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Aug 10th, 12:00 AM

Artificial intelligence in human resource management in the Global South

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Completed Research

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Abstract

The purpose of this paper is to examine the use of artificial intelligence (AI) in human resource management (HRM) in the Global South. Multiple case studies of AI tools used in HRM in these countries in recruiting and selecting as well as developing, retaining and productively utilizing employees have been used. With AI deployment in HRM, organizations can enhance efficiency in recruitment and selection and gain access to a larger recruitment pool. With AI deployment in HRM, subjective criteria such as nepotism and favoritism are less likely to come into play in recruitment and selection of employees. AI deployment in HRM also has a potentially positive impact on the development, retainment and productive utilization of employees.

Introduction

Artificial intelligence (AI) is a potentially transformative force that is likely to change the role of management and organizational practices. AI is having revolutionary impacts on organizational decision making (Jarrahi, 2018) and redefining management models (Thomas et al., 2016). AI's visible impacts can be observed in core competency and business processes such as knowledge management (Liebowitz, 2001), customer outcomes such as perceptions of service quality and customer satisfaction (Brynjolfsson & Mcafee, 2017).

Moving to the focus of this paper, AI is being touted as an effective human resource management (HRM) tool (Cappelli et al., 2019). AI deployments in HRM issues such as recruitment and selection are becoming increasingly widespread and have drastically reduced the time and cost of performing these functions.

AI's potential usefulness as a tool to improve HRM strategy and performance is being increasingly recognized not only in developed countries, but also in developing countries, also known as the Global South (GS) which consist of low- and middle-income countries from Asia, Africa, Latin America and the Caribbean (Rigg, 2016).

Diffusion of AI in HRM practices in these economies has been facilitated via a number of mechanisms. Just like other forms of modern HRM practices that have been reported in prior studies (e.g., Baddar Al-Husan et al., 2009), multinational enterprises (MNEs) from the Global North (GN) have brought AI-based HRM tools in the GS. For instance, by March 2019, EY's AI-powered chatbot "Goldie" had been deployed in 138 countries, many of which are GS economies.

These economies are also creating cutting-edge and innovative AI-based HRM applications. Some notable examples include WeChat Recruiting and Malaysian company Supahands' Digital Innovation Assistant for kNowledge Engineering (DIANE).

Studies that examine the impact of AI on HRM have considerable theoretical and practical significance. Advanced HR practices can enhance organizational performance. Barney & Wright (1998) gave an example of Continental Airlines, which had the worst industry performance in on-time arrivals. In 1995, employees were offered US$65/month for improving on-time performance. Continental's on-time performance improved to be the industry's best. Kaufman (2015) argued that this effect is likely to be temporary and

diminishing and is likely to be copied by competitors. Due to newness and resource intensiveness, AI apps have longer lag times to imitation. Thus AI-based HRM tools can be used to gain and sustain competitive advantage.

AI-based tools can bring significant changes in HRM practices. Prior researchers have, however, noted a substantial gap between the promise and reality of AI in HRM (Tambe et al., 2019). The gap is decreasing with the rapid pace of development of AI tools. Research and practice can benefit from an understanding the benefits of AI in HRM, especially political, social and economic contexts facing the GS. This paper attempts to address these research gaps and pragmatic needs. Specifically, the following research questions have been addressed: What are the impacts of AI on HRM in the GS? How do economic, political, social and cultural contexts in GS economies affect the use of AI and its value addition in HRM?

Our analysis contributes to the HRM literature, and especially research in HRM in GS economies, in several ways. First, we provide a framework for understanding AI's potential usefulness as a tool to improve HRM performance by enhancing efficiency in recruitment and selection, enlarging recruitment pools, reducing the influence of subjective criteria such as nepotism and favoritism and facilitating the development, retainment and productive utilization of employees. Second, our study highlights how social, cultural, political and economic conditions in the GS economies may lead to a higher value addition in AI's use in HRM activities in these economies. Also most of the discussions, results and findings in this paper are general and are applicable in the situations of Global North as well.

The article is organized as follows. We first provide a literature review. Then we discuss the methods. Next, we analyze AI's potential in bringing changes in HRM practices and develop some propositions. It is followed by a section on discussion and implications. The final section offers conclusions.

Literature review

Beer (1985) suggested that HRM policies are influenced by stakeholders and situation-related factors. The interests of shareholders, management, employees, governments and trade unions shape HRM policies. Situational factors include law and societal values, labor market conditions, workforce characteristics, business strategies and management philosophy (Farley et al., 2007). Additional factors include economic, governance-related factors, and legal systems (Whitley, 1999; Leat & El-Kot, 2007).

GS economies utilize outdated and ineffective HRM systems (Bennell, 1994; Do et al., 2019). Recruitment procedures often fail to attract appropriately trained candidates (Cohen & Wheeler, 1997).

Other challenges include ineffective performance standards and reward programs. A complaint that is often reported is that there is too much emphasis on seniority or patronage. Supervisors are reported to engage in abusive behaviors that demoralize the employees (Cohen & Wheeler, 1997).

Because of these various challenges, effective HRM thus would play a key role in the development of these countries (Tessema & Soeters, 2006). Unsurprisingly HRM systems in GS economies are facing pressures for change.

Prior researchers have noted that the pressures to introduce modern HRM practices are especially felt by technology industry sectors such as call-centers (Taylor & Bain, 1999). This can be attributed to several factors, inter alia, job pressures, lack of promotions, working time and work–life balance. The tasks' repetitive and boring natures also lead to high labor turnover rates (Deery & Kinnie, 2004; Houlihan, 2004). Due to their complexity, call centers need diverse skills. They are required to attract and retain employees with skills suitable for their unique requirements. This underscores the importance of effective HR practices.

A related point is that HRM practices of firms in GS economies have different propensities to change. In China, enterprises involved in JVs had started implementing substantive HRM systems earlier than other groups of enterprises (Warner, 2004).

Methods

We build theory from multiple cases (Eisenhardt & Graebner, 2007). Compared to a single-case study, multiple-case studies provide a stronger base for theory building (Rowley, 2002).

As suggested by Eisenhardt & Graebner (2007) we have made connections with related literatures and established theoretical gaps. We have provided an explicit statement of research questions. Theoretical and practical importance of research on AI's use in HRM has been clearly established.

Selection of cases

Case selection in a multiple case study design has broadly the same objectives as in random sampling. The cases need to represent the population and there must be a variation on the dimensions of theoretical interest (Seawright & Gerring, 2008). However, a substantive rather than statistical basis is what distinguishes a multiple case study (Greene & David, 1984).

Logistical and financial considerations also influence the case selection process (Stvilia et al., 2007). Due to these constraints, we have selected only cases of AI-based HRM tools for which sufficient information could be obtained from secondary resources. Archival data is among a variety of recognized data sources for case studies (Eisenhardt & Graebner, 2007).

Following Eisenhardt's (1989) recommendation, we selected ten cases We have combined two approaches: extreme method, and diverse method (Seawright & Gerring, 2008). Our process started with extreme case method and evolved over time to implement different requirements and recommendations.

In the extreme case method, cases with extreme values on the independent (X = characteristics of AI app developers or companies using AI) or dependent variable (Y= effective use of AI in HRM) of interest are selected (Seawright & Gerring, 2008). The cases are extreme in the sense that they are among the earliest AI apps in HRM. The companies that have used AI apps in HRM can be considered to be exemplar. Prior researchers have suggested that best practices models and exemplar companies are good candidates for case research (Eisenhardt, 1989).

If researchers have idea about other factors that affect Y (outcome of interest = effective AI use in HRM), other case selection methods can be pursued (Seawright & Gerring, 2008). We utilize a diverse case method to select specific cases. The cases we have selected cover a wide range of circumstances in which the app was created such as custom developed AI apps for internal use versus packaged AI solutions for retail sale.

As to the deployment of AI apps in HRM, two main themes emerged: a) HRM goals that are intended to be reached with new AI tools (e.g., recruiting, selecting, developing, retaining and productively utilizing employees); b) who developed the apps (developed for internal use versus commercial purpose). In order to achieve diversity, we selected cases with different combinations of these two variables. We illustrate this process with two of the cases in Table 1: DBS and Deayea's "brain surveillance devices".

HRM goals ➡️ Internal use versus commercial use of AI apps ⬇️	Recruiting and selecting	Developing, retaining and productively utilizing employees
Internal use External commercial use	[1] • Harambee's AI tool • DBS's Jim [2] • Talkpush's recruitment chatbot Stanley • Ajinga's Talent Experience Management platform • WeChat recruiting • AIRA recruiting	[4] • EY's Goldie • SupaAgents' DIANE [3] • Deayea's "brain surveillance devices" • Leena AI's chatbot

Table 1: The cases selected and their classification

DBS (Cell I) partnered with Singapore start-up impress.ai to develop Jim. Its availability of 24/7. It saves recruiters about 40 man-hours per month. Jim answered 97% of questions asked by the candidates (dbs.com, 2018). The project to develop Jim began in April 2017 and it was officially launched in May 2018. In five months, Jim interviewed more than 600 candidates.

China's Deayea [cell 3] has developed "brain surveillance devices", which had been deployed by over a dozen Chinese factories and businesses. A device costs around US$15,800 including service fees (Ruohan, 2018). Its devices are used for developing, retaining and productively utilizing employees. In 2015, some high-speed train drives in the Shanghai-Hefei route started wearing the device. The goal is to enhance safety. Deayea has claimed that its device has an accuracy of over 90%. It can assess drivers' attention span and mood. For instance, if a driver is feeling depressed, sleepy or fatigued, they can be replaced (Ruohan, 2018). A driver's attention level is measured in the 1 to 100 scale. When the score is below 85, the device vibrates to warn the driver. If the score falls below 65, the driver receives and the backstage operator receive the message. The driver will be woken up or replaced.

The device is used to train new employees by Ningbo Shenyang Logistics. By integrating the sensors in virtual reality headsets, different scenarios are simulated (Chen, 2018). Deayea worked with an air force institute on a pilot selection system. It can detect "unstable emotions" in candidates during the training process (Ruohan, 2018).

Findings and some propositions

Enhancing efficiency in recruitment and selection

Prior research has suggested that organizational and institutional factors in the GS are associated with various types of inefficiencies in HRM (Siddiquee, 2007; Warner, 2004). A key objective for MNCs operating in the GS such as China is thus to formulate effective and efficient HRM policies and practices (Farley et al., 2007). AI tools perform well in terms of input efficiency such as time and costs for recruitment and selection as well as in terms of output efficiency such as the drop off rates during the application process.

First, AI tools are efficient in terms of cost. According to Glassdoor, on the average, an employer spends about US$3,900 to hire a new worker and the process takes 27.5 days (https://www.glassdoor.co.uk/employers/blog/calculate-cost-per-hire/). With AI deployment in HRM, organizations can reduce recruiting costs. Talkpush charges a minimum of US$300 per month, which allows 100 interviews (US$3 per interview). High-volume packages reduce the cost per interview to US$0.50. AI deployment can thus address the cost-efficiency challenges observed in GS economies (e.g., Farley et al., 2007).

With AI deployment in HRM, organizations can reduce time-to-hire candidates. By automating recruitment processes, organizations typically can reduce time-to-hire a candidate from 10 weeks to 2 weeks. The time to shortlist candidates can be cut from 2–3 weeks to almost instantaneous (Strusani & Houngbonon, 2019). Talkpush uses AI to speed up the recruitment process and make it more real-time and conversational. Its conversational assistant Stanley processes over a million candidates every year. Talkpush's CRM hands over the process from bot to human in minutes. Talkpush had clients in Singapore, Malaysia, Philippines, Macao, Indonesia and China.

AI tools are also efficient in terms of defect reduction. A key benefit of AI tools is to detect fraudulent activities by candidates. For instance, the AIRA system detects a false CV (Fajardo, 2018). One estimate suggested that approximately 20% of CVs submitted for positions in the Indian IT industry are fake (Rai, 2012).

Detecting fraudulent practices is difficult in most GS economies because they lack standard identifier such as the U.S. social security number, which makes it difficult to check potential employees' background. In some countries (Kshetri, 2007), catching fraudulent practices is difficult. It costs up to US$1000 per employee for a detailed background check. In India, companies such as Authbridge, the U.S.-based Rezource, and Supersoft Consultants send their officers to meet the references given by candidates. They check the existence of companies at which applicants claim to have worked in the past. In India, even if the

fraudsters are caught, the legal penalty is not severe (Kshetri, 2015). AI system's capability to detect frauds thus have a higher value addition in the GS.

Prior researchers have emphasized the importance of law and legal systems in HRM practices (Farley et al., 2007; Whitley, 1999). AI-based HRM can address challenges of weak legal and law enforcement systems facing GS economies. Whereas weak legal systems in GS economies encourage fraudulent practices such as providing false information in CV, AI systems can stop such practices.

AI tools have shown a high level of efficiency in terms of productivity. For instance, Ajinga connects recruiters, hiring managers and candidates in order to increase applicant conversion rates and better facilitate hiring decisions. The Phenom Talent Experience Management platform is built on AI. It aims to increase personalization, automation and accuracy for candidates, recruiters, employees and management. Phenom People and Ajinga extract and feed insights from career sites and WeChat into the applicant tracking system (ATS). With Ajinga, companies can create a dedicated account that can be used for recruiting and branding. Ajinga uses geolocation data.

AI tools are also expected to perform well in terms of output efficiency. This is important because the application process is reported to have an average drop off rate of 80% (Avature, 2019). Talkpush users can change their interface from English to Mandarin Chinese, Traditional Chinese, French, Spanish and Hebrew. The recruitment chatbot Stanley is available on Wechat and Facebook Messenger. It welcomes candidates, allows them to choose job positions and asks them job-specific questions. Recruiters can access the candidate data and answers to view, evaluate and process the candidates. The answers are in text, audio or video. After the candidates complete their interview on Stanley over WeChat, recruiters can interact with them via the Talkpush interface. Candidates can be interviewed via WeChat.

AI tools are more efficient in terms of resource utilization. For instance, human beings can participate only when they are really important. The Chilean company Artificial Intelligence Recruitment Assistant's (AIRA) system publishes vacancy announcements in recruitment websites. It reads and ranks the résumés and uses psychometric tests. It also conducts video interviews with applicants. An applicant's performance is measured with indicators related to emotion analytics. Factors such as attention levels and facial expressions are converted into numbers. After all these processes are completed, human recruiters conduct in-depth interviews with the highest-ranked candidates (Ovanessoff & Plastino, 2017).

Likewise, Singapore-based multinational bank DBS, which operates in many GS countries in Asia and the Middle East, has developed a chatbot Jim (Job Intelligence Maestro). Jim reviews CVs, asks screening questions and collects answers to them, conducts psychometric assessments. It also answers basic questions on topics such as hiring response times and career progression. Jim takes eight minutes to assess a candidate, compared with about 30 minutes taken by human-led systems. About one-third of the candidates who passed Jim's vetting were offered a job by DBS, compared with only one-seventh under the previous human-led system (Harper, 2019). The above discussion leads to the following proposition

P1a: With AI deployment in HRM, organizations can enhance efficiency in recruitment and selection in GS economies.
P1b: AI deployment in HRM is likely to lead to a higher efficiency in recruitment and selection in GS economies compared to their GN counterparts.

Expanding recruitment pool

GS economies face a large deficit of human capital. Observers have, for instance, suggested that a key reason why aid to Africa has not worked concerns the lack of human, social and institutional capital (Mistry, 2005).

A related problem is the lack of information on human resources. For instance, health workers are in severe short supply in India. This problem is further compounded by the lack of complete and reliable information on human resources. A key step to address this challenge is to ensure the availability of reliable and comprehensive workforce information (Rao et al., 2012).

AI tools can tackle these problems. One example is the South African social enterprise Harambee's AI tool to help young people find jobs. Harambee uses Google's open sourced AI TensorFlow to interact with more than 1 million young people. It uses precise geographical attributes and preferential behavioral metrics to achieve its goals. Harambee uses machine learning (ML) to more effectively use the data it has collected

(Paul et al., 2019). Harambee's youth employment accelerator CEO Tamera Campbell noted that 2600 jobs for young people were found in the first two years after the organization was established in 2011. By early 2019, 50,000 young people had benefitted (Kennedy, 2019).

Harambee's young recruiters, referred to as "feet on the streets" visit backward townships and villages to collect contacts of unemployed people. Some are invited into its offices to assess interests and skills and test analytical capabilities. Harambee helps them create email accounts and CVs and facilitates the interview process. It provides advice and information on ways to prepare for the interviews such as how to dress and the kinds of questions that might be asked. Potential candidates are also offered clothes for free for the interview. It also provides work readiness interventions, which address the risks that employers have identified (Paul, Jolley & Anthony, 2019). Promising candidates can also get additional assessment and vocational trainings in call-center or similar facilities (Goering, 2018).

Harambee plans to expand its service to over seven million unemployed in South African youths. It has also expanded into Rwanda.

Harambee has developed strong partnerships with companies. It first learns the skills needed by employers. It then works to identify candidates that are likely to be a good match. Harambee's corporate partners provide information about the number of candidates they need and the target hiring date. This process provides them with larger pools of potential candidates by including demographic groups that were overlooked (Paul et al., 2019).

Harambee has reduced the cost barriers for employers to hire unemployed youth. These disadvantaged demographic groups now have access to opportunities that were unavailable but unthinkable before.

Another example is the Chinese social media company WeChat (known as Weixin in China), which had 1.1 billion monthly users as of October 2019 (Grant, 2019). WeChat recruiting has expanded the recruiting pool for companies. WeChat recruiting allows job candidates to review, apply or share jobs in the platform. Some companies' WeChat account have a button, which links to a list of jobs. About 50% of companies use WeChat as a recruiting platform (Fiedler, 2019).

In China, 70% of people trust recommendations from friends. In contrast, only 10% trust advertising. WeChat integrates with HR platforms to facilitate employee referral programs. Organizations encourage employees to share WeChat posts in their networks to expand the pool of candidates. Recruiting platforms such as Ajinga and Talkpush provide chatbot functionality using WeChat. Recruitment features in social media platforms works well in China's relationship-centric culture. The above discussion suggests the following:

P2a: With AI deployment in HRM, organizations can gain access to a larger recruitment pool in GS economies.
P2b: The AI-led increase in organizations' recruitment pool is likely to be higher in GS economies compared to their GN counterparts.

Reducing the effects of values, biases, and subjective preferences

As prior researchers have suggested, recruitment, selection and promotion practices in many GS countries are based on favoritism, nepotism and political loyalty (e.g. Bennell, 1994; Beugre & Offodile, 2001; Das, 1998; Soeters & Tessema, 2004). While it is a legal requirement for listed Indian companies to appoint independent directors, a large proportion of such companies fail to comply thanks to the culture of nepotism and favoritism. The new Companies Act of 2013 requires at least one-third a listed company's total number of directors on the board to be independent. About 17% of S&P Bombay Stock Exchange (S&P BSE) 500 companies were reported to violate the regulation (Walia, 2015).

Likewise, a study conducted across hotels in Northern Cyprus found nepotism's significant negative effect on HRM, job satisfaction and retention (Arasli et al., 2006). Moreover, some people associated with political and economic elites exhibit a sense of entitlement and feel that they should get certain high paying jobs (Yeganeh & Su, 2008).

AI-based HRM solutions attempt to address these problems. DBS reported that Jim's recruitment process is free from biases based on criteria such as age, gender or education in selecting candidates (Chanjaroen, 2019).

Likewise, one of the stated benefits of AIRA is that it reduces the possibility of nepotism, which a problem in the state and in the private sectors in Chile. In the mining sector, for instance, the recruiting process in Chile is biased towards men due to "self-discrimination" of workers, and male dominance (Salinas & Romaní, 2014). Overall, the recruiter's own values, biases, and subjective preferences have no place in AI-based recruitments. The preceding discussion can be summarized as:

P3a: With AI deployment in HRM, subjective criteria such as nepotism and favoritism are less likely to come into play in recruitment, selection and promotion of employees in GS economies.
P3b: The value associated with AI's potential to overcome the effect of subjective criteria such as nepotism and favoritism is higher in GS economies compared to their GN counterparts.

Impact on the development, retainment and productive utilization of employees

In most GS economies, employee productivity-related criteria get less importance. Tessema & Soeters (2006) found that a large proportion of civil servants in Eritrea believed that there was no link between performance and reward. Employee performance evaluation is based more on subjective and behavioral criteria and compliance rather than on productivity (Yeganeh & Su, 2008).

In Iran, there is a social expectation that every employee should comply with Islamic and revolutionary criteria (Yeganeh & Su, 2008). HRM practices that have been reported and observed in GS economies such as seniority-based reward, and pay structures that are overly hierarchical (Yeganeh & Su, 2008) are incompatible with AI-enabled HRM systems.

These challenges can be overcome using AI tools. We consider the Malaysian-outsourcing company Supahands to illustrate this point. Supahands' DIANE is a predictive routing system to match agents and projects based on timing and relevance (Moe, 2018). The company has SupaAgents in the Philippines, Indonesia and Malaysia (Pradhan, 2019).

SupaAgents handle over 1 million units of data each month. The company collects and aggregates data about each SupaAgent. The collected data include skills, availability, and past performance. DIANE utilizes the information to pair a project with the most appropriate team of SupaAgents.

Projects are broken down into small units--micro-tasks. The task is divided between humans and machine so that multiple people can work on a project to improve speed, efficiency and accuracy. They can also be aggregated into larger projects which require multiple workers. The goal is to ensure that SupaAgents complete the project at high levels of accuracy and that the right sets of skills are assigned to each project (Moe, 2018).

Prior researchers have noted that by automating repetitive administrative activities such as personnel reporting and record keeping, HRM professionals can focus more on interpreting information (Gardnera et al., 2003). More benefits can be realized if organizations can go beyond simple automation. For instance, Coca-Cola Vietnam uses Leena AI's chatbot. It cut 60% of the time of the CEO and the Director. The bots can be integrated with workplace chat apps Slack or Facebook's Workplace. They are trained to use information in policy documents. They pull data from back-end systems such as Oracle and SAP.

As another example, EY in 2017 launched an AI-powered chatbot named "Goldie". It is powered by IBM Watson. It answered more than 2.2 million questions by March 2019.

In China, businesses and the military use AI tools to monitor employees' brain activity and emotions (Chan, 2018). They place wireless sensors in employees' caps or hats. The data are combined with AI algorithms in order to assess various emotion conditions such as happiness, anxiety, sadness, and emotion-neutral state. Employers can identify workers' mood shifts, which can help them to take interventions such as changing break times, the nature of the task, or even asking them to take off time from work in order to increase productivity and profits.

A notable provider of emotional surveillance technology *is* Deayea, which installs sensors in helmets and uniform caps to measure conditions of drivers, assembly-line workers or people in similar occupation. The manufacturer's "brain surveillance devices" are special types of "emotional surveillance technology". Deayea claims that the measures have an accuracy of over 90% (Schmidkonz, 2019).

State Grid Zhejiang Electric Power in Hangzhou introduced Deayea's technology in 2014. Manufacturing company Hangzhou Zhongheng Electric uses it to track production line workers (Houser, 2018). Train drivers of high-speed rail lines also use them. The sensor can trigger an alarm if a driver falls asleep (Chan, 2018). Based on above discussion, the following is presented:

P4a: AI deployment in HRM has a potentially positive impact on the development, retainment and productive utilization of employees in GS economies.
P4b: AI's impact on the development, retainment and productive utilization of employees is likely to be higher in GS economies compared to their GN counterparts.

Discussion and implications

Since GS economies utilize outdated and ineffective HRM systems, effective HRM plays a key role in the development of these countries (Tessema & Soeters, 2006). In this way, the adoption of AI-based tools by GS-based firms is one way to leapfrog their counterparts in developed countries. We argue that in many ways, due to the social, cultural, political and economic conditions facing GS economies AI use in HRM is likely to lead to higher value addition in these economies than in their GN counterparts.

AI tools offer many benefits. Organizations increase effectiveness and efficiency in recruiting talent. They are efficient in terms of time to hire a candidate and speed. For instance, AI-based apps developed by Talkpush, AIRA and others can process large numbers of candidates almost instantaneously. They also perform well in terms of other efficiency indicators such as resource use and costs. AI tools are also more efficient in terms of reducing errors. Investments in AI may increase the productivity of employees.

We noted earlier that powerful contradictory forces have shaped the HRM policies in GS economies. In this regard, AI is likely to shape the mechanisms and dynamics of these factors. Specifically, we expect a decreasing influence of informal institutions such as social traditions. AI tools can also overcome the biases associated with demographic characteristics of candidates as well as those related to nepotism and favoritism. On the other hand, AI is likely to lead to a higher degree of professionalism and formalization of HRM systems and practices.

Having said that, it should also be mentioned that the long-term success of AI hinges on the ability to create required culture and organizational shifts in order to make them compatible with such intelligent systems and solutions. In organizations characterized by the prevalence of nepotism, cronyism and favoritism in practices such as hiring and promotion, AI-based systems are bound to fail. Such cultures can contribute to employees' overt and covert resistance to AI systems.

In order to understand the AI-led changes in HRM practices in GS economies, following the typology of PwC (2017), this technology's deployments in HRM are plotted onto a 2 x 2 matrix (Table 5) that illustrates humans in the AI loop (present vs absent) on the horizontal axis against the ability to make adaptation to changing circumstances on the vertical axis. AI systems used in HRM in each cell in Table 5 have unique features that can help achieve different HRM objectives.

Many of the benefits discussed above can be realized because computers are better than human beings in performing repetitive mathematical tasks. Their judgement and intelligence are not affected by factors such as emotions, feelings, wants and needs. They are capable of processing a large amount of information. Such benefits are especially pronounced in assisted intelligence and automation of HRM.

		Roles of humans in the AI loop	
		Present	Absent
Ability to make adaptation to changing circumstances.	No	[I] **Assisted Intelligence** Assists employers or recruiters to make decisions or take actions. They do not learn from their interactions with humans (e.g., Harambee's AI tool)	[II] **Automation** Automate routine or non-routine tasks (manual as well as cognitive). The focus is on automation of existing HRM tasks (e.g., EY's Goldie, Leena AI's chatbot)
	Yes	[IV] **Augmented Intelligence**	[III] **Autonomous Intelligence**

		Augment HRM decisions made by humans. They also continuously learn by interacting with humans and the HRM environment. (e.g., detecting and flagging falsified CVs by AIRA).	Can make adaptation to different HRM situations and act in an autonomous manner without human assistance (e.g., Deayea's "brain surveillance").

Table 2: A typology of AI systems used in HRM

AI tools used in HRM such as Deayea's brain surveillance (cell III) can be considered to an autonomous AI, which is arguably the fourth wave in AI and is the "most monumental" and "most difficult (Lee, 2018). It combines the previous three waves of AI, namely- Internet AI, business AI and perception AI. Machines get the ability to sense the environment around them and respond. They can move intuitively and manipulate objects with the same ease and in just the same way as humans. Outside HRM, autonomous vehicles are perhaps the best example of autonomous AI.

In many cases, better results could be achieved with AI augmentation or augmented intelligence (cell IV), which according to Gartner is "a human-centered partnership model of people and AI working together to enhance cognitive performance" (gartner.com, 2019). For instance, researchers found that breast cancer detection rate significantly improved when AI was combined with analysis from human radiologists (Wu et al., 2019). Financial institutions use AI augmentation in fraud detection. ML algorithms can be trained to identify and flag fraudulent financial activities (Masih, 2019). In HRM such algorithms can help detect fraudulent practices by job candidates. The idea here is that AI plays an "assistive role" in order to advance and improve human capabilities. To put things in context, by interacting with humans, AI can reduce errors (e.g., hiring candidates that have falsified CVs) and the amount of routine work in hiring.

At the same time, it can lead to more positive interactions and services. Augmented intelligence-led automation thus increases efficiency and has the potential to produce complementary and synergistic effect with a human touch, feeling, relatedness, warmth and common sense to reduce the risks associated with automation of decisions.

AI-based tools can be applied in HRM in several ways. Apps such as those related to facial and emotion recognition arguably lack a scientific basis (Barrett et al., 2019). A Chinese company claimed that its revenue increased by US$315 million during 2014-2017 (Houser, 2018). However, it is difficult to determine if these effects can be attributable to the technology. Many critics have pointed out that emotion recognition systems lack scientific foundation

Tambe et al. (2019) identified four challenges in using data science techniques such as AI for HR tasks: (a) complexity of HR phenomena, (b) constraints associated with small data sets, (c) accountability questions related to fairness as well as ethical and legal constraints, (d) possible adverse employee reactions to organizational decisions based on AI and other data-based algorithms. Regarding (a), most AI tools are currently used to automate routine operations. With further development in AI, more complex HR tasks are likely to be automated.

Constraints associated with small data sets is a challenge facing many GS economies because ML algorithms need to be trained with big and diverse datasets. That is, algorithms can learn more and AI offerings become smarter if a huge amount of data are available. Among GS economies, China is an exception. The country is estimated to generate more data than all other nations combined (Economist, 2017), which can be attributed the country's emergence as a global AI powerhouse.

Regarding (c), it can be argued that accountability questions ethical and legal constraints may be less of a concern in GS economies. For instance, Chinese consumers' willingness to share relevant data with companies has facilitated Chinese firms' access to data.

Regarding (d), possible adverse employee reactions would be of concern regarding the use of AI in the development, retainment and productive utilization of employees. No adverse reactions have been reported so far. Such concerns are irrelevant in the use of AI in recruitment and selection.

Future research implications

Before concluding, we suggest several fruitful avenues for future research related to AI use in HRM. First, when new HRM practices are initiated, different groups of employees tend to respond differently. Baddar Al-Husan et al. (2009) found that when a French multinational introduced HR reforms in a Jordanian company, the impact overall had a positive effect on worker experiences, attitudes and behavior. However, differential impacts on different types of employees were noted. For instance, more positive attitudinal and behavioral outcomes were found with more senior staff and those with higher educational. We believe it is reasonable to expect AI deployment in HRM will have different effects on attitudes and behavior of different groups of employees. An intriguing avenue for future research is thus to examine the nature of the various effects of AI on different groups of employees when this technology is deployed in HRM.

Second, prior researchers have noted that the adoption of new HRM practices was a key factor behind Japanese firms' ability to introduce innovations (Aoki & Dore, 1994). The newly introduced practices provided more incentives for employees to develop and share new knowledge within their firms (Santangelo & Pini, 2011). Future researchers should thus explore the effects AI use in HRM on organizational capabilities such as organizational learning, knowledge management and innovative performance.

Third, prior researchers have found that performance management techniques and practices that are developed in the West cannot be successful in GS economies unless they are adapted to the context of these economies (Mendonca & Kanungo, 1996). Future researchers may wish to test whether this observation holds also for AI apps developed in the West.

Concluding comments

We have developed propositions that might serve as a guide to future research on the use of AI in HRM in the context of GS economies. AI-based HRM tools are efficient in terms of a number of objectives such as reducing the time to hire a candidate, costs and utilization of other resources. The number and variety of metrics used in recruitment can be increased using AI. AI is likely to emerge as an important force for achieving HRM goals such as attracting top talents, improving their retention and developing leadership capabilities.

AI-based HRM tools have a higher value addition in GS economies due to formal (e.g., high level of corruption and the underdeveloped rule of law) and informal institutions (e.g., prevalence of nepotism) and economic factors (e.g., inadequate record keeping practices) in these economies. The conditions promoting supervisors' behaviors that demoralize employees can facilitate other forms of abuse in AI. AI also will be an effective tool to fight against the acts of corruption, such as nepotism, cronyism and favoritism.

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