Ethics and Efficacy of Big Data Tools in Human Resource Management

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June 7th, 2020

Introduction

Human ingenuity breeds innovative ideas, human collaboration solves pressing problems, and human cooperation successfully scales solutions. Of all the capital assets of a business, human capital is arguably the most important. Yet, "few companies actually make use of the greatest competitive weapon of all—the powerful resources of motivated, energized, cooperative, trusting people" (Skinner). The role and impact of Human Resource Management (HRM or HR) varies in different industries and organizations but it is an antiquated idea to relegate it to the lower rungs of corporate hierarchy. Even though, it is difficult to quantify HR's "contribution to enhanced organizational performance relative to other organizational investments, such as new production technologies, advertising campaigns, and property acquisitions", its importance is undeniable. (Boxall et. al)

"Human resource management is a contemporary, umbrella term used to describe the management and development of employees in an organization" ("What is Human Resource?"). This broad function includes support for recruiting and retaining talent, onboarding paperwork, compensation and benefits, labor policies and union relations, employee conflict regulation, diversity measures, training, as well as strategic support to executives for organization's direction and culture. While different organizations may emphasize on one or more of these functions, the key "responsibilities of a human resource manager fall into three major areas: staffing, employee compensation and benefits, and defining/designing work" ("Human Resource Management"). Incorrect decisions in these critical tasks could mean deep costs for the organization's success so companies are always looking for to improve this function.

Big data and artificial intelligence are not just futuristic buzzwords for industry trends but an important part of business and technology today. Reports indicate that "37% of businesses and organizations employ AI today" and the "number of enterprises using AI in business grew by 270% between 2015 and 2019" (Jovanović, Budanović, & Letić). Human Resource Management is one of the many jobs and functions that are actively looking for ways to tap into the promise of

big data to improve efficiency and outcome of their work. "According to a Human Resources Professionals Association report, 48% of the members surveyed believed that their organizations would utilize AI in the next five years to address HR challenges" (Varshneya). Human Resource can use technology to automate routine tasks to reduce time spent on administrative work as well harness the intelligent capabilities to support a growing or changing workforce. This paper explores the impact and fairness of big data technologies in important HR functions, such as, recruitment and compensation, followed by a discussion on the transformation of HR's strategic role of job definition and skills development in an increasingly automated organization.

Bringing in the Right People

Finding the right candidate for a job is a difficult, and a time-consuming process composed of many steps. "Hiring is rarely a single decision, but rather a series of smaller, sequential decisions that culminate in a job offer—or a rejection" (Bogen & Rieke). Broadly, the steps can be divided into finding applicants, narrowing selections, effectively interviewing, and making final selection. In each of these steps, companies are seeking to use technology to optimize cost and outcome of hiring. Data shows that employers "spend an enormous amount on hiring—an average of $4,129 per job in the United States" (Cappelli) and it "takes a typical U.S. employer six weeks to fill a role" (Bogen & Rieke). After this intensive search, a good hire should be a strong performer and stays with company long enough to reap the return. Artificial intelligence driven hiring tools claim to offer solutions that make this process more efficient, accurate and less biased.

From the initial outreach phase, companies use online job boards and targeted advertising to reach out to potential candidates. Additionally, widely available data on "social networks, such as Twitter, Facebook, or LinkedIn, have an increasingly important role in recruitment and selection because they provide a lot of easily accessible information, which many employers use before making decisions" (Garcia-Arroyo & Osca). Not only do these sites provide holistic information about a candidate, it allows companies to scour for "passive applicants", people that are not looking for a new job but might be a good fit for a posting. On one hand, these are great tools to maximize the right candidates considered for the position, algorithms leading to these selected people could have coded biases. Job search sites gauge candidate's interest and potential based on what they have done in the past and what they have searched. Because of this, targeted job postings could keep candidates who may be qualified with unique aspects or are not confident to seek certain

positions, from ever being notified about the position. However, knowing these limitations, employers can use recruiting tools that promote equity. Tools like Textio help adjust job descriptions to make it appealing to a wider demographic or Entelo, a headhunting site that flags likely to move candidates, allows both removal of all demographic information or explicitly targeting candidates of a given race or gender. Employers using these tools would need to be careful in assessing if the tools are in fact connecting them to a diverse pool of applicants that could do the job best or simply predicting the type of person that company has been hiring.

While internet-based recruiting has made it easier to cast a wider net for potential applicants, it has increased the challenges of narrowing down to the right candidates. Companies inundated by applications, many not even remotely qualified for the job, have been using Application Tracking System. ATS searches for relevant keywords on a resume and discards it if they are not found. It is effective in eliminating resumes based on minimum requirements but also weeds out resumes that may not have the traditional qualifications but are right for the job. Natural Language Processing (NLP) driven chatbot, Mya, employs an interactive approach to determine candidate qualification by widening the selection criteria. Additionally, systems like Ideal use prior hiring decisions to generate important features of a qualified resume and then assign a score to nudge decision making. This tool also incorporates human resource input to improve prediction. This is a good method to lower automation bias however, "the resulting model will likely reflect prior interpersonal, institutional, and systemic social biases" of the company (Bogen & Rieke). Still, using computational methods to screen resumes, certainly shortens the time taken and allows accepting more resumes.

In addition to the required minimum qualifications for a job, the candidate needs to exhibit strong performance characteristics for the position. The selected candidates are invited to interviews to gauge soft skills that differentiate top performers and assess culture fit. Scholars, Chamorro-Premuzic et al. have proposed a "digital interview, where the images of the verbal and non-verbal behaviors of the interviewees are translated into psychological profiles that also allow making predictions, reducing the biases of the untrained interviewers, and making the process cheaper" (Garcia-Arroyo & Osca) and companies like HireVue have made it a reality. HireVue lets employers solicit recorded interview answers from applicants and then "grades" these responses against interview answers provided by current, successful employees" (Bogen & Rieke).

Such technology poses two questions: is the performance evaluation system of the company reliable and are the features extracted an actual cause of high performance? A notable concern with using machine learning methods is sometimes people confuse correlation with causation. It is possible that all top performers of the group are enthusiastic, but it is false to claim all enthusiastic people will be top performers. Tools using blackbox algorithms should state the uncertainty and employers must exercise caution while using them. Additionally, facial and voice recognition technology may not account for differences in race, gender, accents, and personalities. Though software companies are continually improving on these aspects, automatically rejecting someone unfairly until then, should not be acceptable.

Once the employers select the top candidate, the final steps in recruiting, background checks and offer decisions are also using data and predictions to maximize the chance of worthy acceptance. Beyond established avenues of criminal records and credit reports, HR is adopting tools like Predictum and Fama that use social media content to predict toxic work habits. Social media data suffers from self-selection bias as different people may choose to reveal varying amount and type of information. It cannot accurately determine characteristics across all population and might make an unfair correlation between an individual's social and professional life – potentially costing someone a job offer. On the other hand, if the employers like the candidate, using wide reaching market and individual data, employers can generate offers that are likely to be accepted. Once again, this might be biased against minorities that have historically accepted lower pay. Without transparency of these hiring practices, both these methodologies empower the employer to decide and negotiate better but reduces the candidate's leverage.

Incentivizing Appropriately

Beyond presenting a lucrative offer to secure a top candidate, compensation and benefits continues to reward and incentivize employees to remain engaged at workplace. This includes salary, benefits, such as, "pension plans, life, and medical insurance schemes, vacations and sick leaves, maternity (and paternity) leaves, and healthcare plans" (Ghosh) and recognition for their work. "In addition to performance, factors [to evaluate compensation] include the market rate for the skills, how in demand the skills are, and whether it is better to reward strong performance in base pay or in bonuses" (Guenole and Feinzig). To do this effectively, it is crucial to have analytics that utilizes data from different sources and technology that processes this quickly. Of course, a

factor in this analysis is employee performance evaluation – another area where technology can help with fair assessment. Using artificial intelligence in compensation decisions can reduce the time taken, promote fairness, and allow personalization.

Human Resource team can gain valuable time in the day by "using chatbots in operational activities" as this "will reduce the dissatisfaction of employees towards the execution of total rewards and quick resolution of queries" (Kulkarni). Additionally, many "companies struggle with not having a centralized, automated way to manage compensation" (Nedlund). Managers need to gather all "employees' responsibilities and identify overlap … to properly benchmark employees. But at large employers and employers with highly skilled employees, this manual task becomes a time-consuming and error-prone exercise" (Zoia). A centralized system with sensitive information about all employees raises data privacy concerns so appropriate protection measures should be implemented. In addition, even though, automation of employee skills would certainly streamline the process, it is also susceptible to only considering broad, visible tasks that can be compared but it would undervalue important interpersonal skills that might be the key differentiating factor. Through face to face conversations and observations, humans are more suited to pick up on that and incorporate that into skills evaluation.

While human input can capture uniqueness in performance, it also induces variability and inequitable judgement. Human resource practitioners caution that, by "giving the manager decision-making capabilities that are not necessarily controlled [results in] unfair practices, whether they realize it or not" (Nedlund). Even if human judgement for compensation is not unfair, it can be perceived as such, and it is difficult to argue otherwise. In a survey of "more than 4,000 workers at the 10 biggest technology companies, Blind found that only 45 percent of highly compensated employees felt they were "fairly paid"" (Kulkarni). Using machine learning methods "ensures that the compensation plans are backed by data and are fair with respect to the market conditions" (Varshneya). "By focusing on skills [and market value] in determining compensation, the use of AI minimizes chances that bias exists in the compensation process" (Guenole and Feinzig). This approach would certainly reduce individual bias of managers, but it does not combat issues of systemic bias. If the market historically and systematically under values certain titles or skills, using data backed, blackbox tools would make it harder to detect the unapparent and intangible bias.

In addition, if every company evaluates individual skills and contribution through market conditions, at one-point equilibrium price for compensation of a role that could mean reduced favorable mobility for employees and possible undervaluation of indirect contributors to organizational success. Realistically, this could even mean a human resource team in a technology company. In practice, companies like IBM already utilize technology for compensation decisions, and though "managers have the opportunity to override the AI recommendation… [they] tend to follow recommendations the AI provides, and this has helped ensure employees are not overpaid or underpaid at IBM" (Guenole and Feinzig). Incorporating employee qualifications and market driven data analytics to compensation plans is not inherently bad, but the right factors for the organization's success must be weighed in appropriately and human resources should not succumb to automation bias and completely depend on generic prediction software for decisions.

While AI in HR harnesses the 3Vs (Volume, Variety, and Velocity) of big data to incorporate a broad market comparison for compensation plans, it also looks for new ways to personalize the performance evaluation and engagement. According to a "research by Deloitte, 20% of companies do performance review more than once in a year however, only 9% change the compensation at that pace" (Kulkarni). Waiting for yearly reviews and providing a large sum to reward performances, often does not work for critical issues of disengagement and dissatisfaction that could happen any time. Compensation (including benefits) is a key method to ensure engagement and motivation. By incorporating the "use of AI algorithms to send out cognitive talent alerts to the HR managers, can help them to spot trends in employee behavior and pinpoint the warning signs early on" (Varshneya).

An HR software solution company, Keencorp, "claims to be able to predict employees' engagement and attitudes in different groups by scanning email data" (Vulpen). They also use this data to detect any issues with misconduct, diversity and inclusion, and safety. Being flagged about such potential concern, human resource team can proactively intervene. From engagement assessments, human resource can also "see that employees could potentially be a flight risk, [and] technology can help them understand how to leverage compensation in order to better keep those individuals from leaving their firm and going to the competitor" (Nedlund). All this appears as agile solutions to address employee discontentment and employers can certainly "improve the quality of their performance data by measuring worker behavior and productivity more directly,

but such techniques raise their own unique concerns about worker surveillance, privacy, and other unevenly distributed harms" (Bogen & Rieke). Employee creativity, colleague camaraderie and comfort would be at risk under constant surveillance. This is more data that needs to be securely stored and used, such that, it is for employees benefit not just a corporate tool to gain an upper hand. If company chats and emails are being monitored, the employers must be transparent about the usage and develop ethical guidelines to ensure fair compensation and a healthy work environment for everyone.

Defining and Reimagining Work

In addition to the common human resource functions of hiring and compensation, an important role of strategic HR is to conduct "a detailed job analysis to determine what tasks a job requires and what attributes a good candidate should have, [and evaluate] how that job fits into the organizational chart and how much it should pay, especially compared with other jobs" (Cappelli). This is essentially defining the job in the organization's design. At the frontlines of society's transition into the fourth industrial revolution, the responsibilities of this human resource function are heightened. In addition to utilizing AI technology for their own function, "HR departments should be envisioning how to best design an integrated human-machine [work] experience" (Pir). "PwC forecasts 20% of executives at U.S. companies with artificial intelligence initiatives, report that they will roll out AI across their business this year and expect AI investment to both re-imagine jobs and work processes as well as grow profits and revenue" (Meister). For the success of such initiatives, HR must actively consider the skills for the organization of tomorrow and use artificial intelligence to enhance employee learning and career development.

To successfully plan for the workforce, Human Resource professionals must leverage industry reports and machine learning predictions to monitor the constantly evolving workforce. It is known that "the external environment is changing so rapidly that workforce planning should be an ongoing process that can give the HR function a key role at the table and a strategic position within the business" (Talent). The human resource team can utilize the latest employee engagement and skills assessments tools to gauge the value of human contribution to a task and spot repeated tasks that can be automated to predict the possible redesign of the position. They can also hold open, transparent discussion with employees to learn more about their roles and help them prepare for changing needs. It is important for HR to help alleviate employee concerns around

automation as "the World Economic Forum projects that, even though, 75 million current jobs will be displaced, …133 million new jobs will be created, that need skills in both emotional intelligence and technical intelligence" (Meister). While automation may signal the end of how a particular job is done, it also means an improvement by using uniquely human skills of critical thinking, empathy and problem solving. Knowing such potential will empower employees to view their job and career as agile and automation as an opportunity, resulting a dynamic workforce, and a prepared organization.

Human resource team can use technology to support a personalized learning plan and career development to enable employees to succeed in AI complemented world. Mckinsey's Future of Work report "suggests that as many as 375 million workers around the world may need to switch occupational categories and learn new skills because approximately 60% of jobs will have least one-third of their work activities able to be automated" (Meister). Opportunely, big data driven training and learning is one of the fastest growing fields. According to a literature review on big data in HR, "the main trend in big data publications is the relationship between big data and information management, learning and knowledge" (Garcia-Arroyo & Oscar). The improved search of educational material using "AI tagging of learning content", "open learning platform" and "personalized learning recommendations tailored to job role, business group, skill set, and personal learning history", makes "learning easily available when and where it is needed, to help the acquisition of strategic skills for organization" and employees (Guenole and Feinzig). Employees can be supported and trained with the latest skills of automation and data science as well as tools for personal growth to ensure success and foster trust and engagement in an organization.

Discussion and Conclusions

The digitalization of human resource function will serve as an interesting interplay of human and machine working together for the betterment of an organization where humans and machines will work together. "Artificial intelligence is a human augmentation tool" (Zoia), when applied correctly, it enables humans to be more human, to bring unprecedented value to business organizations and economy at large. Industry experts believe that "HR professionals understand the importance of optimizing the combination of the human mind and machine learning for a

seamless workflow and intuitive work environment" (Durrani). This approach applies in the adoption of technology in HR processes as well as the jobs they support in the changing workforce.

Big data driven human resource technology, is not only championed for time and cost reduction, but also for improving employee experience by streamlining, diversifying and debiasing the recruiting process, making compensation equitable and personal, and enabling superior work definition in a changing workforce. However, as discussed in this paper, despite good intentions, algorithms are also susceptible to bias due to incorrect data, inaccurate correlations, and biased predictions due to historically biased data and systemic inequality. Additionally, as more technology is being implemented to monitor employee social media, conversations, and behaviors, companies must be mindful of potential invasion of privacy and gaining an unfair advantage over employees. This would be unethical and cause employee distrust, making it a toxic environment to work.

As such technology continues to proliferate in Human Resource functions, HR teams will evolve to incorporate roles that enhance the use of technology. In the article, "Three New HR Roles to Expect in the Future: Insights From SHRM APAC 2019", the author summarizes that positions such as Human Experience Strategist, AI Auditor and AI bias expert will emerge as important human resource functions of the future (Lalwani). Such roles would encourage HR teams to look as employees as humans first and use the technology available to its full potential while being aware of its shortcomings and impact.

To conclude, it should be noted that despite concerns of big data and machine learning technology, the benefits justify its usage. The key is to do so critically and wisely. The co-author of "Are Emily and Greg more employable than Lakisha and Jamal?", a study on racial bias in hiring process, Sendhil Mullainathan believes biased algorithms should not make us revert to a biased human process. "A well-regulated process involving algorithms stands out for its transparency and specificity: it is not obscured by the same haze of ambiguity that obfuscates human decision-making" (Kleinberg, et al) and once bias is detected, "[c]hanging algorithms is easier than changing people: software on computers can be updated; the "wetware" in our brains has so far proven much less pliable" (Mullainathan). Keeping this astute critique in mind, human resource teams should be aware of the potential pitfalls of algorithm and push for a just process but not completely shy away from using technology in hiring.

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