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Technology in Human Resource Functions:
Core Systems, Emerging Trends, and Algorithmic Management

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Abstract

Technology continues to shape how we work and manage our workforce. Yet, the human resource (HR) function often lags behind other business functions when it comes to the implementation of technologies. In this chapter, we explore the core HR systems that underpin many HR practices and processes, emerging trends around the use of advanced technology, and the role of algorithmic management in elevating and shifting some of the functionality in HR. Drawing on recent scholarly publications and industry reports, we highlight particular areas of development, discuss practical implications, and identify potential avenues for future research in this evolving field. We conclude that not only organisational capabilities and resources for technology-investment in HR but also knowledge and skills of HR professionals as well as necessity to apply these technologies vary significantly between actors, firms, and industries. Thus, greater contextualisation is needed in the debate around the use and impact of technology in HR.

Introduction

Technology in human resources (HR) is not a new topic in the field and has been discussed for more than four decades (Bondarouk, Parry, & Furtmueller, 2017). Over the years, technology has increasingly been viewed as an opportunity as opposed to a threat, and its benefits are generally summarised as HR efficiency, HR effectiveness, and a more strategic role of the HR function (Parry & Tyson, 2011). Rather than providing an extensive historical overview (Kim, Wang, & Boon, 2021) of all its developments including landmarks such as the introduction of the computer (1977) and the growth of Internet services (1997), we explore a set of technologies available for businesses and discuss the extent of their use within the HR function to date.

Technology and the digitalisation of the HR function remain a key priority for organisations (Strohmeier, 2020a). Digitalisation has been accelerated across organisations, countries, and industries as a result of the COVID-19 pandemic (McKinsey, 2021; PwC, 2020a) and the HR function was not an exception. The Chartered Institute of Personnel and Development (CIPD; 2021) identified digital and technological transformation as one of five key trends influencing the HR profession over the next decade. Yet, in comparison to other business functions, HR lags behind in its digitalisation efforts and the drivers of digital transformation remain with top management, business development, and other functions. A recent Mercer (2021) survey indicates that only three per cent of HR professionals see themselves responsible for leading digital transformation. Notably, organisations continue to use on-premise solutions with less than half (45%) operating in the cloud (Mercer, 2021). Thus, HR cloud transformation is likely to increase in the future as part of organisations' HRM digitalisation efforts, particularly as almost all companies (98%) have digitalisation prioritised as part of their agenda.

We broadly define HRM digitalisation as 'the processes of employing digital technologies and appropriate data to promote the efficiency and effectiveness of HRM activities' (Zhou et al., 2021). For the purpose of this chapter, we particularly review how HR systems and emerging trends can

shape HR practices and the HR function as a whole. First, we highlight the foundational role of core constructs such as human resource information systems (HRIS) and electronic human resource management (e-HRM) (Marler & Fisher, 2013; Ruël, Bondarouk, & Van der Velde, 2007). Second, we discuss a number of emerging trends including artificial intelligence (AI), blockchain technology, Internet of Things (IoT), virtual and augmented reality (VR and AR), and big data and HR analytics (HRA) – all falling under the HRM digitalisation umbrella (Margherita, 2021; Vrontis et al., 2021; Zhang et al., 2021). Third, we explore the role of algorithmic management in elevating and changing some of the functionality in HR departments (Duggan et al., 2020; Meijerink et al., 2021a). We begin this chapter by making a strong case for investment in HR technology, outlining its impact on the central theme of employee experience in organisations.

HR Technology and the Employee Experience

The rationale for technology in HR has been widely discussed in the literature. For example, Johnson and Gueutal (2011) present six core reasons: streamline HR processes and reduce administrative burden; reduce HR administration and compliance costs; compete more effectively for global talent; improve service and access to data for employees and managers; provide real-time metrics to allow decision-makers to spot trends; and enable HR to transform so it can play a more strategic role in the business. Similarly, PwC (2020b) found that there are a multiplicity of reasons to invest in technology. 58 per cent of organisations stated finding, attracting, and retaining talent as the number one driver for HR technology followed by 43 per cent of companies referring to the development of people to reach their full potential. Forty-two per cent of companies highlighted the improvement of the current technology experience, impacting the overall employee experience (PwC, 2020). Fersht and Little (2020) demonstrate how leading firms have integrated technology and HR to transform employee experiences. For example, Accenture has introduced significant technology-led advisory services to

modernise HR; IBM considers a digitally-facilitated skills ecosystem as a cornerstone of employee experience; and KPMG views employee learning services as a central element of the information technology (IT)-HR interface. Notably, these initiatives build on a set of core HR systems that are commonplace now in many multinationals, yet are only implemented in some small and medium enterprises (SMEs) to date. In the following, we discuss these core HR systems in further detail.

Core HR Systems: HRIS and e-HRM

The central technology-based HR system applied in firms is often referred to as HRIS. The most commonly cited definition of HRIS refers to 'a system used to acquire, store, manipulate, analyze, retrieve and distribute pertinent information regarding an organization's human resources' (Tannenbaum, 1990: 27). Key advantages relate to reduced administrative burden and improved HR decision making processes, leading to significant cost savings, which, in turn, helps to justify initial HRIS investment (Beckers & Bsat, 2002). In an effort to integrate IT and HR fields of scholarly inquiry (Boundarouk et al., 2017), the term e-HRM was introduced to refer to 'the (planning, implementation and) application of IT for both networking and supporting at least two individual or collective actors in their shared performing of HR activities' (Strohmeier, 2007: 20). While HRIS are largely focused on within-function aspects, e-HRM relates to HR practices that are relevant to a multitude of stakeholders beyond HR (Bondarouk, Ruël, & van der Heijden, 2009). Traditionally, e-HRM has been presented under three dimensions, for example, Ruël et al. (2004) distinguish between operational, relational, and transformational e-HRM. Operational e-HRM refers to basic administrative HR activities, such as payroll or personnel data management. In this case, e-HRM might allow generating pay cheques and tax reports or provide an option to analyse employees' work efficiency based on time keeping mechanisms. Employees can manage their personal profile using an employee-self-service platform. Relational e-HRM is concerned with more sophisticated HR activities such as recruitment

and selection, learning and development, and performance and rewards management. For example, in recruitment and selection, widely used examples are recruitment via the web (i.e., e-recruitment), the introduction of an applicant tracking system (ATS), and the use of application filters when searching for candidates. In the area of learning and development, e-learning is playing a central role in many firms, offering employees the opportunity to complete training and coursework online. Finally, transformational e-HRM refers to activities linked to organisational strategies and wider business models, such as organisational change processes, strategic re-orientation, and strategic competence management (Ruël et al., 2004). Taking a more applied approach, CedarCrestone (2013) identified seven e-HRM application areas: administration, service delivery, workforce management, talent management, business intelligence through reporting and visualising, workforce analytics and planning, and social media tools. Using the example of talent management, a recently introduced concept that has gained prominence in many leading multinationals is the 'internal talent marketplace'. This system, which has been implemented by firms such as Nestle, IBM, Unilever, Procter & Gamble, and Novartis, allows managers to post open projects, gigs, and positions. Subsequently, managers are able to view diverse employees whose skills and interests could be a good fit. On the other hand, employees fill out their profiles and add in their aspirations and professional interests. They then receive instant recommendations of career opportunities (Gantcheva et al., 2019). The value gained from such a system relates to both relational and strategic advantages including talent deployment, greater retention of employees, facilitation of career mobility, and a skills-based growth of the company.

Importantly, and oftentimes neglected in studies, the value (i.e., efficiency, effectiveness, strategic contributor) of HRIS and e-HRM depend on organisational capabilities, individual skills, and wider engagement with these core HR systems by stakeholders. For example, taking an organisational capabilities approach, Bonadrouk and Ruël (2013) found that many strategic advantages are not

convincingly realised and the actual up take of e-HRM was low among the non-HR staff. Many firms, in particular SMEs, still struggle with core HR systems and are challenged by both technical and human obstacles (Dahlbom et al., 2020). Limitations associated with current systems include using one-way communication, being impersonal and passive, not always allowing for interpersonal interaction, and often creating an artificial distance between individuals and organisations (Stone et al., 2015). To explore these dynamics further, Al-Harazneh and Sila (2021) identify several theories that can help to unearth the interaction of stakeholders with core HR systems. These include unified theory of acceptance and the use of technology (UTAUT), social exchange theory, and leader-member exchange theory. In their study, they found that particularly performance expectancy had a significant effect on behavioural intention to use core HR systems (Al-Harazneh & Sila, 2021). This was confirmed by Wiblen and Marler (2021) who found that shared perceptions of the value of technology impact engagement with the HR system. Thus, this study further highlights the important role of social processes in influencing how managers transition to greater engagement with technology-enabled HR systems. Myllymäki (2021) argues that, to date, the e-HRM literature has not realised the full potential of different theoretical perspectives on technology. She proposes a socio-material perspective which recognises the importance of both human agency and material artefacts in the establishment and development of e-HRM. We conclude that it is critical to examine organisational capabilities, individual skills, and stakeholder engagement with core systems before investing into more advanced technologies in HR.

Advanced and Emerging Technologies

In recent years, attention has turned to the adoption of emerging technologies as a means of transforming HRM systems (Irum & Yadav, 2019). Generally, the use of such technologies in HRM is in its infancy, meaning that research in this area is nascent compared to that on e-HRM, described

above. Most of the literature on emerging technologies in HRM focuses on describing possible applications of these technologies within organisations rather than providing detailed analysis of the impact of these technologies on efficiency or effectiveness.

For a large part, the literature that does exist on emerging technologies in HRM has focused on the use of AI – 'a broad class of technologies that allow a computer to perform tasks that normally require human cognition' (Tambe, Cappelli, & Yakubovich, 2019: 16). Outside of HRM, this includes activities such as problem solving and reasoning, machine learning, natural language processing, image and speech recognition, and the generation of natural language, speech, and images to provide content (Kietzmann, Paschen, & Treen, 2018). Despite a certain amount of hype surrounding the use of AI in HRM, its use remains somewhat limited and in early stages. However, there are predictions that this will transform HRM practice, particularly relating to recruitment, in the future. For example, Pillai and Sivathanu (2020) suggest that AI can transform HRM at three levels: first, through the use of assisted intelligence to support repetitive tasks (e.g., chatbots undertaking interviews); second, in relation to augmented intelligence supporting humans in undertaking tasks and decision-making (e.g., chatbots supporting candidate experience in recruitment); and, third, through autonomous intelligence whereby the technology undertakes tasks on its own. Despite these predictions, there are few studies demonstrating that these activities are currently being adopted by organisations, although some employers claim to have improved the efficiency and effectiveness of HRM via the use of AI. For example, IBM suggested that they reduced HRM costs by around $107 million in 2017 through the introduction of an AI-powered system (Guenole & Feinzig, 2018).

Current use of AI appears to be focused mostly on recruitment and selection, rather than on broader HRM. Indeed, several studies have suggested that AI can support recruitment decisions and reduce human bias (Lewis 2018; Oberst et al., 2021). A survey by Korn Ferry (2018) found that 63 per cent of recruiters believed that AI was changing the way that recruitment was undertaken within their

organisation. In this context, AI would typically be used to, for example, predict a candidate's likelihood of success in the job, based on data from previous job incumbents (Castellanos 2019; Garg et al., 2021). AI can also be used to: conduct background checks on employees; automatically match vacancies and suitable candidates; assess candidates' values, beliefs, and attitudes; develop attractive compensation packages; suggest possible behavioural patterns in relation to job fit and performance; and determine compatibility between an applicant and potential supervisor (Martinez-Gil, Paoletti, & Pichler, 2019; Oberst et al., 2021; Upadhyay & Khandewal, 2018).

While some commentators have suggested the value of AI in broader HRM, authors have also highlighted the difficulty of building an intelligent tool that reflects the complexity of HRM processes (Lambrecht & Tucker 2019; Tambe et al., 2019). There is also a concern that employee reactions to autonomous decision making in relation to HRM will be negative (Suen, Chen, & Lu, 2019; Tambe et al., 2019). This might explain why, despite the rhetoric surrounding the use of AI in HRM, relatively few organisations have adopted it (Oberst et al., 2021). Thus, while AI is suggested to have the potential to transform HRM in relation to its value and effectiveness, its use is likely to remain limited in all but the most pioneering organisations, and outside of recruitment and selection, until employee trust in this technology grows.

The HR function has also been suggested as a potential beneficiary of blockchain technology (Chillakuri & Attili, 2021; Erts, 2018; Fachrunnisa & Hussain, 2020). Blockchain can be described as a distributed and decentralised public ledger or database of records, in which transactions are verified by consensus of the participants in the system, allowing traceability and security without a central authority (Angelis & da Silva, 2019). More recently, blockchain has been combined with AI to create secure systems that can learn from accessible data. Potential applications of blockchain in HRM include those related to background and employment checks in recruitment (Gartner, 2019; Mercer, 2019); a means to store and share employee data safely (Gartner, 2019; Mercer, 2019); and to manage

work contracts and rewards (CompTIA, 2017). Thus, the use of blockchain seems to be more strongly related to the improvement of efficiency and security in HRM activities than to directly transforming the HR function into one that is more strategic, although the transfer of resource intensive processing of employee information to blockchain could free up HR practitioners to spend their time on more value-adding activities.

There has also been some attention paid to the use of the IoT and associated wearable technology and sensors. IoT refers to the ability to connect physical things to the Internet, thus allowing people to access data and information more easily and quickly (Strohmeier, 2020b). The literature suggested that using IoT, wearables, and sensors allows organisations access to real-time information about employees, such as that relating to commitment, engagement, and well-being (Burnett & Liske, 2019; Maltseva, 2020), thus providing insights about the impact of work routines and the work environment of the workforce. Sensors have been used to evaluate and redesign office space (Nappi & deCampos Ribeiro, 2020), examine physiological reactions to fatigue (Maltseva, 2020), and to enhance safety and health in the workplace (Creighton, 2018; Offshore Technology, 2019). Research into these technologies is sparse, with the exception of a study by Strohmeier (2020b) who interviewed HR experts and found expectations that HR activities such as those relating to information, development, and staffing were likely to be transformed by IoT in the next decade.

Finally, virtual and augmented reality has been suggested as another emerging technology that might affect the nature of HRM. VR refers to 'a fully controlled computer-simulated environment replicating the basic features of a real situation' (Schmid Mast et al., 2018: 126) while AR is used to 'create a compound scene, immersing the user in a real setting and adding computer-generated virtual elements' (Brito & Stoyanova, 2018: 820). Research on these elements has focused primarily on their use in training and development (Khandelwal & Upadhyay, 2021), with these technologies being used for some time in disciplines such as Medicine, Logistics, and Defence (Khandelwal & Upadhyay, 2021;

Volkow & Howland 2018). For example, Health Education England uses 'smart glasses' as part of the training for medical students specialising in mental health in which students undertake psychiatric sessions with mock patients so that their tutor can observe them and provide advice and guidance through an earpiece (Ronan, 2020). Outside of training and development, VR has also been suggested as potentially supporting office design activities (Haak, 2020). Once again, research in this field is sparse and focuses on describing the applications of the technology.

HR Analytics

To a large extent, emerging technologies focus on the use or provision of data, often relating to utilising big data as a means of improving the effectiveness and value of HRM activities. Over the past decade or so, we have seen an increased focus on data-driven approaches to HRM, and an emphasis on developing HRA capabilities within the organisation. Analytics in HRM is not a new concept (see , e.g., Fitz-enz, 1995) but it has been reinvigorated over the past few years (Marler & Boudreau, 2017). Recent discussions of HRA have focused on the need to move beyond HR metrics or measures of HR only, to integrate data from different sources and provide business insights (Basens, De Winne, & Sels, 2017; Dahlbom, Sajasalo, & Jarvenpaa, 2020). HRA generally focuses on activities such as examining relationships between variables, developing predictive models, converting data to monetary values, measuring impact or return on investment (ROI), or forecasting ROI (Phillips & Phillips, 2018). Recently a focus has been how to make use of big data – data with high velocity, volume, and variety (Dahlbom et al., 2020), to provide HRM insights. Typically, these discussions focus on the use of algorithms to examine employee attitudes and activities and to link these to business outcomes. For example, algorithms might be used to identify potential employees through social media data; to understand inequalities within an organisation; or to examine how employees interact within a team

through relational analytics. Recently we have seen an explosion of the use of algorithms in managing employees, specifically as part of the gig economy. We will discuss this in depth later in this chapter.

The literature has identified multiple challenges that hinder the practice of HRA. These include technological, organisational, environmental, data governance, and individual factors (Shet et al., 2021). Technological factors include complexity, perceived usefulness, data quality, access to relevant data, and compatibility. Organisational factors encompass top management support, IT infrastructure and capability, financial readiness, training and development of employees, and access to a skilled workforce. Environmental factors focus on the competitiveness and industry type. Data governance refers to challenges around data ownership, security, privacy, analysis, and mining. Finally, individual factors relate to culture, attitude towards analytics, technology and quantitative self-efficacy, and storytelling ability (Shet et al., 2021).

Algorithmic Management: A New, Disruptive Force in HRM

The last decade has seen algorithmic technologies come under increased scrutiny for their apparent ability to autonomously make managerial decisions that were previous the remit of humans. Predominantly found in digitally-enabled or -mediated work arrangements, the managerial processes enabled by algorithmic technologies – collectively known as 'algorithmic management' – typically act as a type of intermediary or 'middleperson' between organisations and their workers to oversee the labour process (Kellogg, Valentine, & Christin, 2020). The advanced nature of the technologies utilised means that this novel monitoring tool is typically quite comprehensive, in that the algorithm may oversee, manage, and control almost all tasks and activities (Veen, Barratt & Goods, 2020; Wood et al., 2019).

Algorithms, more generally, have become somewhat commonplace in mainstream media discourse in recent years. As consumers, we have become more familiar with discussions of how

algorithms are used to tailor personalised suggestions and recommendations on platforms such as Netflix and Spotify. Defined as computational formulae that can autonomously make decisions without explicit human intervention (Eurofound, 2018), algorithms operate based on a sequence of precise instructions telling a computer what to do to efficiently accomplish tasks (Lee et al., 2015). Importantly, algorithms are self-learning and can rewrite themselves as they work, using potentially colossal amounts of data to instantaneously determine an appropriate response to particular scenarios (Hyers & Kovacova, 2018). In a work context, algorithms can be used to atomise work into individual components or tasks to be completed, with the ultimate goal of ensuring high quality standards and the maximum level of efficiency (Duggan et al., 2021a). In this way, algorithms have been utilised to enable organisations to convert computing power into a novel, dynamic, and digitalised economic tool (Maffie, 2020).

With their advanced capabilities, and by negating the need for human supervision, algorithms are presented as being objective and minimising the potential for error or bias (Lee et al., 2015). Consequently, they seemingly represent an effective means of autonomously managing business processes and solving problems in fast-paced, complex domains (Mann & O'Neill, 2016). Within organisations, this has seen algorithms increasingly make decisions that have tended to previously be the remit of managers and HR professionals. For example, the algorithms used by hiring platforms, such as LinkedIn, can sort through thousands of individual profiles to identify the most promising job candidates to company recruiters (Carey & Smith, 2016). Similar platforms, such as HireVue, can also use algorithms to speedily assess candidates via video interviews and game-based assessments to allow client organisations to assess large numbers of applicants (Mondragon, 2021).

Most of the discussion and debate surrounding algorithmic technologies, and in particular, algorithmic management, has focused on digitally enabled work arrangements in the gig economy (Duggan et al., 2020). For organisations such as Uber, Deliveroo, Amazon Mechanical Turk, and

Fiverr, algorithms are commonplace, and their specific capabilities are notably broad (Rosenblat & Stark, 2016). In the gig economy, human managers are typically non-existent, and are instead replaced with algorithmic management practices and data-driven procedures. This results in gig organisations being more easily able to exonerate themselves from any responsibility with respect to managing their typically large workforces, by appealing to algorithms to essentially dissolve their authority into the objective, disinterested medium of a software programme (Van Doorn, 2017).

Algorithmic Management in Practice

The various processes enabled by algorithmic management include allocating work tasks, setting and enforcing minimum quality standards, closely monitoring workers' activities, and generating individualised performance metrics to evaluate workers (Vandaele, 2018). This aligns with our earlier assertion that algorithms can be used to ensure high levels of efficiency; if the algorithmic mechanisms used by a particular organisation determine that minimum quality standards have not been reached, individual workers can be notified and may potentially face corrective action (Jabagi et al., 2019). In the case of gig work, organisations closely mediate transactions between workers and customers, with the strategic goal of efficiently managing and coordinating labour to ensure that minimum service standards are always upheld (Duggan et al., 2020). Importantly, the governing role of algorithmic management is more extreme within certain types of gig work, with the starkest examples perhaps being the immediate 'deactivation' of certain types of gig workers whom the algorithm determines to have failed to meet minimum performance standards (Duggan et al., 2021a).

At an operational level, the managerial practices utilised by gig organisations are often positioned as providing considerable benefits for firms via the lowering of labour costs (Rosenblat, 2018). For these organisations, algorithmic management keeps marginal expenses relatively low (Schmidt, 2017), with significant savings arising from the use of algorithms as virtual automated

managers (Lee et al., 2015). By its very purpose, algorithmic management not only enables the remote connection of workers and customers anywhere in the world, but also ensures the highest possible degree of standardisation in the organisation and delivery of work (Prassl, 2018). Because these functions are automated, algorithmic management makes decisions without human oversight or standard recourse opportunities.

Despite the ongoing interest in algorithmic management across scholarly and policy circles, relatively little is known about the specific details of the algorithmic technologies used by various organisations. In other words, algorithms are often seen as opaque entities by those workers who operate under their guidance, with empirical research on various types of gig workers indicating that individuals know very little about why they are being instructed to behave or act in particular ways (Duggan et al., 2021a; Meijerink, Keegan, & Bondarouk, 2021b). Recent research has attempted to address this confusion, with the development of an 'algorithmic control' framework that proposes that algorithms are used by organisations to implement comprehensive control over the labour process (Kellogg et al., 2020). Specifically, the argument underpinning this framework is that algorithms can direct workers by recommending specific courses of action while restricting others, evaluate workers by recording activities and rating the performance of individual workers, and discipline workers by rewarding compliance or potentially removing them from the organisation's platform if they fail to meet performance standards (Kellogg et al., 2020).

For the most part, gig organisations tend to refute the notion that they use algorithms to comprehensively control their forces, instead arguing that they simply use these technologies to 'match' customers with workers to connect supply and demand of their services (Newlands, 2020). While this particular positioning is certainly accurate to an extent, a growing body of research in this area indicates that algorithmic technologies go far beyond simply matching by closely mediating the working relationship (Murray, Rhymer, & Sirmon, 2020).

Implications of Algorithmic Management

Algorithmic management plays a key role in automating HR-related duties and functions traditionally undertaken by human managers. Through its capacity to replicate or replace many of the activities of human managers or supervisors, algorithmic management raises significant concerns about the quality, fairness, and implications for those who operate under the 'eye' of an ever-observant algorithm (Kuhn & Maleki, 2017). Indeed, much of the existing literature focused on examining the HR implications of algorithmic management is situated within the gig work context (Meijerink & Keegan, 2019; Norlander et al., 2021). Especially prevalent are studies exploring the challenges and risks associated with how gig work is organised, designed, and managed, particularly in terms of the automation of core HR and managerial duties (Bader & Kaiser, 2019; Newlands, 2020).

Many of the most severe and negative implications of algorithmic management seem to affect individual workers. By automating management practice, algorithmic management essentially eliminates the more interpersonal and empathetic aspects of people management. A balanced working relationship typically sees an organisational partner advocating the needs of workers, most commonly in the form of a human manager (Gilbert, De Winne, & Sels, 2011), but this does not seem to exist in any meaningful way in organisations where algorithmic management is dominant. Thus, individuals working under these conditions seem unlikely to establish the trust and improved sense of well-being that we associate with strong, commitment-oriented working relationships (Duggan et al., 2020). While managing the employment relationship lies at the heart of HR research and practice, algorithmic management seemingly eradicates this by eroding the need for human managers in executing HRM activities. This data-driven approach – where an algorithm manages interactions between parties, dictates how work is assigned and takes the lead in evaluating workers' performance – potentially moves the practice of HR into an inhuman form (Meijerink & Keegan, 2019).

Thus, a potential implication of algorithmic management in this context is that workers risk becoming something akin to automatons, merely responding to digital prompts, signals, and step-by-step instructions (Stacey et al., 2018). This is particularly relevant in examining the impact of digitalisation for HRM – something that has consistently been identified across literature as an important area of consideration (Bondarouk, 2020; Strohmeier, 2007). In these ways, algorithmic management has altered business models and confounded established people management structures by destabilising working relationships in terms of surveillance, control, and a lack of transparency. Although enabling the efficient organisation and delivery of work, algorithmic management practices are mainly focused on the provision of instrumental support, leaving little room for engagement or the formation of a meaningful social relationship (Griesbach et al., 2019). Consequently, these shifts require new approaches and ways of thinking about the power dynamics that are likely to continue reshaping workplaces in the future.

Critics have also highlighted the broader implications of algorithmic management for working practices. Notably, Healy, Nicholson, and Pekarek (2017) argue that these technologies are simply a 'fig leaf' used to conceal the re-emergence of older methods of worker exploitation, where work is heavily fragmented, and roles are disintegrated into on-demand tasks without little engagement and minimal security. Algorithmic technologies, while innovative, create a hyper-flexibility that leaves workers isolated and potentially trapped in roles that offer little security, few development opportunities, and an uncertain career path (Ashford, Caza, & Reid, 2018; Duggan et al., 2021b). Indeed, it seems likely that the social interactions we typically associate with traditional working relationships are considered obsolete or even counterproductive where algorithmic management is concerned, as they introduce undesired variability into the process of matching supply and demand (Duggan et al., 2021a). This also raises questions of the strategic orientation of HRM activities in the

gig economy, where typically important issues such as motivating workers, ensuring high-quality performance, and providing social support are seemingly non-existent (Jabagi et al., 2019).

Literature argues that understanding how strategies of managerial control have evolved with the advent of new technologies is key to understanding the future of workplace relations (Schafheitle et al., 2020). Consequently, it is perhaps unsurprising that the gig economy – where algorithmic management is extremely pervasive – has been credited with establishing a new type of scientific management, referred to as 'digital Taylorism' (McGaughey, 2018). In doing so, digital platform organisations can guarantee a high degree of consistency and predictability in the services delivered to customers. Although highly standardised processes may indeed limit the risk of error, such rigidity also tends to increase work arduousness and inhibit professional growth (Jürgens, Malsch, & Dohse, 1993) – both issues of significant concern from a HR perspective.

Conclusion

In this chapter, we explored the core HR systems, including HRIS and e-HRM, that underpin HR practices and processes in many organisations and industries. We then discussed a set of advanced technologies including AI, blockchain technology, IoT, VR and AR, and big data and HRA. We conclude that, with the exception of pioneering multinationals and technology startups, these technologies are still at an infancy stage in respect to their application in HR. To date, these technologies have mainly led to greater efficiencies in HR rather than transforming the HR function. We contend that not only organisational capabilities and resources for technology-investment in HR but also knowledge and skills of HR professionals as well as necessity to apply these technologies vary significantly between actors, firms, and industries. Thus, greater contextualisation is needed in the debate around the use and impact of technology in HR. Finally, we reviewed the role of algorithmic management in elevating and shifting some of the functionality in HR, and we assert that – although

limited to a very specific set of roles and sectors – the encompassing and pervasive role of the algorithmic management function brings a substantial change to traditional HR business models, which, in turn, requires a more critical consideration of the implications and consequences for how people management, as a function and discipline, may need to react and evolve going forward.

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