



Framework for understanding Internet of Things in human resource management

Marco para comprender Internet de las cosas en la gestión de recursos humanos

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ABSTRACT:

This paper investigates role of Internet of Things (IoT) in Human Resource (HR) and attempts in developing a framework for understanding the same. Delphi method is used for reaching consensus in role description and framework development to analyze effects of IoT applications on HR activities. The need for regulatory framework and compliance risk for future reference are gained after analyzing the insights gained through application of Delphi on a sample of twenty experts from field. Based on finding from survey on this focus group, the framework of understanding role of IoT on HR was finally developed finally.

Keywords: Internet of Things, Human Resource Management, People analytics, HR activities and functions

RESUMEN:

Este artículo investiga el papel de Internet de las cosas (IoT) en los recursos humanos (HR) e intenta desarrollar un marco para comprender lo mismo. El método Delphi se utiliza para alcanzar un consenso en la descripción de roles y el desarrollo de marcos para analizar los efectos de las aplicaciones de IoT en las actividades de recursos humanos. La necesidad de un marco regulatorio y el riesgo de cumplimiento para futuras referencias se obtienen después de analizar los conocimientos adquiridos mediante la aplicación de Delphi en una muestra de veinte expertos del campo. Sobre la base de los hallazgos de la encuesta en este grupo focal, finalmente se desarrolló el marco de comprensión del papel de IoT en HR.

Palabras clave: Internet de las cosas, gestión de recursos humanos, análisis de personas, actividades y funciones de recursos humanos

1. Introduction

At the advent of global knowledge economy and digital transformation towards the same, firms are facing great technological revolution that has potential for altering our perception on work. This revolution of technology is felt across the firm ecosystem in varying magnitude. One of the most significant requirements for technological revolution felt alike by all organizations is the need for measurement and computation. Desire for accuracy and precision in computing, monitoring for optimizing performance and predicting trends for future has entailed a new industry spawned on this requirement. The term Internet of Things (IoT) refers to the ability to connect physical objects or things (called smart things) to the internet and thereby generate autonomous context-adequate behavior (Guo *et al.*, 2013). It originated in the Auto-ID labs of Massachusetts Institute of

Technology (MIT) to describe a concept in which all objects can become virtually intelligent and connected to each other to maximize benefits (Atzori *et al.*, 2010; Mattern and Floerkemeier, 2010).

IoT are a series of devices and objects connected to each other and to the internet to optimize output through sending and receiving data. Hence, it is the interconnection of computing devices through internet, devices that are embedded in everyday objects, thereby enabling objects to send and receive data (Hassan *et al.*, 2017). For instance, managing home appliance located at a distance from the office through internet, smart medical objects for remote controlling patient care, sensors to monitor general health and wellbeing and administering treatment when necessary. Physical objects are now connected to the virtual world and can be controlled through remote controls from different places acting as access points for internet (Mattern and Floerkemeier, 2010). Currently there is a plethora of application fields that are called smart technologies such as smart retailing, smart healthcare, smart manufacturing and smart travelling. Smart things are central to internet of things as embedded information and communication technology would then enhance the utility of these smart objects in a revolutionizing way. Through sensors these smart objects can sense each others' context situation and can communicate with each other through built-in networks. Thereby these objects can also interact with people and other objects and can access internet services (Vermesan *et al.*, 2013; Kang *et al.*, 2016).

IoT has revolutionized business. Tracking productivity has never been as simple as now because of these series of devices. Communication tools, wearable computer devices, trackers etc. have greatly taken the workplace and normal life than ever before. In what way IoT is changing the world of business is still not fully fathomed by researchers nor practitioners. There is a difference between consumer IoT and Industrial IoT having repercussion on the technology utilized as well as their business models. Whereas the earlier aims at improving consumer quality of life by saving time, money and energy, the later is integration of operation technology and information technology for improving business through networked sensors, smart machines and data analytics (Palattella *et al.*, 2016). Industrial IoT majorly concerns itself with smart machines interacting with each other which may or might not require human intervention. Industries employ IoT in different ways: to collect big data, to produce digitally charged products which are equipped with sensors and adaptors, and finally, to provide opportunity to others to use IoT and hence become participants in IoT eco system. Organizations adapting to IoT make certain fundamental changes to fit the business. Consequently, Human Resource (HR) professional are changing their operatives everyday to suit the innovation and market place. A more recently used concept is that of 'people analytics' for analysis of data and its interpretation for enhancing work force output. Management of people in organization with the help of IoT is also referred to as people analytics. It is a data driven technique for people management at work place. It is a pervasive and more recent discourse and hence delineates its centrality to the future as the core technology (Borgia, 2014).

1.1. Literature Review

Application of internet of things into academia and industry is yet in its nascent stage and can be considered as post development of the fourth industrial revolution or Industry 4.0 in short (Onik *et al.*, 2018). The IoTs are needed in organization in general and HRM in particular to manage efficiency, security, objectivity without bias and transparency.

Hence researches have been carried out to measure the significance of the technology and its application in future. However, only a limited research has concerned itself with the HRM domain and the application of IoT (Bondarouk *et al.*, 2017).

Earlier studies related human resources to information technology per se rather than IoT for obvious reasons of technology nascence. Powell and Dent-Micallef (1997) show the direct relationship of application of information technology to human resources and technology resources to enhance firm performance. Mahmood and Soon (1991) developed a comprehensive model for information technology for measuring strategic organizational variables. Keen (1993) made a fusion map of information technology and management difference including human resource management.

In a later phase however with the advent of Internet of Things the focus shifted to smart things and people management. Studies have been carried out to refer to internet of things in the management of people management at work place. Gluhak *et al.* (2011) surveyed the facilities for experimental internet of things and found that fundamental changes are required in the management of work place to make way for IoT. Sullivan (2013) studied the application of IoT by

many organizations including Google and explored how Google has in different segments reinvented the HR management by the usage of people analytics. Momin and Mishra (2017) provide evidence for strategic workforce planning being crucial for building human capital and HR analytics help in identifying exactly that. Weinberger *et al.*, (2016) introducing the concept of high resolution management measured every aspect of business operation in industrial context. They found that companies which apply high resolution management, i.e. applying high resolution data for measuring all operatives with real time, gained more efficiency, quality and flexibility. Similarly, Bauk *et al.*, (2018) applied high resolution management to develop business models such as digital add on, digital lock in, physical freemium, Object self service etc. They concluded that IoT enables development of innovative business models in addition to business process monitoring and enhance overall quality of product through monitoring loss of time, money and energy.

Wang *et al.* (2016) use cloud computing technologies to human resource management in small and medium enterprises. By applying game analysis they devised a new and innovative infrastructure of cloud computing for human resource management in small and medium enterprises. Their infrastructures include cloud computing resources' application in human resource alliance, consulting and process reengineering.

Studies exploring linkage between HRM and IoT concerned themselves with the future possibilities of alteration in work place due to automated workplaces, especially if job redesigning was needed to be installed to make high-end automation in HRM. Some researchers also concerned themselves with smart things that HR information system would need, e.g., reporting time and schedule, qualification gap, break time management, staffing etc (Bondarouk et.al.2017). Guo *et al.* (2013) explored the harmonious interaction between human at work place with internet of things. Constantinides *et al.*, (2017) explored the effect of IoT on retail business and found motivation to shop and technology autonomy have a moderating effect on the customers' acceptance of Internet of Things. Onik *et al.*, (2018) point out to the application of IoT to management of human resources is a part of the fourth industrial revolution and therefore is a new phenomenon. They studied the usage of block chain and bit coins in achieving smart, cost effective and efficient factory management system. They particularly found that through algorithms a recruitment system based on block chain and a Block chain based HRM i.e. BcRMS and BcHRM can be developed to maximize benefits in organization. Davenport *et al.*, (2010) studied the issue of talent analysis in various organizations as Google, AT&T, Harrah, AC Milan (Soccer team), Jet Blue and many other organizations. They found that six types of analytics can answer critical talent questions. In addition they found that building talent capability depends on the same five things that affect success in any business analysis. They summarize these facts as DELTA: Data, Enterprise orientation, analytical Leadership, strategic Talent and Analysts. Strohmeier (2018) advised application of IoT is future of HRM with many consequences: change in HR technologies-hardware and software, modifications in HR activities, change task and qualifications of HR actors.

Table 1
Summary of Research on IoT in Business and HR

Authors	Year	Area	Outcomes
Onik <i>et al.</i>	2018	BcRMS and BcHRM in factory management	Application of Bit coins and Block chain technology in achieving efficient, smart, secure, transparent and cost effective HRM
Kahlert <i>et al.</i>	2017	IoT in retail business	Customers' motivation to shop and technology autonomy have a moderating effect on the customers' acceptance of IoT
Guo <i>et al.</i>	2013	IoT & Human	Tow way interaction between human and opportunistic IoT (WiFi, Bluetooth etc). Develop

			a reference architecture for opportunistic IoT
Bauk <i>et al.</i>	2018	High resolution management to develop business models	IoT increases efficiency, security, transparency and overall innovative business process
Weinberger <i>et al.</i>	2016	High resolution management in firm operatives	Applying high resolution data for measuring all operatives with real time, gained more efficiency, quality and flexibility
Wang <i>et al.</i>	2016	Cloud computing and HR management in small and medium enterprises	Through game analysis found cloud computing resources' application in human resource alliance, consulting and process reengineering
Momin and Mishra	2017	HR analytics and HR Planning	strategic workforce planning being crucial for building human capital and HR analytics help in identifying the same
Sullivan	2013	IoT in Google HR	Google in different segments has reinvented the HR management by the usage of people analytics
Gluhak <i>et al.</i>	2011	Industry facilities and experimental IoT	Industries have to make crucial fundamental alteration in work place to make way for IoT in an experimental basis
Bondarouk <i>et al.</i>	2017	Review four decades' literature on electronic HRM	Summary and integrative framework for understanding electronic HRM as basis for future research. Three factors affecting adoption of e-HRM is organization, technology and people.
Powell and Micallef	1997	Human resource management and information technology	Application of information technology to HRM directly increases performance and work output of employees.
Davenport <i>et al.</i>	2010	Talent analytics as competitive advantage	Building capability in talent requires DELTA: Data, Enterprise (orientation), Leadership (analytical), Target (strategic) and Analysts.
Strohmeier	2018	Smart things and HRM	Application of IoT is future of HRM with many consequences: change in HR technologies-hardware and

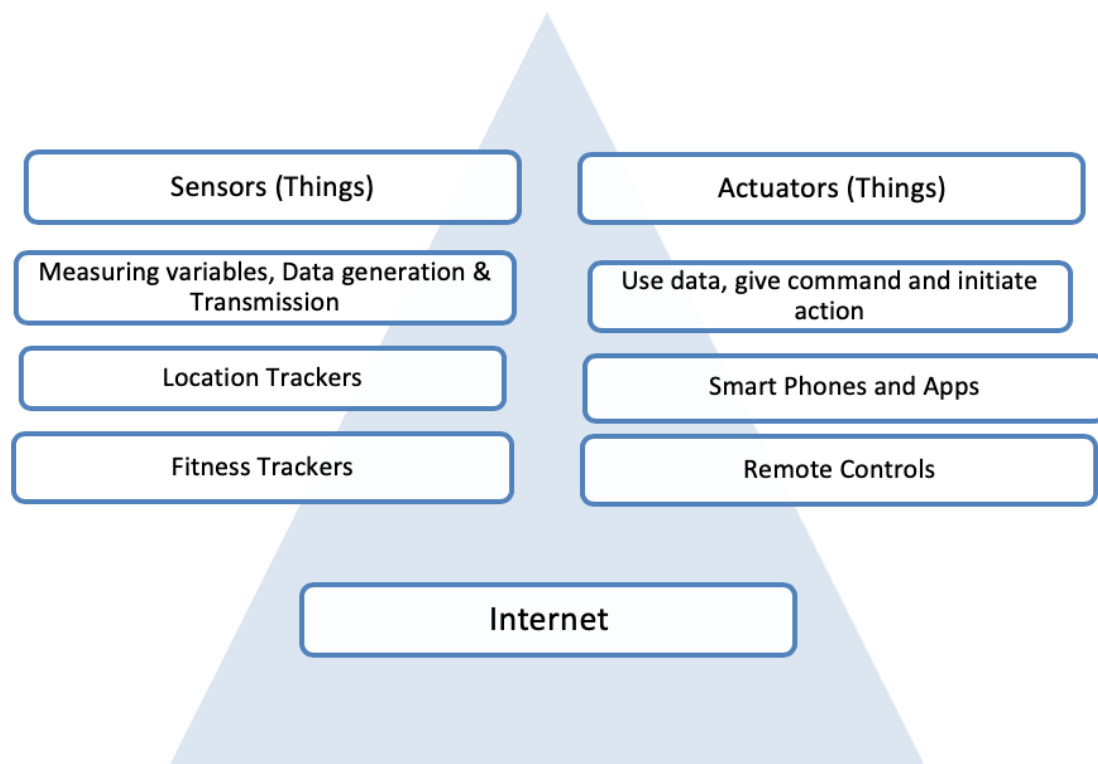
			software, modifications in HR activities, change task and qualifications of HR actors
Mahmood and Soon	1991	Information technology and HRM variables	Developed a comprehensive model for information technology for measuring strategic organizational variables

1.2 Framework for Understanding IoT

The term IoT calls up visions of consumer products such as connected thermostats or smart washing machines, or of companies installing data-capturing sensors to monitor unmanned facilities. Underlying any of these seemingly simple gadgets is an incredible network of sensors, communication technologies, and analytic power. The IoT is a technology architecture connecting the technologies together to perform actions, a way of stitching together many different types of technologies in a specific way in order to do something new. Regardless of the specific technologies in any particular IoT application, the architecture—the way those technologies are connected—is described by the Information Value Loop and Figure-1 represents the interpretation of the same.

The revolution has also affected the human resource management in a big way. In most cases this digital transformation and technological innovation has helped the Human Resource department in preparing the workforce for the alteration in workplace and put big data to use starting from recruitment to talent management. IoT is innovation in technology which has affected human resources management in a big way.

Figure 1
Internet of things



Source: Author's own interpretation

Many companies deploy the employees with exoskeletons on the old workforce to reduce their work burdens and physical strain. Ford in its Valencia factory does exactly that to reduce fatigue in its aged employees, while Audi uses them for relieving exertion from lifting heavy materials. Augmented and virtual reality is another IoT used by companies such as Coca Cola and Pfizer for visualizing work and grasping problems better. Wearable augmented reality and virtual reality vision devices help in visualizing complex data and analyze them. Sometimes these wearable AR

and VR devices have company manual as reference guide readily available to employees; at other times it could also contain data analysis that can be visually represented to make imagination a reality. Some other places it is also used to visualize long distance happenings/images in real time. Airline companies use voice-controlled wearable and connected hearable to make instant instructions and access information at the go. Other wearable devices also operate to show work design and information on need for improvement. For example, smart watches showing floors where work is pending and the routes to particular clients' office are immensely helpful in the fast moving business set ups. Wider ranges of technologies are developing to make many kinds of workplace wearable devices to control business environment and increase workers' productivity.

The advent of Internet of Things (IoT) affects firms in rendering focused approach for work-space and design technology utilized to make way for Internet of Things (IoT) ecosystem. It has now entered into the workplace and presents several exciting possibilities to the HR domain and employees to engage in new ways and rethink their work environment. This helps in making better work place planning as developing buildings that support IoT. For instance, Wipro's Whitefield office in Bangalore came to realize the surplus workspace can be utilized in building space for its banking clients' space for design development. Many companies realize that underutilized space can be transformed into something better that can expand business and also help in diversification. Advent of IoT has brought a huge paradigm shift in the way workplace planning and design is done. The new age office spaces support smart devices and technologies as well as mobile employees. It is based on the basic needs of high speed connectivity as well as secured Wi-Fi infrastructures. Organizations are altering their ways to make way for IoT and there is a paradigm shift sometimes for incorporating IoT applications and people analytics into business today. IoT can bring great benefits to increasing company productivity, and making HR staffers' tasks much easier to perform.

2. Methodology

From the above research studies it is found that there has been a limited work done on IoT in HRM and especially on HR activities (recruitment, selection etc) and future of IoT application in HR. Studies are non-existent on the issue of regulatory framework of IoT application in HR including privacy and security issues. The current study is an attempt at exploring the application and future possibilities of IoT in HR management. The basic question it asks is first, whether Internet of Things forms a significant foundation for HR management. This would then mean that IoT is one of the basic requirements in HR management. Secondly, the study also explores the future possibilities of IoT applications in HR functions and practices.

Method: The study adopted explorative Delphi survey method. Delphi is a survey method with experts on the field taken as participants/respondents of questionnaire. The feedback from the experts' panel provided the basis for future developments.

Sample: The determination of sample for Delphi is to be selected from highly knowledgeable people having proved themselves in their respective field. The subject experts were chosen from among university professors (8 professors from HR departments of universities in Delhi NCR), HR professional in industries (2 professionals from steel industry, 2 from textile industry, 3 from banking and IT sector and 3 professionals from public service to balance the ratio of service sector, manufacturing industry and public service) and finally two HR technology experts were taken. Thus the group of experts represents HR practitioners and managers, HR technology experts and HR researchers and professors. The experts are chosen based on their outstanding subject knowledge. For professors, the quality and quantity of publications in leading national and international journals, membership in leading association and academic forums and a familiarity with information technology is the criteria. For the industry experts the criteria taken was the number of terms completed in HR departments especially in senior position, leading positions in professional bodies, familiarity with internet of things manifested in the involvement in automation and upgradation of HR activities to installation of IoT in the organization etc.

Regarding the exact number of sample selection, it was based on two factors. While the availability of experts posed a challenge along with the limitations of implementation efforts, the need for representation of different opinions was essential balancing the extremities. This number of twenty experts thus was a balance of these factors.

Tools/Instrument: In the current research a questionnaire containing thirty-five items relating to application of IoT in HRM is developed. In Delphi technique the questionnaire is developed through stages. In the first stage only a small team of three experts were asked to frame questions that would answer the future alteration in HR activities depending on the adoption of IoT

in organization. This questionnaire was distributed among all the experts and told to evaluate the consequences of IoT on HR activities. The results were segregated into three subthemes of software, hardware and data. The HR activities that were expected to be altered were again segregated into Staffing, recruiting, selecting, training, appraising.

The items in the questionnaire were framed to depict change statements. For example the item on compensation is "Sensors will provide data on compensation", item on recruitment is "recruitment now will be supported through smart things". The responses are presented in a five point Likert scale ranging from 'strongly agree' to 'strongly disagree'. At the end of each HR activities there is also a question on the time frame with a response presented on years in which the expected results are anticipated. For instance at the end of recruitment segment the item on time is "what is the expected time period for this change to occur"?

This survey hence is iterative and provides a detailed and authentic answer to the research questions of the current study. The questionnaire was developed keeping in mind the aim of the research. In the first segment a number of items on alternated technologies in HR for future are presented. Answers to such questions would explore the first research question as to the application of IoT in HR. the second segment relates to the consequences of IoT in HR and the future. It contains items relating to HR practices and functions such as recruitment, selection, appraisal, training and job analysis, performance management, compensation etc. it also has items on HR actors and technologies as well.

Methods of data collection: All the data were collected through direct contact and clarifying certain portions over phone. The data was collected in three rounds to be iterative to suit Delphi survey method. The results derived from the first round of data collection were further used after deriving means, standard deviations and bar charts for each segment.

3. Results

IoT has enabled companies to connect, track, monitor, evaluate and analyze machine and humans alike in a digital forum. It can influence companies to deal with both organizational and personal gadgets of employee and organization as well as connect to apps-driven population that seeks job online. IoT ecosystem facilitates companies' efficient dealing of human resource, compensation, HR planning and recruitment, selection procedures, employee management data, security measures, data on HR inventories etc.

Five HR functions that are considered for this paper constitute basic HR contributions to organizations and are relevant in organizational objectives (Strohmeier, 2018). These functions are HR recruitment and selection, HR compensation management, HR training and development, HR information or analytics and finally HR performance management. The questionnaire contained questions relating to these HR functions with representation from each segment. Despite being an inadequate set of functions for HR activities measurement this list is a start to investigating the effect of IoT on HR functions. Though it is apparent that the HR informatics or analytics is subject to change through automation, it is also other HR activities which undergo systematic changes due to IoT. This is especially so because of the introduction of sensing devices to track HR activities. Questions on HR functions pertain to HR recruitment and selection (items 1-7), HR performance management (Item # 8-14), HR training and development (Item # 15-21), HR compensation management (Item # 22-28) and finally HR information and analytics (Item # 29-35). The mean and standard deviation of functions are given below:

Table 2
Mean & Standard deviation of functions

HR Functions	Un-weighted		Weighted	
	<i>Mean</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Standard Deviation</i>
Recruitment & Selection	3.01	1.1	3.02	1.11
Performance Management	2.98	0.83	3.01	0.81
Training & Development	3.43	0.92	3.47	0.87

HR Information & Analytics	3.29	0.77	3.63	0.79
Compensation Management	2.936	0.89	3.01	0.9

3.1. Results on IoT Application to HR Functions

The HR professionals and academics as expert of the Delphi survey agreed strongly unanimously on future application of IoT in HRM, mostly across all HR activities. However the degree of application to specific functions differed according to the intensity and degree of change that is expected. Participants agreed broadly that sensors will be used extensively across HR activities, especially in HR information or analytics (to obtain HR data). They predicted the application of sensors as wearable smart things at workplaces. Majority of the experts disagreed that such wearable sensors might hamper privacy of employees. IoT devices such as **smart phones and mobile apps** are considered as the cornerstones of IoT tools by the expert participants to improve employee qualities through continuous feedback and coaching, and to connect despite location distance, enabling employee/product improvement possible even at the weirdest hours. Social network creation etc can help sharing information and ideas boosting collaboration from different parts. Through apps work teams can share their information and ideas as well as enable product/service delivery faster and smoother. These tools can make the concept of flexi-time and flexi-workplace a reality. Secondly, HR professional agree unanimously that **location trackers** act as tools of IoT that can track the whereabouts of employees through movement tracking and job attendance monitoring. Though there is a threat of breach of employee privacy experts suggest that they can be used with employee permission on job and that benefits of these far outweigh the privacy concerns. For instance it can prevent industrial accidents by predicting fatigue level of employees. Third, **virtual reality and augmented reality** according to experts can effectively manage HR. Virtual reality situations can assess candidates' mantle in dealing with reality during selection procedures. Work from home, interview of candidates from a different location, evaluation of projects, explaining projects through virtual reality creation are the options given by our expert participants. Finally, **IoT sensors on employees** can access information of employees on their behavioral outcomes in various situations. Complex socio-metric measurements are possible through these IoT tools which can predict employee social behaviour in an objective and precise fashion.

Majority of the experts predicted that a future direct interaction of IoT with HR software and hardware to make way for data and digital service for HR functions. For example, HR development is possible with software continuously tracking coaching, feedback and training outcomes in employees who show a qualification gap or training deficit. Experts also expect a manifold and multiphase increase in HR data volume. Application of multiple IoT as multiple wearable sensors will increase the volume of HR data. This voluminous data can then be used for different purpose starting from avoiding accident proneness to comprehensively improve employee quality. In terms of differentiation in the items of the questionnaire, the HR information and analytics as well as HR Training and development are considered by experts to be significantly changing due to introduction of IoT in the form of smart things as sensors or smart operation. Other HR functions such as recruitment & selection, compensation and performance management are perceived as moderately being affected by the application of IoT. This signifies that usage of smart things as sensors will call for rapid change in training and HR Analytics whereas the other things will change but with less rapidity and intensity.

In recruitment for instance, job seekers now depend heavily on mobile technology and mobile apps to access information on companies as well as jobs. Therefore, HR can make use of these technologies for enhancing their visibility in the job market through networks such as LinkedIn, Naukri etc. which are accessed in smart devices. For speedy deliverance of recruitment process and procedures as well as results, fast identification of skills set, selection procedure etc., the use of IoT tools increases efficiency of the organization. Alternatively, organizations also create apps to manage employees such as coaching/training and its evaluation, performance appraisal apps which have objective criteria to evaluate efficiency of employees' performance, feedback etc to keep track of organizational growth efficiently and conveniently. The entire ecosystem of IoT in effect makes the manual systems obsolete.

3.2. Result on Compliance Risk and Regulatory framework

Human resource which leans on completely on success of workers is well versed with the compliance risks and fraud etc. and the repercussions of ill behaviour in finding more followers. During the Delphi survey the items under each segment of HR functions had a one question that dealt with the inherent risks and compliance problems in case of adoption of IoT to particular HR function. For instance experts were asked what kind of risks and compliance problems are involved if smart things are introduced to rate performance on job? Majority of experts have noted that evaluating and monitoring is important, as is understanding risk and in taking precautions to protect the organization. Experts have also viewed that IoT aids can help ward off threat of extinction for company's reputation, existence and also maintain workplace morale. Our professional participants have warned that since sensor data can provide socio-metric measurements on employee social behaviour, it is dangerous in falling in wrong hands. Therefore before installing employee ID badges and connective smart watches, HR has to consider for which important problem is it installed and to take it out as the problem is solved. Employee socio-metric quantification is also likely to compartmentalize employees and kill creativity and uniqueness. It should therefore be used only to supplement and not substitute personal identity of employee.

3.3. Results on Outsourcing or In-House Management

The results regarding outsourcing or in-house management of the 'smart things' in HR was diverse. Human resource management has the big task of ensuring compliance along with managing performance. Hence they can either develop regulations in house or can outsource them to other agencies. Delphi survey has revealed that outsourcing compliance can greatly save time and energy of employee that have to actually perform regular jobs. Two experts have maintained that when it is outsourcing, it is essential to involve employees from time to time and ask their opinion on the same. A perfect balance would be therefore outsourced company and HR department to work hand in hand to save cost as well as outsourcing certain part such as regulation compliance to a more expert company. Strategic HR compliance can reduce the administrative hazards.

4. Conclusion

However the human resource manager should also be aware of the side effects of IoT, it is not without its problems. For instance, despite persistent need and temptation for tracking employees' whereabouts, their attendance in office and need for recording information as these, it raises question of employees' privacy. Hence employees' permission is a must. Corporate security concerns are also a spinoff effect of using IoT in HR. As an instance, organizations' data is convenient in being accessible and can be shared in smart devices.

IoT, like automation and mechanization in the early 30s, can throw employees out of job and create big anomalies of workplace. Hence, there has to be a slow and gradual transformation of companies to IoT based facilities. Nevertheless, as with the emergence of any new technological innovation, it is important to note drawbacks, and for HR managers to be aware of these to ensure a smooth transition into this new age of information sharing.

Accumulating high quality data will increasingly demand prolonged time span thereby compromising employee responsibility towards real work. Also varied work pressure may not be rightly judged if only a particular quarter is taken. Therefore HR analytics experts only consider statistical reliability and validity establishment for a particular tool is a continuous process and is never ending. Multiple systems in an organization being connected would actually lead to breach of information therefore need careful handling. Otherwise it will lead to duplicate data, or incorrect data. Also only a few organizations have developed regulatory frameworks for handling personal information of employees which might become a problem. Deloitte analysis has made a design of how to quantify workforce in a secure way.

While evaluating whether the in-house solution is better or outsourced solution is better, one has to consider a few Key Performance Indicators. During the transition of workflow to a digitized and streamlined workflow, there is a need for measuring the benefits of both in-house and outsourced solutions for managing personnel. These are parameters that can justify expenditures in in-house solution or cloud based human capital management solution by way of weighing both options objectively. These key performance indicators are workflow, flexibility, liability and affordability. Workflow is the process of continuity in input-output in the company that can get intensive at times. Without the help of automation the regulation of these are prone to mistakes by being repetitive. Cloud based solutions can detect mistakes easily while completing repetitive work with precision and accuracy. Human resource planning therefore must make use of these solutions to

locate and relocate, train, plan for new recruitment and selection etc. it can do away with the mistakes in paperwork due to repetitiveness. Tracking software ensures that the employee's detailed information is not only stored but also with less time and resource it helps in precise decision making. Automated digitized software is also flexible in their applications and many times can be generalized to other places and workforce. Human capital management solutions have more functionality than manual systems with a lower maintenance cost. For example HR biometrics devices that are used for our educational institutions are also used in hospitals and offices.

Compliance with company policy and industry or government regulations is an essential part of IoT in HR and often subject to auditing and fines other compliance and reporting procedures. Hence it can be labor intensive and subject to misinterpretation and error when done manually. HCM solutions can streamline these time-consuming tasks and are easily reported or audited at any point. When one considers affordability, IoT in HR can be much less cost intensive as once installed it requires less maintenance. In current times many companies have come up to provide solutions for HR compliance and one can easily make use of their services to find a solution. Hence outsourcing regulation compliance needs while keeping the employees in the loop would go a long way in solving complex problems of maintaining compliance.

4.1. Implications

Internet of Things is the new revolution that has taken the world and is set to become an integral part of organizational decision making and productivity. The human resource has been greatly affected by the process by incorporating the technological changes by way of AR and VR devices as well as wearable devices along with biometric and tracking devices. These have become integral to evaluating effectiveness of human resource management and are set to become the next big thing in redefining business environment. In current decade, digitization and because of that, IoT in HR Technology is dictating technology evolution. Hence IoT in HR is going to be the future of business by being medium for all HR solutions starts from recruitment, selection and training to appraising employee performance objectively while ensuring safety for employees. However, for leveraging these solutions good regulation framework must be developed along with privacy policies against misuse of the large personal data at disposal. Superior information security will ensure that the personnel data and devices are not mishandles and privacy is protected. In its nascent stage IoT has dictated HR innovation in a big way and has altered the way we perceive work environment for good. The success in this endeavor towards innovation in HR solutions therefore depends not on how HR is able to leverage the innovations to meet the needs and also how good the policies are in protecting human capital. As Bersin, J., Mariani, J. & Monahan, K. (2016) of Deloitte says, "the desire to quantify, measure, and monitor ourselves has spawned an entire industry...by balancing employees concerns and business goals, organizations can solve workplace problems that benefit both the employer and the employee".

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