# The Role of Big Data & Predictive Analytics in the Employee Retention: A Resource Based View


## Abstract

**Purpose –** We have attempted to understand how big data & predictive analytics (BDPA) can help retain employees in the organization.

**Design/methodology/approach –** Our study is grounded in the positivism philosophy. We have used a resource-based view (RBV) to develop our research hypotheses. We tested our research hypotheses using primary data gathered using a single-informant questionnaire. We obtained 254 usable responses. We performed the assumptions test, performed confirmatory factor analysis (CFA) to test the validity of the proposed theoretical model, and further tested our research hypotheses using hierarchical regression analysis.

**Findings –** Our statistical result suggests that the various human resource management strategies play a significant role in improving retention, under the mediating effect of the BDPA.

**Research limitations/implications –** We have grounded our study in the positivism philosophy. Moreover, we tested our hypotheses using single-informant cross-sectional data. Hence, we cannot ignore the effects of the common method bias on our research findings. Moreover, the research findings are based on a particular setting. Thus we caution the readers that our findings must be examined in the light of our study limitations.

**Practical implications –** The study provided empirical findings based on survey data. Hence, we provide numerous guidelines to the practitioners that how the organization can invest in creating BDPA that helps analyze complex data to extract meaningful and relevant information. This information related to employee turnaround may guide top management to reduce the dissatisfaction level among the employees working in high-stress environments resulting from a high degree of uncertainty.

**Social implications –** The study help understand the complex factors that affect the morale of the employee. In the high-paced environment, the employees are often exposed to various negative forces that affect their morale which further affect their productivity. Due to lack of awareness and adequate

information, most of the employees and their issues are not dealt with effectively and efficiently by their line managers. Thus the BDPA can help tackle the most complex problem of society in a significant way.

**Originality/value –** Our study offers some useful contributions to the literature which attempts to unfold the complex nexus between human resource management, information management, and strategy. The study contributes to the BDPA literature and how it helps the retention of employees is one of the areas which still remains elusive to the academic community. Moreover, the managers are still skeptical about the application of BDPA in understanding human-related issues due to a lack of understanding of how and to what extent the employee-related information can be stored and processed. Our study findings further open the new avenues of research that need to be tackled.

**Keywords:** Big Data, Big Data & Predictive Analytics (BDPA), Resource-Based View (RBV), Human Resource Management, Employee Retention

**Paper type** – *Research paper*

## 1. Introduction

Human resource plays a key role in any organization performance and is a vital asset for an organization (Cappelli, 2000; Naraynan et al. 2019). In order to effectively manage this asset, talent management strategies have been successfully employed in diverse sectors around the world (Cappelli, 2000). Effective practices in human resource management (HRM) play a pivotal role in the retention of staff and are likely to enhance job security (Irshad and Afridi, 2012). Employee retention is considered one of the important human resource functions. Retaining employees is an important activity that helps organizations gain a competitive advantage (Armstrong, 2006; Paille, 2013). Skilled and talented human resource has emerged as an essential element for sustained competitive advantage which never depreciates (Kumar and Kaushik, 2013). In this highly competitive and fast-paced world, talent retention has become a prime concern for corporates (Naris and Ukpere, 2010; Olckers and Du Plessis, 2012). Data-driven decision-making and application of big data have been acknowledged in almost all functions of management (Davenport and Harris, 2007; Chen et al., 2012; Watson, 2014; Frisk and Bannister, 2017; Kar and Dwivedi, 2020; Bag et al. 2021). Big Data Predictive Analytics (BDPA) stimulates the interest of companies to embrace data-driven decision-making and sophisticated Big Data applications (Davenport et al. 2007; McAfee et al.,2012; Secundo et al. 2017; Agarwal et al. 2021). It has the immense capability to transform the entire business process that's why

research on big data has become very popular among the academic community and policymakers (Wong, 2012; Fosso Wamba et al., 2016; Dubey et al., 2019). Many human resource management and information management scholars are making significant efforts to shape the practice, but find it extremely difficult (Garcia-Arroyo and Osca, 2019; Rombaut and Guerry, 2020; Hamilton and Sodeman, 2020). Despite significant attempts, the research and practice often remain as two solitudes (Shah et al. 2017; Calvard and Jeske, 2018; Zhang et al. 2021). The existing literature has remained silent on the factors that influence employee retention. Moreover, the literature does not provide empirical evidence on the role of the BDPA in employee retention. Hence, we note this as a clear research gap. To address these research gaps we have outlined research questions as:

*RQ1: What are the functions of human resource management that influence employee retention?*

*RQ2: What are the effects of the human resource functions on employee retention?*

*RQ3: How does the BDPA mediate the effects of human resource function on employee retention?*

To answer our three research questions we have gathered 254 usable responses from human resource managers from manufacturing organizations. To theoretically substantiate our empirical findings, we grounded our theoretical model in the resource-based view (RBV) (Barney, 1991). We have organized our paper as follows. In the second section, we provided a critical review of underpinning theories. In section 3, we have presented our theoretical model and research hypotheses. In section 4, we provided a detailed overview of our research design. In section 5, we presented our data analyses. In section 6, we discussed our research findings and further outlined our contributions to theory, and noted implications to the practitioners. We further outlined our research limitations and presented detailed future research directions that may help extend our study. Finally, we have concluded our study.

## 2. Literature Review

We have undertaken an extensive review of literature drawn from multiple reputable databases, following Tranfield et al. (2003) guidelines. We have classified our literature review in following stages as (see Figure 1):

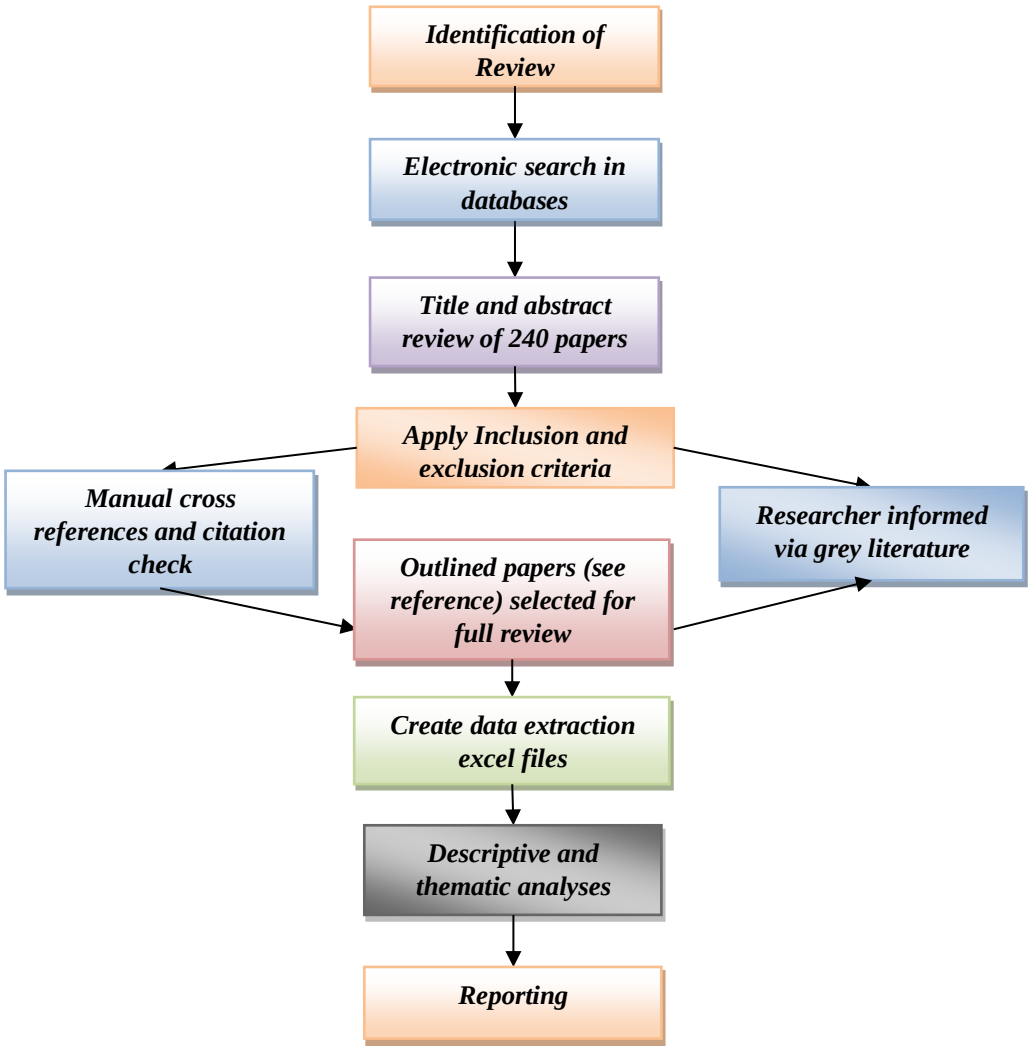


Figure 1: Systematic Review Procedure

### *Stage 1: Planning the Review*

We have planned our literature review into three distinct phases as:

*Phase 1: Identification for the Need of Review*

In our present study we want to investigate the impact of recruitment & selection, learning & development, compensation & reward and performance appraisal on employee's retention under the mediating effect of BDPA.

*Phase 2: Proposal for Review*

The literature review is a necessary part of any logical works. Regardless this segment, we first identified reputable Journals using key words like talent management, functions of talent management, employee retention, factors affecting employee retention, recruitment & selection, compensation & benefits, learning & development, performance & career development. In a way, we identified over 240 articles published in reputable journals.

*Phase 3: Development of Review Protocol*

Initially published literature were reviewed. To ensure that we did not end up with sketchy literature, we thoroughly reviewed all possible articles published in journals related to talent management, employee retention, BDPA, and related concepts.

***Stage 2: Conducting Review***

Execution of the review is further divided into three phases:

*Phase 4: Identification of Research*

We initially reviewed some articles that deal with talent management and employee retention and its related issues to identify our research and define the scope of the present study (e.g., Michaels et al., 2001; Whitley,2002; Robertson and Abbey, 2003; Morton, 2004; Heinen and O'Neill, 2004; Schweyer, 2004; Morton,2005; Tansley et al., 2006; Romans and Lardner, 2005; Lewis and Heckman, 2006; Ready and Conger, 2007; Bhatnagar, 2007; Makhijani et at., 2009; Silzer and Dowell, 2010; Chikumbi, 2012; Holt et al., 2012; Nazia and Begum, 2013, Malinen et al., 2013; Festing and Schäfer, 2014; Brockbank et al.,2018; DiRomualdo et al., 2018).

*2.1 Employee Retention*

Talent management is composed of talent planning, talent acquisition, talent development, talent deployment, talent retention and talent evaluation (Forman 2005). Hughes and Rog (2008) argued that talent retention is one of the ways of keeping talent within the organization. In this highly competitive and fast paced world, talent retention has become a prime concern for the corporates because it is ensuring the accomplishment growth and sustainability of the organization (Naris and Ukpere, 2010; Olckers and Du Plessis, 2012).

*2.2 Factors Affecting Employee Retention*

Talent management is not just a one-time process but a cyclic process with continuous follow ups and constant updating (Vigoda, 2000). There are several factors which leads to employee retention, which are training and development (Vinesh, 2014; Renaud et al. 2015), compensation and benefits (Rambur et al., 2005), work life balance (Parkes and Langford, 2008), career advancement (Khan, 2014), supportive work environment (Ghosh and Sahney, 2011), organizational commitment (Culha, 2010), an engaging work environment (Thakur and Bhatnagar, 2017), organizational culture, strong values and internal branding (Hatch and Schultz, 2008) and of course influential HR practices (Cesario and Chambel, 2017). The factors which are reasons or ways to improve employee retention can also be used as retention strategies by the firm like performance and potential assessment, career path management, assessment centers, feedback mechanisms, learning initiatives, coaching & mentoring (Collings and Mellahi,2009). Compensation and rewards can be one of the ways to deal with the employee related problems related to employee retention but to improve the level of commitment of the employee- feedback on performance, employee involvement, flexible work options must be considered (Curtis and Wright, 2001; Buers et al., 2018). A sense of connection created between an employer brand and employee and regular employee engagement influences the employees decision to stay in the organization (Pandita and Ray, 2018). Through regular employee feedback and involvement valuable insights can be gained which can offer the greatest competitive advantage to any organization (Memon et al. 2021). However, this advantage is not always realized due to the constant disruptions and instability in workplaces today. Due to this, there is strong need for integrating human resource (HR) function with the analytics to improve businesses as well as individual employee success (Di Claudio, 2019).

### *2.3 Analytics in Human Resource Management*

The analytics in human resource management is regarded as one of organizational capabilities that have immense potential to improve the decision-making ability on human and organization capital (Rasmussen and Ulrich, 2015; Renaud et al. 2015). Establishing an explicit and clear definition of the concept of HR analytics is a bit strenuous considering its many layers and nuances (Marler and Boudreau, 2017). As a result, very few academic literature on HR analytics are available. This is simply due to the dynamic nature of the discipline, even though data is quantifiable and absolute- the component of people makes it very unstable and different. HR analytics is considered to be rigorous process that requires all minute details to make an effective and efficient decision (Ghasemaghaei et

al. 2018). From the start of an employee's life in an organization to improving their productive journey in the organization to tracking the results of such investment in the employee. It is a clear methodology to harness innovative insights and apply this to better productivity (Minbaeva, 2018).

*2.4 Big data & Predictive Analytics*

Big data & predictive analytics (BDPA) is an emergent suite of technologies that can store and process extremely large volumes of various types of data in real-time and at cheaper costs than ever before (Baer and Campbell, 2011; Bag, 2017; Sedkaoui, 2018b; Bag et al. 2021a). BDPA can be understood as an integration of data and technology that accesses, integrates, and reports all available data by filtering, correlating, and reporting insights not attainable with past data technologies (Jeble et al. 2018; Mikalef and Krogstie, 2020). According to the Department of Business-Innovation and Skills (2013), BDPA is an emerging phenomenon, which reflects higher dependence on data in terms of growing volume, variety and velocity. The usage of big data in the context of learning can be classified into four categories (Sedkaoui, 2018b). The first is *descriptive analytics* which looks to answer the question 'what happened?', secondly there is *diagnostic analytics* which looks to answer 'Why did this happen?', thirdly *predictive analytics* which seeks to answer 'what is going to happen?' to be able to anticipate the future through in depth consideration of what we are aware of from the past. And lastly there is *prescriptive analytics* which answers the question 'what must be done to make this happen?' and which helps to bring the course of action. Out of the four categories, the concept of Big data and Predictive analytics (BDPA) has become an organizational capability. The review of various definitions and models reveals that there are various factors which affect employee retention. However, impact of Big data and predictive analytics on employee retention is to be tested empirically.

*2.4 Identification of Research*

We presented the issues identified through extensive review of literature (see, Appendix 1). We have identified recruitment & selection, reward & remuneration, training & development, performance & career development, grievance handling, employee involvement, BDPA and employee retention as the major variables for the present study.

**Phase 5: Selection of Studies**

The question 'How talented employees can be retained' and 'Can analytics play an important role in retaining employees' needs to be answered thus; various factors identified in literature which leads to employee retention as a gap in literature. The relationship between factors that lead to employee retention under the mediating effect of the BDPA is proposed.

## 3. THEORETICAL FRAMEWORK, RESEARCH HYPOTHESIS AND RESEARCH DESIGN

### 3.1. Theoretical Framework and Hypotheses Development

We have grounded our theoretical framework in the resource-based view (RBV). The resource-based view (RBV) has attracted significant attention from the management scholars (Hitt et al. 2016; Gunasekaran et al. 2017; Dubey et al. 2019a). The RBV argues that a firm gain competitive advantage through bundling of strategic resources and capabilities (Barney, 1991; Barney et al., 2001). Following RBV logic we can understand an organisation as a collection of tangible and intangible resources (Barney, 1991; Amit and Shoemaker, 1993). The theoretical framework includes, as stated in the literature review, recruitment and selection, remuneration and reward, training and development, career development, grievance handling, employee involvement as independent factors leading to employee retention with a mediating effect of big data and predictive analytics. Figure 2 shows the diagrammatic representation of the theoretical framework of employee retention

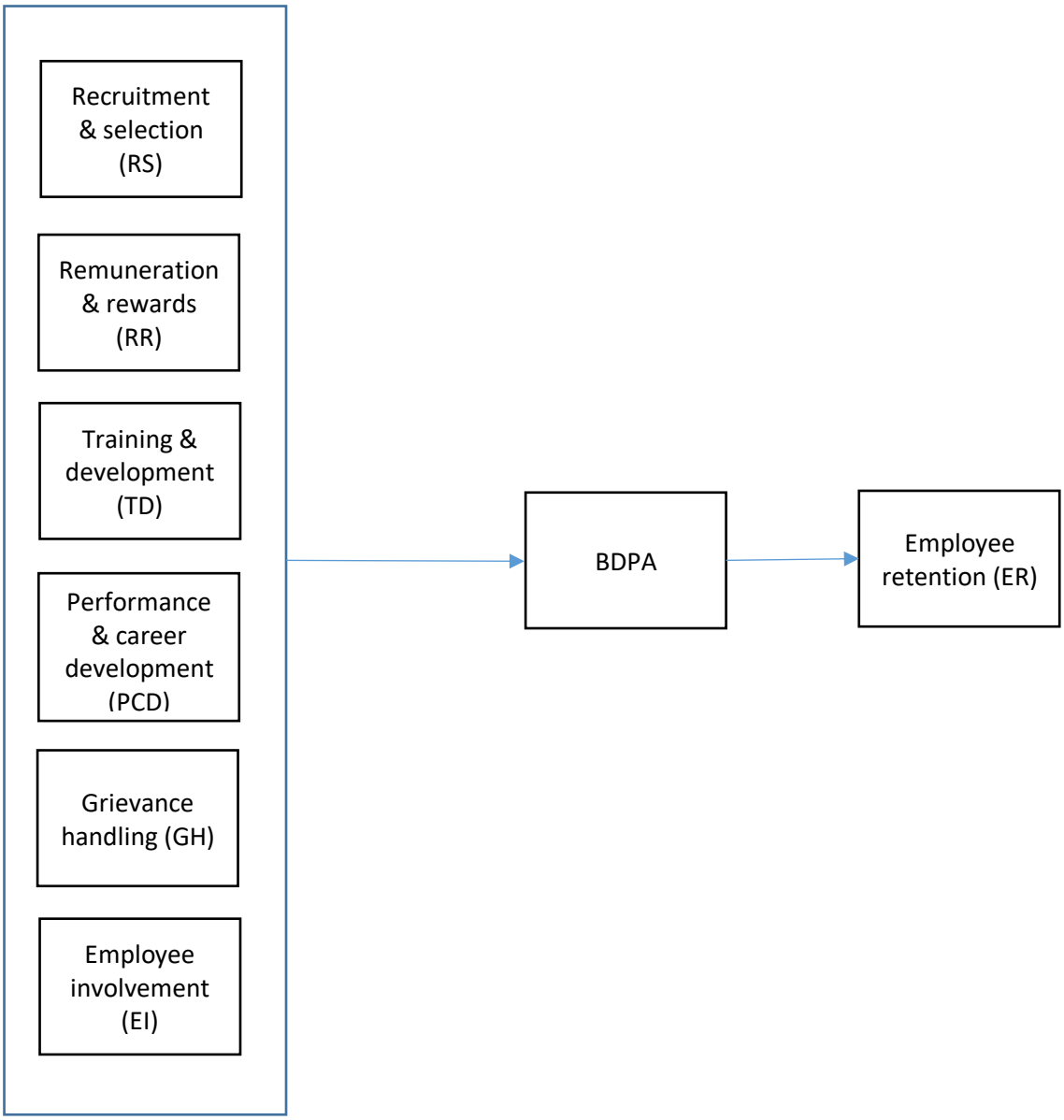


Figure 2: Theoretical Framework of Employee Retention

### *3.2.1 Recruitment & Selection (RS)*

Recruitment and selection practices have evolved from the traditional form to have a strategic orientation in the organization (Huselid, 1995; Paul and Anantharaman, 2003). Owing to the dynamic nature of modern organizations, selection is now done with a holistic organizational perspective, wherein formal employment planning is done. Selection is competency based with various selection instruments used and written objective job descriptions for each candidate. E-recruitment practices are widely adopted, and developmental and succession planning is done (Marin and Giner, 2014).

Recruitment practices are widely adopted, and developmental and succession planning is done Consequently, these contemporary practices have been defined as recruitment and selection innovations which exhibit interdependent primary features of strategic integration, long-term focus and a means to translate strategic demands to a suitable recruitment and selection specification (Paul and Anantharaman, 2003). Based on preceding arguments we hypothesize it as:

***H1: The RS has a positive and significant effect on the BDPA adoption***

### *3.2.2 Reward & Remuneration (RR)*

Organizations offer rewards as an appreciation of certain behavior in the form of financial and non-financial incentives after the accomplishment of assigned tasks (Danish and Usman, 2010; Smith, 2001). Sandra O'Neal has explained that Total reward embraces everything that employees value in the employment relationship. An equally wide definition of total reward has been given by World at Work, which state that a summation of rewards comprises of all of the employer's available tools that may be used to attract, retain, motivate and satisfy employees(Huselid,1995; Danish and Usman.,2010Cho et al.,2006) Considerable benefits of total reward approach are: Greater impact on motivation and commitment of people, Enhances the employment relationship which helps to improve the level of employee engagement, Increased engagement as a part of a multi-step process and involving people in their own package design gives a positive message, Flexibility to meet individual needs because they bind the individual to the organization(Demo et al., 2012; Marin and Giner, 2014;Ahmad and Allen, 2015). Hence, we hypothesize it as:

***H2: The RR has a positive and significant effect on the BDPA adoption***

### *3.2.3 Training & Development (TD)*

Malabika Sahoo, Sumita Mishra, (2019) says that the success of training depends on its transfer to specific work contexts and the extent of its application in the job (Kastenmüller et al., 2012) and Motivation is essential for training transfer and it facilitates the actual transfer of training across varied domains and contexts (Latham, 2007).Individual characteristics are the qualities which trainees carry to the training situations.They can be defined to include capabilities (e.g. mental ability and intelligence, aptitudes), personality traits (e.g. Big Five, locus of control), motivational constructs (e.g. self-efficacy goal orientation), values and interests (e.g. vocational and occupational interest), emotions and perceptions (e.g. perceived managerial support) as examined by (Bell et al., 2017). Not only the act of training but also analysis of its need helps to create and design useful training programs with

implications for the current job as well as future responsibilities (van Eerde et al., 2008).Winning the war of talent -total reward approach help to deliver a positive mind set of 'great place to work' and 'Employer of choice' because attracting and retaining talented people is the need of the hour. Hence, we hypothesize it as:

***H3: The TD has a positive and significant effect on the BDPA adoption***

### *3.2.4 Performance & Career Development (PCD)*

The performance appraisal process identifies training needs and opportunities. Performance appraisal helps in setting the organization strategy and goal (Sharma and sharma,2017). Career development has been advancing its traditional content areas of performance appraisal as well as exploring the newer ones. High level of employee participation in the appraisal processes. Pay rise, promotions, training and development and other rewards are very closely linked to performance appraisal (Kasemsap ,2015). (Sharma and sharma,2017) concludes in their study that analytical tools such as Synergita and IBM Kenexa HR analytics powered by IBM Watson help HR professionals to get insights into performance data for performance improvement and talent management (IBM, 2017; Synergita, 2017). In one of Gartner's research notes, Hostmann et al. (2009) developed a performance management framework linking analytics and business intelligence. Business analytics can be used for organizational transformation such a performance management. Strategic and predictive analytics allow organizations to ask and answer big questions about how value can be created, captured and leveraged (Kasemsap ,2015). Based on preceding discussions, we hypothesize it as:

***H4: The PCD has a positive and significant effect on the BDPA adoption***

### *3.2.5 Grievance handling (GH)*

According to (Akanji ,2005) a well-constructed and effective employee grievance management induces a positive performance, while poorly designed employee grievance management process is destructive as it heats up the work environment and brings about dislocation and disharmony of the entire organization with attendant reduction in productivity and performance of organizations. Through good conflict management strategies, weaknesses in the organizational decision-making are exposed which may prompt the establishment to effect changes and search for positive solutions (Longe,2015). According to a report from McKinsey institute, the effective use of industrial big data has the underlying benefits to transform economies, and delivering a new wave of productive growth. (Manyika et al.,2012). Hence, we hypothesize it as follows:

***H5: The GH has a positive and significant effect on the BDPA adoption***

### *3.2.6 Employee Involvement (EI)*

According to Kumari and Kumari (2014), employee involvement is the process by which employees are empowered to partake in managerial decision making and improvement activities suitable to their ranks in the organization. Price (2004) see employee involvement as a procedure connecting participation, communication, decision making which leads to industrial democracy and employee motivation. He noted that involvement of employees in an organization's operation motivates and enables them to effectively and successfully add value to the organization. (Locke and Schweiger ,1979) define it as joint decision making between managers and subordinates. In the view of (Muindi ,2011).(Zheng et al., 2009) views that the innovations enable employee participation in various aspects of the organization and make an employee feel as integral part of organization. (Phillips, 2009) These innovations chiefly include information sharing (Gupta, 2011) with employees pertaining to business operation and performance as well strategic aspects of the organization and encouraging employees to participate in suggestion group systems (Huselid, 1995; Pfeffer, 1994; Ichniowski et al., 1997; Bohlander and Snell, 2009; Demo et al., 2012; Ogbonnaya et al., 2016).

***H6: The EI has a positive and significant effect on the BDPA adoption***

### *3.2.7 BDPA and Employee Retention (ER)*

BDPA comprises of technologies (i.e., data mining tools and database) and techniques (i.e., analytical methods) that an organisation can employ to analyse huge volume of complex data for various applications. (Kwon et al., 2014; Jeble et al., 2018; Bag et al., 2020). Such an application of data is done with the intention of extension of a firms' performance in the realm of business (Bag et al., 2021). According to (Manyika et al.,2011), automated algorithms created through BDPA could be the basis for transparency, customizing offerings and replacement of human decision making (Horita et al., 2017). These benefits could fuel the competitive advantages for businesses' in both developed and emerging economies alike (Kamioka et al., 2016). Hence, we hypothesize it as:

***H7: The BDPA adoption has a positive and significant effect on the ER***

## 4. Research Design

*4.1 Questionnaire Development*

Based on independent, dependent and mediating variables, a questionnaire was developed and content validity was established through Experts Opinion and Pretesting. Total 6 experts were approached for the validation, out of six experts four of them are the corporate HR and two belong to professor grade from academics. Based on the results of the pre-test, the items was reduced from 52 to 40. There were two parts of the questionnaire. The first segment dealt with the respondent's demographic profile, while the second dealt with the employee retention report.

*4.2 Measures*

In order to improve reliability, minimize measurement error, ensure greater variability among survey participants, and improve validity, we used multi-item construct measures for our theoretical framework. (Churchill, 1979). Table 3 presents constructs of the framework (see Figure 2) and their measuring items. The questionnaire used five-point Likert scales ranging from strongly disagree (1) to strongly agree (5).

4.*3 Data Collection*

We used our questionnaire to gather responses from the senior level human resource managers. We randomly selected manufacturing organizations HR using LinkedIn and Facebook platform. We finally send e-mail to nearly 300 respondents. Out of 300, we received 269 usable responses. This suggest that our response rate (89.7%) is quite high.

## 5. Data Analysis

Following the data collection outlined in the previous section, the following tests were carried out for the study:

Before performing further data analysis, it is essential to test the assumptions of psychometric properties in order to determine the reliability and validity of measurement objects. For the current study, the following tests were conducted. Firstly, Cronbach's alpha is the measure of internal consistency (reliability) and is most commonly used for Likert questions in a survey questionnaire

(Pallant, 2007). The Cronbach alpha coefficient ranges from 0 to 1 with the value above 0.7 suggest high levels of internal reliability (Hair et al., 2006). Cronbach Alpha value of standardized 40 items is 0.959, which is highly reliable. Secondly, we performed Kaiser-Meyer-Olkin (KMO) test. It is a measure of sampling adequacy and often used to quantify the degree of inter-correlations among the variables (Hair et al., 2006; Kaiser, 1974; Bartlett, 1954). KMO value is .913 that indicates that data set is considered suitable for factor analysis. The table also shows the significance value of Bartlett's Test of Sphericity is .000, less than 0.05 indicating that data is multivariate normal and acceptable for subsequent analysis. Thirdly, we performed normality test. This is a test for testing normal sample distribution by plotting histogram (Figure 3: Histogram for Normality Test) and P-P Plot (Figure 4: P-P Plot of Regression Standardized Residual) the mean, median, and mode values are almost matched with each other and the skewedness and kurtosis values are less than 2 and 7 respectively, thus fulfilling the normality assumption. Fourthly, we performed linearity test. Linearity is a test to check the relationships between independent and dependent variables ensuring best representation in regression analysis (Hair et al., 2011) presented in the form of a graph (see, Figure 5). The partial regression plot as in the Figure 5 shows that the clutter around the line does not exhibit any non-linear pattern and the points above and below are approximately similar thus, indicating that the assumption of linearity is met.

Figure 3: Histogram for Normality Test

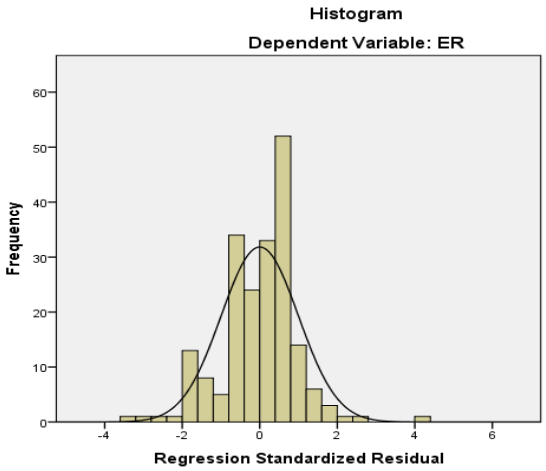


Figure 4: P-P Plot of Regression Standardized Residual

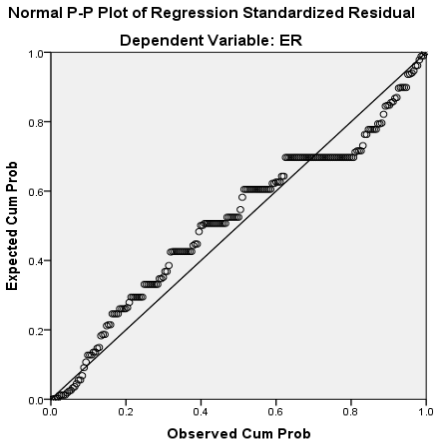


*Figure 5: Partial Regression Plot for Linearity test of variables leading to Employee's Retention*

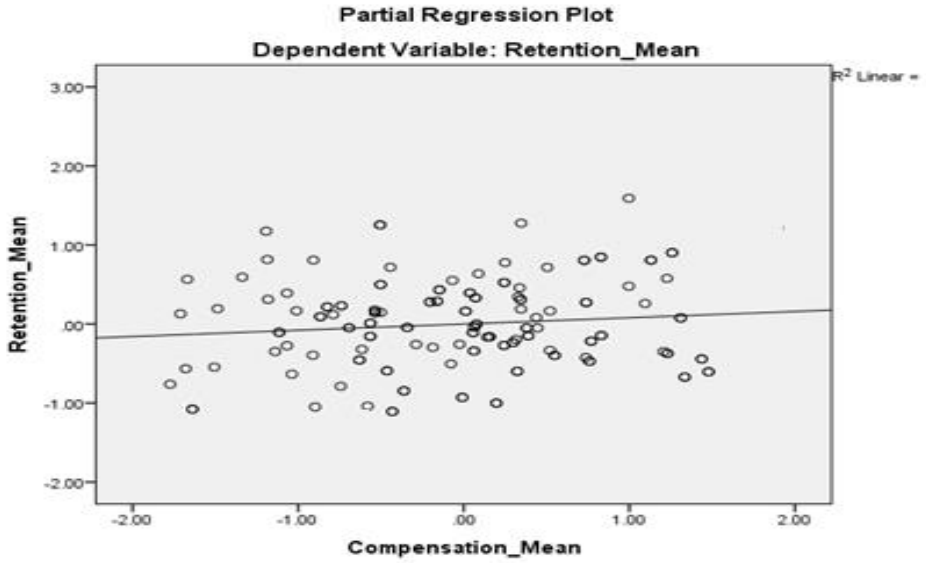

**Table 1: Multicollinearity test**

| S.No | Independent Variable | Collinearity Statistics | |
|---|---|---|---|
| | | Tolerance | VIF |
| 1 | RS | 0.629 | 1.589 |
| 2 | RR | 0.544 | 1.839 |
| 3 | TD | 0.561 | 1.781 |
| 4 | PCD | 0.609 | 1.641 |
| 5 | GH | 0.726 | 1.378 |
| 6 | EI | 0.546 | 1.83 |

Source: Compiled from SPSS 20.0 Output Sheet

### *5.1 Assessment of Psychometric Properties*

It is important to ensure that the measurement model has a sufficient degree of validity and reliability before checking for a significant relationship in the significant model (Fornell and Larcker, 1981). In order to confirm the theoretical constructs drawn for testing the impact of predictors on employee retention measurement theory. Confirmatory Factor Analysis (CFA) tests the reliability and validity of the data, through drawing Scale Composite Reliability (SCR) and Average Variance Extracted (AVE). Later, discriminant validity is checked thorough factor inter correlation matrix. The values of SCR and AVE for employee's retention are duly presented in Table 2. It is observed from Table 2 that the constructs of theoretical framework possesses convergent validity as the standardized factor loadings of the items are mostly greater than 0.7 and not less than 0.5. Secondly, the Scale Composite Reliability (SCR) is found to be greater than 0.7 and Average Variance Extracted (AVE) is found to be greater than 0.5 except for work culture and personality factors but since the other reliability and validity tests are well within the prescribed limits thus, both these variables are included in study.

The Table 2 shows that the constructs of theoretical framework possesses convergent validity as the standardized factor loadings of the items are mostly greater than 0.7 and not less than 0.5. The factor loading ranges from 0.643 to 0.985. Secondly, the Scale Composite Reliability (SCR) is found to be greater than 0.7 in case of all the variables except grievance handling. Average Variance Extracted (AVE) of all the variables is found to be greater than 0.5, which is the recommended value as per Fornell and Larcker (1981). The subsequent analysis describes the discriminant validity of the scale.

## Table 2: SCR and AVE Scores for Employee's Retention

| Variables | Items | Factor Loadings | Variance | Error | SCR | AVE |
|---|---|---|---|---|---|---|
| RS | Employment Planning | .856 | .733 | .267 | .919 | .558 |
| | Alignment of HR strategy with Business Strategy | .661 | .437 | .563 | | |
| | Competency Based Selection | .769 | .591 | .409 | | |
| | Skill Inventory | .712 | .507 | .493 | | |
| | Reference check | .817 | .667 | .333 | | |
| | Validation of selection process | .707 | .499 | .501 | | |
| | succession planning | .723 | .522 | .478 | | |
| | Approach to recruitment | .750 | .563 | .437 | | |
| | Cost effectiveness | .708 | .502 | .498 | | |
| RR | Non-monetary benefits | .730 | .533 | .467 | .902 | .539 |
| | Fringe Benefits | .891 | .794 | .206 | | |
| | Ownership schemes | .742 | .551 | .449 | | |
| | Methodology of pay | .761 | .579 | .421 | | |
| | Competitive pay plans | .716 | .513 | .487 | | |
| | Remuneration planning | .688 | .474 | .526 | | |
| | Incentive planning | .672 | .452 | .548 | | |
| | Job evaluation | .643 | .414 | .586 | | |
| TD | Training Budget | .873 | .762 | .238 | .875 | .585 |
| | Evaluation of Training | .749 | .561 | .439 | | |
| | Alignment of training with Business Strategy | .723 | .522 | .478 | | |
| | Training Innovation | .710 | .504 | .496 | | |
| | Training Motivation | .757 | .574 | .426 | | |
| PCD | Employee Participation | .911 | .830 | .170 | .862 | .612 |
| | Factors related to performance appraisal | .721 | .519 | .481 | | |
| | Performance and Training needs are related | .711 | .506 | .494 | | |
| | Concerned for performance problems | .770 | .592 | .408 | | |
| GH | Resolving grievance and formal grievance handling procedure | .742 | .551 | .449 | .551 | .551 |
| EI | Information sharing | .985 | .970 | .030 | .861 | .759 |
| | Degree of employee participation and Involvement | .740 | .548 | .452 | | |
| BDPA | Predictive Analytics | .885 | .783 | .217 | .902 | .606 |
| | BDPA & competitive advantage | .789 | .623 | .377 | | |
| | BDPA and functions of HRM | .818 | .669 | .331 | | |
| | Significance of big data for all types of organizations | .719 | .517 | .483 | | |
| | Bigdata and recruitment | .779 | .607 | .393 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Importance of big data and linkage with HR analytics | .662 | .438 | .562 | | |
| ER | Employee retention depends on several factors | .778 | .605 | .395 | .893 | .628 |
| | ER is one of the concerns for HR | .701 | .491 | .509 | | |
| | ER and long-term success | .891 | .794 | .206 | | |
| | Impact working environment on Employee retention | .806 | .650 | .350 | | |
| | Analytics and Employee retention | .773 | .598 | .402 | | |

Discriminant validity is the extent to which any single construct is different from the other constructs in the model (Carmines and Zeller, 1979). It can be examined through the evaluation of the average variance extracted (AVE). Fornell and Larcker (1981) suggested that average variance extracted for each construct should be greater than the squared correlation between constructs. Table 3 shows inter-item correlation matrix of employee retention variables**.** The leading bold shaded diagonal in Table 3 represents the AVE and the lower half indicates the correlation coefficients between the constructs.

**Table 3: Inter-Item Correlation Matrix of Employee Retention Variables**

| | RS | RR | TD | PCD | GH | EI | BDPA | ER |
|---|---|---|---|---|---|---|---|---|
| RS | **0.746** | | | | | | | |
| RR | .712 | **0.733** | | | | | | |
| TD | .711 | .713 | **0.764** | | | | | |
| PCD | .691 | .680 | .735 | **0.782** | | | | |
| GH | .486 | .540 | .611 | .679 | **0.742** | | | |
| EI | .629 | .662 | .613 | .634 | .626 | **0.871** | | |
| BDPA | .609 | .675 | .662 | .625 | .524 | .673 | **0.778** | |
| ER | .629 | .646 | .739 | .723 | .623 | .636 | .658 | **0.792** |

As a result, theoretical model's constructs have sufficient reliability, convergent validity, and discriminant validity.

### 5.2 Hypothesis Tests through Mediating Regression Analysis

Mediation analyses are employed to understand a known relationship by exploring the underlying mechanism or process by which one variable influences another variable through a mediator variable (Cohen et.al., 2003). Baron and Kenny (1986) laid out several requirements that must be met to form a true mediation relationship. The hypotheses are tested using mediation effect of BDPA and analyzed

using regression analysis procedure suggested by Baron and Kenny (1986). Figure 6 represents path followed by mediating regression analysis. The variable is dependent if it has one or more unidirectional arrows pointing towards it (such as *Y*), using all variables that have unidirectional arrows that point toward *Y* as predictors/ independent variables. The first regression predicts *Y* from *X* (path *c*). The second regression predicts *M* from *X* (path *a*). The third regression predicts *Y* from both *X* and *M* (path *c'*). Thus, to estimate the strength of association that corresponds to each path in Figure 5, a series of three ordinary least squares (OLS) linear regression analyses can be run. Thus, the top panel of Figure 6 estimates the **total effect of *X* on *Y* and is denoted by path *c***. The bottom panel of Figure 6 estimates the product of path *a* and *b* coefficients and the strength of the **mediated or indirect effect of *X* on *Y***, that is, how much is the increase in *Y* that occurs as *X* due to *M*. The path *c'* coefficient estimates the strength of the **direct (also called partial) effect of *X* on *Y***, any effect of *X* on *Y* that is not mediated by *M*. We present the summary of hypotheses results as:

**Figure 6: Path used to analyze Mediating Regression Analysis**

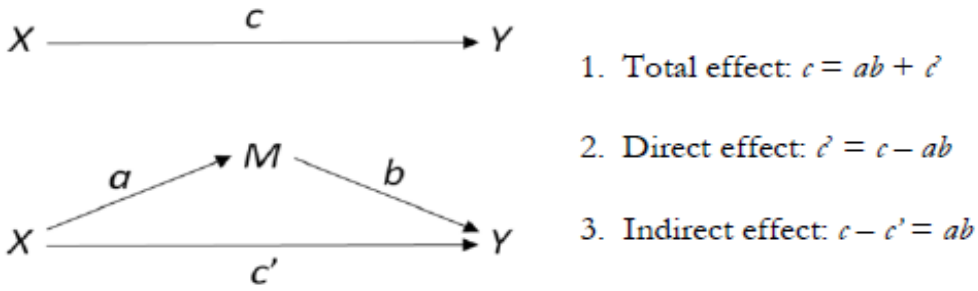


**Table 4: Summary of Hypotheses Testing**

| Hypothesis | Path | β | p-value | Supported/Not-supported |
|---|---|---|---|---|
| H1 | RS→BDPA | .511 | 0.000 | supported |
| H2 | RR→BDPA | .565 | 0.000 | supported |
| H3 | TD→BDPA | .631 | 0.000 | supported |
| H4 | PCD→BDPA | .499 | 0.000 | supported |
| H5 | GH→BDPA | .315 | 0.000 | supported |
| H6 | EI→BDPA | .439 | 0.000 | supported |
| H7 | BDPA→ER | .767 | 0.000 | supported |

We can see from Table 4 (H1-H6) hypotheses were supported. These results of our study support the previous findings that the human resource management is one of the critical aspect that plays a significant role in the adoption in BDPA (see, Gupta and George, 2016; Secundo et al. 2017). Further our Hypothesis H7 was supported. This findings of our study support previous findings of the scholars (see, Rombaut and Guerry, 2020; Hamilton and Sodeman, 2020).

## 6. Conclusion

Our results obtained through statistical analyses provide an interesting insights on associations and complementaririties among human resource practice, adoption of big data & predictive analytics capability and employee retention. Table 4 provides a summary of the evidence our data provides in support of the research hypotheses developed in our study. Together these findings have some implications to theory and practice, as well as put some research questions for future research in this area.

### 6.1 Contributions to Theory

This study builds on Davenport and Harris (2007) arguments that the availability of quality data is the first step in building BDPA. Zhang et al. (2021) argue that big data & predictive analytics capability (BDPA) is a "*must-have*" capability for both human resource management researchers and managers. It further builds an opportunity for interdisciplinary scholars to tackle some complex problems that may not be addressed by traditional sample-based data. Accordingly, our study provides empirical support that human resource practices (i.e., recruitment & selection, remuneration & rewards, training & development, performance & career development, grievance handling, and employee involvement) under the mediating effect of BDPA has a positive and significant influence on the employee retention. There is a rich body of literature that has addressed the importance of human resource management as a source of competitive advantage and further recognized the negative effects of employee turnover on the sustainable competitive advantage of the organization (Naraynan et al. 2019). However, despite significant efforts towards explaining how to explain employee turnover and the ways to improve employee retention (Paille, 2013), the literature on the role of BDPA on ER is still in the nascent stage. Our study does not directly address means of employee retention (ER). Our study findings extend the ER literature by empirically examining the mediating role of BDPA between HR practices and the ER. The findings argue that ER is a high-paced economy is a complex mechanism. Amidst growing opportunities, the HR managers often fail to understand "*what*" influences the ER and "*how*" to minimize the *employee turnovers*?. Although we are not trying to suggest directly the role of technologies in the ER, we believe the BDPA is one of the ways to uncover the hidden reasons which

we often fail to discover in the limited data era. The BDPA in a way helps create transparency and help build better intra-organizational relationships which are often considered as a vital component in achieving superior performance. Thus these findings strengthen the resource-based view perspective in the dynamic condition.

### 6.2 Implications to Practice

The extracted knowledge from this study supports the managers in their efforts to recognize the important drivers of the ER. and the role of BDPA capability to improve the effects of these drivers on the ER. It is important to note in this study that competitive advantage stems from the ways in which emerging technologies like BDPA are used, rather than from the technologies themselves. Thus we argue based on the findings that managers who consider investing in BDPA should carefully evaluate and examine: (a) their existing technological capabilities to acquire timely and accurate information related to their employees; (b) their organizational capabilities to process timely and accurate information from large and complex data to make important decisions related to the welfare of their employees. In absence of these conditions, the BDPA is not as likely to help address the complex ER-related issues which is one of the main areas of concern among organizations in the fast-paced economy.

### 6.3 Limitations and Further Research Directions

Our study is underpinned in the positivism philosophy. We have used primary field data to contributes to the data-driven research that aims to tackle problems in human resource management literature and the big data & predictive analytics literature. In a way, our study is an interdisciplinary approach to tackle complex problems that require extensive data to unfold the hidden layers and thus be considered a strength of this study. Nonetheless, there are numerous limitations that should be taken care of by future scholars. Firstly, two item measurement scales used for grievance handling and employee involvement used for capturing the manager's response. We believe in future scholars can use multi-item construct as suggested by scholars (Churchill, 1979; Malhotra and Grover, 1998). As we are aware that the measurement error is one of the major sources of the error in the survey based research. There are multiple issues that may contribute to the measurement error, the use of multi-item construct is often considered one of the ways to reduce the measurement error. Secondly, we acknowledge that we have used a single-informant questionnaire. The use of a single-informant questionnaire is often

considered as one of the major sources of common method bias (CMB) (Ketokivi and Schroeder, 2004). The measurement of the independent and dependent variables with the same participants may lead to the common bias issue (Podsakoff et al. 2003). We recommend future scholars to undertake survey-based research using a multi-informant questionnaire. Thirdly, we are unable to draw inferences related to the direction of cause-effect relations based on our cross-sectional data. Guide and Ketokivi (2015) argue that endogeneity is one of the major issues associated with the cross-sectional measurement model. The organizational literature may help explain the implied direction of effects, and indeed, finding the moderation effect provides us enough power to discard the reverse direction; yet, we still cannot completely reject the likelihood of some reverse causality (Srinivasan and Swink, 2018; Salem et al. 2019). Future studies may examine the interaction effect of the variables on the paths connecting HR practices and BDPA. Moreover, the longitudinal data may help tackle these causality problems.

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## Appendix 1: Issues identified from the literature

| Sr. No. | References | Recruitment & Selection | Remuneration | Training & Development | Performance and Career Development | Grievance handling | Employee Involvement | Big data | Predictive Analytics | Employee Retention | HR Analytics | Talent Management | Factors affecting ER |
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| 3 | Driver,1979 | | | | A | | | | | | | | |
| 4 | Locke and Schweiger, 1979 | | | | | | A | | | | | | |
| 5 | Beach and Dale 1980 | | | A | | | | | | | | | |
| 6 | Super, 1980, | | | | A | | | | | | | | |
| 7 | Britton, 1982 | | | | | A | | | | | | | |
| 8 | Chang and Lorenzi,1983 | | | | | | | | | | | | |
| 9 | Gutteridge,1986, | | | | A | | | | | | | | |
| 10 | Torrington and Hall,1987 | | | | | | | | | | | | |
| 11 | Westin and Feliu, 1988 | | | | | A | | | | | | | |
| 12 | Keep,1989 | | | A | | | | | | | | | |
| 13 | Gowen,1990 | | | | | | A | | | | | | |
| 14 | Jain, 1991 | | | | | A | | | | | | | |

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| 15 | Meija and Enid,1991 | | | | | A | | | | | | | |
| 16 | Marchington et al.,1991 | | | | | | A | | | | | | |
| 17 | Arthur,1992 | | | | | A | | | | | | | |
| 18 | Earley, 1993 | | | | | | A | | | | | | |
| 19 | Rossler and Koelling,1993 | | | | | | A | | | | | | |
| 20 | Pfeffer, 1994 | | | | | | A | | | | | | |
| 21 | Hankins andKleiner,1995 | | | A | | | | | | | | | |
| 22 | Huselid, 1995 | A | A | A | | A | A | | | | | | |
| 23 | Prais, 1995 | | | | | | | | | | | | |
| 24 | Swanson,1995 | | | A | | | | | | | | | |
| 25 | Ashton and Green,1996 | | | A | | | | | | | | | |
| 26 | Delaney and Huselid,1996 | | | | | A | | | | | | | |
| 27 | Hirsh and Jackson,1996 | | | | | A | | | | | | | |
| 28 | Dirkx,1997 | | | A | | | | | | | | | |
| 29 | Ichniowski et al.,1997 | | | | | A | | | | | | | |
| 30 | Thomas,1997 | | | A | | | | | | | | | |
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| 32 | Brannick, 1999 | | A | | | | | | | | | | |
| 33 | Harel. and Tzafir, 1999 | | | | | A | A | | | | | | |
| 34 | Apostolou, 2000 | | | | | | A | | | | | | |
| 35 | Cascio, 2000 | | | | | | | | | | | | |
| 36 | Jackson,2000 | | | | A | | | | | | | | |
| 37 | Lang, D. and Wittig-Berman,2000 | | | A | | | | | | | | | |
| 38 | Curtis and Wright,2001 | | | | | | | | | A | | | |
| 39 | Weinert,2001 | | | | A | | | | | | | | |
| 40 | Pattanayak, 2003 | | | | | A | | | | | | | |
| 41 | Paul and Anantharaman, 2003 | A | | | | | | | | | | | |
| 42 | Herr et al., 2004 | | | | A | | | | | | | | |
| 43 | Lehman et al.,2004 | | | | | | | A | | | | | |
| 44 | Price, 2004 | | | | | | A | | | | | | |
| 45 | Sonia and Kleiner,2004 | | | | | A | | | | | | | |
| 46 | Walton and Mallon,2004 | | | | A | | | | | | | | |
| 47 | Huang et al,2006 | | A | | | | | | | | | | A |
| 48 | Rai and Singh,2005 | | | | A | | | | | | | | |
| 49 | Rao,2005 | A | | | | | | | | | | | |
| 50 | Sauber et al,2006 | | | | | | | | | | | | A |
| 51 | Armstrong, 2006 | | | A | | | | | | | | | |
| 52 | Cho et al., 2006 | A | A | | | | | | | | | | |
| 53 | Lewis and Heckman, 2006 | | | | | | | | | | | A | |

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| 54 | Noe, 2006 | | | A | | | | | | | | | |
| 55 | Nwachukwu, 2006 | | | | | A | A | | | | | | |
| 56 | Schreuder,2006 | | | | A | | | | | | | | |
| 57 | Smith, 2006 | | | A | | | | | | | | | |
| 58 | Truelove, 2006 | | | A | | | | | | | | | |
| 59 | Agraim, 2007 | | | | | A | | | | | | | |
| 60 | Armstrong and Murlis, 2007 | | A | | | | | | | | | | |
| 61 | Bhatnagar,2007 | | | | | | A | | | A | | A | A |
| 62 | Buckley and Caple,2007 | | | A | | | | | | | | | |
| 63 | Choo and Bowley 2007 | | | A | | | | | | | | | |
| 64 | Davenport et al.,2007 | | | | | | | A | | | | | |
| 65 | Hair,2007 | | | | | | | | A | | | | |
| 66 | Larsson,2007 | | | | A | | | | | A | | | |
| 67 | Latham,2007 | | | A | | | | | | | | | |
| 68 | Singh B.D.,2007 | | A | | | | | | | | | | |
| 69 | Baer,2008 | | | | A | | | | | | | | |
| 70 | Cappelli,2008 | | | | A | | | | | | | | |
| 71 | Eerde, 2008 | | | A | | | | | | | | | |
| 72 | Michael and Combs, 2008 | A | | A | | | A | | | A | | | A |
| 73 | Armstrong, 2009 | | | A | | | | | | | | | |
| 74 | Beukes,2009 | | | | A | | | | | | | | |
| 75 | Bohlander and Snell,2009 | | | | | | A | | | | | | |
| 76 | CIPD ,2009 | | | | A | | | | | | | | |
| 77 | Hostmann et al.,2009 | | | | | | | | A | | | | |
| 78 | Phillips, 2009 | | | | | | A | | | | | | |
| 79 | Zheng et al., 2009 | A | A | A | | | A | | | | | | |
| 80 | Davenport,et al.,2010 | | | | | | | A | | | | | |
| 81 | Fink,2010 | | | | | | | | | | | A | |
| 82 | Govaerts and Kyndt,2010 | | | A | A | | | | | A | | A | A |
| 83 | Guchait and Cho,2010 | | | | A | | | | | | | | |
| 84 | McMurray et al., 2010 | A | | | | | | | | A | | | |
| 85 | Manyika et al. 2011 | | | | | | | A | | | | | |
| 86 | Dirani and Kuchinke,2011 | | | A | | | A | | | | | | |
| 87 | Gupta, 2011 | | | | | | A | | | | | | |
| 88 | Judeh, 2011 | | | | | | A | | | | | | |
| 89 | LaValle,et al,.2011 | | | | | | | A | | | | | |
| 90 | Muindi,2011 | | | | | | A | | | | | | |
| 91 | Sengupta,2011 | | | | | | | | | | | | A |
| 92 | Iverson and Zatzick,2011 | | | | | | A | | | | | | |
| 93 | Agyeman,2012 | | | | | | A | | | | | | |

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| 95 | Chen et al.,2012 | | | | | | | A | | | | | |
| 96 | Demo et al., 2012 | A | A | A | | | A | | | | | | |
| 97 | Dries et al,2012 | | | | A | | | | | | | | |
| 98 | Ghosh,2012 | | | | | | | | | | | | A |
| 99 | Kastenmüller et al.;2012 | | | A | | | | | | | | | |
| 100 | Manyika,2012 | | | | | A | | | | | | | |
| 101 | Martins and Meyer,2012 | | | | | | | | | | | | A |
| 102 | Khattak and Khattak,2013 | | | | | | A | | | | | | |
| 103 | Khattak, et al.,2013 | | | | | A | | | | | | | |
| 104 | O'Meara and Petzall 2013 | A | | | | | | | | | | | |
| 105 | Punia and Kant, 2013 | | | A | | | | | | | | | A |
| 106 | Waller and Fawcett,2013 | | | | | | | A | A | | | | |
| 107 | Wixom et al,2013 | | | | | | | A | | | | | |
| 108 | Ajibade and Ayinla ,2014 | | | | | | | | | | | | |
| 109 | Deepa et al.,2014 | | | | | | A | | | | | | |
| 110 | Deery,2014 | | | | | | | | | A | | A | |
| 111 | Enthoven,2014 | | | | | | | A | | | | | |
| 112 | Fitz-Enz et al., 2014 | | | | | | A | | A | | | | |
| 113 | Kim and Park,2014 | | | | | | | | | | | | A |
| 114 | Kumari and Kumari,2014 | | | | | | A | | | | | | |
| 115 | Lee et al,2014 | A | | | | | | | | | | | |
| 116 | Marin and Giner, 2014 | A | A | | | | | | | | | | |
| 117 | Milman and Dickson,2014 | | | | | | | | | A | | | A |
| 118 | Park,2014 | | A | A | A | | | | A | A | | | |
| 119 | Saunderson, 2014 | | | A | | | | | | | | | |
| 120 | Sharma et al.,2014 | | | | | | | A | | | | | |
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| 122 | Ahmad and Allen, 2015 | A | A | | | | | | | | | | |
| 123 | Al-Emadi et al.,2015 | | | | | | | | | A | | | |
| 124 | Cai and Zhu,2015 | | | | | | | A | | | | | |
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| 126 | Dubey and Gunasekaran ,2015 | | | A | | | | A | | | | | |
| 127 | Guo and Vargo.,2015 | | | | | | | A | | | | | |
| 128 | Kasemsap,2015 | | | | | | | | A | | | | |
| 129 | McCaffery,2015 | | | | | | | A | | | A | | |
| 130 | Ransbotham et al., 2015 | A | | A | | | | A | A | A | A | | |
| 131 | Alshathry et al,2016 | | | | | | | | | A | | | |
| 132 | Ikramullah et al.,2016 | | | | A | | | | | | | | |
| 133 | Kamioka et al. 2016 | | | | | | | A | | | | A | |

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| 134 | Kelly,et al,2016 | | | A | | | | | | | | | |
| 135 | Lugmayr et al,2016 | | | | | | | A | | | | | |
| 136 | Ogbonnaya et al., 2016 | A | A | | | A | A | | | | | | |
| 137 | Singh and Sankhi,2016 | | A | A | | | | | | | | | |
| 138 | Sharma and Sharma,2017 | | | | | | | | | | A | | |
| 139 | Bell et al,2017 | | | A | | | | | | | | | |
| 140 | Cappelli,2017 | | | | | | | A | | | A | | |
| 141 | Cesário and Chambel,2017 | | | | | | | | | | | | A |
| 142 | Chaurasia et al.,2017 | | | | | | | A | | | | | |
| 143 | Dubey, et al.,2017 | | | | | | | A | A | | | | |
| 144 | FossoWamba et al.,2017 | | | | | | | A | | | | | |
| 145 | Heuvel and Bondarouk, 2017 | | | | | | | | | | A | | |
| 146 | IBM,2017 | | | | | | | | | A | | | |
| 147 | Larkin,2017 | | | | | | | | | | A | | |
| 148 | Malik,2017 | | | | A | | | | | | | | |
| 149 | McDonnell,2017 | | | | A | | | | | | | | |
| 150 | McGill,2017 | | A | | | | | | | | | | |
| 151 | Naim and Lenka,2017 | | | | | | | | | A | | | A |
| 152 | Papa et al.,2017 | A | A | A | A | | | | | A | | | |
| 153 | Singh et al,2017 | | | | | A | | | | | | | |
| 154 | Secundo ,et al,2017 | | | | | | | A | | | | | |
| 155 | Sumbal,et al,2017 | | | | | | | A | | | | A | |
| 156 | Synergita.,2017 | | | | | | | | | A | | | |
| 157 | Dechawatanapaisal et al,2018 | | | | | | | | | | | | A |
| 158 | Isa et al,. 2018 | | | | | | | | | A | | A | |
| 159 | Ahmad et al,2018 | | | | | | | | | | | | A |
| 160 | Brockbank et al,2018 | | | | | | | | | | A | | |
| 161 | Dhanpat et al,2018 | | A | A | | | | | | | | | A |
| 162 | DiRomualdo et al,2018 | | | | | | | | | | A | | |
| 163 | Djafri and Bensaber,2018 | | | | | | | A | | | | | |
| 164 | Dubey et al,2018 | | | | | | | A | | | | | |
| 165 | Grover et al,2018 | | | | | | | A | | | | | |
| 166 | Gulyani and Sharma,2018 | | A | | | | A | | | | | | |
| 167 | Ismail and Rishani ,2018 | | | | A | | | | | | | | |
| 168 | Matongolo et al.,2018 | | A | | | | | | | | | | A |
| 169 | Mayo,2018 | | | | | | | | | | A | A | |
| 170 | Sedkaoui and Khelfaoui,2018 | | | | | | | A | | | | | |
| 171 | Shrivastava et al,2018 | | | | | | | | | | A | | |
| 172 | Ott et al,2018 | | | A | | | A | | | | | | A |

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| 173 | Pandita and Ray,2018 | | | | | | A | | | A | | A | |
| 174 | Rodriguez and Cunha,2018 | | | | | | | A | | | | | |
| 175 | Walford and Jackson,2018 | | | | | | | | | | A | A | |
| 176 | Arasanmi and Aishwarya,2019 | | | | | | | | | | | | A |
| 177 | DiClaudio,2019 | | | | | | | | | | A | | |
| 178 | Ajayi et al.,2019 | | | | | | | A | | | | | |
| 179 | Wilkinson,2019 | | | | | | | | | | A | | |
| | **Total** | **18** | **18** | **37** | **23** | **18** | **32** | **31** | **9** | **18** | **13** | **12** | **19** |

Source: Compiled by author from various sources