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Digital Business : Internet of Things (IoT) as Challenges and Opportunities

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Abstract

The research brings to light some formidable challenges as well as the exciting opportunities highlighted by the Internet of Things (IoT) in the present era. The initial segment furnishes an outline on the manner of the linkage between the virtual and the material objects. This segment outlines the framework of the Internet of Things (IoT). The other segment focuses on the opportunities that the Internet of Things (IoT) outlines in the diverse industries. These opportunities include the areas of public sector, manufacturing, energy and utilities, healthcare as well as transportation. As observed, there was augmentation in the new opportunities in every sector, including cost reduction and proficiency. The third segment of the research highlights the framework of the major challenges created by the Internet of Things (IoT), like constraints in linkage, lack of satisfactory standards, compromised privacy and security, problems in analytics of data and algorithmic hitches. A literature review was also made, and it brought to light the nature of initial introduction as well as the significance of the Internet of Things (IoT), along with some positive feedback for the maximum utilization of the utilities. The final segment contemplates on the ideas of the practice and learning of the Internet of things (IoT).

Keywords : challenges, opportunities, linkage, proficiency and standards

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Introduction

We are aware that the Internet of things (IoT) comprises of confirmed matrix of material things, that are implanted in diverse gadgets, as electronic devices, sensors, as well as software systems, in certain linked networks. The linkage of the networks authorizes the material objects to garner and make collection of the data. The Internet of Things (IoT) has made it possible to make the linkage of the material and virtual data. The Internet of Things (IoT) has also permitted the controlling and sensing of things in a remote fashion, while those are present on the available linking framework. As it was established, the systems that were based on computers and the physical objects, have peaked the maximum level of linkage, that provided diverse benefits. The researchers had publicized the basic idea of the Internet of Things (IoT). The necessary framework for the Internet of Things (IoT) is the radio-frequency identification (RFID). This technology provided the basic requirement of the Internet of Things (IoT). The radio-frequency identification (RFID) also has a significant function in the centers of auto-recognition.

Objective of Research

The objective of the research is to highlight the challenges posed and the opportunities made by the Internet of Things (IoT) in digital business.

Methodology

The acquiring and the execution of the latest technology involve unreliability and threat into the environment of digital business. To compete effectively in the market, with international competitors, in this era of competition, the digital businesses need to use innovative as well as smart tools and techniques, The Internet of Things (IoT) enhances the capability as well as the potential of the diverse activities of digital business for attaining the goals of the digital business, that are generally decided in advance, by furnishing the required support. When the digital business acquires and executes the Internet of Things (IoT), and initiates the digital business function, it needs to take

into consideration the additional requirement of the advantages of the basic software and hardware. This again necessitates the presence of experts of technology and a larger amount of financial support, for the complete usage of the available technologies as well as applications. A diverse set of building blocks could be utilized for initiating the process, and making the process ready for utilization. In the recent past, the Internet of Things (IoT) had laid a considerable impression on several features of human life, that included the areas of workplaces, educational institutions, residences, digital businesses, agricultural environments, hospitals as well as healthcare facilities. The innovation as well as technological progress brought into effect, quick convergences and changes in the areas of digital transmission systems, digital electronics technology, wireless, micro-electric mechanical systems, along with the introductions of the Internet of Things (IoT). The progress and the innovation of the technology, have posed several challenges to the present generation. The introduction of the new technologies and the global competition have caused the Internet of Things (IoT) to play an important part in economic prosperity, social welfare, digital business activities as well as environmental protection. Every digital business competes hard to win several customers in the shortest possible time, and incurring the lowest possible expenditure. This practice becomes successful only if the digital businesses utilize the advanced technology and the Internet of Things (IoT). The digital businesses need to conduct the accurate usage of the advanced technology, separate strategic planning, in every aspect of the digital business operation to remain globally competitive. The result would bring success in the long run, and the digital businesses would earn the well-deserved profit. This proves that the digital businesses need to focus on the innovative and progressive technologies to augment their competitiveness in the global market. The Internet of Things (IoT) is an absolutely essential and new technology for the digital business to formulate their policies. The new technology has opened several windows for reaping advantages for revenue augmentation, operational efficiencies, and cost-effectiveness. Several pieces of literature are also available about the challenges and complications posed by the Internet of Things (IoT) in the management of digital businesses.

The researchers had noted that the basic idea of the Internet of Things (IoT) was to have the identifiers for every material thing and connect the same to a certain linked framework, that provided

the feasibility for computers to detect and regulate the things as closely as possible. The other observation that was focused was the identifying of the objects to near-field communication, barcodes as well as digital watermarking. In the present era, diverse applications of the Internet of Things (IoT) have come to light. Specifically, the Internet of Things (IoT) depends on the supporting progress of the technology that cause the various skills, having the ability, to shut the opening between the virtual and the physical objects. Some of the common abilities that could be mentioned are localization, identification, linking, cooperation and sensing, that are responsible for obstructing user interfaces and data processes. The Internet of Things (IoT) is normally heavily dependent on radio-frequency identification (RFID) for the sensors of garnering data and the processes of recognition.

The sensors have the ability to make a quick recognition of the changes, that were registered by the physical things. The factor of analytic importance is smart technology, in the Internet of Things (IoT), as it makes transfers of the potentials of processing to the numerous segments of the linking framework. Small objects are authorized by another technical feature, namely, nanotechnology, for the demonstrating of the linkage to the matrix. The understanding of the outline of the Internet of Things (IoT), is also of analytic significance, before exposing the possible outcomes, that it brings to focus. The Internet of Things (IoT) is required to have a vast matrix that amalgamates the varying devices with computers, with a form of linking that is used for radio-frequency identifiers (RFID) or wireless matrices. The function of the identifying of objects, that use the radio-frequency identification (RFID), normally happen only in real-time. The devices of the Internet of Things (IoT), like sensors, have the potential to load the project data as well as various things, related to the physical alterations of the thing. Through the specialized technology, known as Nanotechnology, smaller things have profited the position to become a segment of the huge matrix.

The Internet of Things (IoT) has different layers, that have diverse potential. The bottom layer provides the raw data without requiring any explanation. The second layer provides data that are applicable to queries, as ‘what’, ‘who’, ‘where’ and ‘when’. The third layer addresses the awareness, and answers the queries on ‘how’. The fourth layer augments the level of perception by answering

the questions on ‘why’. The highest layer constitutes the sagacity, and that is due to the assessed comprehension. It is of vital importance to establish that the gadgets, that are connected to a specific matrix ascertains the real capability of the Internet of Things (IoT). It is feasible to execute the isolated and simple observation, and receive raw information through the technology of instrumentation. Further advanced and isolated observation furnish illustrations, as well as outline through the fusion of data. Computerized failure observation utilizes the power of intuition to project the links and the designs through a detailed study of the batch. Anticipatory maintenance plays the part of prediction by the making of forecasts, utilizing online study and prognosis. In the end, independent adjustment is primarily responsible for providing the awareness by initiating the connection of cause and effect through implanted analytics. The layers play the role of the numerous possibilities that are provided by the Internet of Things (IoT).

Discussion and Findings

The study has apprised the significance of the Internet of Things (IoT) in the present age. The new potential to link the physical and the virtual links, is being utilized in diverse sectors. The Internet of Things (IoT) has begun to metamorphose the diverse industries in the present economy. The segment of manufacturing has adopted the Internet of Things (IoT) ahead of the others. The other segments of the industries include the entertainment and media, transportation, home monitoring, hospitality, public sector, smart cities, healthcare as well as energy and utilities. In the segment of manufacturing, new smart products have started making their appearances, using the Internet of Things (IoT). This segment depends on the Internet of Things (IoT), utilizing simple and isolated observations, as well as advanced detections. The reason for executing the process of continuous observation is for the practical tracing of every asset, including raw materials as well as stock. The machineries with implanted sensors, help in making smooth observation of the machineries of diverse types, and immediately identify any snag in the machine. The sensors, in general, make an augmentation of the level of accuracy, while making an in-depth study of the results. The amalgamation of the information, obtained from diverse sensors, permit the in-depth study, of the information, that brings satisfactory results. The productivity of the manufacturers has been augmented by the use of the

sensors to diagnose any snag or failure and make the resolution before the production is hampered. So it is observed that the Internet of Things (IoT) permits the manufacturers to create systems, that are highly sustainable, making the process cost-effective, minimizing the requirement of human intervention, and making drastic reduction of wastage. The study further highlighted that in the sectors of transportation as well as distribution, diverse opportunities are generated by the Internet of Things (IoT). The development of intelligent vehicles with a large number of sensors, proved to be a major breakthrough in the sector of transportation. The introduction of smart transportation has become materiality in the present age. The linking of vehicle to vehicle, closely observed process of navigation, fleet management, flexible control of driving, planning of trips, collection of taxes, multimodal transmission, assistance for travel, systems of safety, data for passengers, as well as signals of traffic, pose the opportunities in smart transportation. The study also observed that there are innovative probabilities for the growth of linked vehicles through telematics, diagnostics, videos as well as audios. There is positive potential for the advancement of safety on the roads, through innovative vehicles of safety, that have a variety of sensors, that provide the signal to the driver, of unforeseen alterations or snags in the vehicle, that affect the serviceability, or could cause an accident. The sensors are utilized to put a stop to all untoward events, that are linked with the vehicles. There is also the potential to make an in-depth comprehension regarding the utilization of the cars, with the help of the sensors. The introduction of driver-less vehicles is an innovation of the recent past. The utilization of the Internet of Things (IoT) in the transportation sector has led to augmented sustainability, more speedy distribution system, and reduction in the cost of fuel.

The segment of the energy and utility focused on the Internet of Things (IoT) is augmenting the lifecycle of the framework of electricity. Furthermore, the energy sector has focused telematics as a significant implementation of the Internet of Things (IoT). Smart meters are already being utilized for isolated monitoring in some parts of the world. The meters that were manually operated, failed to meet the required limits accuracy, and provided the valid reason to the energy sector for the switching to smart meters. The isolated observations provided the information, for the complete knowledge regarding the potential, supply as well as demand, providing the prediction, regarding the resolving of the issue of the meeting of the demands and the supplies. There was the potential of

making the recommendation of the utilization of the process of batch analysis, for the saving of energy. As far as the public sector is concerned, a higher level of productivity and efficiency could be recorded, in the delivery of service, for the extensive usage of the Internet of Things (IoT). Due to the extensive participation, in the Internet of Things (IoT), more help could be provided for the progress of the framework of protection and setting up the systems of the control of crimes. The leaders of the municipalities had the provision of developing the detection of the monitoring systems for communities and make progress for the development of the measures of safety. The Internet of Things (IoT) provided the potential for the continuous observation of the issues related to parking slots, increased costs of municipal energy, as well as overcrowding. It was further observed that the Internet of Things (IoT) had brought about the much desired alterations in the sector of healthcare, and had the capacity to generate innovative features in the time ahead. There is every provision to execute the real-time observations in the matters of alterations in the physiology of the human body and metamorphose, with the linked sensors, the delivery of service. The research further focuses that the usage of smart machines with sensors, in the various departments of the hospitals, could be a boon for the patients, as they could be under continuous observation. The surgeons in the sector of healthcare, could utilize the Internet of Things (IoT), for the usage of robotics for executing the surgeries, from remote locations. The availability of the Internet of Things (IoT), could make the diagnostics in the hospitals a simpler process. Similarly, there are other features in the Internet of Things (IoT), like smart management of traffic, more efficient monitoring of frameworks, intelligent buildings, developing of smart phones, smart tracking of drug and food, warning of natural disaster, smart economy in breeding and agriculture, and smart systems of the emergency response. These features highlight the Internet of Things (IoT), as having valuable potential, in all the aspects of our lives.

The research highlights that the greatest challenge posed by the Internet of Things (IoT) is privacy and security of the gadgets and the devices of the Internet of Things (IoT). The linking of the physical and the virtual objects is the source of the danger to the security of the gadgets of the Internet of Things (IoT). The design of the majority of the bases of the codes did not pay the required attention to the security of the Internet of Things (IoT). The linking to the open matrix is thus proved

to be endangered due to the cyber attacks and hackers. Much concerns were raised about the augmented linkage between the physical and the virtual object, as the same could cause the breach of privacy to the participants and compromise the privacy. The dangers to privacy, associated with the Internet of Things (IoT), have been highlighted well by the researches. With the diverse implementations of the Internet of Things (IoT), the challenges posed by the technology has turned to be real-life. The comprehension of the data garnered through diverse sensors, establish the necessity of the expertise. A level of standardization of the process has posed to be a major issue, and need immediate resolution. The requirement of the porting of the existing bases of codes and making certain of their operation under all adverse conditions, in the diverse linked environment, needs the technical expertise of the apex level. The challenges posed by the algorithms, get focused when single sensors garner huge sizes of data. The successful analyses of the data become difficult if the batches of the data are large in number. The analyses of the distributed data, require that experts of the technology, initiate the required technology, for the analyses of the data, that were remaining unassessed. The effective utilization of the cloud computing and the diverse centers of the data, require different storage devices, for the successful distribution of the data. For the analyses of the streaming data, there is the essential requirement of the proper algorithms. Another major challenge posed in the environment of the Internet of Things (IoT) is the constraint posed in the transmission of data. The gadgets are unable to make successful transmission and there could be constraints with the bandwidth that could pose further analytical challenges. Further expenses are augmented due to the high cost of the maintenance of the transmission systems. The complexity of the supply of power and software issues need to be addressed with priority for the execution of the operations in the environment of the Internet of things (IoT).

The paper has highlighted the salient features of the Internet of Things (IoT), and augmented the closeness of the innovated opportunities in digital business, explaining the utilization of the Internet of Things (IoT), in the processes of the garnering of data, the analyses of the data, and the presentation of the data as well as the understanding of the digital business. The paper also projects the six-stage model for the reflection of learning from experiences. The six-stage model comprises of descriptions, feeling, evaluations, analyses, conclusion and action plan. The paper also introduced

several innovative ideas of the applications of digital business. The Internet of Things (IoT) is one such idea. The several linking implementations of the Internet of Things (IoT) had linked the physical and virtual objects. The evaluation process has brought to light the several benefits of the Internet of Things (IoT). The progress of technology has metamorphosed the society in general, and showed the world the linking of the various devices and the objects. The potential to set up an authentic tracking and observation system, and obtain a deep understanding of the environment of the Internet of Things (IoT) is one of the salient features of the research. The several implementations of digital business are exposed in the study, that provides the confirmation of a changing world. These implementations introduce processes for making the digital business cost-effective, and how the benefits in every sector could be maximized with the digital applications and the environment of the Internet of Things (IoT). The continuing progress of technology, and the utilizations of the available digital applications with investment in modern technology, could richly benefit the digital businesses.

The digital businesses could augment the level of efficiency as well as reduce the costs of operation, for the delivery of service, with the assistance of the Internet of Things (IoT). Research is needed to be undertaken in every sector, for ascertaining the possible applications of the Internet of things (IoT). This research helped to determine every possibility of benefit that could be provided by the Internet of Things (IoT), as well as the possible challenges that could be faced by the digital businesses, during the utilization of the digital applications. This purpose requires the need to increase the advantages of the Internet of Things (IoT), and improve the strategies for the addressing of the adverse conditions. An in-depth research on the addressing of the challenges posed by technology, and associated with the digital businesses, is absolutely essential.

Conclusion and Future Scope of Research

The Internet of Things (IoT) is one of the greatest innovations of the present era, and the managerial forecasts predict that a huge number of devices, would have the linkage to the internet in a very short time. The researchers need to focus on the leading challenges, related to the Internet of Things (IoT) for the augmentation of the benefits. Privacy and the security remain the major concerns that need

to be addressed on priority. The absence of regularization of the norms as well as the upcoming threats to digital business, need to be the focus of further research. The digital implementations of the Internet of Things (IoT) would be enhanced in the coming days, and this would permit the digital businesses to meet all the requirements of the customers, as well as record the cost-effectiveness and the efficiency.

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References

1. Angelova, N., Kiryakova, G., & Yardonova, L. (2017). The Great Impact of Internet of Things on Business. *Trukia Journal of Sciences*, 15(1), 406-412. <https://doi.org/10.15547/tjs.2017.s.01.068>
2. Attaran, M. (2017). The Internet of Things : Limitless Opportunities for Business and Society. *Journal of Strategic Innovation and Sustainability*, Vol. 12(1), 11.
3. Barman, A., & Das, M. K. (2018). Internet of Things (IoT) as the Future Smart Solutions to HRM.
4. Brous, P., Janssen, M., & Herder, P. (2020). The Dual Effects of the Internet of Things (IoT) : A Systematic Review of the Benefits and Risks of IoT Adoption by Organizations. *International Journal of Information Management*, 51, 101952, <https://doi.org/10.1016/j.ijinfomgt.2019.05.008>
5. Celik, F. (2016). Internet of Things as a Source of Future Marketing Tools (Bachelor's Thesis, University of Twente).
6. Chan, H.C. (2015). Internet of Things Business Models. *Journal of Service Science and Management*, 8(04), 552. <https://doi.org/10.4236/jssm.2015.84056>

7. Ferretti, M., Schiavone, F., Al-Mashari, M. & DelGiudice, M. (2016). Internet of Things and Business Processes Redesign in Seaports. The Case of Hamburg. *Business Process Management Journal*. <https://doi.org/10.1108/BPMJ-05-2015-0079>
8. Ghouchani, B. E., Jodaki, S., Joudaki, M., Balali, A., & Rajabion, L. (2019). A Model for Examining the Role of the Internet of Things in the Development of e-business. *VINE Journal of Information and Knowledge Management Systems*.
9. Kiel, D., Arnold, C., Collisi, Matthias., & Voigt, K. I. (2016). The Impact of the Industrial Internet of Things on Established Business Models. In *Proceedings of the 25th International Association for Management of Technology (IAMOT) Conference*. pp. 673-695.
10. Krotov, V. (2017). The Internet of Things and New Business Opportunities. *Business Horizons*, 60(6), 831-841. <https://doi.org/10.1016/j.bushor.2017.07.009>
11. Massis, B. (2016). The Internet of Things and Its Impact on the Library. *New Library World*. <https://doi.org/10.1108/NLW-12-2015-0093>
12. Natasa, D., Aleksandra, L., Zorica, B., Marijana, D. (2016). Internet of Things in Marketing and Retail. *International Journal of Advances in Computer Science & Its Applications*.
13. Nord, J.H., Koohang, A., & Paliszkiwicz, J. (2019). The Internet of Things : Review and Framework. *Expert Systems with Applications*. 133(1), 97-108. <https://doi.org/10.1016/j.eswa.2019.05.014>
14. The Economist. (2014). Internet of Things will Bring Business Success to the Rest of the World. <https://www.economist.com>
15. Van Leemput, E. (2014). Internet of Things (IoT) Business Opportunities—Value Propositions for Customers.
16. Vivekananth, P. (2016). The Impact of Internet of Things (IoT) in Human Resource Management. *IPASJ International Journal of Management (IIJM)*, 4(9).
17. Yerpude, S., & Singhal, T. K. (2017). Internet of Things and Its Impact on Business Analytics. *Indian Journal of Science and Technology*, 10(5), 1-6. <https://doi.org/10.17485/ijst/2017/v10i5/109348>

18. Grubor, A., & Jaksa, O. (2018). Internet Marketing as a Business Necessity. *Interdisciplinary Description of Computer Systems : INDECS*, 16(2), 265-274. <https://doi.org/10.7906/indecs.16.2.6>
19. Biggs.,Garrity, J., La Salle, C., Polomska, A., & Pepper, R. (2015). Harnessing the Internet of Things for Global Development, a Contribution to the UN Broadband Commission for Sustainable Development. Available at SSRN. <https://doi.org/10.2139/ssrn.2588129>
20. Zitkiene, R., Markeviciute, G. & Mickeviciene, M. (2017, October). The Determinants of Consumer Behavior Influencing the Smart Technology Recognition and Acceptance. In *International Conference at Brno University of Technology, Faculty of Business and Management*.