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## People Analytics: An Evidence-Based Approach in Managing Employees

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### Abstract

The Human Resources (HR) analytics provide ample benefits to the organizations, but the employee data privacy remains a big concern for the HR professionals to tackle. In addition, data is now the new goldmine for the Human Resources HR professional. The role of HR has evolved from transactional work to transformational work to provide greater strategic value for organizational effectiveness. More companies are now embedding analytical tools in their HR function as a new fact-based approach in designing relevant strategies to make informed decisions while managing their people more effectively. Understanding people's behaviour is a winning strategy for an organization to survive in the revolving business outlook as employees are the ones who actually translate strategy into action. However, in reality HR is facing several challenges when it comes to data analytics. Data analytics is commonly used in talent management to yield desired employee engagement in terms of retention rate, recruitment, job satisfaction and happiness. This paper explores critical issues related to HR data analytics from various viewpoints. In total, there are five main issues discussed which are conservative approach to data analysis, lack of data governance, reskilling and upskilling, data accuracy and reliability, and management resistance.

**Keywords:** HR Analytics, Talent, Employee Engagement, Digitalisation, Machine Learning

### Introduction

People analytics is gaining a popularity in Human Resources (HR) management paves immense opportunities for organizations to thrive. People analytics success framework is comprises of seven pillars which are workforce planning analysis, sourcing analytics, hiring analytics, onboarding, culture fit and engagement, performance assessment and development and employee lifetime value, employee churn and retention, and employee wellness, health and safety (Noe et al., 2012). Also known as HR analytics, talent analytics or workforce analytics, data is being harnessed to allow organizations grasp better understanding on what keeps people happy at work, what drives productivity, which employees will likely to leave, and more. According to Raguseo (2018) this type of analytical

structure involves the process of analysing data for performance evaluation and development, employee lifetime value, onboarding, culture fit, employee engagement, and workforce planning. Indeed, the adoption of data analytics helps to improve HR management better than ever before. Pape (2016) added the use of visualization tools and predictive analytics to enhance data accessibility about employee attributes, behaviours and performances, making it more easier for HR to interpret and take actions. Moreover, people analytics applications in organizations provide additional insights about job applicants while keeping recruitment and retention processes automated (Baesens et al., 2017; Marler and Boudreau, 2017).

People analytics related terms and concepts started appearing within academic articles and in online searches in 2004, of which people analytics and HR analytics being the most popular keywords (Tursunbayeva & Pagliari, 2018). Notably, AON through its acquisition of a psychometric testing company known as Cut-e in 2017 further amplified the concepts of people analytics in designing customized talent solutions using less arbitrary methods to improve business performance in an increasingly tightly-bound labour market (Consultancy.uk, 2017). As the society is embracing digitalization especially post Covid-19 period, people is becoming more interested with the idea of big data and machine learning tools due to different level of data analysis required to understand social phenomena, evaluate policies, tailor marketing to employees' needs, predict employee behaviour, make precision medicine possible and many other novel and useful practices. However, studying human attributes while simultaneously finding ways how data can be used as a competitive advantage is complex by nature in view that people behave differently and have a huge volume of data. In fact, the transformation of traditional HR management to digital HR management or HR analytics has not only benefited organizations, but also invited entangled challenges. With HR analytics, tracking, data privacy and data security of employees can be vulnerable (Chatterjee et al., 2022). As posited by Johannink (2015), main organizational challenges relating to HR analytics include data availability, absenteeism, followed by data privacy concern and employee engagement. Thus, the following sections discuss the main issues pertaining to these challenges which are conservative approach to data analysis, lack of data governance, cybersecurity concern, reskilling and upskilling, data accuracy and reliability, and management resistance.

### **Conservative Approach to Data Analysis**

There is only a gradual progress on people analytics practices in recent decades despite the growing hype about it (Contractor, 2018). In addition, learning human behaviours is challenging, let alone integrating analytical aspects into it. Sierra- Cedar (2018) echoed the findings by stating that only 16% of organizations reaping the benefits of people analytics through real action. They argued that organizations mainly focus on employee attributes data such as age, gender, education, average compensation, career background and employment duration while forgetting to incorporate interaction between workforce to improve workplace performance. Several scholars highlighted the importance of employee collaboration and inter-organizational relationship in people analytics objectives corresponding to the significant shift in the focus of HR practices from individual-based performance to employee interactions and performance as a group (Tursunbayeva et al., 2018). There is no doubt that flexible work arrangement provides the employees more leeway to get jobs done. However, it becomes a challenge for the HR team to maintain communication and meet the needs of employees while they are working remotely. As to

allow for a smoother workflow, HR rely on analytical software to monitor work completion and productivity level of their employees.

### **Lack of Data Governance**

Unauthorized access to employee data such as tracking employees without consent increased the risks associated with HR analytics applications. Employee surveillance during the course of remote working has drawn a blurry line between privacy and productivity monitoring (Blum, 2022). The Gartner 2021 User Influence on Software Decisions Survey shows the accelerated trend of workforce surveillance revealing the implementation of these tracking systems has caused frustration for 60% of workers interviewed, an increase by twofold prior to the pandemic (Rimol, 2021). In the case of Google, the usage of extensive toolbox of digital surveillance techniques is not only meant to study the likelihood of staff leaving but the company has illegally spied on employees by taking screenshots on work devices while running encrypted messaging services and spying on the use of third-party online storage services before terminating the employee — which has violated the U.S labour laws (Krouse, 2021; Feldman, 2021).

In this digital era, laws and regulation pertaining to data privacy such as Personal Data Protection Act (PDPA), Russian Data localisation law and the EU General Data Protection Regulation amplified the importance of data governance in HR function especially to maintain the reputation and credibility of an organization towards achieving strategic business objectives. In the context of HR, part of the focus lies on being an administrative expert by managing people using technology to rapidly deliver quality HR products and services - which if not done well, will create a lot of issues to the organization (Noe et al., 2012). Generally, HR teams routinely deal with highly sensitive information of the employee such as salary info, account details and medical records which are stored in a local data warehouse for record keeping and analysis. There is a potential misuse of these personal data by HR (McKnight et al., 2011) creating hesitation for employees to allow their personal data to be analysed using HR analytical tools (Ben-Gal, 2019). As such, sound data quality alone is insufficient to manage regulatory risks attached to employee data as a strong data governance is also prominent to enhance digital trust among workforce, stakeholders and regulators.

Interesting findings from a very recent study conducted by Chatterjee et al (2022), clarified the dual impacts of tracking employees by the HR managers to monitor employee behaviours, work style and interaction among themselves. However, there must be a clear guideline or policy to not jeopardize employee's privacy especially outside the working hours while making sure only authorized personnel such as senior management and HR teams are allowed to have unrestricted access to employee's personal data. Accenture (2018) demonstrated the need for HR to design a clear data management strategy by establishing a data governance committee in the organization. In fact, the majority of the employees would develop trust issues if the employers were to be involved in a data breach. Accordingly, HR function can address this issue by demonstrating the material benefits of leveraging HR analytics for human capital management to enhance workforce performance and enable forward-looking insights that inform leadership decision-making hence gaining the trust of the C-suite (Accenture, 2018). Nonetheless, leadership support to employees via effective regulations implementation could possibly help organizations to avoid such misuse of applications of HR analytics. As data collection is rapidly expanding into unregulated terrain, it is crucial for companies to maintain employees' trust by placing more emphasis on data consent and transparency (Blum, 2022).

### **Cybersecurity Concern**

Despite boundless possibilities for modern HR software development, this thriving ecosystem could cause security vulnerabilities leading to poor decision making by the management. A number of researchers claimed that among corporate threats associated with people analytics includes the misuse of organisational information, intellectual property theft or fraud (Guenole et al., 2017). Along with the acceleration of technological adoption, cyber threats and challenges have also evolved at a rapid pace. Apart from people risks such as staff attrition and organization reputation, hack vulnerability or data theft are new forms of cyber-risks linked to people analytics (Royal & Windsor, 2016). In fact, Malaysia had also fallen victim to cyberattacks. During the first Movement Controlled Order imposed by the Government, Cybersecurity Malaysia has reported a total of 838 cyber-security incidents, a 82.5% jump compared to the previous year. In a sense, HR is highly susceptible to cyber-attacks as the result of the new hybrid working model during the Covid-19 pandemic. Dealing with recruitment alone, HR teams are exposed to cyber threats via email attachment from unknown sources, claiming to be resumes from candidates. A recent Europol report declared that a phishing attack or attempting to steal data or install malware to ransom is the most common form of cyber-attack in the EU.

### **Reskilling and Upskilling**

The Future of Jobs Report 2020 released by the World Economic Forum discussed the needs for upskill and reskill workers as 94% of business leaders expect them to be equipped with new job skills especially in digital aspects such as data analysis and information technology as a core workforce strategy to decisively tackle skills gaps issue in people analytics practice. The report further highlighted that the opportunity to reskill and upskill generally offered to only 70% of the workforce by 2025. One major disruption brought by the Covid-19 crisis is the new hybrid work model which has forced HR professionals to optimize decision making using people analytics models in order to ensure employee engagement and productivity remained intact with increased flexibility in remote working conditions (Farmiloe, 2021). It is definitely a big paradigm shift for HR functions to change and redefine their objectives in view that a one-size-fits-all solution is no longer a relevant concept across HR practice. This can be done via evidence-based approach and modern analytical tools as each person is unique and requires tailored solution instead of practicing a uniform law for all.

For instance, the demand for data analysts and scientists is expected to grow (World Economic Forum, 2020), hence it raised an ongoing debate on whether data analytics should be outsourced to IT experts or built in-house. Past studies showed that the workforce is facing difficulties to continuously learn and unlearn technology interfaces as they have limited to no formal and exposure to information technology (IT) tools, knowledge and skills (Bondarouk and Brewster, 2016; Vrontis et al., 2021; Mariappanadar and Aust, 2017). According to Ulrich's Four Role Model, an organization can reap great strategic advantage when the HR teams also act as the strategic partner and change agent instead of being an administrative expert or employee champion only. As change is significant and inevitable, HR can act as a change catalyst by conducting a performance assessment to close gaps between current and desired performance as employees are continuously adjusting themselves to work in a dynamic business world. Meanwhile, scholar claims that by 2025 HR analytics will become a part of the business-wide analytics department, a shift from its current position within the HR department (Johannink, 2015).

### **Data Accuracy and Reliability**

Is HR asking the right question? How accurate is the data collected to be integrated in the analysis? These are common issues entangled with data analysis. Generally, challenges linked to data handling are missing data, outdated data, outliers and unavailable data which the HR team must be aware of. Precisely, HR could be relying on outdated data by spending too much time looking backward trying to identify the loopholes in employee retention of a few years back instead of designing a better strategy to minimise the turnover rate based on current trend. Similarly, as the senior management tries to attract and retain “stars” within the company, attractive perks and remuneration do matter. With the judgement that compensation is correlated to employee retention, the HR analytics team must identify updated extrinsic and intrinsic motivation that can contribute to organization's productivity and overall business performance.

Ultimately, asking the right questions are essential to develop a reliable analysis as wrong data input will affect decision making of an organization. However, as discussed earlier, HR competency level in analytical tools is still moderate given the slow progress of people analytics implantation in the company. Hence, it is crucial for the HR teams to design a valid set of questions in solving particular employee-related issues. For example, to know the underlying reason for high turnover rate, the scope of data collected must be accurate and relevant as the costs to find, hire and train new talent is much more expensive than the cost to retain an employee. According to the HR Digest, it is cost effective to retain a talent as it could save the US companies about \$160billion of annual employee turnover cost. As such, HR is exposed to the risks of creating a false data bubble. Akers (2018) explained that only 4% of HR professionals have confidence in the accuracy of the employee data while 84% of CEOs have doubts on data quality used to form strategic decision-making. And why is that so? One of the reasons is that HR management tend to make assumptions and decisions based on incomplete or conflicting data instead of focusing on forward planning and inter-department collaboration to gain meaningful insights. Furthermore, the quality of people's data is challenged as it can be outdated due to massive data handling by HR teams, resulting in errors in data reporting and blocking profitable growth of the organization. Briefly, a valid HR analytics modelling should began with problem identification followed by a needs analysis before building & testing hypotheses and create a blueprint for analytics before posing relevant questions.

Importantly, setting specific questions in data analysis based on pain points, strategy, goals and budget help to provide relevant insight that would facilitate business decision processes. For instance, HR can investigate key drivers of attrition and whether it is valuable to find the replacement by asking the following questions (Chrisos, 2019; Preusse, 2016) using HR analytics software like Microsoft Power Business Intelligent (BI), Microsoft Excel, SPSS, R and Tableau to easily manipulate and manage voluminous sets of data and generating valuable insights. Those specific questions as such:

1. Can the work being done by this potential new hire be added to someone's additional responsibilities, or split between several existing employees?
2. Is it more cost-effective to give someone a raise and expand their job description?
3. Can the proposed position be done part-time?
4. Do competitors have similar positions?
5. Does this position add to the bottom line?
6. Will this position become obsolete down the line with technology advancements?

7. Is there a possible merger or buyout that could happen that would create redundancies? If there is, are there ways to reuse employee talents and skills in another necessary position within the company?
8. How many years supervised under current management?
9. When was the last time an employee was promoted?
10. What is the employee level of satisfaction on engagement, work life harmony and environment?

Internal data, market survey and industry will help HR to answer the questions above. Otherwise, HR should endeavour the relational analytics via cross-departmental communication together with people analytics application to make actionable decisions. Consequently, provide a cost-effective solution for employee turnover issues. On the other hand, as the companies aim to become more certain in decision making, high reliance on technology such as data mining and profiling during the hiring process could pose few problems. Implicit bias or unconscious association is often observed during the recruitment stage where the algorithm used to categorize and predict performance of candidates based on certain criteria tend to be biased (Persson, 2016). As several studies reported the costly impact of gender bias in the hiring process of a Fortune 500 company could expose 32 additional failures and productivity losses of about US\$2.8 million annually (Raguseo, 2018; Pape, 2016).

### **Management Resistance**

When it comes to the question whether people analytics is worth the investment? Majority of the HR professionals face difficulties to convince higher management for that as to tackle retention problems by outsourcing people analytics software or staff (Preusse, 2016). A survey by Tata Consultancy Services found that just 5% of big-data investments go to HR, the group that typically manages people analytics. It is also reported that apart from weak hypotheses and bad data, some people analytics projects fail due to unengaged stakeholders. Lack of enforcement after output is delivered makes the analysis useless. To inculcate learning culture within the workforce, organizations are sometimes torn in between impending workload and the goal to enhance employee skill set due to limited time and funds (Raguseo, 2018). Some people analytics projects could be very costly and time consuming, the analysis produced might be outdated and not relevant to implement (Persson, 2016; Chalutz Ben-Gal, 2019) causing management to be sceptical of its effectiveness. Thus, HR teams must be able to demonstrate short-term wins of implementing people analytics via leaner system and measurable business outcome such as higher job offer acceptance rate and increasing employee engagement.

### **Discussion and Conclusion**

Going forward, it is expected that more organizations will adapt and adopt with the technological advancement brought by HR analytics as a proper data-driven tool for effective decision-making while gaining actionable business insights despite the challenges associated with it. Realizing the powerful impact of being analytic literate, HR professionals must act fast to equip employees and management with the practical use of analytical software like Tableau and Microsoft Power BI in daily tasks operation for better insight and reporting to achieve business strategic objectives through continuous learning and development programs. Industry wise, the Big Data platform is appealing for the business sector to discover as it is a game changer in terms of providing innovative solutions using evidence-based

formulas. However, a better approach needs to be done by the HR team to convey the beneficial impact of utilizing people analytics especially for small firms where there is limited access to data and funds. In contrast, most big organizations like public listed companies have rich dataset and efficient resource management on their employees, hence allowing them to explore the retention or recruitment trend more effectively for business improvement. In making the transformation of people analytics towards practical implementation a seamless process, it is therefore essential for the HR professional to also have a strong foundation in data visualization so that all important findings derived from the analysis related to the employee related issue can be conveyed effectively to the senior management.

## References

- Akers, E. (2018). HR Data Danger: The Risks of Inaccurate Business Data. Theaccessgroup.com. Retrieved from <https://www.theaccessgroup.com/en-gb/blog/hr-data-danger-the-risks-of-inaccurate-business-data>.
- Baesens, B., De Winne, S., and Sels, L. (2017), "Is your company ready for HR analytics?", MIT Sloan Management Review, Vol. 58 (2), pp. 20.
- Bondarouk, T., and Brewster, C. (2016), "Conceptualising the future of HRM and technology research", The International Journal of Human Resource Management, Vol. 27 (21), pp. 2652-2671.
- Blum, S. (2022). *Employee surveillance is exploding with remote work—and could be the new norm*. HR Brew. Retrieved from <https://www.hr-brew.com/stories/2022/01/19/employee-surveillance-is-exploding-with-remote-work-and-could-be-the-new-norm>.
- Chrisos, M. (2019). *How to Use HR Analytics to Reduce Attrition and Turnover Rate*. Techfunnel. Retrieved from <https://www.techfunnel.com/hr-tech/how-to-use-hr-analytics-to-reduce-attrition-and-turnover-rate/>.
- Chatterjee, S., Chaudhuri, R., Vrontis, D., and Siachou, E. (2022), "Examining the dark side of human resource analytics: an empirical investigation using the privacy calculus approach", International Journal of Manpower, Vol. 43 (1), pp. 52-74.
- Consultancy.uk. (2017). Aon acquires psychometric and advisory firm cut-e. Retrieved from <https://www.consultancy.uk/news/13493/aon-acquires-psychometric-and-advisory-firm-cut-e>.
- Ben-Gal, C. H. (2019), "An ROI-based review of HR analytics: practical implementation tools", Personnel Review, Vol. 48 (6), pp. 1429-1448.
- Diez, F., Bussin, M., and Lee, V. (2019), "HR Analytics Modelling", Fundamentals of HR Analytics, Emerald Publishing Limited, Bingley, pp. 69-98.
- Fernandez, V., and Gallardo-Gallardo, E. (2021), "Tackling the HR digitalization challenge: key factors and barriers to HR analytics adoption", Competitiveness Review, Vol. 31 (1), pp. 162-187.
- Farmiloe, B. (2021). 13 Ways HR Leaders Are Reskilling For a New Future of Work [Blog]. Retrieved from <https://blog.shrm.org/blog/13-ways-hr-leaders-are-reskilling-for-a-new-future-of-work>.
- Iyer, S. (2020). *8-Step approach to being HR Analytical*. LinkedIn. Retrieved from <https://www.linkedin.com/pulse/8-step-approach-being-hr-analytical-sriram-iyer-ihrp-sp>.



- Krouse, S. (2021). How Google Spies on Its Employees [Ebook]. The Information. Retrieved from <https://www.zlti.com/wp-content/uploads/2021/09/How-Google-Spies-on-Its-Employees---The-Information.pdf>
- Leonardi, P., & Contractor, N. (2018). Better People Analytics: Measure Who They Know, Not Just Who They Are. Retrieved from <https://hbr.org/2018/11/better-people-analytics>
- Marler, J. H., and Boudreau, J. W. (2017), "An evidence-based review of HR analytics", *The International Journal of Human Resource Management*, Vol. 28 (1), pp. 3-26.
- Mariappanadar, S., and Aust, I. (2017), "The dark side of overwork: an empirical evidence of social harm of work from a sustainable HRM perspective", *International Studies of Management and Organization*, Vol. 47 (4), pp. 372-387.
- McKnight, D. H., Lankton, N., and Tripp, J. (2011), "Social networking information disclosure and continuance intention: a disconnect", 44th Hawaii International Conference on System Sciences (HICSS). doi: 10.1109/HICSS.2011.379.
- Noe, A. N., Hollenbeck, J. R., Gerhart, B., & Wright, P. M. (2012). *Human Resource Management. Global Edition*. New York. McGraw-Hill International Edition
- Peeters, T., Paauwe, J. and Van De Voorde, K. (2020), "People analytics effectiveness: developing a framework", *Journal of Organizational Effectiveness: People and Performance*, Vol. 7 (2), pp. 203-219.
- Pape, T. (2016). Prioritising data items for business analytics: Framework and application to human resources. *European Journal of Operational Research*, 252(2), 687–698.
- Persson, A. (2016). Implicit Bias in Predictive Data Profiling Within Recruitments. In: Lehmann, A., Whitehouse, D., Fischer-Hübner, S., Fritsch, L., Raab, C. (eds) *Privacy and Identity Management. Facing up to Next Steps. Privacy and Identity 2016. IFIP Advances in Information and Communication Technology()*, vol 498. Springer, Cham. [https://doi.org/10.1007/978-3-319-55783-0\\_15](https://doi.org/10.1007/978-3-319-55783-0_15)
- Preusse, S. (2016). Is HR Analytics worth the investment?. Retrieved from <https://www.linkedin.com/pulse/hr-analytics-worth-investment-sean-preusse>
- Royal, C., & Windsor, G. S. S. (2016). Sustainable institutional investment models and the human capital analytics approach. *Routledge handbook of social and sustainable finance*.
- Raguseo, E. (2018). Big data technologies: An empirical investigation on their adoption, benefits and risks for companies. *International Journal of Information Management*, 38(1), 187–195.
- Rimol, M. (2021). Gartner Survey Finds 60% of Employees Experience Frustration with New Software. Gartner. Retrieved from <https://www.gartner.com/en/newsroom/press-releases/2021-11-02-gartner-survey-finds-60-percent-of-employees-experience-frustration-with-new-software>.
- Shrivastava, S., Nagdev, K., and Rajesh, A. (2018), "Redefining HR using people analytics: the case of Google", *Human Resource Management International Digest*, Vol. 26 (2), pp. 3-6.
- Sierra-Cedar, I. (2018), *HR Systems Survey White Paper, 21st Annual Edition*, available at: [https://www.sierra-cedar.com/wp-content/uploads/Sierra-Cedar\\_2018-2019\\_HR\\_SystemsSurvey\\_WhitePaper.pdf](https://www.sierra-cedar.com/wp-content/uploads/Sierra-Cedar_2018-2019_HR_SystemsSurvey_WhitePaper.pdf) (accessed 30 June 2022)
- Tursunbayeva, A., Di Lauro, S., & Pagliari, C. (2018). People analytics—A scoping review of conceptual boundaries and value propositions. *International Journal of Information Management*, 43, 224-247.

- Vrontis, D., Christofi, M., Pereira, V., Makrides, S. T. A., and Trichina, E. (2021), "Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review", In Press, *The International Journal of Human Resource Management*. doi: 10.1080/09585192.2020.1871398.
- Verasai, A. (2016). Cost of Employee Turnover vs Retention Proposition. *The HR Digest*. Retrieved from <https://www.thehrdigest.com/cost-of-employee-turnover-vs-retention-proposition/>.
- World Economic Forum. (2020). *The Future of Jobs Report 2020* (pp. 142-162). Geneva: World Economic Forum. Retrieved from [https://www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs\\_2020.pdf](https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf)
- Young, A., Baker, Y., Le Claire, M., Rice, S., Boyd, D., Goodcre, T., & Lee, M. (2018). *Supercharging HR Data Management* [Ebook] (pp. 4-7). Accenture. Retrieved from [https://www.accenture.com/t20180829T083931Z\\_\\_w\\_\\_/hk-en/\\_acnmedia/PDF-85/Accenture-Supercharging-HR-Financial-Services.pdf](https://www.accenture.com/t20180829T083931Z__w__/hk-en/_acnmedia/PDF-85/Accenture-Supercharging-HR-Financial-Services.pdf)