Internet of Things in Human Resources

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ABSTRACT

The Internet of things (IoT) is now becoming a new trend in the technical field and emerges as the market trend and technical advancement. The prospect of IoT is that every object will have a unique way of identification and can be addressed so that every object can be connected. It presents previously unheard-of chances to boost worker engagement, increase workplace safety, and improve workforce management by integrating diverse devices and systems. IoT has a positive impact on human resource management, aiming to enhance workplace efficiency and organizational dynamics. It completely modifies the human resource management and workplace of the organization. It will bring a new challenge to how human resource development is practiced. It will change the manner in which human resources are developed and managed, calling for a new and adaptive human resource development approach. This paper deals with the impact of the Internet of things (IoT) on the human resources in organizations.

KEYWORDS: *Internet of things, IoT, industrial Internet of things, IIoT, human resources, HR, human resource management, HRM, automation.*

INTRODUCTION

The rapid advancement of technology has had a significant impact on various sectors. Technology has a great impact on every area of life along with the various modes of communication gadgets including laptops, tablets, mobile phones, smart phones, etc. Every organization is now becoming technology-based to manage the operations of the business and human resources is not exempted. Technology plays an important role in changing human beings' lives. It has a great impact on every area of life along with the various modes of communication gadgets. Technology is developing very fast and people are adapting daily whether in homes or at work. Society is now facing another wave of Internet technologies that will have a big impact on the way we live and work. This phenomenon, known popularly as the Internet of things (IoT), presents a situation where data generation is the order of the day.

Internet of things (IoT) is an emerging technology that is now becoming an extremely attractive word among all people connected with the Internet. IoT is the interworking of physical devices, buildings, vehicles, and other devices. IoT is embedded with software, sensors, network, and actuators that are capable of collecting things and interchange the data. It is important to understand the impact of the Internet of things on human resource management as people spend most of their time in the workplace, on smart phones, tablets, etc. connected to the Internet. IoT makes companies capable of connecting, monitoring, tracking, analyzing, and evaluating machines and humans in a digital structure [1].

OVERVIEW OF INTERNET OF THINGS

The concept of the Internet of things (IoT) has been around since the late 1990s, but it gained momentum in the 2000s with the rise of Internet-connected devices. The Internet began with some military computers in the Pentagon called Arpanet in 1969. It expanded throughout the 1980s as a set of four parallel military networks, each at a different security level. The evolution of IoT is shown in Figure 1 [2]. The core technology which gives the Internet its particular characteristics is called Transmission Control Protocol/Internet Protocol (TCP/IP), which is essentially a set of rules for communication [3].

Internet of things (IoT) is a worldwide network that connects devices to the Internet and to each other using wireless technology. These devices contain hardware such as sensors and electronics which give them the ability to interact with other objects and to be monitored and controlled from afar. The idea is that the physical devices with sensors or the ability to capture data, shares that data with websites. The information is then used or analyzed in real time or at a later time, to create efficiencies. IoT is expanding rapidly and it has been estimated that 50 billion devices will be connected to the Internet by 2020. These include smart phones, tablets, desktop computers, autonomous vehicles, refrigerators, toasters, thermostats, cameras, alarm systems, home appliances, insulin pumps, industrial machines, intelligent wheelchairs, wireless sensors, mobile robots, etc. Figure 2 illustrates the Internet of things [4], while Figure 3 shows its various applications [5].

There are four main technologies that enable IoT [6]: (1) Radio-frequency identification (RFID) and near-field communication, (2) Optical tags and quick response codes: This is used for low cost tagging, (3) Bluetooth low energy (BLE), (4) Wireless sensor network: They are usually connected as wireless sensor networks to monitor physical properties in specific environments. Communications technologies in Internet of things are portrayed in Figure 4 [7]

IoT technology enables people and objects to interact with each other. It is employed in many areas such as smart transportation, smart cities, smart energy, emergency services, healthcare, data security, industrial control, logistics, retails, structural health, traffic congestion, manufacturing, and waste management. The Internet of things is extensively developed world-wide with a focus on civilian applications such as electric power distribution, intelligent transportation, healthcare, industrial control, precision agriculture, environmental monitoring, etc.

The growth of the internet of things (IoT) is drastically making impact on home and industry. While the IoT affects among others transportation, healthcare, or smart homes, the Industrial Internet of things (IIoT) refers in particular to industrial environments. IIoT is a new industrial ecosystem that combines intelligent and autonomous machines, advanced predictive analytics, and machine-human collaboration to improve productivity, efficiency and reliability. It is bringing about a world where smart, connected embedded systems and products operate as part of larger systems [8].

The industrial Internet of things (IIoT) refers to the application of the Internet of things (IoT) across several industries such as manufacturing, logistics, oil and gas, transportation, energy/utilities, chemical, aviation and other industrial sectors. A typical industrial Internet of things is shown in Figure 5 [9].

IOT IN HUMAN RESOURCES

The classical Internet has radically altered the way we access information, profoundly transformed the way we think, act, and remember. The IoT has the potential to fundamentally shift the way we interact with our surroundings. It has emerged as a new paradigm aiming at providing solutions for integration, communication, data consumption and analysis of smart devices. It promises to usher in a revolutionary, fully interconnected "smart" world, with relationships between objects and their environment and objects and people becoming more tightly intertwined. Human resources department is in a distinctive position to prepare the workforce for this new way of working and to utilize the big data generated by the Internet of things. The department involves developing people with a focus on improving knowledge, skills, and abilities to guide organizations, create a long-term vision, develop strategy, staff the organization, and motivate people toward the vision. Figure 6 shows a typical HR team [10]. All these activities of HR are being impacted by the emergence of the IoT. It is no longer business as usual for HR professionals. As a result of the emergence of IoT, the world is experiencing significant, largely economic and sociotechnical, induced changes. These changes will impact on how human resources are developed [11].

APPLICATIONS OF IOT IN HUMAN RESOURCES

IoT has led to the development of applications in the industrial sector, including the use of IoT for room monitoring and management, early warning systems, and sensors connected to the IoT network that can monitor employee. Common applications of IoT in human resources include the following [12-14]:

➢ *Recruitment*: One of the benefits of IoT in HR is improving the recruitment process. Recruitment is one department that entails a lot of paperwork, from job ads to resumes. With the help of IoT, HR can minimize the use of paperwork. The technology allows HR to store everything online, including employment history and personal details. Studies show that almost 30% of employers believe one bad hire can cost them a lot of money. Big data and IoT can prevent this by helping recruiters to gather data about potential hires through various means, from online resumes to social media profiles and employment records.

➢ *Workplace Safety:* IoT plays a role in enhancing workplace safety. IoT devices may keep an eye on working circumstances, spotting any risks and guaranteeing adherence to safety rules. Devices such as motion sensors, surveillance cameras, and temperature sensors can be installed to monitor the risk of workplace accidents and hazardous conditions, providing alerts or notifying managers if conditions are unsafe.

➢ *Employee Experience*: HR can leverage IoT to improve the employee experience. It helps ensure workplace comfort and well-being. Employers want their workers to be productive without compromising their health and well-being. HR can identify any health issues and identify hazardous situations according to the data that these IoT devices can provide. For example, some wearables can pinpoint specific locations of sick employees and establish a map of safety and pre-authorized zones. IoT technologies can also help make the workplace safer, improving efficiency and productivity. Use technologies that are enabled by the Internet of things to find out what makes employees happy and engaged.

➢ *Employee Performance:* IoT provides the ability to monitor employee performance within an organization in real time. By using data from IoT sensors, companies can monitor employee performance, productivity, and work quality in real time. Sensors and IoT devices can be used to collect data on productivity, working hours, and employee health. This data can be used by HR managers as a basis for making more informed decisions regarding employee development, performance evaluations, and wellness programs. IoT can integrate data from time management systems with other devices to help organizations manage work schedules and employee performance. Simplify attendance monitoring, cut down on mistakes, and boost productivity using automated solutions that use biometric data or face recognition. Human resource managers may learn a lot about their employees' happiness and health from the data collected by Internet of things (IoT) devices that track certain wellness indicators in real time.

➢ *HR Analytics:* Human resource analytics (HRA) is attracting increasing interest as an innovative practice in the domain of human resource management. HRA adoption is defined as the process through which an organization invests in, operationalizes, and assimilates HRA into the workforce's decision-making process. The HRA involves an interplay of knowledge from information science, information technology, computer science, mathematics, and statistical science to process data on a real-time basis and arrive at a data-driven decision to predict the outcomes of complex challenges. HRA is considered as future value-driver in HR because it enables systematic analysis of complex data that may help resolve various organizational challenges. To reap the benefits of data-driven decision-making, HRA should be integrated with relevant products, services, and business-level indicators.

➢ *Electronic HRM:* The HRM includes the practices and disciplines that involve and develop different resources about employees in the organization. Internet of things (IoT) has great impact on e-HRM, which gives various facilities and supports to e-HRM functionalities such as securities, standards, privacy, and regulations. The combination of e-HRM with IoT has wide applications for implementing policies, strategies, and practices within the organization. An e-HRM has mainly five activities: e-Selection, e-Recruitment, e-Performance, e-Compensation, and e-Learning.

BENEFITS

The Internet of things holds great potential to transform the way companies manage their human resources. IoT has become a breakthrough innovation in the HR sector, as it enhances work efficiency and effectiveness. The utilization of IoT is essential to maximize the quality of organizations. Internet-connected devices make it easier for job candidates to access and submit applications, while companies can use data from IoT devices to monitor and evaluate candidates. Other benefits include the following [15]:

➢ *Cost reduction:* IoT helps companies identify and reduce waste in HR operations. For example, monitoring employee availability in real time can help organizations avoid overstaffing or understaffing, which can significantly save costs. HRM of the company has realized that IoT has potential to reduce costs in the business models and can enhance the growth of the business models.

➢ *Automation:* IoT impacts HR management by automating the use of connected devices and data-based systems to perform specific tasks. With increased automation, employees need to focus more on activities that are not easily done by machines, such as work that requires cognitive abilities.

➢ *Productivity:* IoT can help improve productivity among employees. These technologies have eye-

tracking capabilities to detect eye movement through sensors. By tracking these motions, HR personnel can identify factors like specific working hours or disruptions due to background noises. The information HR can gather using IoT technologies can help them collect data on how productive employees are, especially those working remotely.

➢ *Faster Decision-making:* IoT data enables companies to make faster and more accurate decisions about various aspects of HR operations. For example, by monitoring employee availability in real time, organizations can quickly identify resource shortages and take necessary steps to address them.

➢ *Collaboration:* Collaboration of human-machine interactions makes the system better than just focusing on humans with humans or machines with machines alone. Human-machine interaction is related to the concept of mutual learning, which is a two-way process that causes a reciprocal, dependent exchange, action, or influence of human and machine collaboration.

CHALLENGES

The emergence of IoT has presented some challenges to fields like HR. The IoT poses profound challenges to HR as a field of study. The challenges include limited labor with skills and competencies in IoT, changes in work patterns caused by IoT can affect HR performance and productivity. Data security, employee privacy, and workplace culture changes are key concerns that require careful attention. IoT could throw employees out of the job and build large anomalies in an organization's workplace. Other challenges include the following [11,15,16]:

➢ *High Cost*: It costs a lot of money to train and develop human resources who are competent in operating IoT.

➢ *Privacy:* Data privacy, security, and ethical concerns are complex issues that must be carefully navigated when dealing with employee data. IoT adoption in HR presents concerns regarding data security and employee privacy that need to be addressed with explicit policies and moral standards. Needless to say that privacy concerns of employees' need to be decided on an individual basis. Perhaps, embracing IoT ecosystem in an organization may outweigh benefits derived from it than individual privacy concerns.

➢ *Complexity:* The complexity of IoT technology can make it difficult to manage human resources who do not have a technology background.

Human resource management must use cutting-edge technologies to manage this complexity.

➢ *Integration:* It can be difficult to integrate IoT with current HR systems and make sure they work together. To integrate IoT in recruitment, companies must consider hiring IoT engineers to help set up an HR-related system.

➢ *Skill Development:* Human resources are now required to develop technical and data-driven skills to support the adoption of technologies that connect devices for real-time data sharing. This plays a crucial role in enhancing the efficiency and effectiveness of organizational operations. Human resources are not only faced with organizational culture changes but are also expected to adapt to the demand for new, more technical, and data-driven skills. Organizations that invest in HR development tend to have more competent, motivated employees who are prepared to face change.

➢ *Training:* The advances in IoT create a demand for new sets of skills. As working adults assume these jobs, they need to be retrained and reskilled. Training and preparing the human capital needed to fill the high demand of high-tech jobs is going to be a considerable undertaking, which makes the implications for HR enormous. In the age of IoT, adult education and HR are uniquely positioned to provide the education and training needed not only by the workforce of today but also that of tomorrow, which will face increasingly high-tech and shifting demands in the workplace.

➢ *Regulatory Compliance*: Compliance with organization or company policies and industry is important for the IoT in the human resources. The regulation compliance for outsourcing is required and employees are kept in the loops to solve complex issues and maintain compliance.

CONCLUSION

The Internet of things is now becoming a new trend in the technical field and emerges as the market trend and technical advancement. In the field of human resources (HR), IoT is quickly becoming a revolutionary force. The use of IoT in HR entails using sensors and networked devices to collect and process data in order to enhance employee experiences and HR procedures. The impacts of IoT on HR are considerable. HR professionals need to identify potentially disruptive technologies, and carefully consider their potential before these technologies begin to exert their disruptive powers in the workplace and society. The workforce of today is

global. It is vital for HR practitioners to understand and address the implications that IoT can have in the context of different cultures. More information about Internet of things in human resources can be found in the books in [17-19] and the following related journal: *IEEE Internet of Things Journal.*

REFERENCES

[1] Z. Abdussamad et al., "Impact of Internet of things (IOT) on human resource management: A review," *Material Today Proceedings*, vol. 56, no. 6, 2022, pp. 3534-3543.

[2] https://images.search.yahoo.com/search/images?p=images+of+Internet+of+things+in+human+resources&fr=mcafee&type=E210US1357G0&imgurl=https%3A%2F%2Fi1.rgstatic.net%2Fpublication%2F335246709_Human_Resource_Development_and_the_Internet_of_Things%2Flinks%2F5d6586a7a6fdccc32cd6687b%2Flargepreview.png#id=54&iurl=https%3A%2F%2Fimage.slidesharecdn.com%2Finternetofthingsinapparelindustryautosavedwe-190401073949%2F75%2FInternet-of-things-in-apparel-industry-autosaved-we-6-2048.jpg&action=click

[3] M. Townes, "The spread of TCP/IP: How the Internet became the Internet," *Millennium: Journal of International Studies*, vol. 41, no. 1, 2012, pp. 43 –64.

[4] A. Z. Alam, "Analysis of Internet of things in DHL logistics (smart warehouses)," May 2020, https://www.linkedin.com/pulse/analysis-internet-things-dhl-logistics-smart-warehouses-alam

[5] https://images.search.yahoo.com/search/images?p=images+of+Internet+of+things+in+human+resources&fr=mcafee&type=E210US1357G0&imgurl=https%3A%2F%2Fstl.tech%2Fwp-content%2Fuploads%2F2022%2F10%2Fimg1-1.png#id=13&iurl=https%3A%2F%2Fstl.tech%2Fwp-content%2Fuploads%2F2022%2F10%2Fimg1-1.png&action=click

[6] M. N. O. Sadiku, and S.M. Musa and S. R. Nelatury, "Internet of things: An introduction," *International Journal of Engineering Research and Advanced Technology*, vol. 2, no.3, March 2016, pp. 39-43.

[7] P. Sadeghi et al., "Towards a reliable modulation and encoding scheme for Internet of things communications," *13th IEEE International Conference on Application of Information and Communication Technologies (AICT),* October 2019, https://www.researchgate.net/figure/Communications-Technologies-in-Internet-of-Things_fig1_335104959

[8] M. N. O. Sadiku, Y. Wang, S. Cui, and S. M. Musa, "Industrial Internet of things," *International Journal of Advances in Scientific Research and Engineering*, vol. 3, no. 11, Dec. 2017, pp. 1-4.

[9] A. R. Sadeghi1, C. Wachsmann, and M. Waidner, "Security and privacy challenges in industrial Internet of things," *Proceedings of the 52nd Annual Design Automation Conference*, June 2015.

[10] https://images.search.yahoo.com/search/images?p=images+of+Internet+of+things+in+human+resources&fr=mcafee&type=E210US1357G0&imgurl=https%3A%2F%2Fi1.rgstatic.net%2Fpublication%2F335246709_Human_Resource_Development_and_the_Internet_of_Things%2Flinks%2F5d6586a7a6fdccc32cd6687b%2Flargepreview.png#id=205&iurl=https%3A%2F%2Fgloballyinform.com%2Fwp-content%2Fuploads%2F2025%2F01%2FHuman-Resource.webp&action=click

[11] R. M. Yawson, D. Woldeab, and E. Osafo, "Human resource development and the Internet of things," *Proceedings of the 25th Annual Academy of Human Resource Development International Research Conference in the Americas.* Richmond VA, USA. February 14 -17, 2018.

[12] "How the Internet of things is changing HR," September 2023, https://www.ipcconsultants.com/blog/how-the-internet-of-things-is-changing-hr

[13] S. V. Shet et al., "Examining the determinants of successful adoption of data analytics in human resource management – A framework for implications," Journal of Business Research, vol. 131, July 2021, pp. 311-326.

[14] R. M. Yawson, "Human resource development and the Internet of things," *Proceedings of the 25th Annual Academy of Human Resource Development International Research Conference in the Americas.* Richmond VA, USA. February 14 -17, 2018,

[15] O. N. Ulfa, "The role of Internet of things (IoT) on human resources in industry 4.0," *Formosa Journal of Science and Technology*, vol. 3, no. 11, 2024, pp. 2515-2526.

[16] "Internet of things (IoT) in HR: Connecting the dots," November 2023, https://blog.jobed.ai/internet-of-things-iot-in-hr-connecting-the-dots/

[17] M. N. O. Sadiku, *Internet of Things and Its Applications*. Moldova, Europe: Lambert Academic Publishing, 2024.

[18] G. Singh, V. Garg, and R. Goel (eds.), *Promoting Inclusivity and Diversity Through Internet of Things in Organizational Settings* *(Advances in Human Resources Management and Organizational Development).* Business Science Reference, 2022.

[19] Sadiku | Samuel A. Ajayi | Janet O.Sadiku "Robotic Process Automation in Human Resources" Published in International Journal of Trend in Scientific Research and Development(ijtsrd), ISSN:2456-6470,Volume-10 | Issue-1, February 2026, pp.258-264.
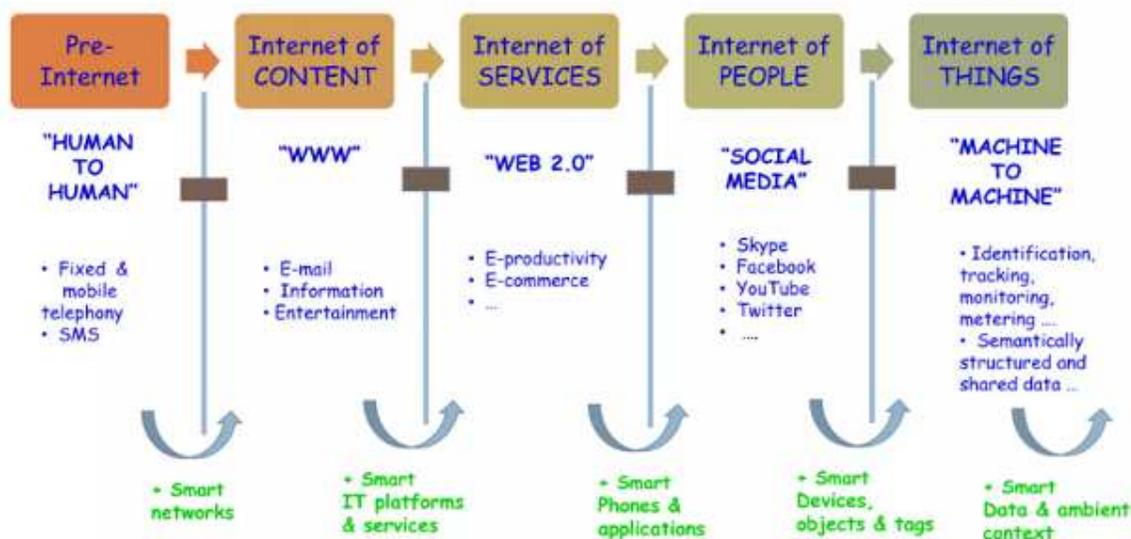
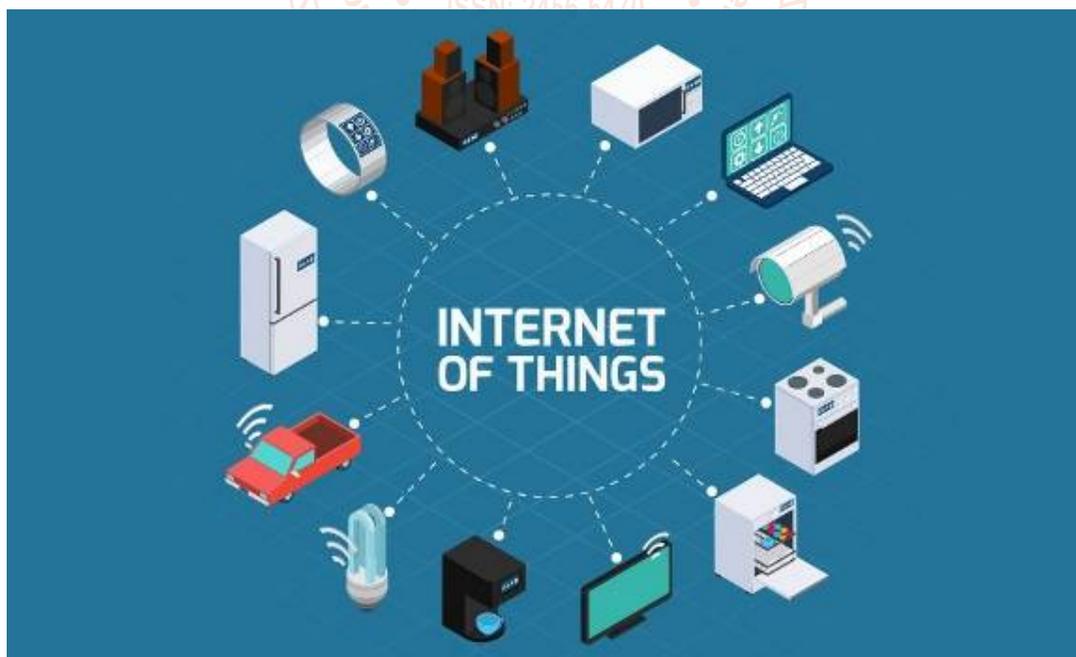**Figure 1 The evolution of IoT [2].**

Figure 2 The Internet of things [4].

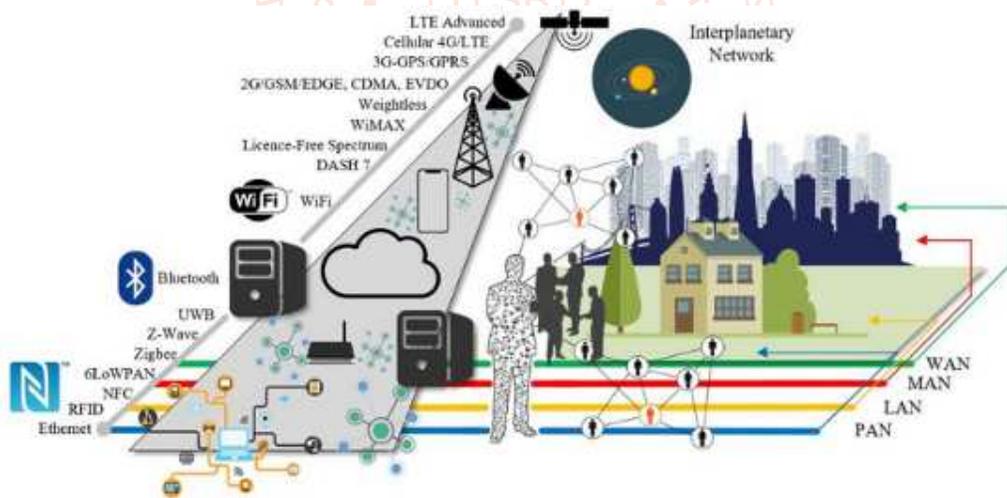**Figure 3 Applications of IoT [5].**

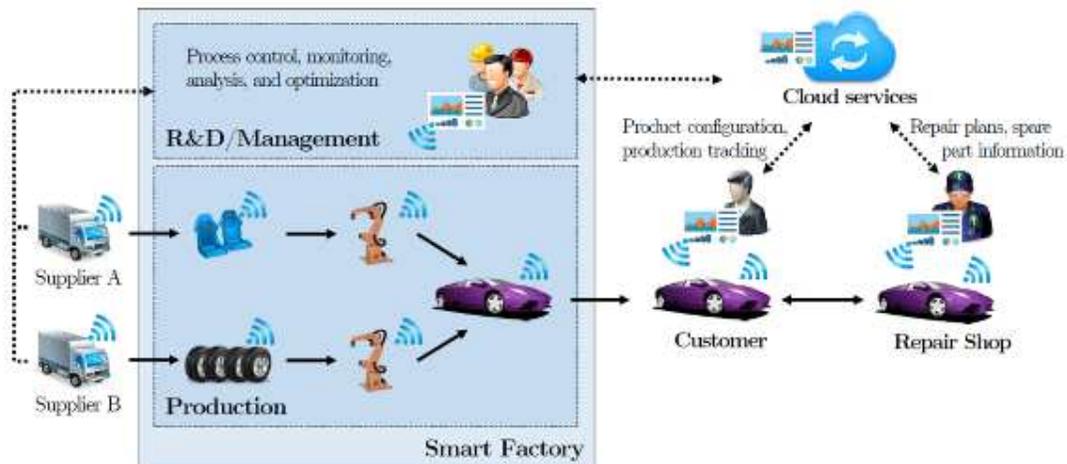**Figure 4 Communications technologies in Internet of things [7].**

Figure 5 A typical industrial Internet of things [9].

Figure 6 A typical HR team [10].