50 billion people will be linked [9].

IoT demonstrates a broad reach since it offers organizations a unique chance to transform data into insights. There are a variety of other variables driving IoT adoption, such as enhanced sensors, device connectivity, lifestyle development, and mobility. The following are some IoT predictions that will come true in the future years.

For some years, the business intelligence sector has been studying IoT growth. In the next five years, it is expected that about USD 6 trillion will be spent on IoT solutions. Businesses will embrace IoT solutions at a somewhat quicker pace than other industries. Following such tactics will provide them with the following benefits:

- Increased productivity
- Lowering operational expenses

• The government will also be interested in these approaches, which enhance the standard of living of people. They are estimated to be the second in importance of users of such systems.

7 Result

IoT simplifies corporate activities such as inventory tracking and administration. This is easily accomplished by simply putting IoT software and devices in warehouses and storage facilities. Personnel may focus on cognitively demanding jobs with IoT in place to manage inventories. IoT devices capture and send data to manage important parameters operations, fresh insights, higher productivity, and the ability for enterprises to make more informed and precise conclusions. They inform institutions about what is going on and occurring instead of whatever they imagine or expect will occur. As firms acquire more data from customers, IoT enables them to better promote their products and services. This data is significant because it gives insights into customer behaviour, making it simpler to successfully promote products/services.

8 Conclusion

The Internet of Things has profoundly changed the way we live communicate, play, and work, but its complete capability has yet to be realized. The overwhelming power of this technological behemoth will be completely realized when technology has an influence on people's lives at all times. It will alter people's attitudes regarding the usage of technology, and the resulting ripple

effect will domesticate IoT. Devices are being manufactured by corporate actors, firms are developing new applications, technocrats are developing new technologies and protocols, and users are utilizing IoT solutions and services. The Internet of Things (IoT) is commonly regarded as a unique paradigm capable of profoundly transforming the commercial and development industries. It allows for the seamless integration of numerous production equipment capable of detecting, classification, computing, transmission, actuation, and network in light of this fully clever machine-to-machine integration world. It allows for the creation of entirely new businesses and market potential.

References

[1] Daiwat A. Vyas, Dvijesh Bhatt, Dhaval Jha, IoT: Trends, Challenges and Future Scope, Volume 7- Number 1 Sept 2015 – March 2016 pp.186-197, IJCSC

[2] L. Atzori, A. Iera, G. Morabito, The Internet of Things: A survey, Computer Networks 54 (2010) 2787–2805.

[3] H. Sundmaeker, P. Guillemin, P. Friess, S. Woelfflé, Vision and challenges for realising the Internet of Things, Cluster of European Research Projects on the Internet of Things - CERP IoT, 2010

[4] Springer Nature Switzerland AG 2019 1 A. Rayes, S. Salam, Internet of Things From Hype to Reality.

[5] Vimal Jerald A., Albert Rabara S., Daisy Premial Bai T., Internet of Things (IoT) based Smart Environment integrating various Business Applications, International Journal of Computer Applications (0975-8887), Volume 128- No.8, October 2015.

[6] Martin Hudik, Gabriel Koman, Jorma Jaako Imppola and Josef Vodak, Use of Internet of Things in the Business Environment to Smart Business, LOGI- Scientific Journal on Transport and Logistics, Vol. 10, No. 2, 2019, DOI: 10.2478/logi-2019-0014

[7] Sheshadri Chatterjee, Internet of Things and Social Platforms: an empirical analysis from Indian consumer behavioural perspective., Taylor & Francis online, DOI /10.1080/0144929X.2019.1587001.

[8] M. Aabid A Majeed, Thashika D Rupasinghe, Internet of Things (IoT) Embedded Future Supply Chains for Industry 4.0: An Assessment from ERP-based Fashion Apparel and Footwear Industry, International Journal Supply Chain Management, Vol. 6, No. 1, March 2017.

[9] Jayavardhana Gubbi, Rajkumar Buyya, Slaven Marusic, a Marimuthu Palaniswamia, Internet of Things (IoT): A Vision, Architectural Elements, and Future Directions.

[10] Scheer, A., Cameron, I.: Architecture of integrated information systems: foundations of enterprise modelling. Springer, Heidelberg (1992).

[11] Amit R, Zott C (2000) Value drivers of e-commerce business models[M] INSEAD.

[12] Chesbrough H, Rosenbloom RS (2002) The role of the business model in capturing value from innovation: evidence rom Xerox Corporation's technology spinoff companies[J]. Ind Corp Chang 11(3):529–555

[13] Timmers P (1998) Business models for electronic markets[J]. Electron Mark 8(2):3–8.

[14] Osterwalder A, Pigneur Y An e-business model ontology for modeling e-business[C]//15th Bled electronic commerce conference. Bled, Slovenia, 2002:17–19.

[15] Peilu-Feng*, Hohhot Minzu College, Hohhot 010051, China, Big Data Analysis of E Commerce Based on Internet of Things.

[16] A Conceptual Data Model and its Automatic Implementation for IoT-Based Business Intelligence Applications, Julian Eduardo Plazas, Sandro Bimonte, Christophe de Vaulx, Michel Schneider, Quang-Duy Nguyen, Jean-Pierre Chanet, Hongling Shi, Kun Mean Hou, and Juan Carlos Corrales.

[17] Martin Húdik1, Gabriel Koman1, Jorma Jaakko Imppola2 and Josef Vodák1, Use of the Internet of Things in the Business Environment to Smart Business, LOGI – Scientific Journal on Transport and Logistics Vol. 10 No. 2 2019 DOI: 10.2478/logi-2019-0014