BioGecko

Vol 12 Spl Iss 01 2023
ISSN NO: 2230-5807

Digital Technologies and Collaborative Artificial Intelligence for Environment Ecosystem: Optimising Internet of Things adoption for Human Resource Management

SANKARA RAO ALLADA[1]
[1]Assistant professor, Electronics and communication engineering, Dadi institute of engineering and Technology, Jntuk
asankararao@diet.edu.in

Dr S Barathi[2]
[2]Assistant Professor, Department of English, Srinivasa Ramanujan Centre, SASTRA Deemed to be University, Kumbakonam
barathi0723@gmail.com

Dr.AL.NACHAMMAI[3]
[3]Assistant Professor (Sr. G), Mathematics, Kongu Engineering College, Erode-638060 Tamilnadu
nachusenthilnathan@gmail.com

Dr. Melanie Lourens[4]
[4]Deputy Dean Faculty of Management Sciences, Durban University of Technology South Africa
melaniel@dut.ac.za
Orcid ID: 0000-0002-4288-8277

PATHAN SHAHNAVAJKHAN AKABARKHAN[5]
[5]ASSISTANT PROFESSOR, FACULTY OF COMPUTER SCIENCE, Shri C.J. Patel College of Computer Studies, Sankalchand, Patel University
sapathan.fcs@spu.ac.in
Orcid – id: 0000-0002-8183-3615

Liton Chandra Voumik[6]
[6]Assistant Professor, Department of Economics, Noakhali Science and Technology University, Noakhali, Bangladesh-3814
litonvoumik@gmail.com

***Abstract*—** The introduction of new innovations is seen as a crucial element in helping business firms adapt to change in a competitive business condition. Artificial intelligence, the internet of things, robotics, and transaction processing are just a few of the innovations that have accelerated development in the workplace. Improved communication technology enables businesses to maintain constant contact with their workers, distributors, buyers, and distributors, but it has also presented numerous challenges for businesses looking to gain an advantage.

The deployment of the Internet of Things and other technologies allows for more effective resource distribution, 24/7 connectivity, and improved service delivery. The IoT makes it possible to gather large amounts of data, store them, and handle them so that the participants may use them to make better decisions. Additionally, businesses are utilising digital technologies to increase cooperation, manage work effectively, and create a better working environment to boost employee productivity. The advanced organisation considers improving the overall productivity of individual capital to be the primary responsibility of human resource division. As a result, through the use of IoT and other associated technology, HR executives and directors are searching for specific patterns on the overall growth of skill set, competences, and other elements in order to effectively sustain having realized the mission of the company.

The primary goal of the study is to evaluate how collaborating AI technologies and digital innovations in general have impacted the development of a better organisational ecosystem. It also aims to comprehend how IoT adoption has improved the effectiveness of human capital inside the business. The study is empirical in nature, and the writers will gather the information from the respondents to carry out a thorough analysis. A critical analysis is then done using "***Descriptive Statistics, Correlation Analysis, and Regression Analysis***".

Keywords— *"Artificial Intelligence", "Internet of Things", Environment Ecosystem, "Human resource management", Multiple regression analysis.*

Introduction

The overall increase in innovation and technology has resulted in enhanced shift on the way business is being conducted. Technology has transformed the place where individuals work and use these tools for enhancing their efficiency. Technology is focused in providing quick access to large volume of data, support in making critical analysis and present dynamic reports for better decision making (Nawaz, 2020). Hence, the effective application technology is highly critical for achieving competitive edge, managers are now focusing in investing in technology so as to support their team members to perform their task efficiently and enable in realising the overall goals of the organisation.

The business enterprises are considered as the entity which channelises the efforts of its members in order to create products and services to meet the needs of the customers, in the current digital environment the process remains the same, however the management is highly poised in using the technology to enhance competitiveness, reinforce in creating better ecosystem and also explore new markets at lesser cost (Pillai, & Sivathanu, 2020). Hence, the implementation of technology is involved in impacting very aspect of the work, work ecosystem and other aspects in the business, furthermore it is used to enhance the overall productivity and efficiency of the employees.

Human resource management has taken a strategic position and is considered as the integral part of the business and support the management in taking strategic decisions. The application of digital technology, which are mainly stated as digital HR, has been forcing the management in enhancing the overall efficiency of the employees, support the organisation to achieve more productivity and enable in achieving the goals of the organisation (Stanley & Aggarwal, 2019). Techno centric HR management has resulted in modernising the ecosystem of the business, enrich the skills and capabilities of the employees and improve the performance of organisation effectively. Hence, the role of technology in the organisation has enabled in optimising the business ecosystem and performance of the employees.

The human resource department in the current organisational environment focuses in managing the human capital effectively though the application of technology. The integration of various communication and other related tools tend to integrate the individuals who are scattered across the globe, address the issues related to efficiency and optimise the allocation of resources for enhanced performance. Furthermore, the application of technologies enables in addressing the wellness of the individuals, create flexible work timings, support in enhanced tracking of performance, plan for training and development to harness new skills, optimise resources and enhance efficiencies (Jia et al., 2018). The digital HR aspects like artificial intelligence, robotics, IoT, process automation etc. supports the management in managing their human capital in an effective manner. The collaboration of technology and human resources management has created a major impact on other business functions as the human capital are integrated. It also enables in managing the organisational ecosystem which provides the necessary resources to accomplish the task as per the goals of the organisation.

With the advent of data and digital technology there is an enhanced development in the globalisation and achievement of organisational goals. The management of many business enterprises are now looking to unleash the potential of digital technology in embracing the human resource strategy. The enhanced implementation of technology has enabled in easier connection among the employees, eliminating the boundaries between the different geographical locations and collaborating with individuals at any point in time. The IoT is stated as the key aspect which tend to source various information about the external environment and process them for taking quick decisions. It is

considered as a key measure in collecting different categories of information within the organisation and outside so that it can be processed for effective decisions (Boon et al., 2019). The IoT has enabled the organisation in storing and managing large amount of data, collect the current skill set of the employees, their performance and ability to meet the goals of the self and team. The application of IoT technology also supports in quantifying the employee activities like their efficiency in performing the task, time taken to complete the given task, measure productivity every month, also understand their work life balance, health and wellness aspect and thereby support in creating better ecosystem in the business enterprises (Barman, 2018). The digital HR also support in identifying process efficiencies, implement innovation in the process and support in enhancing growth of the organisation in a sustainable manner. Hence it is vital for the HR professionals to apprehend the potential power of IoT and other tools so as to optimise the performance and efficiency of the employees in the organisation.
This study is made in order to understand the role of digital technologies and AI for creating ecosystem in the business enterprises and also optimise the IoT in enhancing the performance of the employees. The IoT technologies can be applied in different aspects like the Creation of collaborative ecosystem, flexible working system, manage the health and wellbeing of the employees and supporting in innovation and creativity in the business process. Hence, this study is to understand the role of these aspects of IoT in optimising the performance of the employees in the organisation.

Review of Literature

Artificial intelligence advancements can assist businesses of all sizes in achieving their development objectives. Although not limited to application development, artificial intelligence has a presence in many fields (Vinichenko et al., 2019). It frequently includes subjects like the humanities, brain science, math, and even pertinent hypothetical knowledge and abilities in clearly defined realms of implementation, including compiling life experiences in related areas. Furthermore, at the hypothetical level of knowledge, artificial intelligence has a diverse range and nature and will not belong in any one field. human resources The Board organises, correlates, controls, and supervises predominantly delegate practise through a range of ways and approaches with the eventual purpose of enabling the activity to get the greatest results.
At the heart of traditional human capital, leaders rely on thriving corporate interests and human resources management, ignoring the need to improve human capacity and the link between individual development and business development. In the internet age, human resources, the boards of today's companies, should pay more attention to the needs of marketing gifts, from the focus of leaders to entrepreneurs (Valanarasu, 2019) The human advantage of leaders is extremely crucial for business development. It is an important part of a good business for leaders and also an important reason to keep things running. Therefore, reasonable techniques should be used to improve the board's skills and level and to promote the continued financial development of companies. In the age of the information economy, human resources are a source of progress and information improvement (Jain, Yadav & Shrivastava, 2019). To improve the focus on reseller training, efforts must increase the cost of human capital for managers, improve the character of employees while understanding reseller inventory and business development.
Through the barriers to humans and artificial intelligence to be overcome during the innovation process and the basic brainstorming and development activities to be implemented, we can create a framework for potentially creative applications of artificial intelligence in the innovation process (Jain, & Pandey, 2019). To understand the potential of artificial intelligence, we need to identify where artificial intelligence can help and replace human decision-making to drive innovation. There are four possible areas where human decision-making can theoretically be supported: (1) develop ideas beyond the boundaries of information processing. (2) generate ideas beyond the boundaries of information processing. (3) develop ideas beyond local research routines. and (4) generate ideas beyond local research practices. Artificial intelligence systems with this capability will primarily be able to support, rather than completely replace, people in the innovation process, as they play a supportive role by processing more information and not benefiting from it, supporting the whole innovation process (Morley et al., 2019). These artificial intelligence systems can therefore help people overcome the

limitations of cognitive information processing, which often prevents them from fully examining large amounts of data and paying attention to multiple data sources.

A new business model has emerged with the integration of blockchain and IoT, as well as AI and IoT. In reality, autonomous vehicles cannot be viable solutions unless the IoT and AI collaborate closely. We will soon be able to ride in an autonomous automobile that makes use of AI and IoT (Furman & Seamans, 2019). This model will undoubtedly mark the beginning of the end for decision theory, optimization theory, and the computer sector. Smart sensors drive the sensors utilized by the autos to acquire real-time data, while artificial intelligence algorithms control the decision-making technology. Deep learning and AI-based technologies use this data to conduct important actions and come to smart choices.

Research methodology

The descriptive research design will be used by the researchers to achieve the study's goal because it allows the researchers to delve deeper into the subject. Since IoT is increasingly being used in human resource management, it is crucial to investigate how IoT and AI might be utilized to improve the effectiveness of human capital inside a company.

The authors intend to collect the information from select companies in India, both "primary data and secondary data" sources are collated for the study, the primary data is made through the issue of questionnaires to the employees working in select companies, closed ended questions were shared to the respondents and their responses were collated. Nearly 220 questionnaires were issues and of which only 189 completed data were received. "Convenience sampling method" is used in order to select the respondents, secondary data source like Scopus online database, EBSCO, Google scholar etc (Ciuriak, 2019).

The overall development and implementation of digital technologies in the human resources domain are discernible, as it supports in improving the optimising the performance of employees, support in process efficiencies and achieve better growth and development (Jain, & Pandey, 2019). The HR managers are highly poised in addressing the performance management issues, provide training and development to upgrade their skills, achieve efficiency and productivity and create better organisational ecosystem in an effective manner(Panwar et al., 2021).

The statistical analysis is performed using SPSS package, which will be applied to test the relationship between the variables, measure the regression coefficients and other analysis for inferring the data.

Analysis and Interpretation

The part of the study focused in performing detailed statistical analysis using the SPSS package, the "independent variables" considered for the study are: Creation of collaborative ecosystem, flexible working system, manage the health and wellbeing of the employees and supporting in innovation and creativity in the business process and the dependent variable is stated as optimising the human resources in organisation (Armour, & Sako, 2020). The analysis part is divided into three sections, the first section provides the percentage rate analysis, second part involves in stating the correlation analysis among the dependent and independent variables, third section enables in stating the regression analysis.

Table I. Percentage rate analysis of the demographic variables

(Source: Created by the Researchers)

Respondents Gender	Frequency	Percent
Male	121	64
Female	68	36
Respondents Age	Frequency	Percent
21 - 25 Years	37	19.6
25 - 30 Years	88	46.6
30 - 35 Years	44	23.3

35 - 40 Years	20	10.6
Education	Frequency	Percent
Completed Undergraduate course	52	27.5
Completed Postgraduation course	104	55
Completed Professional course	33	17.5
Organisation working	Frequency	Percent
Top 500 companies	128	67.7
Not top 500 companies	61	32.3
Designation	Frequency	Percent
Operations Manager	59	31.2
Human resource executives	83	43.9
Human resource manager	47	24.9
Experience	Frequency	Percent
1 - 4 years	64	33.9
4 - 8 years	49	25.9
8 - 12 years	27	14.3
12 -16 years	13	6.9
More than 16 years	36	19

Table 1 of the analysis shows that 64% of the respondents were male and 36% were female, and that 46.6% of the respondents were between the ages of 25 and 30 years, 23.3% were between the ages of 30 and 35 years, 19.6% were between the ages of 21 and 25, and 10.6% were between the ages of 35 and 40 years. 55% of the respondents have finished post-graduate coursework, 27.5 % have finished undergrad coursework, and the remaining 17.5 % have finished professional coursework. 67.7% of the respondents have stated that they are working in top 500 companies and remaining 32.3% of the respondents stated that they are not working in such companies. 43.9% of the respondents of them are human resource executives, 31.2% of the respondents have stated that they are currently working as operations manager and remaining 24.9% of them are human resource manager.

Table II: Data pertaining to state that AI supports in creating Ecosystem
(Source: Created by the Researchers)

AI creating Ecosystem	Frequency	Percent
Strongly Disagree	13	6.9
Disagree	17	9
Neutral	32	16.9
Agree	70	37
Strongly Agree	57	30.2
Total	189	100

Table 2 shows that, while 37% of respondents agreed with the assertion that AI fosters the development of a better environment, only 30.2% strongly agreed. Thus, it should be emphasised that roughly 67% of respondents were in favour of AI helping management maintain and enhance ecosystems. 6.9% of respondents have severely disagreed, 9% have disagreed, and 16.9% are neutral.

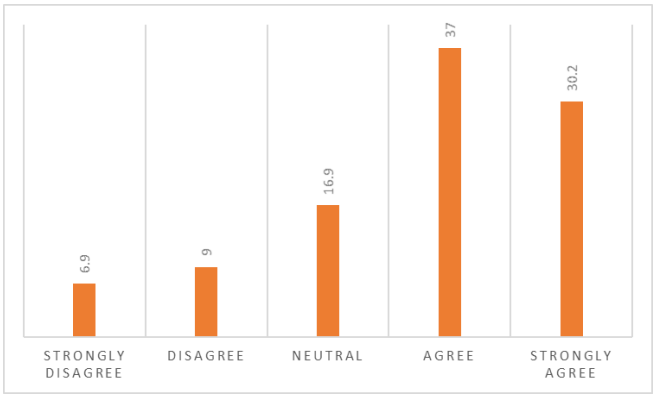

Fig 1: Chart pertaining to state that AI supports in creating Ecosystem
(Source: self-developed)

Table III: Data pertaining to state that IoT enables in optimizing the human resources in organization
(Source: Created by the Researchers)

IoT Optimisation in HR	Frequency	Percent
Strongly Disagree	15	7.9
Disagree	16	8.5
Neutral	31	16.4
Agree	66	34.9
Strongly Agree	61	32.3
Total	189	100

Based on Table 3, it can be seen that 34.9% of respondents agreed with the statement that IoT makes it possible to optimise human resources in business enterprises, and 32.3% strongly agreed. This means that 67.2% of respondents have a very positive opinion of the role that IoT plays in improving personal resources. 8.5% of them disagreed with the statement, 7.9% of them completely disagreed, and 16.4% of them were neutral.

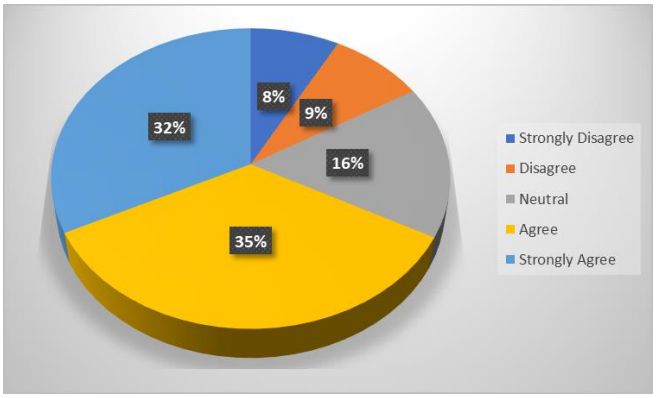

Fig 2: Chart pertaining to state that IoT enables in optimising the human resources in organisation

(Source: self-developed)

This part of the analysis states the overall Karl Pearson's coefficient of correlation between the independent variables and dependent variable.

Table IV: Correlation analysis
(Source: Created by the Researchers)

Correlations	Creation of collaborative ecosystem	Flexible working system	Manage the health and wellbeing of the employees	Supporting in innovation and creativity in the business process	Optimising human resources in organisation
Creation of collaborative ecosystem	1	.901**	.852**	.873**	.833**
Flexible working system	.901**	1	.859**	.873**	.837**
Manage the health and wellbeing of the employees	.852**	.859**	1	.854**	.771**
Supporting in innovation and creativity in the business process	.873**	.873**	.854**	1	.812**
Optimising	.833**	.837**	.771**	.812**	1

human resources in organisation					

This intends to provides the linear regression analysis of the information, this is intended to understand the nature of association between the variables considered for the analysis.

Table V: Calculation of R squared value

R	R Square
.862a	0.744

Table 5 of the analysis shows that the coefficient of determination, or R squared value, is 0.744, or 74.4%. Since the chosen model is said to be the best fit when the value of R squared is greater than 0.70, the current value indicates that the data is the best fit and can be used for even farther analysis.

Table VI: Regression weights

(Source: Created by the Researchers)

Regression	B	Std. Error	Beta	t	Sig.
(Constant)	0.093	0.171		0.546	0.585
Creation of collaborative ecosystem	0.317	0.101	0.305	3.152	0.002
Flexible working system	0.34	0.094	0.352	3.598	0.000
Manage the health and wellbeing of the employees	0.021	0.084	0.021	0.255	0.799
Supporting in innovation and creativity in the business process	0.229	0.092	0.22	2.486	0.014
F Value	133.445				

Sig.	.000 b				

From table 6, the regression equation can be stated as follows:

Y (Optimising human resources) = 0.093 + 0.317 x Creation of collaborative ecosystem + 0.340 x Flexible working system + 0.021 x Manage the health and wellbeing of the employees + 0.229 x Supporting in innovation and creativity in the business process

The regression equation shows that all the independent variables tend to possess a positive influence on the optimisation of human resources in the organisation

Furthermore, the F value is 133.445 and the significance value is 0.00, which is less than 1% level of significant hence the data are statistically different.

Confirmation of the hypothesis

Based on the analysis stated in the above section, the hypothesis results are stated as follows

Table VII: Results of the hypothesis

(Source: Created by the Researchers)

Hypothesis	P value	Accept / Reject
There is a significant difference between the creation of collaborative ecosystem through IoT and optimising the human resources in the organisation	0.00	Accept
There is a significant difference between the Flexible working system through IoT and optimising the human resources in the organisation	0.00	Accept
There is a significant difference between the Manage the health and wellbeing of the employees through IoT and optimising the human resources in the organisation	0.799	Reject
There is a significant difference between the Supporting in innovation and creativity in the business process through IoT and optimising the human resources in the organisation	0.014	Accept

Conclusion

The use of the Internet of Things and the like provides a better distribution of resources, connects people at any time of the day and effectively improves the service provided. IoT enables large amounts of data to be collected, stored and managed so that it can be made available to stakeholders for better decision-making. Human resource management has a strategic position and is considered an integral part of the business and supports the management in making strategic decisions. The use of digital technology, primarily defined as a digital human resource, has forced management to improve the overall efficiency of employees, help the organization achieve higher productivity and help achieve business goals.

Digital aspects of human resources, such as artificial intelligence, robotics, IoT, process automation, etc. support the management of efficient human capital management. The collaboration between technology and personnel management has had a significant impact on other business activities as human capital is integrated. It also helps manage the organizational ecosystem and provides the necessary resources to implement the project in line with the organization's goals

REFERENCES

A. Jain, A. K. Pandey, (2019), "Modeling and Optimizing of Different Quality Characteristics in Electrical Discharge Drilling Of Titanium Alloy (Grade-5) Sheet" Material Today Proceedings, 18, 182-191

A. Jain, A. K. Pandey, (2019), "Multiple Quality Optimizations in Electrical Discharge Drilling of Mild Steel Sheet" Material Today Proceedings, 8, 7252-7261

A. Jain, A.K.Yadav & Y. Shrivastava (2019), "Modelling and optimization of different quality characteristics in electric discharge drilling of titanium alloy sheet" Material Today Proceedings, 21, 1680-1684

Armour, J., & Sako, M. (2020). AI-enabled business models in legal services: from traditional law firms to next-generation law companies? Journal of Professions and Organization, 7(1), 27–46.

Barman, A. (2018), 'Human Resource Information Systems (HRIS) : The New Role of HR in the Giant Data Age', International Conference on Innovative Research in Management and Accounting, Banking, Economics, Marketing, Tourism, Business, Human Resources, Law and Governance (IC-2018), organised by Krsihi Sanskriti Publications, 26 May 2018.

Boon, C., Den Hartog, D. N., & Lepak, D. P. (2019). A Systematic Review of Human Resource Management Systems and Their Measurement. Journal of Management, 45(6), 2498-2537.

Ciuriak, D. (2019). Economics of AI/ML and big data in the data-driven economy: Implications for Canada's Innovation Strategy. In ML and Big Data in the Data-Driven Economy: Implications for Canada's Innovation Strategy

Furman, J., & Seamans, R. (2019). AI and the economy. Innovation Policy and the Economy, 19(1), 161–191.

Jia, Q., Guo, Y., Li, R., Li, Y., & Chen, Y. (2018). A Conceptual Artificial Intelligence Application Framework in Human Resource Management. 8th International Conference on Electronic Business, 106-114.

Morley, J., Floridi, L., Kinsey, L., & Elhalal, A. (2019). From what to how. An overview of AI ethics tools, methods and research to translate principles into practices. arXiv preprint arXiv:1905.06876.

Nawaz, Nishad. (2020). Exploring Artificial Intelligence Applications In Human Resource Management. Journal of Management Information and Decision Sciences Volume 23, Issue 5, 2020

Pillai, R., & Sivathanu, B. (2020). Adoption of artificial intelligence (AI) for talent acquisition in IT/ITeS organizations. Benchmarking, 27(9), 2599-2629.

Stanley, D. S., & Aggarwal, V. (2019). Impact of disruptive technology on human resource management practices. International Journal of Business Continuity and Risk Management, 9(4), 350-361

V. Panwar, D.K. Sharma, K.V.P.Kumar, A. Jain & C. Thakar, (2021), "Experimental investigations and optimization of surface roughness in turning of EN 36 alloy steel using response surface methodology and genetic algorithm" Materials Today: Proceedings,

Valanarasu, M. R. (2019). Smart and secure IoT and AI integration framework for hospital environment. Journal of ISMAC, 1(03), 172–179.

Vinichenko, M. V., Rybakova, M. V., Chulanova, O. L., Kuznetsova, I. V., Makushkin, S. A., & Lobacheva, A. S. (2019). Using natural and artificial intelligence in the talent management system. International Journal of Recent Technology and Engineering, 8(3), 7417-7423