

Using AI to modernise HR and increase productivity

“It’s not that there isn’t a need for AI in human resources; the problem is we don’t yet fully understand its capabilities, or how to leverage it as a tool” (HRPA, 2017).

Human Resources (HR) departments face increasingly complex workforce challenges. These are driven by expectations of a compelling employee experience, virtualisation of the workplace, a growing demand for novel skillsets, and a continuing stream of new technology and data.

The new HR priority is to grow a workforce that can readily adapt to an ever-evolving environment and also, enable the discovery of new workforce insights.

In a business context, HR is a great department for employing Artificial Intelligence. That is, using AI to deal with the “human” component of businesses.

Benify (2018) has reported that “billions of dollars in venture investment has poured into HR tech in recent years. In the first half of 2018 alone, \$1.33bn was invested, surpassing all of 2017. And that doesn’t even include the vast sums which large enterprises are investing to bring new innovations to their HR function”.

This article aims to raise awareness of the available opportunities in HR to the Artificial Intelligence community. Also, there is a need to build existing HR investment technology and processes, including core HR platforms and cognitive solutions. By doing so, HR will have the opportunity to improve overall employee experience, reduce costs, increase accuracy and boost the quality of their services. The expectation is that, if HR is able to achieve these goals, the department will have a positive impact on business productivity.

The Office of National Statistics (ONS, 2016) has reported that UK productivity levels during the economic downturn fell sharply compared to the rest of the G7. The average British worker produced 16% less on average than the UK’s G7 counterparts in 2016 (FT, 2018). Perceived as a challenge, this opened up opportunities for AI businesses in both service delivery and manufacturing business environments. To use manufacturing as an example, machine automation raises product quality and speed of production for competitive advantage. Also,

automating data generation and analysis processes provides information that helps managers make informed business decisions. Accurate forecasting, predictive maintenance, optimisation of manufacturing processes and automation of material procurement are among the areas where AI actively supports most businesses.

However, is automation on its own going to help raise the UK productivity levels?

We understand that in every process, whether automated or not, human action within that process is the most critical matter when considering productivity. How can we apply AI to what we have learned about humanity in order to help ourselves live and work more productively?

Productivity is loosely usually defined as the ratio between input and output. That is average value added per hour worked.

Often, productivity is related to what I will call the '4Ms'; i.e. **M**oney, **M**achine, **M**aterial and **M**ethod. The influence of 4Ms on productivity is very broad and may differ with the application. As a result, current AI initiatives have mainly focused on problems related to the 4Ms. But it is in fact the 'Man' i.e. the human resource which bring the 4Ms together and so, contributes the most. The 4Ms will be unable to raise productivity without the involvement of a "Man". People constitute an organisational resource which is unique. They work with the other 4Ms to accomplish business goals and objectives. Also, they are unique because they have capability to improve themselves and thus increase their value to an organisation. In other words, people can learn, develop and grow (Haughton et al., 2014).

If employees do not have appropriate skills for the job, there will be inevitable negative impact on productivity. This is confirmed by Financial Times report (2018):

"Low skilled workers are too prevalent. One of the productivity problems often cited by employers is that too many UK workers have inadequate skills. In what came as a shock to the UK, the OECD found in 2016 that England had one of the largest proportions of low-skilled young workers among advanced economies. But even more worrying, the Paris-based organisation established that young English workers were no more skilled than older employees, suggesting a high likelihood that weak productivity will be difficult to remedy in the coming years."

Understanding every factor that may affect every employee and their relationship to productivity can sometimes be complex. This is mainly because the human resources sector is currently going

through dynamic and comprehensive changes. HR is now regarded as the most important resource for business and enterprise development. Along with these changes, requirements in the field of human resource management are also changing. Ensuring productivity in the workplace can be challenging because HR has to deal with technology-related problems which affect productivity. A report published by First Psychology Scotland (2015) says that 85% of their research respondents use their devices for social purposes at work at some point during the day. Similarly, 70% of US workers are disengaged from their employment duties few hours a day. They are mostly distracted by technologies such as smartphones, social media, personal emails and the demands of their personal lives. Most employees find it hard to focus consistently and are unable to produce at their highest capability. (Universal Class)

Knowledge, skills and competencies related to human resources are an important aspect of building competitive advantage (Thite, Wilkinson, & Shah, 2012; Zheng, 2013). Modern HR practices are providing R&D support which aim to encourage employees to use their skills to generate new ideas. However, HR requires the means to predict, understand and match the type of support to the “appropriate employee”. The appropriate employee is one likely to generate ROI from the R&D support. For this reason, modern HR management can be perceived to contain three factors. These include taking extra risks when it comes to understanding individual behaviour patterns, employing extra personalisation and being predictive. In order to maintain its position in modern working environments, HR has to embrace these factors in managing and guiding the total energy of the employees towards achieving the strategic goals of a company. The use of AI to relate human resources factors at personalised level and productivity may be a solution for modern HR departments.

There have been various analytics tools developed to understand customers’ behaviour. However, according to Bersin et al. (2018) who explores how technology is reshaping the HR management, there has not been comparable investment in analytics for HR, and in particular related to productivity. Bersin explains that instead of utilising the power of analytics, HR initially focused on improving reporting.

Existing HR technologies focus on automating employee information such as annual leave management, time management, salary and benefits, payroll report and training. Performance measurements are commonly recorded in employee information based on the specific chosen Key Performance Indicators (KPIs) within each business.

Related performance and productivity ought not to be conflated. Even though they mean different things, they are often used interchangeably. Productivity is the measure of the efficiency of production whereas performance deals with the way in which someone functions to accomplish something successfully.

Production is a quantitative measure of output, whereas performance refers to the individual achievements of a staff member with respect to the goals of the firm (which can include individual productivity where this can be measured). Performance can be difficult to measure in industries where there is an element of service to be fulfilled. For example, where performance is measured quantitatively, the quality of the service is commonly ignored while staff focus on the quantity being measured

Measuring the quality of service is one issue, but there are other challenges which exist in the service sector.

The UK economy relies on service sectors such as financial and insurance services. Chandha et al., 2017 reported the largest fall in productivity to be in the financial sector, where the average growth in productivity has gone from 1.1% – 0.2%.

While this is the case, there are also difficulties in measuring the productivity in the service sector because it encompasses a multitude of activities which all require specific measures of their output and intermediate consumption. This can lead to misleading results. Measuring productivity for the financial sector can be complex because this sector has not yet constructed an adequate price indicator for its output. According to Office of National Statistics' (2016) measure of productivity, the overall sectoral contribution to gross value added (GVA) has fallen from 1.4% – 0.9% on average. The financial sector is indicated to be having the largest swing by moving from 2.4% – 2.8%. However, the GVA indicators are constructed in such a way that the price indices are used to deflate nominal indicators. At the moment, the same price index is usually used to deflate both output and intermediate consumption and this can lead to misleading results. The problem is more profound for the financial sector because there is no adequate constructed price indicator for its output (Chadha et al., 2017). The ONS is currently working on implementing double deflation¹ which will be implemented in 2020.

¹ In simple terms, double deflation is the separate deflation of output and intermediate consumption to arrive at volume GVA.

Notwithstanding these objective quality measures, productivity in the UK is declining. This suggests opportunities for deploying AI in various areas of HR.

1. Estimating productivity

If HR had an AI tool which was able to predict each employee's productivity, the department could plan and budget for specific and personalised training, encourage more focused R&D for employees, and design personalised motivation initiatives. This means that HR will be able to design initiatives and decide when and how to implement them in order to improve productivity.

These AI tools may be developed based on Production Functions (PFs). PF is a specification of the minimum input requirements needed to produce designated quantities of output (maximum output). The range of factors that influence productivity is very broad (discussed in Mason et al., 2018). These factors are also changing with technology. This means that the existing PFs are limited and may require updating before embedding them in HR AI tools. For example, Cobb-Douglas production function could be improved to include more factors that will correctly reflect individual's productivity. Cobb-Douglas formula:

$$Y = AL^{\beta}K^{\alpha}$$

Whereas Y = total production, L = labour input (e.g. total number of person-hours worked etc.). K = Capital input (the real value of all machinery, equipment, and buildings – depending on the business). A = Total factor productivity (and your usual depreciation by utility in day after). α and β are the output elasticities of capital and labour, respectively. These values are constants determined by the requirements and the available AI technology. Output elasticity measures the responsiveness of output to a change in levels of either labour or capital used in production, *ceteris paribus*.

2. Enhancing and protecting existing employees' talent

- Understanding employees' behaviour and nurturing their capabilities to maximise business output. Network models of organisations (based on either Actor Network Theory or Activity Networks, or some combination of the two) lend themselves to analysis using Decision trees

or Bayesian networks. In these Actor Networks, employees and technology are represented as nodes in the networks, and the number of connections between them represent objective measures of the value of the job being done, against which the individual's productivity can be compared. Activity Networks show a more idealistic representation of the work-place where the working relationships between employees is depicted. Both of these techniques capture information flow, and the nature of the working relationships and transformation of information flow involved. This information will facilitate job description development, the smooth induction of new hires, and a clearer understanding of performance and productivity.

- Similarly, AI HR analytics based on Actor/Activity Networks may be able to understand and identify employees with strong social influences on other employees and the external business networks. Such employees should be carefully treated when making firing decisions or if they decide to leave. The organisation may use the results of AI HR analytics to plan ahead, as such employees could functionally disconnect the business network, or make a negative impact on the remaining employees.
- Given the appropriate data, AI HR tools will be able to identify behaviours that bring cohesiveness and those that bring diversity. By doing so, HR may be able to use the information to match people who generate maximum productivity.
- HR managers have always focused on talent development. They recognise that it is no longer just about what employees need to know, but also when, where and how the development experience enables productivity. HR understands that continuous learning is necessary to keep pace with the rapidly changing skills required for today's workforce. The talent development journey – from learning and skill development to employee feedback – can also be enabled by AI cognitive systems.
- Most employees know what training they require for them to be better at their jobs. Others do not know and require advice on this. In both situations, AI algorithms could monitor and study the skills, behaviours, and activities of the highest producers and then advice on how to enhance other team members' productivity to the same level.

3. Recruitment

- HR Professional Association - HRPA (2017) recognises the need to reduce unconscious bias (e.g. the issues which cause gender wage gaps), mirror (tendency to favour candidates with similar traits or competencies) and language biases (in job descriptions and resume selections). A lot of research is being conducted to close the gender wage gap (HRPA, 2017). Also, there are limited Machine Learning platforms which analyse language patterns in order to help employers identify resume and language biases. More work needs to be done to develop reliable tools, because biases affect the whole candidate screening process. They reduce communication and the number of applicants from diverse backgrounds.
- AI will relieve HR departments of the huge burden of sifting through terabytes of data that make up candidate's resumes, social media accounts, reference letters and other sources. This procedure is among the most time-consuming tasks faced by HR professionals who are, more often than not, faced with the need to take shortcuts in order to get their job done in time. This exposes flaws in the company's recruiting procedures, resulting in the hiring of individuals in inappropriate roles. Consequently, the employee having a short-lived career and the company incurs another costly recruitment process.
- AI has a robust analytical capacity that allows it to go through huge amounts of data about numerous candidates at the same time. Such tools may go through the resumes or references and also include post-hiring performance assessments which offer valuable insights into the applicant's potential. Employees' performance metrics may be recorded and stored by employers. These may be shared by employers with the permission of employees. AI will save time used to handle these types of tasks. This will leave HR staff with time for live interviews, shortlisting and performance analysis.
- AI may help to free up HR departments' resources by assisting the personnel with delivering personalised induction for new employees. New employees may want to know more about their payment, holiday leave, social benefits and general rights. Also, answering questions about company policy on absence during religious holidays or unpaid bonuses can be both repetitive and time-consuming for HR professionals. AI algorithms could support this through the use of intelligent HR chatbots. These bots could easily be programmed to provide answers to FAQs in real time to both new or veteran employees. They can act as self-service platforms. Again, they would allow the HR personnel to focus on responding to more complex and urgent questions.

- For starters, AI technology is meant to be immune² to stereotypes and the impact the applicant's race, gender or ethnicity can have on the outcome of employee screening. The AI software can design relevant interview questions that completely disregard someone's background at the expense of focusing on their professional competency for a particular job. These assessment questions will be based on the applicant's earlier work records and, more importantly, on the requirements of the job they apply for.
- In most cases, much emphasis is given to job skills when it comes to recruitment. However, technical skills make up a part of a person's success (Bersin, 2018). In fact, companies with highest financial return from hiring, allocate almost 40 % of their hiring criteria to emotional and psychological qualities like ambition, learning agility, passion, and sense of purpose (Bersin, 2018). The question is, how could we use this knowledge to develop AI tools that are capable of capturing these qualities?
- Statistically AI systems can 'predict' and 'learn' by plotting curves of possible outcomes and then optimising decisions based on many criteria. You could imagine an AI system that looks at the possible demographics, job history, and interview questions with a candidate and then "predicts" how well they will produce on the job.
- Most studies find that there are dozens of management and leadership qualities that define success, and each individual brings a slightly different and unique combination of them. Can AI algorithms predict the management style which will ensure high productivity in the firm?

In addition to removing the unneeded burden from HR personnel, AI can help with streamlining all of these tasks and gaining unprecedented insights into the real productivity potential of each candidate and employee. All of this could be done without the limitations of human bias and capacity for error.

² "As humans and AI increasingly work together to make decisions, researchers are looking at ways to ensure human bias does not affect the data or algorithms used to develop AI tools. Identifying and mitigating bias in AI systems is essential to building trust between humans and machines that learn. As AI systems find, understand, and point out human inconsistencies in decision making, they could also reveal ways in which we are partial, parochial, and cognitively biased, leading us to adopt more impartial or egalitarian views. In the process of recognizing our bias and teaching machines about our common values, we may improve more than AI." (<https://www.research.ibm.com/5-in-5/ai-and-bias/>).

4. Continuing Professional Developments (CPD)

Most managers rely on personal experience to determine which employees need attention, coaching or recognition. CPD conversations are often relegated to annual appraisals. Also, training recommendations are mostly prescribed by HR. In some cases, these are not personalised and may not be appropriate to some employees. Cognitive AI solutions can be used to guide both employees and HR managers. Managers can have people insights embedded in their dashboards and other daily tools. Information generated and analysed from these tools will guide their teams toward the right learning opportunities. Cognitive solutions that integrate learner needs and critical industry knowledge enable curated learning paths that can be accessed anywhere, at any time, through any channel.

5. Measuring the impact on HR's decisions

In order to deal with aspects of human behaviour HR departments will require AI Cognitive tools which are capable of learning and improving. These tools may involve Actor/Activity networks models which enable the development of feedback and learning as individuals become a part of that network. In addition, they may embed improved PF's which are customised and business focused. This can offer the ability to create talent (through training), identify talent, and to identify problems at an early stage. This leads to the full realisation of individual productivity capabilities.

Analytics systems can understand speech, identify photos, and use pattern matching to pick up signals about mood, honesty, and even personality. These algorithms are not 'intuitive' like human beings, but they are fast, so they can analyse millions of pieces of information in seconds and quickly correlate them against patterns. AI can collate data and predict issues which may affect employees' well-being and engagement. For example, AI can identify patterns of stress and unacceptable behaviour and thus alerting HR or line managers.

Conclusion

AI will allow HR to effectively understand the 'human' component of their businesses at both a collective and personalise level. It will allow HR to accurately measure its impact on an employees' experience, well-being and productivity.

Due to continuous business changes and economic uncertainties, coupled with advancement in technology, HR managers require sophisticated tools to support their professional work. This range from early shortlisting of talents and applicants' screening to induction procedures and performance assessment. In addition to removing the unneeded burden from HR personnel, AI can help with streamlining all of these tasks and gaining unprecedented insights into the real productivity potential of each candidate and employee. All of this is done without the limitations of human bias and capacity for error, making AI an HR management tool of the future, with rapid benefits.

At the same time the promise must be tempered by pragmatism, and there is a need for further research and investigation. For example, determining what data can be used in analytics, tracking performance and so on, and the appropriate data protection concerns. Within this framework AI can be used to enhance the candidate experience, helping the recruitment of employees which meet the expectations of employees. The adoption of AI will require some changes in most business processes. HR departments will be faced with a challenge of ensuring that the HR AI tools can integrate with existing systems in order to provide meaningful insight. Also, another challenge is to identify ways to redefine processes to maximize the use of HR AI and at the same time maintain the "human" side of human relations.

Applying AI in HR will require high levels of transparency. Both HR personnel and employees need to have a clear understanding of how decisions are being made to mitigate unknowingly injecting bias into their programs. In addition, every company's management and people decisions are often culture based, so HR departments have to take time to try these systems in the real world and tune them for best use. The most complex challenge is to prevent the developers from transferring their personal biases to these tools. "Narayanan suggests that rather than trying to sanitize AI systems of stereotypes and bias, programmers should develop mathematical instructions for computers so machines can learn what is or is not acceptable" HRP (2017)

When AI systems in HR get smarter, more proven, and more focused on specific problems, there will be improvements in productivity, performance, and employees' wellbeing. HR departments need to engage, be vigilant, and willing to invest, while the AI community and investors require to speed up their decisions of focusing their business attention to this opportunity.

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