Human Engineering for technology integrated IT/ITES work spaces amidst pandemic; an expedition

Dr. Angelo Mathew
Asst. Professor,
Dept. of Personnel management,
Loyola College of Social Sciences,
Thiruvananthapuram, India.

Abstract: The transformational challenges enforced by Covid 19 pandemic into the organizational ecosystem created a platform of perfect uncertainties for HR managers to experiment human capital with technology. It has prompted a need to explore the implications of industrial talent especially as regards relationships between people and machines. Human engineering is found to have a decisive role if facilitated properly in resource levelling with technology with or without AI, among knowledge workers ensuring success. The paper aims to discuss the practical implications and impediments faced by HR practitioners of corporate India to propose an ideal preposition for virtually productive and sustainable future:

Keywords: Human engineering, Technology integration, resource levelling.

PURPOSE

This paper examines the operational nitty-gritty of AI and technology integration while initiating human engineering to combat impediments posed by the pandemic in organizations while dealing with resource levelling. Four HR practitioners from Indian IT majors were the focus point to extract and disseminate exposure based sharing's on the experience worth learning.

I. INTRODUCTION

The management of industrial labour or knowledge workers, especially while dealing with relationships between people and machines became inevitable during the pandemic. Human engineering is the study of the mental and physical capacities of human beings in relation to the demands made upon them by their job and by the equipment/ technology they have to use to carry out their jobs. The human resource managers dealing with operations of an enterprise amidst dealing with a large pool of engineers evolved a facilitative mechanism to integrate technology ensuring productivity, especially while confronting the pandemic gave direction to the study. The researcher is inquiring into the dynamics of relationships between workforce and technology enabled resource leveling. HR practitioners who thought about human engineering as the panacea to deal with a complicated organizational ecosystem caused by the pandemic,gave direction to this study. Four top level HR practitioners have been approached through semi-structured interviews, considering four different medium sized IT organizations as in-depth case studies, to infer commonalities. Present organizational eco-system across the organizations studied found to be affected by the

moderator variable pandemic. The general objective of the study is to explore into approaches and systems that may reduce the potential for human error, by enhancing human interface virtually to increase system agility, lower lifecycle costs, improve safety, and enhance overall organisational performance where men and machines sync without resistence. Though only 22% of firms globally found to have adopted AI enabled technology in managing human resources till 2019, the trend has changed drastically to 67% since covid19 imposed restrictions at places of work (Vaio,et.al.2020). This study may throw light on how Human Engineering was initiated by the HR and how it was accomplished in the context of real world constraints. From the very beginning of imposed restrictions to curtail the spread of the pandemic, companies started to experiment integration of technology at various levels and reported hickups affecting functional efficacy of HR decisions in the management of virtual work.Performance started to face impediments of different sorts since the inception of the work from home regime. Organizations initiated ERP-based technology integration as an immediate remedy due to the ease and experience for the past few decades. While some of the seasoned human decision-makers could sense and monitor adverse employee behavior, psycho physical problems and maladjustmentments, those managerial remedies initiated by them didn't reach the scholarly. Even state-of-the-art algorithms or artificial intelligence enabled systems or technology find this to be a challenging problem. Tambe, et.al (2019). This realization prompted HR practitioners to initiate about half a century old Human Engineering (R.Coburn, 1973) to tackle the situation and it has been found working well beyond expectations.

II. REVIEW OF RELEVANT LITERATURE

The traceable origins of human engineering dates back to the second industrial revolution, though the realistic application of it is found in the Naval Electronics Laboratory centre, California in 1973 as specified in the technical document No.278, where it is found to be comprehensively used in developing systems to involve human capital in promising ways especially within project organizations and frameworks. (R.Coburn, 1973). As a measure of problem solving when complex organizational systems contradict in a given platform, initiating human engineering can work like a panacea, as it engulfs the espirit decorps in a natural way of relationship building leading to success.

In their study on artificial intelligence (AI) as technology integration mode for HR, Premnath, S., Arun, A., & R, D. A(2020) explains that such technology integration advanced by leaps and bounds in recent years, making it a crucial tool for enterprises all over the world. This study looks specifically at the application of AI in HRM in India, as well as the benefits and problems of integration and the limitations of AI in HRM. In industry 4.0, artificial intelligence (AI) will be the driving force. Artificial intelligence (AI)-based machines will make up the bulk of the workforce. The purpose of this study is to introduce the AISHRM conceptual model, which stands for "Artificial Intelligence-based Strategic Human Resource Management for Industry 4.0, Rangana Samarasinghe, Dr. Ajith Medis, K. (2020)

AI's development potential is related to the UN 2030 agenda for Sustainable Development, there found a research that looks at the connections between AI, machine learning, and long-term development in a futuristic perspective covering almost all published work in this domain through a meta- analysis covering a database containing 73 English-language publications published between 1990 and 2019, which predicts the predominant position technology may hold in the years to come in managing men. Vaio, A.D., Palladino, R., Hassan, R., & Escobar, O.R. (2020). Almost every company is using AI in their functional areas right now to boost employee productivity. The role of AI in the HR area begins with employee recruitment and ends with employee performance evaluation. G. Bhardwaj, S. V. Singh, and V. Kumar(2020).

Mathur, Shipra. (2019) states that Artificial Intelligence (AI) is redefining human resource management by programming logic to be carried out in the digital age. The tremendous expansion and current trend of big data is the most powerful driving force behind the rise of artificial intelligence. AI aids and simplifies the job of HR managers by automating repetitive work and

assisting in decision-making without cognitive biases. Artificial intelligence is being used by almost all firms in the IT sector to improve human resource efficiency, Verma, Richa, and Bandi, Srinivas (2019).

III. DESIGN / METHODOLOGY / APPROACH

The paper achieves these objectives through semi-structured interviews in four in-depth case studies.

Research questions:

Rationale of the present study was discussed, which led to the development of three research questions.

- How human engineering works as an initiative in the resource leveling and management of knowledge workforce during the pandemic?

- To understand technology integration in HR for resource leveling experienced by HR practitioners

- What are the problems and concerns faced by HR practitioners with technology integration in managing people?

The criteria for interpreting the findings:

- The central premise of the study is to critically consider the managerial facilitation of human engineering during a pandemic where task functions are taking place virtually.

- The researcher used the narrative case analysis method to get a clear idea regarding technology integration initiated or experienced by the management.

Case Study Protocol:

Case-study protocol had been adhered to and includes;

1. Stage Description: The research expedition was initiated in a stage-by-stage procedure to rule out likely doubts on the grey areas to arrange it in an organized manner, and the role played by HR practitioners in really facilitating human engineering.

2. Field procedures: The researcher collected first-hand data from the General Manager (Above middle-level executives) through telephonic interviews. The second-hand data are collected through journals, websites, and articles.

3. Design of Case Study Questions: The researcher followed a semi-structured interview schedule. The questions are identified based on the assumptions and observations of the researcher and recent approaches to deal with pandemics shared through blogs and LinkedIn by HR management practitioners.

IV. RESEARCH LIMITATIONS / IMPLICATIONS

The paper reports on sector-specific research (IT/ITES). However, the paper does illustrate the lack of engagement between Technology management literature and personnel/HR literatures on the role of HR practitioners in human engineering for organizations.

V. PRACTICAL IMPLICATIONS

The paper draws out the effect of human engineering on the management of talent where technology is integrated for resource leveling, and the role played by HR practitioners.

© 2022, IJARCSMS All Rights Reserved   ISSN: 2321-7782 (Online)   Impact Factor: 7.327   ISSN: 2347-1778 (Print)   **138 | P a g e**
Special Issue: National Conference on "Self Reliant India (Atmanirbhar Bharat) Opportunities & Challenges"
Organised by: Department of Commerce in association with IQAC of Sheth T.J.Education Society's, Sheth N.K.T.T. College of Commerce and Sheth J.T.T College of Arts,
(Reaccredited by NAAC B+ (2.62), 3rd Cycle, ISO Certified: 9001:2015).
Kharkar Ali, Thane West, Thane, Maharashtra-400601, India.

VI. ORIGINALITY / VALUE

The value of this paper for the academic community is that it emphasizes a lack of engagement between Technology management literatures and HR/personnel management literatures on the role of HR practitioners in human engineering for organizations in the context of a pandemic by integrating technology. When collated data is analyzed, likely, such a core managerial mechanism for the deployment of staff and productivity emerges.

VII. ANALYSIS OF HR FACILITATION AND PRACTICES FOR HUMAN ENGINEERING LEADING TO EFFICIENT RESOURCE LEVELING

The qualitative data analysis modality has been designed in using the constant comparison method. Practicing HR managers have sought considerable support from project managers or operations executives as specialists focusing on efficient resource-leveling.

Technology integration in Managerial Practices

Recruitment	Selection	Placement	Inference
Available pool of manpower is ascertained almost every quarter Through an intense manpower planning exercise. The ERP-based system enabled process (Use of SAP module etc.)	Verify with the next level project managers on hire / redeployment based on KSA analysis	If the pool of ideal persons/ resource is found to be as per the competency requirements, will be posted to the project identified based on KRA	Technology integration through ERP
	Would issue circular on selection to the interested in representing for the opportunity.		Use of internet communication technology, including the formation of an official WhatsApp group
This enables identification of overall resource requirements considering all the projects presently run and expected to roll out within the next 30 days. Could spot upcoming internal as well as external recruitments.		Interested people from the selected but considered for higher-end track record would get placement based on KPIs.	
	Before the process begins, HP will conduct a Planning meeting on selection criteria	Each of the project in progress and about to commence will get suitable members spotted by the DSS (Thump rule-based algorithm written on if, else… logic based on KPIs, KRAs, and KSAs)	HRIS integration
People hired before a decade also rarely exist and are found to have confrontations with HR for the significant dependence on program-based measures.	Previous performance appraisal summary is used to align KSA with KRAs		Use of Decision support systems & algorithm centric thump rules
It is likely that only after ascertaining the resources on benches (Programmers/developers/tester or any help kept idle due to lack of work	Campus selection/ Headhunting based on	Would be placed in various projects based on their experience, interest, and ability to perform tasks.	

© 2022, IJARCSMS All Rights Reserved   ISSN: 2321-7782 (Online)   Impact Factor: 7.327   ISSN: 2347-1778 (Print)   **139 | P a g e**
Special Issue: National Conference on "Self Reliant India (Atmanirbhar Bharat) Opportunities & Challenges"
Organised by: Department of Commerce in association with IQAC of Sheth T.J.Education Society's, Sheth N.K.T.T. College of Commerce and Sheth J.T.T College of Arts,
(Reaccredited by NAAC B+ (2.62), 3rd Cycle, ISO Certified: 9001:2015).
Kharkar Ali, Thane West, Thane, Maharashtra-400601, India.

etc. for a short span of time) An algorithm/ program based on the attributes of employees and the relationship between those attributes and job performance-based review is in place. Virtual recruitment drives through LinkedIn, online portals, etc.	KSA requirements. Generated by the system (HRIS) Administration of Virtual aptitude tests, psychometrics, skype interviews, etc.	The newly selected have no other criteria virtual Offer and appointment orders	HRIS and virtual recruitment selection and placement systems Virtual assistive technology

1. All the four HR practitioner respondents have shared almost the same opinion on the specific questions pertaining to recruitment, selection, and placement for resource-leveling. All of them mentioned that as the pandemic-related restrictions changed the scenario, whenever they shifted their focus from physical coordination HR to virtual systems, technology was getting integrated.

   (* Details of the specific technology used in their organizations mentioned by respondents has been kept anonymous as requested)

2. All the interviewees shared that an information system or ERP won't generate cues without a proper reason; nevertheless, performing employees rarely suffered emotional decisions, which the system could not trace. Certainly, avoidable laxity on the part of HR or project managers was spotted in the end.

3. All the respondents shared that the employee allocations for each project are chosen based on their experiences, interest, and ability, as entered in the ERP by the project management team/ people who are in lead roles.

4. AI applications, such as pattern recognition and language translation, and deep learning using neural networks are finding a nominal place, or it holds an evolving space; at present senior executives who participated say that they are closer to the real AI.

5. Whenever data science analyses are practically attempted in decision making involving employees, it is generating grave disagreement with team leads or project managers and workers alike as they characteristically see it as an imperative threat for making substantial decisions about human beings.

© 2022, IJARCSMS All Rights Reserved   **ISSN: 2321-7782 (Online)**   **Impact Factor: 7.327**   **ISSN: 2347-1778 (Print)**   **140 | P a g e**
Special Issue: National Conference on "Self Reliant India (Atmanirbhar Bharat) Opportunities & Challenges"
Organised by: Department of Commerce in association with IQAC of Sheth T.J.Education Society's, Sheth N.K.T.T. College of Commerce and Sheth J.T.T College of Arts,
(Reaccredited by NAAC B+ (2.62), 3rd Cycle, ISO Certified: 9001:2015).
Kharkar Ali, Thane West, Thane, Maharashtra-400601, India.

Managerial Functions

Onboarding	Training	Allotting	Appraising	Rewarding	Retention	Separating
It is believed that the Coordination of fresh hires and their entry to the organization had to be virtually managed. During the meeting of HR each	In this stage, the project manager approves a summary of periodic work-related flaws spotted on the specific team members (qualifiers) that make them eligible to be recommended for training. HR will identify the previous year's drawbacks based on the evaluation report of prior training and performance. They will find out the necessary list of key resource people available in-house or outsourced. They allocate to different projects or	There will be an algorithm run by the HRIS to plan resource allocation for effective leveling based on KPIs and KRAs, as mentioned in the guidelines. so that, after allocating eligible people based on KSAs, the HR will co-opt members from the bench; It is purely based on the recommendations of project heads/ team leads (though AI-based review summary pertaining to each employee on the bench is with the HR)	Each project will have an appraisal team or committee; they will arrange meetings with performing employees due for appraisal. During the meeting, they will evaluate the previous year's (project) deficiency/deviations from standards/ mistakes at the project level, work team level, and client level and accordingly plan things and make necessary arrangements (Eg: Project team start booking programs for appraisal summary based on KRAs)	WFH and associated savings enabled companies to manage rewards. During a pandemic, reduced pay, partial payment proportionate pay, etc., were suggested by the oracle financials module but decided to arrive at board-level decisions. A very negligible amount of appraisal based increments could be processed based on the reported savings due to very senior personnel ousted/quit the company	Pandemic gave less compulsion on retention. Technology integration was not used for this purpose. Certain crucial personnel expressed disgrace or put up their papers while announcing restrictions and cost cut decisions. Such inevitable cases were managed at the individual level by the HR	On the planning day itself, expenses and current cost of final settlement/ situation where the need for more money to function than allocated budget, the ERP people module will generate such details including calculation. Initiation of a discussion with the employee getting relieved and getting approval from the higher-ups in the only manual task remaining

	teams for on-the-job training based on their interest, experience, and ability. (Captured beforehand at varying levels of self-appraisal or feedback in the HRIS will be considered; while finalizing the list, the HR will seek project members' interest). Then all the project teams/ members undergo training separately as their training schedule and activities will be designed and communicated by the HR team.						

1. All the respondents shared that, during the selection of existing employees or fresh hires for placements, dilemmas aroused many times due to the use of higher-end technology. When data science is used, numerous central outcomes in HR, such as the issue of pink slips or termination, though they are relatively exceptional events, create unrest among the exiting pool of

employees, especially when it turns up to be objectively sharp with zero humane consideration in it.

2. One of the four respondents revealed, "Machine learning and other data science techniques during the pandemic was initially attempted as a measure to reduce cost and functional efficiency as virtual work became the order of organizational existence, by the end of 90 days required human intervention has been initiated, regardless of large numbers on our rolls".

3. All the respondents shared that before the project meeting held by HR, project managers will make the list of Co-opting members based on past appraisal data generated by ERP.

4. All the respondents shared that only with the approval of HR could be required to implement the data generated by the ERP-based pan organizational and pan-continental project appraisal data and its KRA-based review.

5. The majority of the respondents shared that an ethical audit would be ideal to ensure a humane approach to knowledge workers. Though their duty to perform to the tune of standards or expectations is a fact, algorithm-based estimates mostly reflect the income and expenditure statements prior to submission leading to penultimate decisions.

VIII. FINDINGS

The paper examines specific human engineering practices, such as staff bench period determination with algorithms where technology integration happens through appraisal and efforts at work re-structuring in the resource leveling front. The paper finds that in IT/ITES organizations, such as software development, testing, embedded system development, etc., distinctiveness such as scrum project models, focus group training, and ERP-based decision-making limit the capacity of HR practitioners. It is also found that human engineering enables organizational members to appreciate HR practitioners and results in active collaboration with change. As employees'orientation gets redirected to participative performance enhancement due to human engineering interventions, employee development becomes the likely outcome of HR strategy. An ethical audit would be ideal in the future to ensure a humane approach to knowledge workers by reinventing the hi-tech to hi-touch approach through concrete human engineering oriented indirect communication for greater results.

IX. DISCUSSION

Software development service operations took a virtual back seat during the pandemic period where a solution is still evolving. Destined to learn as well as reflect on how HR leaders present human engineering at their companies to overcome hassles of the pandemic, various findings need to be discussed critically. As need to respond to people personally declines the reality of functional coordination and management of work has been modified by AI algorithms. Most of the senior HR managers strongly conveyed their concerns of tech integration; nevertheless, the demands of cost-cutting and downsizing complement cost as one of the major considerations. Recommendations across the stages of the process life cycle are labeled as output of causal reasoning due to the virtual communication systems in place instead of the direct physical interface and performance monitoring. Randomization of respondents and experiments carried out by the selected managers reiterate the fact that, human engineering may be developed as a means of virtual work performance strategy as it accommodates employee morale and contribution, while managers happens to manage knowledge workers online.

X. CONCLUSION

There is a substantial gap between the promise and reality of artificial intelligence in human resource (HR) management. This article identifies four challenges in using data science techniques for HR tasks: the complexity of HR phenomena, constraints imposed by small data sets, accountability questions associated with fairness and other ethical and legal constraints, and possible adverse employee reactions to management decisions via data-based algorithms. It then proposes practical

© 2022, IJARCSMS All Rights Reserved   ISSN: 2321-7782 (Online)   Impact Factor: 7.327   ISSN: 2347-1778 (Print)   143 | P a g e
Special Issue: National Conference on "Self Reliant India (Atmanirbhar Bharat) Opportunities & Challenges"
Organised by: Department of Commerce in association with IQAC of Sheth T.J.Education Society's, Sheth N.K.T.T. College of Commerce and Sheth J.T.T College of Arts,
(Reaccredited by NAAC B+ (2.62), 3rd Cycle, ISO Certified: 9001:2015).
Kharkar Ali, Thane West, Thane, Maharashtra-400601, India.

responses to these challenges based on principles of human engineering as an approach integrating participative integration of functions and employees, Repare of performance deviations by matching or surpassing a personal performance assessment related disagreement   found while AI or algorithm is in place. or achievement of standard performance through human engineering experiments, and ensuring both economically efficient and organisationally appropriate employee contribution as a proof for effective employee management during pandemic.

References

1. The National Bureau of Economic Research, Cambridge, MA, USA,2019

2. Calle Rosengren and Mikael Ottosson, "Employee Monitoring in a Digital Context," in *Digital Sociologies*, ed. Jessie Daniels, Karen Gregory, and Tressie McMillan Cottom (Chicago, IL: Policy Press, 2016), pp. 181-194.

3. Prasanna Tambe, Peter Cappelli; Artificial Intelligence in Human Resources Management: C challenges and a Path Forward, California Management Review 61(4):000812561986791

4. David Meyer, "Amazon Reportedly Killed an AI Recruitment System Because It Couldn't Stop the Tool from Discriminating against Women," *Fortune*, October 10, 2018, https://fortune.

   com/2018/10/10/amazon-ai-recruitment-bias-women-sexist/.

5. See what-next/. https://www.technologyreview.com/s/613281/google-cancels-ateac-ai-ethics-council

6. Jason Bloomberg, "Don't Trust Artificial Intelligence? Time to Open the AI Black Box, *Forbes*, September 16, 2018, https://www.forbes.com/sites/jasonbloomberg/2018/09/16/dont-trust-artificial-intelligence-time-to-open-the-ai-black-box.

7. Premnath, S., Arun, A., & R, D. A. (2020, September). A Qualitative Study of Artificial Intelligence Application Framework in Human Resource Management. https://doi.org/10.31219/osf.io/uqhn2

8. Rangana Samarasinghe, Dr. Ajith Medis, K. (2020). Artificial Intelligence Based Strategic Human Resource Management (AISHRM) For Industry 4.0. *Global Journal Of Management And Business Research,* Retrieved from https://journalofbusiness.org/index.php/GJMBR/article/view/3059

9. Vaio, A.D., Palladino, R., Hassan, R., & Escobar, O.R. (2020). Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review. *Journal of Business Research, 121*, 283-314.

10. G. Bhardwaj, S. V. Singh, and V. Kumar, "An Empirical Study of Artificial Intelligence and its Impact on Human Resource Functions," 2020 International Conference on Computation, Automation and Knowledge Management (ICCAKM), 2020, pp. 47-51, doi:10.1109/ICCAKM46823.2020.9051544

11. Mathur, Shipra. (2019). "Artificial Intelligence: Redesigning Human Resource Management, Functions and Practices."https://www.researchgate.net/publication/338448468_Artificial_Intelligence_Redesigning_Human_Resource_Management_Functions_and_Practices

12. Verma, Richa,Bandi, Srinivas, Artificial Intelligence & Human Resource Management in Indian IT Sector (January 6, 2019). Proceedings of 10th International Conference on Digital Strategies for Organizational Success, Available at SSRN: https://ssrn.com/abstract=3319897 or http://dx.doi.org/10.2139/ssrn.3319897

© 2022, IJARCSMS All Rights Reserved   ISSN: 2321-7782 (Online)   Impact Factor: 7.327   ISSN: 2347-1778 (Print)   **144 | P a g e**
Special Issue: National Conference on "Self Reliant India (Atmanirbhar Bharat) Opportunities & Challenges"
Organised by: Department of Commerce in association with IQAC of Sheth T.J.Education Society's, Sheth N.K.T.T. College of Commerce and Sheth J.T.T College of Arts,
(Reaccredited by NAAC B+ (2.62), 3rd Cycle, ISO Certified: 9001:2015).
Kharkar Ali, Thane West, Thane, Maharashtra-400601, India.