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Disruptive human resource management technologies: a systematic literature review

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Abstract

Purpose – The disruptive human resource management (HRM) technologies are now considered a significant facilitator to change and benefit the entire HRM landscape. This view needs to be further verified by reviewing the knowledge on the subject in the empirical research landscape. Thus, the study's objectives were to find (1) the current knowledge and (2) the areas where empirical research is lacking in disruptive HRM technologies.

Design/methodology/approach – The article is a literature review that was followed by the systematic literature review and the preferred reporting items for systematic reviews and meta-analyses (PRISMA). The review considered 45 articles published during the 2008–2021 period extracted from the Scopus database, and bibliometric analysis was performed to achieve the research objectives.

Findings – The results found that scholarly attention has been given to electronic HRM (E-HRM) rather than the disruptive HRM technologies. The areas investigated include the determinants of intention, adoptions and use of E-HRM and the outcomes of E-HRM adoptions and use. These outcomes can be further divided into general outcomes and HRM outcomes.

Research limitations/implications – The findings reveal gaps in E-HRM research and disruptive HRM technologies remain untapped in the empirical research landscape. Hence, the study findings provide some implications for future research and applications.

Originality/value – The study found empirically proven determinants of E-HRM intention, adoptions and use and E-HRM adoptions and use outcomes. These were found in the studies conducted during the 2008–2021 period.

Keywords Disruptive human resource management technologies, Systematic literature review, PRISMA

Paper type Research paper

1. Introduction

Disruptive technologies involve continuously creating new technologies (Aghion and Howitt, 1990) by constantly destroying existing ones (Buhalis *et al.*, 2019; Rodriguez, 2016). Current disruptive technologies include Artificial Intelligence (AI), Robotics, Internet of Things (IoT), Autonomous Vehicles, 3D Printing, Nanotechnology, Biotechnology, Materials Science, Energy Storage and Quantum Computing (Schwab, 2016). These are treated as powerful driving forces for business activities (Gupta and Saxena, 2012), and they have significantly changed the ways of doing business. Practitioners believed they could affect billions of consumers, millions of workers, and trillions of economic activities across industries (Manyika, 2017; Schwab, 2016).

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Disruptive technologies are now incorporated into a variety of concepts. Disruptive human resources management (HRM) technologies are the disruptive technologies embedded in HRM (Gupta and Saxena, 2012). It is also termed as electronic HRM (E-HRM) (Chandradasa and Priyashantha, 2021a, b; Thite, 2018), digital HRM (Halid *et al.*, 2020; Strohmeier, 2020; Thite, 2018), smart HRM (Strohmeier, 2018) or smart human resources 4.0 (SHR 4.0) (Liboni *et al.*, 2019). Major disruptive HRM technologies are social media, cloud computing, big data/data analytics, mobile technologies and the IoT (Waddill, 2018).

HRM is a strategic and coherent approach for managing organisations' people (Armstrong and Taylor, 2020) and helping increase performance. When disruptive technologies are combined with HRM, its strategic relevance for improved corporate performance grows (Stone and Dulebohn, 2013). It is viewed that it can change the entire HRM landscape (Bondarouk *et al.*, 2016; Strohmeier, 2020). Social media is currently used for candidate recruitment and selection (Bersin, 2017). It has made it much easier for vacancy notifications, skill assessments and profile checking (Bersin, 2019). Internal communications, team collaboration, training, learning and employee development are also facilitated by social media (Waddill, 2018). Big Data/Data Analytics can be used for job seeker tracking at hiring, employee tracking for various kinds, employee performance evaluations and career path modelling (Waddill, 2018). They can predict employee satisfaction levels, engagement patterns, and learning and development levels (Waddill, 2018). The succession planning, health, safety and well-being levels are also facilitated by big data/data analytics (Waddill, 2018). Cloud-based technologies give greater automation for almost all HRM activities through human capital software systems (Waddill, 2018). IoT helps with employee tracking, performance management, health, safety, well-being and job designing (Aronica, 2014). Mobile technologies drive all these functionalities of Social Media, Big Data/Data Analytics, Cloud Computing, and the IoT (Waddill, 2018). Industry experts and analysts view such disruptive HRM technologies create greater efficiency in managing human resources, enhanced employee experience (Barman and Dass, 2020) and more accessibility to HRM practices than ever before (Bersin, 2019; Thite, 2018).

Rationale: Thus, disruptive HRM technologies' benefits may encourage the interested parties to adopt such technologies. HRM technology adoption has been much researched, including the benefits and barriers of HRM technology adoption (Bondarouk and Ruël, 2009; Strohmeier and Kabst, 2009). However, a synthesis of empirical studies is limited. A review study by Bondarouk *et al.* (2017) covered four decades of E-HRM adoption research. It has not included the disruptive HRM technologies, and no review study after 2017 has been conducted. Given the much evidence of conceptual clarifications (Ma and Ye, 2015; Strohmeier, 2020), bloggers' perspectives (Barman and Das, 2018; Joshi, 2018), and industry experts', vendors' and book authors' views (Strohmeier, 2018) on disruptive HRM technologies, the extant literature has empirical gaps. Other than that, empirical researchers may have found other phenomena than those found in Bondarouk *et al.* (2017). Hence, looking up the current empirical knowledge on disruptive HRM technologies is imperative.

Objective: Therefore, the objectives of this research were to find (1) the current knowledge and (2) the areas where empirical research is lacking in disruptive HRM technologies.

We were capable of accomplishing these objectives by conducting a systematic review of 45 articles published between 2008 and 2021. These articles were picked from the Scopus database according to the PRISMA article selection guidelines. Keyword co-occurrence analysis was one of the bibliometrics analyses performed with VOSviewer. Findings reveal that E-HRM was studied rather than disruptive HRM technologies. They also demonstrate that the empirical research for disruptive HRM technology remains largely unexplored. The key areas of E-HRM that have been studied include factors of intention, adoptions and use of E-HRM, as well as the outcomes of E-HRM adoptions and use. However, limited research into

such findings reveals the inadequacy of existing knowledge. Thus, the findings point to new possibilities for future research.

The following sections of this manuscript provide a complete overview of the study's methodology and findings. The methodology outlines how the literature review was carried out and analysed systematically. The results and findings section outlines the significant findings of the study. It is split into four subsections: study selection, study characteristics, results of studies and reporting biases. Next, one after the other, the discussion, conclusion, practicality and research implications are outlined.

2. Methods and methodology

2.1 Study selection process and methods

The SLR was used in the research. It used a more objective method of article selection, inclusion criteria and analysis methods. Regarding the article selection procedure, the PRISMA article selection steps, known as PRISMA flow diagram, were followed, as is recommended for SLRs (Liberati *et al.*, 2009). The steps include the "Identification," "screening," and "included." Figure 1 depicts how these steps were followed in this study.

The identification stage includes determining the search terms, search criteria, databases and data extraction method. The key search term was "Disruptive Human Resource Management Technologies." The search criteria were developed by including the terms "Disruptive Human Resource Management Technologies," "Disruptive HRM Technologies," "EHRM," "Electronic HRM," "E-HRM," "Virtual HR" and "Digital HRM." They were typed in the Scopus database with the "OR" operative between each term.

According to the PRISMA 2020 flow diagram, the articles identified must be screened. The screening, retrieval, and assessment of the eligibility of each article were the tasks performed at the screening. In each task, the articles that did not match the inclusion criteria were eliminated (Meline, 2006; Priyashantha *et al.*, 2021a, b, c). The inclusion criteria for screening the articles were the "empirical studies" published in "English" in "Journals" from "2008 to 2021." Reasons for choosing the final empirical journal articles include that they are recommended for SLRs (Tranfield *et al.*, 2003), and they ensure sufficient homogeneity in methodological quality to derive relevant findings (Okoli and Schabram, 2010) which satisfy internal validity (Petticrew and Roberts, 2006).

This screening was done through automation and manually. We included articles satisfying the inclusion criteria "empirical studies" published in "English" "journals" from "2008 to 2021" by using Scopus' automatic article screening functions by study type, language, report type and publication date. The other publication types (e.g. research notes, editors' comments, books, book chapters, book reviews, conference proceedings and unpublished data), non-English articles and articles published out of the considered year range were excluded. Then the full versions of the screened articles were retrieved for the next stage of screening; the eligibility assessment.

The eligibility assessments were done manually by the authors. It requires assessing methodological quality by setting a minimum acceptable level (Meline, 2006). Articles that meet the minimum acceptable level are included, while those that do not meet the minimum acceptable level are excluded (Meline, 2006). Accordingly, the minimum acceptable level was "the empirical studies that employed quantitative techniques."

2.2 Study risk of bias assessment

Review quality is reduced due to researcher bias in article selection and analysis (Kitchenham and Charters, 2007). Using a review protocol, following a systematic, objective article selection procedure and analysis methods (Kitchenham and Charters, 2007; Xiao and

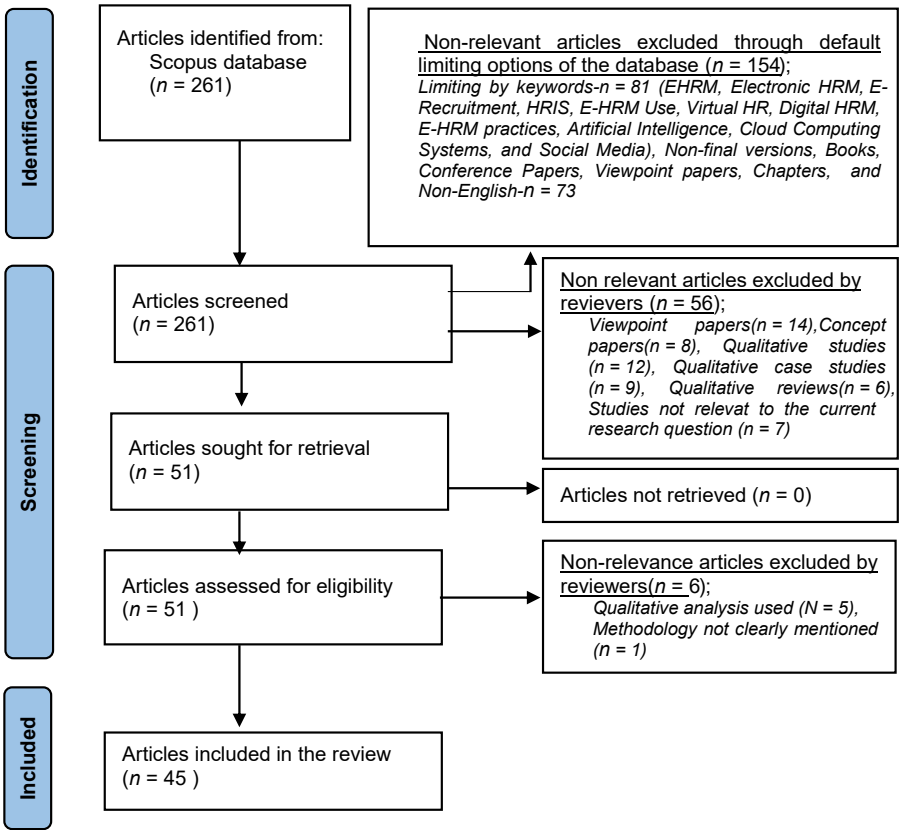

Figure 1.
PRISMA article selection flow diagram

Watson, 2019) and performing a parallel independent quality assessment of articles by two or more researchers (Brereton *et al.*, 2007) avoid bias in article selection and analysis. Thus, the articles' risk of biases was avoided by following all such requirements.

2.3 Methods of analysis

The analysis method was the bibliometric analyses performed using Biblioshiny and VOSviewer. It is a mathematical technique to examine scientific activity in research (Aparicio *et al.*, 2019; Paule-Vianez *et al.*, 2020). In particular, it provides two types of analysis; (1) evaluation, performance, and scientific productivity analysis, and (2) scientific maps (Cobo *et al.*, 2012). The scientific map analysis provides the research's structure, evolution and key players (Noyons *et al.*, 1999). Different information in an article, called a unit of analysis, is used to create such maps, commonly called bibliometric networks (Callon *et al.*, 1983). The keywords that signify an article's primary content are amongst the most widely used units of analysis for such bibliometric networks. Various links can be created using the co-occurrence relationship of the keywords in an article (Aparicio *et al.*, 2019). The VOSviewer visualises such relationships in a map, called "keyword co-occurrence network visualisation."

The normalisation of the network visualisation is required to relativise the relationships between the keywords to gain important information about the area of investigation. Thus, the VOSviewer, by default, applies the association strength normalisation and creates a

network in a two-dimensional space. In that space, the strongly related keywords are indicated by nodes close to each other, whereas the weakly related nodes are located far away (van Eck and Waltman, 2014). Then the VOSviwer assigned the nodes into a network of clusters where the nodes with a high correlation with other nodes tend to be put into the same cluster (Chen *et al.*, 2016). VOSviewer uses colours to indicate the cluster assigned to a node. Thus, a cluster may represent a common theme. Since one of our objectives was to find the current knowledge of disruptive HR technologies, this keyword co-occurrence analysis was utilised.

Another analysis is the density visualisation derived from the keyword co-occurrence analysis. It was used to achieve the study's second objective: to find the areas where empirical research is lacking in disruptive HRM technologies. VOSviewer manual states that keywords' density at each position in the item density visualisation map is denoted by colour range from blue to green to red by default. The closer a position's colour is red, the greater the number of items in its proximity and the higher its weight. If the fewer items in a certain point's proximity and the lower the weights, the closer the point's colour is to blue. If items in a point are average, the colour is green. Thus, we searched what keywords have fallen into the blue or green area to achieve the study's second objective.

Additionally, "annual article publications," "average citations received," "most relevant sources articles published," and "country-wise article publications" were generated by the software. They were to explain the article set profile in the review. The first three outputs were generated from Biblioshiny of *R*, and the VOSviewer generated the final output.

3. Results and findings

3.1 Study selection

According to the PRISMA flow diagram, we identified 261 articles during the identification stage. Articles published outside of the 2008–2021 time frame were excluded. The articles did not contain the keywords E-HRM, Electronic HRM, E-Recruitment, HRIS, E-HRM Use, Virtual HR, Digital HRM, E-HRM practices, Artificial Intelligence, Cloud Computing Systems and Social Media were excluded. The total number of articles then remained at 180. We further tried to include the articles on empirical studies in final versions published in journals in English. It was performed through automation with the database's limiting options. Then 107 articles were retained. These were retrieved to an MS Excel sheet with their essential information: the article's title, abstract, keywords, authors' names and affiliations, journal name, cited numbers and year of publication.

Next, the authors of the study independently went through each article. They excluded 56 articles based on the criteria "viewpoint papers," "concept papers," "qualitative studies," "qualitative case studies," "qualitative reviews," and "studies not relevant to the current research." Then 51 articles were retained for the next step, the eligibility checking.

The eligibility check revealed five "qualitative analyses" and one "methodology not clear" article. They were excluded. Finally, 45 articles were retained for the review. This entire article selection process is shown in Figure 1. Then, the MS Excel sheet was modified to fit the analysis requirements to achieve the research objectives.

3.2 Study characteristics

This research looked at 45 studies conducted by 100 authors in 27 countries. They have been published in 36 journals. The average number of citations each article obtained was 10.4. There were 171 keywords and 2,400 references in total. Table 1 presents that information in detail.

Figure 2 depicts the annual article publication, showing a gradual increase. It also shows that the majority of studies were completed in 2021. Figure 3 shows the average citations

received by each article. The citations received for a study indicate the popularity of the field that the study represents. Therefore, the increasing trend in Figure 3 demonstrates that the disruptive HRM technology field is getting increased attention from scholars.

Figure 4 shows the most relevant sources of the articles. It summarises the 20 journals which have published the highest number of articles. Thus, the *International Journal of Human Resource Management* has published the highest number of articles (4). The *Asian Social Science and Employee Relations* have published three articles each. Two articles have been published in the *International Journal of Business Information Systems* and the *Journal of Asian Finance Economics and Business*. The rest of the journals have published one article each.

Figure 5 shows the country-wise article publications and how countries are interdependent on citations. Since the larger nodes in the figure denote the number of occurrences, Jordan has the highest publications. As some nodes in the figure are unclear in size to examine the second and third places in publications, we created a Table 2 using the VOSviewer. It summarises and ranks the countries with publications and their citations. Accordingly, Jordan, India, Malaysia and the United Kingdom ranked first, second and third. However, concerning the citations, the first, second, and third places go to Taiwan, the UAE and Bahrain, indicating that they are famous for disruptive HRM technology research.

Description	Results
Timespan	2008:2021
Journals	36
Countries	27
Journal articles	45
Average citations per article	10.4
References	2,400
Author's keywords	171
Authors	100

Table 1.
The primary information of the article set

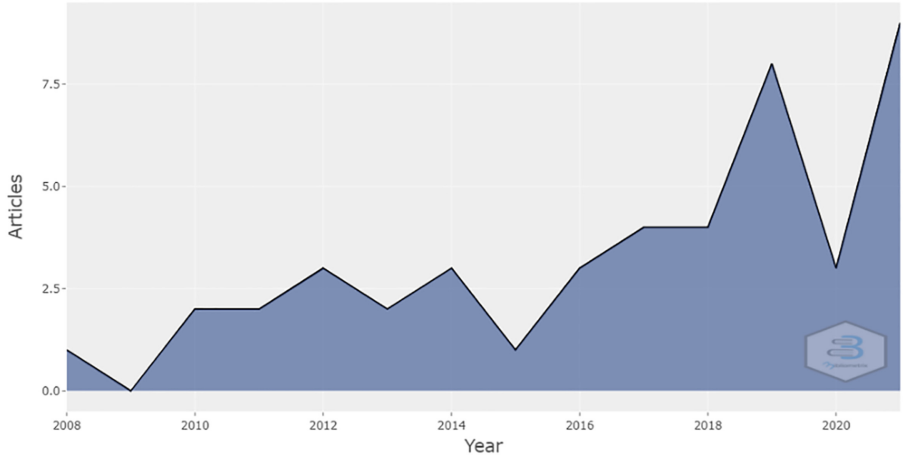

Figure 2.
Annual article publication

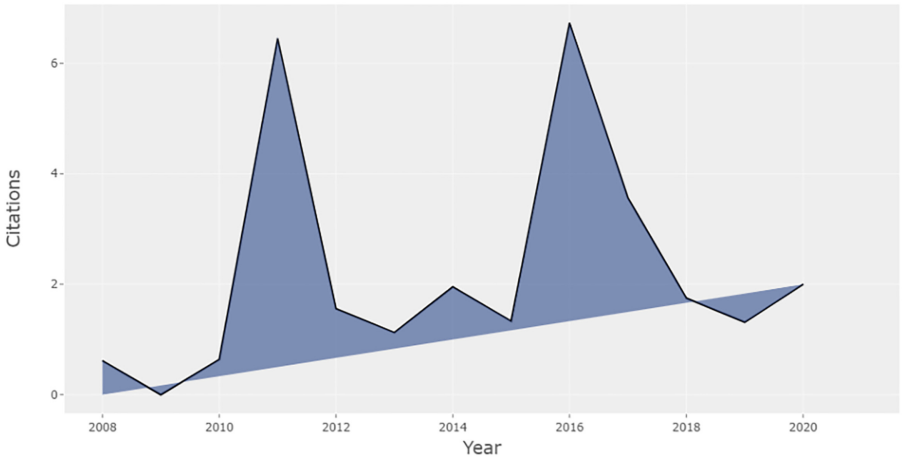

Figure 3.
Average citations received for the articles

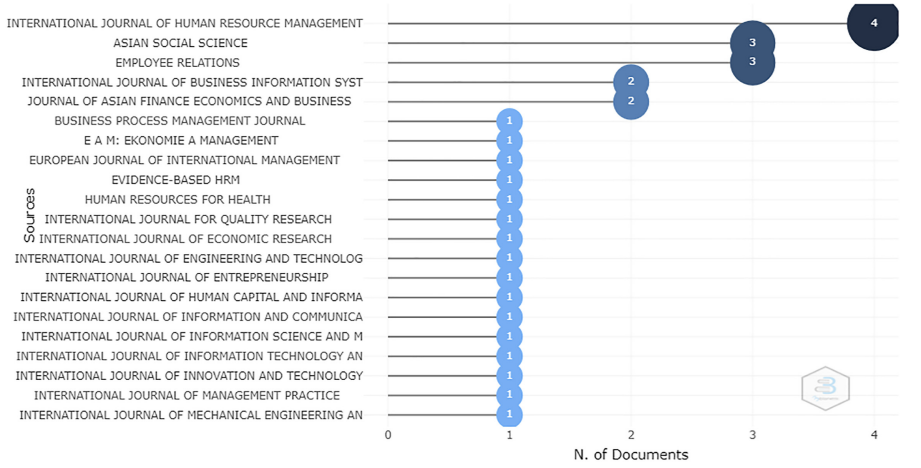

Figure 4.
Most relevant sources of the article publications

3.3 Results of studies

This section reports the findings complying with research objectives. The findings were developed using keyword co-occurrence analysis. The two forms of "keyword co-occurrence; network visualisation" and "density visualisation" were utilised in the analysis. The keyword co-occurrence network visualisation, in particular, addressed the first objective: finding the current knowledge of disruptive HRM technologies. The keyword co-occurrence density visualisation addressed the second objective, finding the areas where empirical disruptive HRM technology research is lacking.

3.3.1 The current empirical knowledge in disruptive HRM technologies. Using the minimum keyword occurrences functionality of VOSviewer software, we discovered that 19 keywords frequently occurred in the studies. It was achieved by gradually increasing the number of times a keyword occurred, starting with one, until the threshold keyword level reached a level that covered more keywords (Table 3). We chose 19 threshold keywords at the two minimum keyword occurrences since very few threshold keywords (e.g. three) were generated at a

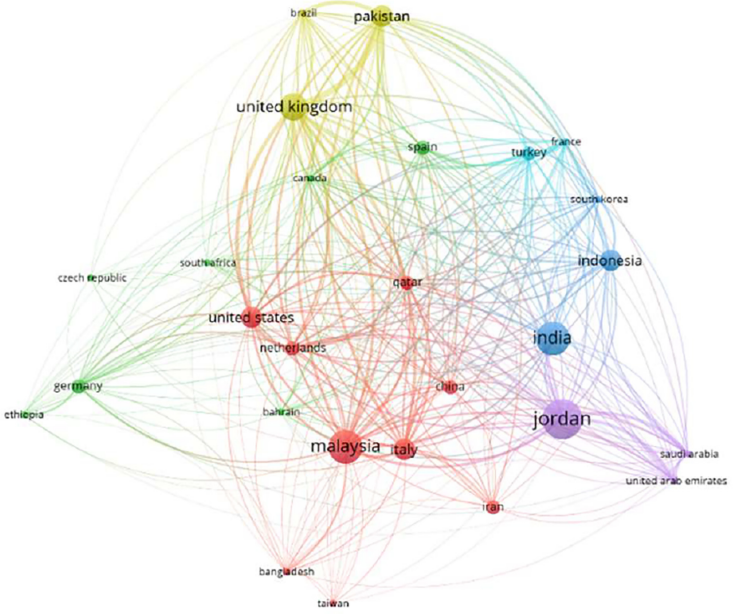

Figure 5.
Country-wise article publications

higher number of minimum keyword occurrences (e.g. five or six). We did so because we thought it was clear enough to understand the areas investigated in the studies. Figure 6 depicts those 19 keywords and their relationships, while Table 4 shows their frequency.

As shown in Table 4, the highest number of keyword occurrences was observed for E-HRM. A larger red node is shown in Figure 6 to demonstrate it further. Even though our focus was on disruptive HRM technologies in the empirical research landscape, we discovered that the current empirical research has focussed on E-HRM, implying that disruptive HRM technologies have not been empirically tested.

The keyword co-occurrence network visualisation in Figure 6 shows the connections of keywords shown in nodes. The connection represents the relationship between each keyword. Specifically, the strength of a relationship is characterised by the thickness of the line. Therefore, Figure 6 shows that E-HRM and the HRM are linked by a thicker line indicating that E-HRM is highly related to HRM. Moreover, the link of HRIS and information technology with HRM indicates their relationship to HRM.

The nodes in Figure 6 are in three clusters: red, green and blue. Those clusters have keywords which are denoted in Table 5. As shown in Figure 6, the different clusters indicate that disruptive HRM technologies varied by different areas of investigation. Grouping the keywords in one cluster means that the keywords are highly likely to represent the same topic. Hence, as shown in Table 5, the red, green and blue clusters reflect common themes as "adoption and outcomes of E-HRM," "use of E-HRM and HRM outcomes," and "intention to use the E-HRM," respectively.

3.3.1.1 E-HRM adoption and outcomes – red cluster. *Adoption and E-HRM:* The E-HRM adoption is determined by perceived usefulness, HRM strength (Wahyudi and Park, 2014), top management support, employee attributes, system complexity, IT infrastructure and industry pressure (Masum *et al.*, 2015).

Employee performance and E-HRM: The successful E-HRM implementation helps for increased labour productivity (Iqbal *et al.*, 2018) and employee performance (Ajlouni *et al.*, 2019;

Rank	Country	Journal articles	Rank	Country	Citations
1	Jordan	6	1	Jordan	1
2	India	5	2	Taiwan	172
3	Malaysia	5	3	United Arab Emirates	111
4	The United Kingdom	4	4	Bahrain	74
5	Indonesia	3	5	Saudi Arabia	48
6	Italy	3	6	Brazil	42
7	Pakistan	3	7	Qatar	41
8	The United States	3	8	Bangladesh	31
9	China	2	9	Turkey	17
10	Germany	2	10	Iran	17
11	Iran	2	11	Ethiopia	15
12	The Netherlands	2	12	China	12
13	Qatar	2	13	Spain	9
14	Spain	2	14	Netherlands	9
15	Turkey	2	15	Italy	9
16	Bahrain	1	16	Pakistan	8
17	Bangladesh	1	17	India	8
18	Brazil	1	18	Malaysia	7
19	Canada	1	19	Indonesia	3
20	The Czech Republic	1	20	United Kingdom	2
21	Ethiopia	1	21	Czech Republic	1
22	France	1	22	United States	0
23	Saudi Arabia	1	23	South Korea	0
24	South Africa	1	24	South Africa	0
25	South Korea	1	25	Germany	0
26	Taiwan	1	26	France	0
27	The United Arab Emirates	1	27	Canada	0

Table 2.
Country-wise publications and citations received

Minimum keywords occurrences	Threshold keywords level
1	171
2	19
3	4
5	3
6	3

Table 3.
Occurrences of keywords

Nurlina *et al.*, 2020) through HR service quality (Iqbal *et al.*, 2018; Nurlina *et al.*, 2020). Thus, the increased employee performance is an outcome of the E-HRM implementation.

HRIS and E-HRM: HRIS supports all HRM functions (Ukandu *et al.*, 2014). Web-enabled access (Strohmeier and Kabst, 2012), Internet access, availability of separate HR sections, basic computer skills and fear of unemployment (Dilu *et al.*, 2017), influence successful HRIS implementation. Additionally, organisational support (literacy, technical and technology involvement support) influences successful HRIS implementation (Ibrahim *et al.*, 2019).

Information technology (IT) and E-HRM: Researchers have found that IT use, virtual organisations adoptions (Lin, 2011) or E-HRM use (Zareena, 2018) can contribute to organisational innovation (Lin, 2011), cost and time savings, comfort, convenience, increased communication and data accuracy (Zareena, 2018). All of these outcomes point to more favourable outcomes.

Innovation and E-HRM: The adoptions of IT and virtual organisations help organisational innovations (Lin, 2011). Instead, the E-HRM implementation has been

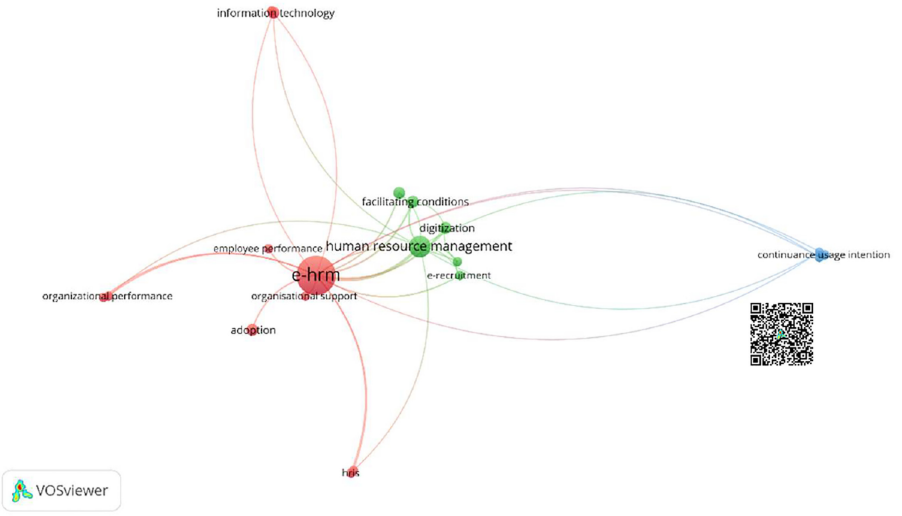

Figure 6.
The keyword co-occurrence network visualisation

Keyword	Occurrences
E-HRM	38
Human resource management	9
Human resource information systems (HRIS)	4
Adoption	3
HRM effectiveness	3
Facilitative conditions	2
Information technology	2
Continuance usage intention	2
Digitisation	2
E-Recruitment	2
Employee performance	2
Innovation	2
Organisational support	2
Organisational performance	2
Perceived ease of use	2
Perceived usefulness	2
Social media	2
Strategic HRM	2

Table 4.
The keywords with a minimum of two occurrences

researched as an innovation in the organisation (Roy and Jegan, 2019). Findings imply that conventional practices can be done innovatively with the technology.

Organisational support and E-HRM: Organisational information system-related support (literacy support, technical support, and technology involvement support) help the end-user satisfaction for E-HRM-related applications (Ibrahim *et al.*, 2019) and effective implementation of E-HRM (Rathee and Bhuntel, 2021). Therefore, organisational support is a factor for successful E-HRM implementation and employee satisfaction.

Organisational performance and E-HRM: The E-HRM moderates the influence of high-performance work practices on organisational performance (Obeidat, 2016). Thus, E-HRM is a factor for organisational performance. Additionally, E-HRM mediates impersonal trust and

HR service quality, resulting in employee productivity (Iqbal *et al.*, 2019). Thus, employee productivity and organisational performance are outcomes of E-HRM.

Strategic HRM and E-HRM: E-HRM is a strategic HRM initiative that modifies the influence of high-performance work systems on organisational success (Obeidat, 2016). Moreover, strategic HR involvement is reciprocally related to higher E-HRM capability (Marler and Parry, 2016). Therefore, E-HRM is treated as a strategic HRM initiative for organisational success.

3.3.1.2 Use of E-HRM and HRM outcomes- green cluster. *Digitalisation and E-HRM:* Some researchers have referred to the E-EHM as the "digitalisation of HRM." They have found determinants (performance expectations, ease of use, social influence and facilitating conditions) affecting E-HRM use (Vazquez and Sunyer, 2021).

E-Recruitment and E-HRM: E-recruitment is another area researched. Social media, particularly social network sites' qualities (easily navigate, secure process, eminence proficiency, candidate's attraction and network expedition) contribute to effective E-recruitment (Waheed *et al.*, 2019). Moreover, it is a factor in SMEs' corporate sustainability (Alkhodary, 2021).

Facilitating conditions and E-HRM: The facilitating conditions are factors for E-HRM use (Vazquez and Sunyer, 2021). Thus, creating more facilitative conditions aids E-HRM use.

HRM effectiveness and E-HRM: HRM effectiveness results from E-HRM implementation (Al-Harazneh and Sila, 2021; Obeidat, 2016; Sanayei and Mirzaei, 2008).

HRM and E-HRM: The E-HRM has changed the HR manager's role from administrative expert to the strategic agent (De Alwis, 2010). Because all the administrative HRM functions (planning, recruitment, selection, performance, compensation, communication, training and development) can be done by the E-HRM (Ukandu *et al.*, 2014). Thus, HRM value creation (Ruël and van der Kaap, 2012), internal efficiency, employee commitment (Bissola and Imperatori, 2013), HRM effectiveness (Al-Harazneh and Sila, 2021; Obeidat, 2016; Sanayei and Mirzaei, 2008) and labour productivity (Iqbal *et al.*, 2018, 2019) are outcomes of E-HRM. Other than that, HRM service quality (Iqbal *et al.*, 2018; Nurlina *et al.*, 2020), impersonal trust (Iqbal *et al.*, 2019) and increased employee performance (Nurlina *et al.*, 2020) are also consequent of E-HRM adoption. Moreover, social media as part of E-HRM use has been found to influence achieving the relational HRM objectives (better internal communication, collaboration and personnel engagement) and management of operational and transformational HR functions (e.g. personnel administration, training, performance management and skill assessment) (Martini *et al.*, 2021).

Social media and E-HRM: Social media is a good tool for E-HRM. Specifically, it is being used for E-recruitment (Waheed *et al.*, 2019). Thus, researchers have found that the E-recruitment's effectiveness is determined by the quality of social media sites (Waheed *et al.*, 2019). Social media use in HRM can also increase HRM performance and organisational performance (Vardarlier and Ozsahin, 2021). Moreover, social media is used for relational and

Table 5.
Keywords categorised into clusters

Cluster	Common theme	Keywords
Red (10 items)	E-HRM adoption and outcomes	Adoption, E-HRM, Employee Performance, HRIS, Human Resource Information Systems, Information Technology, Innovation, Organisational Support, Organisational Performance, Strategic HRM
Green (6 items)	E-HRM use and HRM outcomes	Digitalisation, E-Recruitment, Facilitating Conditions, HRM Effectiveness, Human Resource Management, Social Media
Blue (3 items)	Intention to use the E-HRM	Continuance Usage Intention, Perceived Ease of Use, Perceived Usefulness

extended relational purposes in the organisation resulting in greater HRM success (Martini *et al.*, 2021).

3.3.1.3 Intention to use the E-HRM – blue cluster. *Continuance usage intention and E-HRM:* The users' attitude and satisfaction determine the intention for E-HRM (Yusliza *et al.*, 2018). Besides, the users' perceived usefulness and perceived ease of use also determine the intention for E-HRM (Rawashdeh *et al.*, 2021). Then the E-HRM usage intention, in turn, results in successful E-HRM implementation (Rathee and Bhuntel, 2021).

Perceived ease of use and E-HRM: Perceived ease of use of E-HRM influence the intention of E-HRM (Yusoff and Ramayah, 2012). Besides, the perceived ease of use helps E-HRM user satisfaction, which in turn helps the intention of E-HRM (Rawashdeh *et al.*, 2021). Instead, perceived ease of use contributes to E-HRM implementation (Rathee and Bhuntel, 2021; Vazquez and Sunyer, 2021). These findings reveal that perceived ease of use determines E-HRM intention and adoption.

Perceived usefulness and E-HRM: The perceived usefulness of E-HRM impact E-HRM usage intention (Rawashdeh *et al.*, 2021; Yusliza *et al.*, 2018) and effective E-HRM implementation (Rathee and Bhuntel, 2021). Other than that, the perceived usefulness of E-HRM is a factor for E-HRM user satisfaction that results in E-HRM intention (Rawashdeh *et al.*, 2021).

3.3.2 Areas where empirical research is lacking. This section covers the study's second objective. E-HRM is the most commonly used keyword in studies, as seen in Table 4, indicating that it has been extensively researched. The density visualisation map created by the VOSviewer shows it in the node with the red background (Figure 7). According to the VoSviewer manual, a node in the red background indicates sufficient research for established knowledge. However, keyword nodes with a green background indicate that there has been less study on those keywords. Thus, all other keywords in Figure 7 are in the green background, indicating insufficient research. The empirically tested determinants of E-HRM intention, adoption and use, and the outcomes of E-HRM adoption and use, emphasised in 3.3.1, can be viewed as insufficient for established knowledge.

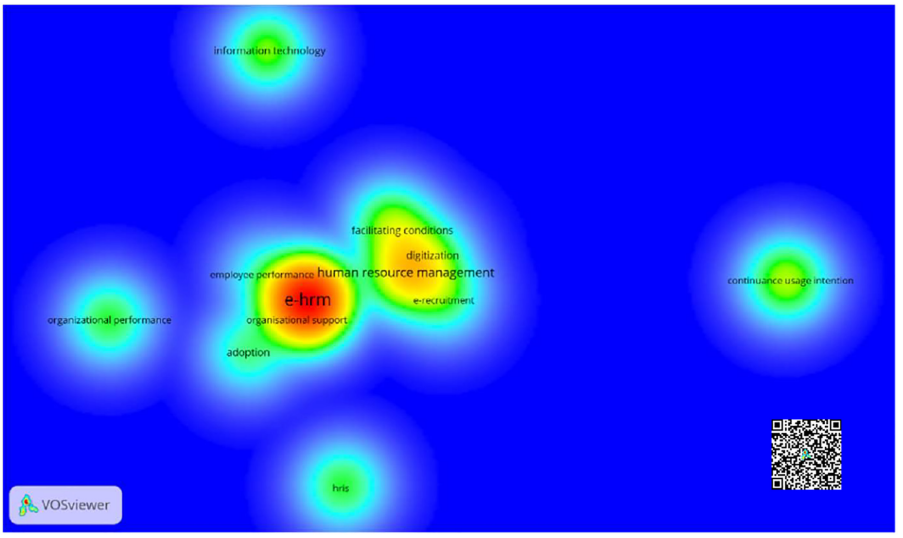

Figure 7.
Keyword density visualisation map

Additionally, as the keywords were investigated more than twice and explained under 3.3.1, it is essential to find them tested only once. Thus, Table 6 shows the keywords investigated only once. It mainly highlights two areas as determinants and outcomes of E-HRM.

As determinants, decision-making responsibility given to the user (HR staff) and the technical (IT) department cause the HRM technology usage intensity (Lujan and Florkowski, 2010). Additionally, E-HRMs' ability for; strategic execution, playing the strategic partners' and administrative expert's roles, management of people, transformation and change, and the regulatory pressures are the determinants for E-HRM adoption (Poba-Nzaou *et al.*, 2020). Besides, the perceived behavioural control (Noerman *et al.*, 2021) and the social influence determine the E-HRM intention and use.

As outcomes of E-HRM, HRIS success (Strohmeier and Kabst, 2012), employees' affective commitments resulting from the relational and transformational aspects of E-HRM (Bissola and Imperatori, 2013) and improved employee retention (Allumi Nura and Hasni Osman, 2013) are evidenced. Additionally, organisational agility (Hamidianpour *et al.*, 2016), better talent attraction, acquisition and development (Vazquez and Sunyer, 2021), and corporate sustainability (Alkhodary, 2021) are outcomes of E-HRM.

These determinants and outcomes investigated only once can be treated as insufficient for established knowledge.

3.4 Reporting bias assessment

The PRISMA guidelines required the assessment of biases due to missing the results in reporting. No systematic assessment was performed for this task; however, we followed systematic and objective software tools and PRISMA guidelines to avoid bias in reporting the results.

4. Discussion

Each article's results and synthesis were mainly reported under "the current empirical knowledge in disruptive HRM technologies" and "areas where empirical research is lacking." That was done to represent the two objectives of the study. In sum, both these sections have reported the same thing: "determinants" and the "outcomes" of E-HRM. Only these two areas have been subject to empirical research during the period. The determinants have been investigated relating to the intention, adoption, and use of E-HRM. The theory of planned behaviour postulates that intention leads the behaviour (Ajzen, 1991). Thus, the intention to use the E-HRM results in E-HRM adoption, which ultimately causes E-HRM use. The E-HRM intention is the desirability or willingness for E-HRM (Davis and Davis, 1989; Moghavvemi, 2017). The E-HRM adoption refers to the decision-making process to initiate HR-related technologies. It is a strategy to transfer traditional HRM techniques to E-HRM systems and their acceptance by the users (Bondarouk *et al.*, 2017). Other than that, E-HRM use is the application of E-HRM functionalities in day-to-day activities (Obeidat, 2016). Finding the

Table 6.
Areas tested only once in studies

Affective commitment	E-performance management
Cognitive absorption	Employee retention
Corporate sustainability	HR technology intensity
Design characteristics	Motivations
E-learning	Social influence
E-payment of human resources	Talent
E-performance appraisal	Top management support

different determinants relating to each element in that process is essential for smooth E-HRM use behaviour. Our study results revealed many determinants relating to intention, adoption and E-HRM use. Those have been tested only in minimal studies.

Two types of outcomes were found concerning the E-HRM outcomes: general outcomes and HRM outcomes. The general outcomes were discovered through E-HRM adoption, whereas the HRM outcomes were discovered through E-HRM use. Since these outcomes have been tested in minimal studies, finding more outcomes is missed. Moreover, no outcomes were found except for determinants for intention to E-HRM.

Moreover, the focus of this study was to find empirical research on disruptive HRM technologies. The books' authors and practitioners cited that the major disruptive HRM technologies are social media, cloud computing, big data/data analytics, mobile technologies and the IoT (Bersin, 2017; Waddill, 2018). They have used synonyms for disruptive HRM technologies as digital HRM Waddill (2018), (Halid *et al.*, 2020; Strohmeier, 2020), smart HRM (Strohmeier, 2018), or SHR 4.0 (Liboni *et al.*, 2019), etc. Except for social media, these areas were not found in the two analyses done under 3.3.1 and 3.3.2. Thus, our results found gaps in the empirical research landscape. They indicate that the areas are still untouched for empirical research.

One limitation of the study is the minimal empirical research accessible, found in only 45 articles. That may be because the articles for the review were chosen from only one database. Furthermore, we looked at only empirical studies, ignoring other types. This omission leaves out a significant amount of relevant literature.

4.1 Practicality and research implications

Regarding the practicality of the findings, the determinants of E-HRM intention, adoption and use, and the outcomes of E-HRM adoption and use imply the policymakers and the practitioners for their E-HRM adoption decisions.

Implications for future researchers include various aspects. One such is the absence of empirical data on disruptive HRM technologies. As stated in the introduction, disruptive HRM technologies have many uses today. The industry experts view that disruptive HRM technologies have caused a change in the entire HRM landscape. However, almost all the components of disruptive HRM technologies (cloud computing, big data/data analytics, mobile technologies, and the IoT) remain untouched for empirical research except for social media. Even though we found the application of social media influence for recruitment, the finding is not enough for established knowledge. Also, many other uses of social media for HRM functions have not been investigated. As a whole, more uses of disruptive HRM technologies for HRM must be empirically investigated.

As the current study found only 45 articles for the review, another significant implication is the limitedness of the available research. More research needs to be done on the (1) investigated determinants for intentions, adoptions and use of E-HRM and (2) the outcomes of E-HRM adoptions and use. There were no outcomes resulting from E-HRM intentions other than the E-HRM adoptions or use.

The current realities indicate employee disengagement globally (80%) and workplace stress like role conflicts and health and safety issues (Gallup, 2013, 2021). Mitigating those issues is a timely requirement. There is a notion that the application of HRM technologies into employment setup can mitigate these issues (Turner, 2020; Waddill, 2018). Our review did not find any study investigating such sociological aspects with disruptive HRM technologies or E-HRM.

Besides, the E-HRM is designed to carry out all HRM functions (Omran and Anan, 2019). However, we noticed gaps in the empirical research landscape concerning specific E-HRM functions. For example, one or two studies have investigated e-recruitment, e-learning,

e-payment, e-performance appraisal and e-performance management. Specifically, e-selection, e-health and safety, e-team work and e-collaboration are yet to be investigated.

Additionally, as some studies emphasised, the code of ethics for any system implementation is essential. Therefore, gaps were found in the roles of ethical codes in E-HRM implementation (Delgado-Alemany *et al.*, 2022). Moreover, E-HRM implementation requires checking whether the new system fits the organisational legitimacy. However, gaps were found in effect produced by E-HRMs on organisational legitimacy. Future research could examine whether E-HRM provides or removes legitimacy from an organisation? Whether organisations or society deem E-HRMs legitimate or whether E-HRMs' legitimacy aids their implementation (Díez-Martín *et al.*, 2021). Besides, although the E-HRM has been researched in different institutional settings, there are gaps in its application in educational institutions. Thus, future research could focus on how education influences E-HRM or how educational institutions incorporate EHRM into higher education (Almahameed *et al.*, 2020; Gómez-Martínez *et al.*, 2020). What types of competencies should be taught to enable EHRM? Therefore, we hope all these implications may be on the agendas of future researchers.

5. Conclusion

Disruptive technologies are seen as a critical factor in HRM. This viewpoint must be supported by the empirical research landscape's knowledge of disruptive HRM technology. We conducted an SLR to find (1) current knowledge and (2) areas where empirical research on disruptive HRM technology is lacking. We used inclusion criteria to review 45 articles published during the 2008–2021 period. The articles were found using Scopus, and PRISMA guidelines were applied to select articles and report the findings.

The study's first objective was to find the current knowledge on disruptive HRM technologies. Accordingly, the study discovered that E-HRM was examined rather than disruptive HRM technologies. It demonstrates that the empirical research landscape for disruptive HRM technology is still largely untouched. The primary areas as determinants of intention, adoption or usage of E-HRM and the outcomes of E-HRM adoptions or use have been tested.

Perceived usefulness, ease of use, attitude towards the E-HRM, performance expectancy, effort expectancy, social influence and satisfaction with the E-HRM have been investigated as determinants for E-HRM intention. Determinants for E-HRM adoptions include perceived usefulness, HRM strength, top management support, employee attributes, system complexity, IT infrastructure and industry pressure. Moreover, web-enabled access, Internet access, availability of separate HR sections, basic computer skills, fear of unemployment and organisational support are also determinants for such adoptions. The determinants of E-HRM use are performance expectations, ease of use, social influence and facilitating conditions.

The outcomes of E-HRM found can be classified as general outcomes and HRM outcomes. The general outcomes were found from E-HRM adoptions, whereas the HRM outcomes were discovered from E-HRM use. The general outcomes of E-HRM adoptions include labour productivity, increased employee performance, organisational performance, organisational innovation and organisational success. Moreover, cost and time savings, comfort, convenience, improved communication and data accuracy are also the outcomes of E-HRM adoption. The HRM outcomes of E-HRM use include effective recruitment, HRM effectiveness, changes in the HR manager's role from the administrative expert to the strategic agent, HRM value creation, internal efficiency, employee commitment and labour productivity. Besides those, improved HRM service quality, impersonal trust, increased employee performance, relational HRM objectives achievement, operational and transformational HR functions management and increased HRM performance are the HRM-related outcomes resulting from E-HRM use.

The study's second objective was to find the areas where empirical research is lacking in disruptive HRM technologies. There was no article found for disruptive HRM technologies. Instead, we found E-HRM articles that have investigated determinants and outcomes. The determinants were for E-HRM intention, adoption, and use. The perceived behavioural control, social influence and top management support are determinants for E-HRM intention. E-HRMs' ability for; strategic execution, playing the strategic partner and administrative expert roles, management of people, transformation and change and the regulatory pressures are the determinants for E-HRM adoption. The level of decision-making responsibility of the user (HR staff) and the technical (IT) staff cause the HR technology usage intensity.

Under the second objective, the outcomes we found were related to E-HRM use. They can be divided into organisational and general outcomes. The general outcomes of E-HRM use include organisational agility and corporate sustainability. The HRM outcomes of E-HRM use are the HRIS success, employees' affective commitments, improved employee retention, better talent attraction, acquisition and development and corporate sustainability.

Thus, this study found determinants of E-HRM intention adoption and use and the outcomes of E-HRM adoptions and use.

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