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Measuring HR Analytics Application and HR Analytics Competencies of HR Professionals: Towards Operationalization from Conceptualization

H.H.D.P.J. Opatha
Lecturer
University of Sri Jayewardenepura, Sri Lanka
poojaopatha@sjp.ac.lk

N.W.K.D.K. Dayarathna
Professor
University of Sri Jayewardenepura, Sri Lanka
dushar@sjp.ac.lk

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ABSTRACT: *Human Resource (HR) analytics plays a crucial role in bridging the gap between subjective and objective HR practices, revealing that HR decisions are not solely based on theory and applications but also on numerical evidence. Assessing the extent of HR analytics applications helps management understand "where we are" and "where to go" in terms of HR analytics practices. However, the adoption of HR analytics doesn't happen automatically; there must be internal motivating factors within the organization. One key factor is the HR analytics competency of HR professionals, which significantly boosts the application of HR analytics. Therefore, evaluating the competencies of HR professionals helps them gauge "where am I" and "what areas should I focus on mastering" in terms of HR analytics competencies. This article introduces two instruments for measuring HR analytics applications in the organization and the HR analytics competency of HR professionals, utilizing a 5-point Likert scale measurement. The validity and reliability of these instruments are ensured, and the measurements are developed based on a combination of literature findings and the researchers' insights. These two sets of instruments are anticipated to assist organizations and HR professionals in gauging their respective levels of HR analytics application and competencies.*
KEYWORDS: HR analytics, competencies, conceptualization, operationalization

INTRODUCTION

The primary and distinctive input leading to a sustainable competitive advantage for organizations navigating uncertain business environments is the workplace insights derived from employees' capabilities. The ongoing viability of HR hinges on the degree to which HR insights contribute to the realization of business strategies. Consequently, HR needs to shift its

focus from being merely "descriptive" to becoming "predictive" and "prescriptive." The incorporation of analytics into HR functions empowers strategic teams to make informed decisions related to personnel by relying on pure analytical evidence. HR analytics plays a pivotal role in closing the divide between subjective decision-making and objective decision-making.

Ivancevich (1992) suggests an age-old adage in HRM emphasizing the importance of measurable outcomes: "If you can't measure it, forget it." The underlying idea is that without demonstrating your contributions objectively, it's unlikely that your requests will gain attention. Thus, evaluation through measurement holds significant importance in any HRM unit. Highlighting contributions within an enterprise should be a primary concern. Various HR metrics, such as absence rate, turnover rate, cost per hire, training ROI, and yield ratio, serve as indicators of HR effectiveness (Carlson and Kavanagh, 2018). It is widely acknowledged that the success of HR analytics relies on the skills and capabilities of HR professionals (Eriksen, 2016). However, the focus of this paper is not on discussing HR metrics or other measures of HR effectiveness. Instead, it aims to introduce a measurement scale or instrument to assess the extent to which an organization is implementing HR analytics. This involves a self-evaluation of the organization's use of HR analytics applications. Additionally, the paper proposes another instrument for HR professionals to assess their proficiency in HR analytics.

METHODOLOGY

We performed a literature review to conceptualize key ideas, identify dimensions, and pinpoint indicators for variables to facilitate operationalization. Additionally, the snowball technique was utilized to uncover supplementary pertinent literature by examining reference lists from various articles. The questionnaires, designed to operationalize HR analytics applications and assess the competencies of HR professionals, were crafted based on a combination of researchers' insights and established literature. Statistical measures were taken to ensure the reliability and validity of the two instruments.

HR Analytics: Towards Conceptualization

According to Singh et al. (2017), HR analytics is perceived as an evidence-based domain that enhances the ability of HR professionals to make informed decisions, thereby amplifying the impact of HR investments on business performance. The shift in HR towards a greater emphasis on analytics has transformed it into a strategic center of excellence rather than merely an operational partner, as noted by Malla (2018).

Analytics, as described by Bhattacharyya (2017), involves the scientific manipulation of data using mathematical and statistical techniques to enhance decision-making in business. This transformation positions HR as the engine of business intelligence, a crucial element for the sustained performance of the organization, according to Fred and Kinange (2015). The various types of analytics i.e., descriptive, predictive and prescriptive, as categorized by Fred and Kinange (2015), Jabir et al. (2019), Bhattacharyya (2017), and Lydgate (2018), offer a comprehensive perspective on this analytical approach.

Descriptive analytics involves analyzing the data relating to past events using simple statistical techniques like mean, median, variance, standard deviation etc. and describing what is contained in the data set. Predictive analytics involves building predictive models via applying advanced statistical methods (factor analysis, regression analysis, correlation analysis, independent sample T-test etc.) and analytical methods to identify future trends, relationships, impacts, differences etc. which are not readily observed in descriptive analytics. Prescriptive analytics is quite different from descriptive and predictive analytics as prescriptive analytics involves describing the actions that need to be taken by the management after analyzing the outcomes and conclusions derived from descriptive and predictive analytics.

Achieving the highest level of HR analytics proficiency requires a thorough mastery of the three essential analytics components: descriptive, predictive, and prescriptive. HR analytics goes beyond mere numerical calculations and the identification of statistical relationships and impacts. While these aspects are integral to HR analytics, a significant emphasis is placed on making informed, evidence-based decisions that contribute to the long-term success of both the organization and its talented workforce, guided by numerical insights. In this context, descriptive, predictive, and prescriptive analytics are equally crucial for the optimal functioning of HR analytics. Moreover, descriptive and predictive analytics are often employed as prerequisites for prescriptive analytics, where effective decisions on "what should be done" are informed by the outcomes derived from descriptive and predictive analytics. The comprehensive framework of HR analytics encompasses descriptive HR analytics, predictive HR analytics, and prescriptive HR analytics, collectively facilitating the formulation of effective and efficient evidence-based HR decisions.

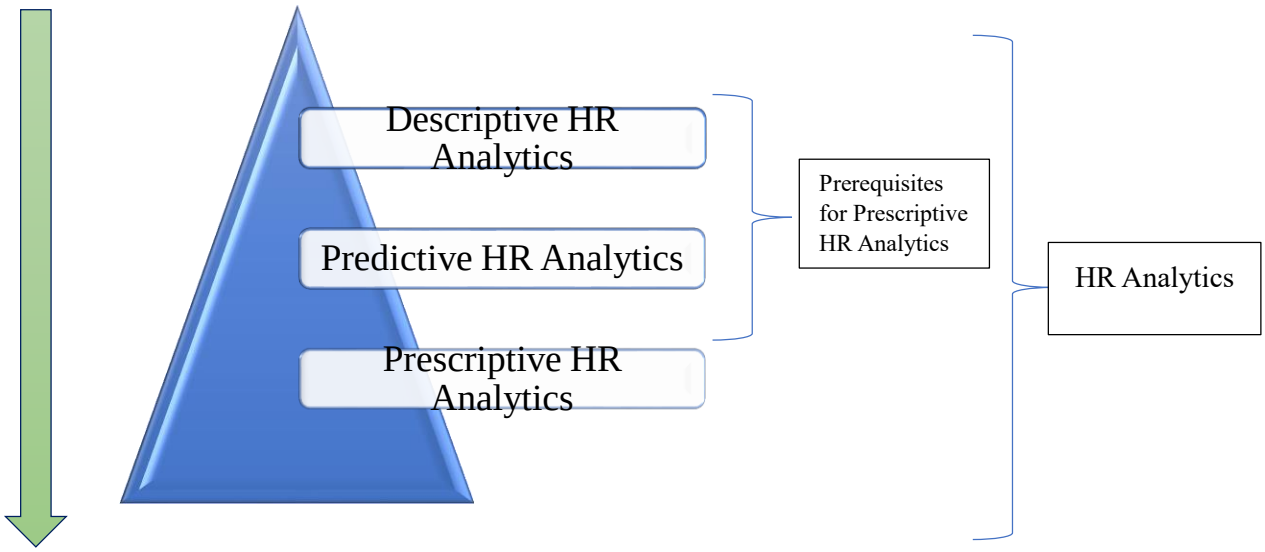

Figure 1. Three HR Analytics Types

Despite the fact that the benefits of HR analytics outweigh the associated costs, Ejaz et al. (2020) contend that the adoption of HR analytics in many organizations is relatively low due

to various factors. Rogers, who introduced the innovation diffusion theory in 2003, posited that individuals within a social system decide to embrace an innovation based on their perceptions of relative advantage, compatibility, complexity, trialability, and observability (Ejaz et al., 2020). The adoption process of innovation, informed by the Theory of Planned Behavior (TPB), consists of three stages: Knowledge, Persuasion, and Decision.

The first stage involves acquiring knowledge about the innovative subject to gain awareness. Successfully completing this stage requires technology self-efficacy (belief in one's ability to handle technology-based analytics software), quantitative self-efficacy (confidence in dealing with mathematical/statistical metrics and calculations), and risk-taking self-efficacy (confidence in accepting and successfully facing risks). An HR professional possessing these three types of self-efficacies is more likely to successfully acquire awareness and knowledge of HR analytics.

The second stage, persuasion, involves cultivating a positive disposition toward HR analytics, which reflects the extent to which HR professionals believe, think, and intend to exhibit positive behavior towards HR analytics. It also encompasses social influence, measuring the degree to which others or change agents influence HR professionals to adopt HR analytics due to its benefits. Additionally, tool trialability assesses the extent to which HR professionals can regularly experience technical tools and techniques. Lastly, perception of relative advantage gauges the extent to which HR professionals perceive the adoption of HR analytics as advantageous in terms of profitability, ease of use, comprehensibility, and satisfaction. An HR professional with elevated levels of technology self-efficacy, quantitative self-efficacy, and risk-taking self-efficacy, coupled with a positive attitude towards HR analytics, positive social influence, and substantial experience in handling analytics tools, is more likely to promote the adoption of HR analytics in a favorable manner.

The third and final stage involves making the decision to adopt HR analytics after successfully completing the prerequisite stages. These three stages illustrate how an HR professional begins to consider the adoption of HR analytics. However, in the practical business environment, deciding to adopt HR analytics is not sufficient; the execution of that decision holds significant importance. The Technology-Organization-Environment (TOE) framework, initially introduced by Tornatzky and Fleischer in 1990, underscores the importance of examining technological, organizational, and environmental factors in the adoption, implementation, and evaluation process of technical innovation (Gurusinghe et al., 2021). Various factors influence the execution of HR analytics, with this paper specifically considering seven factors as the key enablers (BOOSTERs) of HR analytics execution.

Business Strategy Alignment

HRM strategies, policies, processes, procedures etc. should be congruent with the organizational strategies to enhance business performance and achieve competitive advantage (Teena and Sanjay, 2014). HR professionals must ensure that there is no gap between the application of HR analytics and the business strategy. The alignment of HR analytics applications with business strategy is boosting HR analytics execution.

Outstanding Competencies of HR Professionals

Ulrich et al. (1995) define competency as an individual's demonstrated knowledge, skills, or abilities. Strong data management skills, a captivating storyteller, an understanding of the business, the ability to visualize the results, strong psychological skills and excellent statistics and numbers skills are the six must-have competencies of a world-class analytics team (Anderson, 2016). Outstanding competencies of HR professionals ensure fast HR analytics execution.

On-time Investments

Investing in HR analytics via providing training opportunities on HR analytics applications and purchasing technical resources is inevitable for the successful execution of HR analytics. A survey done by a research institute in 2021 exhibits that only one-quarter of organizations are good or very good at designing and implementing HR analytics processes may be because of the lack of technological investments.

Supportive Employees

HR analytics cannot be processed without big data most of which relates to employees of the organization. Thus, on many occasions, HR data might have to be gathered originally from employees. Thus, HR analytics to function properly as expected the data providers must also be supportive during the data-gathering process. Further, HR professionals must be backed by a supportive team that also believes in HR analytics favourably to implement HR analytics applications.

Top Management Support

Top/senior management support is a serious prerequisite for the people analytics team to be effective (Peeters et al., 2020). HR professionals must convince the importance of HR analytics to the top management to get their support. This also can be vice-versa. Developing an "analytics culture" that supports HR analytics is not just enough to implement HR analytics applications. HR professionals with the support of top management in the organization should promote HR analytics by increasing trust and sharing their valuable experiences in HR analytics (Davenport, 2006; Ejaz et al., 2020).

Ethical Data Governance

It is hard to maintain the trust of employees and ensure the law without comprehensive ethical data governance (Togt and Rasmussen, 2017). Hence, it is crucial to develop strict rules and regulations within the organization to collect, organize, analyze, and store data ethically. Ethical and privacy issues can be distinctly addressed with ethical data governance policies. Therefore, ethical data governance enables HR analytics applications.

Research Culture

HR analytics is simply about doing research on HR issues and making solutions to clear up those issues. Thus, building a research-oriented culture plays a big role in the process of HR analytics applications.

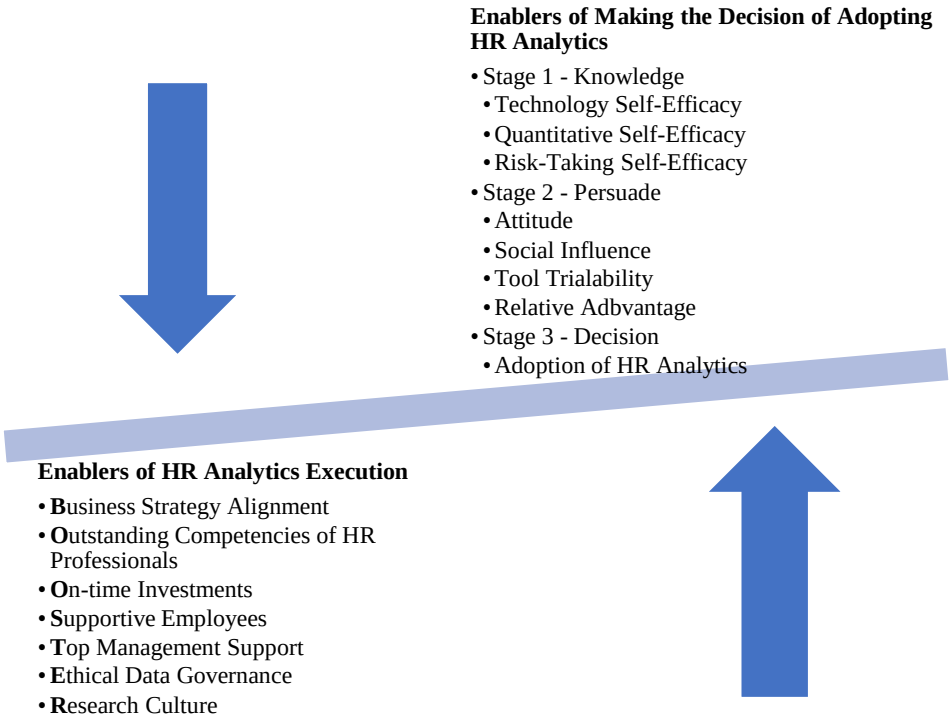

Figure 2. Enablers of Making the Decision of Adopting HR analytics and the Enablers of HR Analytics Execution

As depicted in Figure 2, there needs to be a balanced alignment between the factors facilitating the decision to adopt HR analytics and those facilitating the execution of HR analytics. For instance, even if the organizational factors supporting HR analytics execution are present, the actual execution may not occur if HR professionals lack the factors necessary for decision-making regarding the adoption of HR analytics. Similarly, the mere presence of decision-making factors doesn't guarantee successful execution if the execution facilitators are absent. Therefore, the simultaneous presence of both decision-making and execution facilitators is crucial for the effective implementation of HR analytics. Put simply, deciding to adopt HR analytics does not ensure successful execution if the necessary facilitators for execution are lacking. Additionally, it's worth noting that decision-making facilitators can positively influence the emergence of execution facilitators and vice versa.

HR Analytics Competency: Towards Conceptualization

Competence is the ability or capability, and the proof of competence is performance (Aithal and Aithal, 2019). Competencies can be defined as "a measurable level of knowledge, skill, abilities, behaviours, and other characteristics needed by a person to successfully perform work roles or any other occupational functions" (Maree et al., 2020).

As per the definitions found in the literature, HR analytics competencies for HR professionals encompass the knowledge, skills, and abilities necessary for the effective implementation of HR analytics tasks. According to Boudreau (2017), analytical skills are essential for HR

professionals to successfully embrace HR analytics. Bechter et al. (2020) discovered that organizations require managerial and structural capabilities to fully leverage the potential of HR analytics. Referring to KPMG's 2019 Future of HR survey, 37 percent of respondents express a high level of confidence, specifically "very confident," in their key capabilities, including analytics and artificial intelligence (AI), in transforming HR's ability to engage in analytics.

Application of HR Analytics: Towards Operationalization

In this section, the development of the HR analytics application instrument is explored, detailing the dimensions and indicators employed in its construction. According to Dessler (2008), Human Resource Management (HRM) comprises recruiting, screening, training, rewarding, and appraising. The five fields of HRM encompass employment planning, staffing, human resource development, rewards management, and employee and labor relations, as noted by Opatha (2009). Armstrong and Taylor (2014) identify people resourcing, learning and development, performance and reward, employee relations, and employee well-being as the primary functional areas of HR. Additionally, Aswathappa (2008) outlines the scope of HRM, including employee hiring, remuneration, motivation, maintenance, and industrial relations. Taking into account the insights from the literature, the decision was made to designate indicators for HR analytics application based on the fields of HRM. These indicators include employment planning, staffing, human resource development, employee and labor relations, and rewards management.

Descriptive analytics, predictive analytics and prescriptive analytics are the three dimensions of HR analytics as mentioned in the previous part of this paper. Thus, the degree of application of HR analytics is measured by how descriptive analytics, predictive analytics and prescriptive analytics are used in selected five HRM fields i.e., employment planning, staffing, human resource development, employee and labour relations and rewards management. The operational definition of the application of HR analytics is to which extent the organization practices descriptive analytics, predictive analytics and prescriptive analytics in the five fields of HRM i.e. employment planning, staffing, human resource development, rewards management and employee and labour relations.

Dimension	Indicators	Statements
Descriptive	Employment Planning	1. Formal surveys, past employee requirement trends, unit forecasting or any other analytical method are utilized to calculate and describe the forecast employee demand. 2. Replacement charts are drawn to figure out and describe the internal replacements.
	Staffing	1. Selection schemes are utilized to assess and describe the candidate's suitability in accordance with the job description and job specification.

	Human Resource Development	2. Measures the percentage of candidates who were successful at the interview process compared to the total job candidates interviewed (Recruitment Success Ratio). 3. Measures the cost per hire. 4. Assesses the degree of success of the induction program at the end of induction.
	Employee and Labour Relations	1. Training needs are identified by using formal surveys. 2. Cost of training and development programs are compared with the benefits of those programs and calculate the ROI (Return on Investment) of training programs. 3. Career path ratio (total promotions / (total promotions + total transfers) is calculated to find out the employees' rate of growth. 4. The degree of employee performance is measured by using performance evaluation schemes.
	Rewards Management	1. Absenteeism ratio is calculated. 2. Turnover ratio is calculated. 3. Retention ratio is calculated 4. Employee satisfaction ratio is calculated. 5. Accident ratio is calculated. 6. Number of grievances presented and settled is calculated. 7. Number of strikes and their duration is measured. 1. Measures the relative worth of the job quantitatively. 2. Pay surveys are conducted to analyze the salaries paid by other competitive organizations.
Predictive	Employment Planning	1. Compares forecast employee demand and estimated supply to find out the future net employee requirements.
	Staffing	1. Investigates whether there is any impact from the methods used for recruitment (attracting suitable job applicants) on the number of qualified applicants attracted.

	Human Resource Development	2. Quantitative results of several selection methods (interviews, tests, background investigations, medical tests etc.) are utilized to predict and select the best job candidate who will make the maximum contribution to the organization in future. 3. Evaluates the relationship between the degree of success of the induction program and the performance of newly hired employees.
	Employee and Labour Relations	1. Investigates the relationship between the degree of success of the training and the performance of employees. 2. Assesses the impact of performance evaluation on the career development of the employees by using formal surveys. 3. Assesses the impact of training and development on the career development of the employees by using formal surveys. 4. Predicts future promotions based on the current performance of the employees.
	Rewards Management	1. Predicts what union actions and how they will negatively impact the business process. 2. Analyzes the current employee grievances to identify future union actions. 3. Predicts future workplace hazards through factory investigations. 4. Analyzes the turnover intention of the employees using formal surveys. 5. Predicts suitable punishments for various violations of the rules of the organization. 1. Predicts future salary hikes/drops through past trends of salary hikes/drops. 2. Surveys are conducted to measure the relationship between pay and employee satisfaction.
Prescriptive	Employment Planning	1. Decides strategies for employment shortages and surpluses based on the derived results of the analysis.
	Staffing	1. Decides best methods of recruitment (attracting suitable job applicants) based on the results derived of the analysis.

	Human Resource Development	2. Decides best methods of selection and the way of doing selection based on the derived results of the analysis. 3. Decides the best way of doing induction based on the derived results of the analysis.
	Employee and Labour Relations	1. Decides strategies to improve training and development programs based on the derived results of the analysis. 2. Decides strategies to improve the performance of employees based on the derived results of the analysis. 3. Decides strategies to improve the career development of employees based on the derived results of the analysis.
	Rewards Management	1. Decides suitable strategies to retain talented employees within the organization based on the derived results of the analysis. 2. Decides suitable strategies to improve the health and safety of the employees based on the derived results of the analysis. 3. Decides suitable strategies to reduce or settle the grievances of employees based on the derived results of the analysis. 4. Decides suitable strategies to reduce negative union actions of the employees based on the derived results of the analysis. 5. Decides suitable actions to maintain the discipline of the employees. 1. Develops compensation strategies to make employees satisfied based on analysis.

Table 1. Operationalization Table of Application of HR Analytics

HR Analytics Competency of HR Professionals: Towards Operationalization

Bernard et al. (2018) found four groups of competencies which are leadership competency, technical competency, monitoring/maintaining competency and functional/developing competency. Findings according to Kiran et al. (2018), revealed that *"HR analytics tools are used by the majority of HR executives in making strategic decisions for the organization while non-HR executives use analytical tools for effective decision making to some extent". "Human Resources Professionals in many companies have shifted to become data-driven organizations where every decision at operational, functional and top levels of an organizational hierarchy*

depend on evidence-based data to make appropriate decisions" (Reena et al., 2019). Hence, it is integral to build HR analytics skills within each HR person as it provides positive consequences to the organization in making predictive evidence-based decisions.

First of all, HR professionals need to possess a thorough knowledge of human resources and business. They should have an excellent understanding of HR planning, staffing, human resource development, rewards management, labour relations management etc. Further, they should know about organizational goals, objectives, and strategies and should possess some knowledge regarding other functional fields' operations. Knowledge about these areas will benefit managers to utilize HR analytics in a way that integrates HR results with business results. Then the knowledge of statistics and statistical tools is highly important for data analysis and interpretation. HR professionals should know the mechanism of data collection, survey design and designing experiments (Bhattacharyya, 2017). Statistical and mathematical knowledge contributes to making future decisions precisely. With programming skills, analytical skills, interpretation skills and data visualization skills, HR managers can understand the right story for the data and information derived and can take action against them. All these skills ensure that HR managers become more data and analytics-driven in their workplaces.

Ulrich et al. (1995) did a longitudinal study, which was initiated in 1998, with data from 12,689 HR professionals in 109 organizations and found the most critical HR professional competencies as business knowledge (18.8%), functional HR expertise (23.3%) and management of change (41.2%). Management of change is the most critical competency for HR professionals according to this study. Long and Ismail (2008) examined the essential HR competencies among 32 HR professionals working in Malaysian manufacturing companies in Johor. The HR Competency Survey model which was developed by Brockbank and Ulrich was used in this study. It measures the strategic contribution, personal credibility, HR delivery, business knowledge, and HR technology competencies of HR professionals. Selmer and Chiu (2004) have found updated competencies needed for future HR leaders as human resource knowledge, professional personal skills, strategic labour relations, change agent, innovation and crisis management, financial/business knowledge, organizational knowledge and corporate knowledge. Yusoff and Ramayah (2012) carried out a survey to acquire data from 154 HR professionals to analyze the validity and reliability of the HR Competencies Scale developed by Ulrich et al. (1997) among HR professionals in the Malaysian context. The instrument which measured the competencies of Knowledge of Business, HR Functional Expertise and Managing Change generated a high degree of confidence in the scale's validity and reliability. Some of the items they utilized are mentioned below in Table 2.

Dimension	Item
Knowledge of Business	The HR professionals in our company are knowledgeable about our company's business model
HR Functional Expertise	The HR professionals in our company are effective in recruiting, promoting and placing appropriate people who fit the job description and recruitment.
Managing Change	The HR professionals in our company can use up-to-date methods and technologies to accomplish functional goals (e.g., online recruiting and e-learning).

Table 2. HR Competency Measuring Instrument

McCartney et al. (2020) identified key HR analytics skills, including consulting, technical knowledge, data fluency, data analysis, HR and business acumen, research and discovery, storytelling, and communication. This analysis was based on an examination of 110 HR analyst job advertisements collected from Australia, Canada, Ireland, the United Kingdom, and the USA, along with 12 in-depth semi-structured interviews with HR analytics professionals from Canada and Ireland.

Anderson (2016) outlined six essential competencies for a top-tier analytics team: robust data management skills, compelling storytelling ability, a thorough understanding of the business, proficiency in visualizing results, strong psychological skills, and excellent statistics and numerical skills. Additionally, Peeters et al. (2020) emphasized the importance of HR professionals possessing knowledge and skills in HR analytics software, in addition to the competencies identified in the Anderson model.

Building upon the literature mentioned above, the dimensions of HR analytics competencies for HR professionals were defined as knowledge and skills. The indicators for knowledge include familiarity with HR metrics, proficiency in HR analytics software, and the ability to interpret statistical data. The indicators for skills comprise adept data management, effective storytelling, in-depth understanding of the business, capability to visualize results, strong psychological acumen, and proficiency in statistics and numerical analysis.

The operational definition of HR analytics competency for HR professionals pertains to the degree to which these professionals possess both knowledge and skills. Knowledge is assessed based on their familiarity with HR metrics, proficiency in HR analytics software, and the ability to interpret statistical data. Skills, on the other hand, encompass strong data management, effective storytelling, a deep understanding of the business, the capacity to visualize results, robust psychological capabilities, and proficiency in analyzing statistics and numbers.

Dimension	Indicators	Statement
Knowledge	Knowledge of HR Metrics	1. My knowledge of formulas for calculating HR metrics (absenteeism ratio, ROI of training, turnover ratio, cost per hire etc.) is……..(Very High, High, Average, Low, Very Low)
	Knowledge of HR Analytics Software	1. My knowledge of how to function with HR analytics software (related to payroll, attendance, performance evaluation etc.) is……..(Very High, High, Average, Low, Very Low) 2. My knowledge of functioning with co-relation and regression analysis in SPSS or any other statistical software is……..(Very High, High, Average, Low, Very Low).
	Knowledge of Interpreting Statistical Data	1. My knowledge to interpret derived data from software and metrics is ……..(Very High, High, Average, Low, Very Low).
Skills	Data Management Skills	1. My ability to collect, organize and store data well in relevant document files and software is ……..(Very High, High, Average, Low, Very Low).
	Captivating Storyteller	1. My ability to narratively describe the analysis results well is ……..(Very High, High, Average, Low, Very Low).
	Understand the Business	1. My ability to understand organizational weaknesses, strengths, threats and opportunities is ……..(Very High, High, Average, Low, Very Low).
	Ability to Visualize Your Results	1. My ability to present derived analysis results well in an attractive way is ……..(Very High, High, Average, Low, Very Low).
	Psychological Skills	1. My ability to correctly convert the analysis results into meaningful facts without making contradictories is ……..(Very High, High, Average, Low, Very Low).
	Statistics and Numbers Skills	1. My ability to perform statistical analysis including correlation, simple regression-, factor- and t-test analysis etc. is ……..(Very High, High, Average, Low, Very Low).

Table 3. Operationalization Table of HR Analytics Competency of HR Professionals

Reliability and Validity

Reliability

Reliability assesses the quality of the measurement which was utilized to collect data. The questionnaire must provide consistent results for it to be reliable. Cronbach's Alpha test was utilized to test the reliability of the two instruments developed and as per Table 4, it can be identified that Cronbach's alpha of each instrument is greater than 0.7. This assures the reliability of the two instruments.

Instrument	Cronbach's Alpha Value
HR Analytics Application	.947
Competencies of HR Professionals	.935

Table 4. Reliability

Validity

Validity ensures that instruments accurately measure what they intend to measure. The construct validity of the instruments was tested using KMO (Kaiser-Meyer-Olkin) and Bartlett's tests. Statistically, convergent validity is confirmed when the Average Variance Extracted (AVE) exceeds 0.50. To establish an acceptable level of convergent validity, the AVE should not fall below 0.5, indicating that the latent construct explains no less than 50% of the indicator variance (Fornell and Larcker, 1981).

Variable	AVE	KMO Value	Bartlett's Test (sig. value)	Eigenvalues (% of Variance)
HR Analytics Application	0.643	.870	.000	51%
Competencies of HR Professionals	0.591	.912	.000	64%

Table 5. Validity

KMO value highlights the sample adequacy with the proportion of variance in the variables that might be caused by the given items. As per the results derived from KMO, it can be said that the adequacy of the sample to measure each construct is sufficient and good as the KMO value of each instrument is greater than 0.8. KMO values between 0.8 and 1 mean that sample adequacy is ensured. The significance level of Bartlett's test for each instrument is below 0.01 which indicates that there is a substantial correlation among the items of each variable. This rejects the null hypothesis that the correlation matrix is an identity matrix and the variables are not related. The eigenvalues (% of variance) for the two variables are greater than 50% and this reflects that a greater variance of the variable is explained by each item. According to the percentage of eigenvalues, 51% of the variance in HR analytics applications is explained by

the 47 items in the instrument. 64% of the variance in competencies of HR professionals is explained by the 10 items in the instrument.

DISCUSSION AND CONCLUSION

In the context of advancing technology and intensifying business competition, effective management relies on well-defined evidence. Regardless of the field or subject area, whether it be accounting, marketing, production, or HR, analytics plays a pivotal role in providing data-driven evidence to management for making accurate decisions that ensure long-term survival in the industry. Consequently, the HR field has increasingly embraced HR analytics to inform people-related decisions, leading to a widespread adoption of HR analytics in organizations. This paper offers both theoretical and practical contributions. It introduces two new instruments designed to measure HR analytics application and the competencies of HR professionals in this domain. The HR analytics application instrument incorporates three dimensions (descriptive, predictive, and prescriptive analytics) and five indicators (employment planning, staffing, human resource development, rewards management, and employee and labor relations). The theoretical contribution lies in providing valuable tools for future empirical research, where researchers and practitioners can employ these instruments. From a practical perspective, assessing the extent of HR analytics applications encourages HR professionals to evaluate their current usage and explore opportunities for further integration. Simultaneously, measuring HR analytics competency enables professionals to conduct a self-assessment, identifying areas for improvement to enhance the effectiveness of HR analytics.

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Annexure 1. Measurement of HR Analytics Applications

Statements	SA	A	N	D	SD
Application of HR Analytics					
1. Formal surveys, past employee requirement trends, unit forecasting or any other analytical method are utilized to calculate and describe the forecast employee demand.					
2. Replacement charts are drawn to figure out and describe internal replacements.					
3. Selection schemes are utilized to assess and describe the job candidate's suitability in accordance with the job description and job specification.					

4.	Measures the percentage of candidates who were successful at the interview process compared to the total job candidates interviewed (Recruitment Success Ratio).					
5.	Measures the cost per hire.					
6.	Assesses the degree of success of the induction program at the end of induction.					
7.	Training needs are identified by using formal surveys.					
8.	Cost of training and development programs are compared with the benefits of those programs and calculate the ROI (Return on Investment) of training programs.					
9.	Career path ratio (total promotions / (total promotions + total transfers) is calculated to determine the employee's growth rate.					
10.	The degree of employee performance is measured by using performance evaluation schemes.					
11.	Absenteeism ratio is calculated.					
12.	Turnover ratio is calculated.					
13.	Retention ratio is calculated					
14.	Employee satisfaction ratio is calculated.					
15.	Accident ratio is calculated.					
16.	Number of grievances presented and settled is calculated.					
17.	Number of strikes and their duration is measured.					
18.	Measures the relative worth of the job quantitatively.					
19.	Pay surveys are conducted to analyze the salaries paid by other competitive organizations.					
20.	Compares forecast employee demand and estimated supply to find out the future net employee requirements.					
21.	Investigates whether there is any impact from the method used for recruitment (attracting suitable job applicants) on the number of qualified applicants attracted.					

22. Quantitative results of several selection methods (interviews, tests, background investigations, medical tests etc.) are utilized to predict and select the best job candidate who will give the maximum contribution to the organization in future.					
23. Evaluates the relationship between the degree of success of the induction program and the performance of newly hired employees.					
24. Investigates the relationship between the degree of success of the training and the performance of employees.					
25. Assesses the impact of performance evaluation on the career development of the employees using formal surveys.					
26. Assesses the impact of training and development on the career development of the employees using formal surveys.					
27. Predicts future promotions based on the current performance of the employees.					
28. Predicts what union actions and how they will negatively impact the business process.					
29. Analyzes the current employee grievances to identify future union actions.					
30. Predicts future workplace hazards through factory investigations.					
31. Analyzes the turnover intention of the employees using formal surveys.					
32. Predict suitable punishments for various violations of the rules of the organization.					
33. Predicts future salary hikes/drops through past trends of salary hikes/drops.					
34. Surveys are conducted to measure the relationship between pay and employee satisfaction.					

35. Decides strategies for employment shortages and surpluses based on the derived results of the analysis.					
36. Decides the best methods of recruitment (attracting suitable job applicants) based on the results derived of the analysis.					
37. Decides the best methods of selection and the way of doing selection based on the derived results of the analysis.					
38. Decides the best way of doing induction based on the derived results of the analysis.					
39. Decides strategies to improve training and development programs based on the derived results of the analysis.					
40. Decides strategies to improve the performance of employees based on the derived results of the analysis.					
41. Decides strategies to improve the career development of employees based on the derived results of the analysis.					
42. Decides suitable strategies to retain talented employees within the organization based on the derived results of the analysis.					
43. Decides suitable strategies to improve the health and safety of the employees based on the derived results of the analysis.					
44. Decides suitable strategies to reduce or settle grievances of employees based on the derived results of the analysis.					
45. Decides suitable strategies to reduce negative union actions of the employees based on the derived results of the analysis.					
46. Decides suitable actions to maintain the discipline of the employees.					
47. Develops compensation strategies to make employees satisfied based of analysis.					

SA – Strongly Agree

A – Agree

N – Neutral

D – Disagree

SD – Strongly Disagree

Scale of Measurement

47 – 84.6 - Very low level of HR analytics application

84.7 – 122.2 - Low level of HR analytics application

122.3 – 159.8 - Moderate level of HR analytics application

159.9 – 197.4 - High level of HR analytics application

197.5 – 235 - Very high level of HR analytics application

Annexure 2. Measurement of HR Analytics Competency of HR Professionals

Competencies of HR Professionals	VH	H	N	L	VL
1. My knowledge of formulas about calculating HR metrics (absenteeism ratio, ROI of training, turnover ratio, cost per hire etc.) is……..(Very High, High, Average, Low, Very Low)					
2. My knowledge of how to function with HR analytics software (related to payroll, attendance, performance evaluation etc.) is……..(Very High, High, Average, Low, Very Low)					
3. My knowledge of functioning with co-relation and regression analysis in SPSS or any other statistical software is……..(Very High, High, Average, Low, Very Low).					
4. My knowledge to interpret derived data from software and metrics is ……..(Very High, High, Average, Low, Very Low).					
5. My ability to collect, organize and store data well in relevant document files and software is ……..(Very High, High, Average, Low, Very Low).					

6. My ability to narratively describe the analysis results well is ……..(Very High, High, Average, Low, Very Low).					
7. My ability to understand organizational weaknesses, strengths, threats and opportunities is ……..(Very High, High, Average, Low, Very Low).					
8. My ability to present derived analysis results well in an attractive way is ……..(Very High, High, Average, Low, Very Low).					
9. My ability to correctly convert the analysis results into meaningful facts without making contradictories is ……..(Very High, High, Average, Low, Very Low).					
10. My knowledge on formulas of calculating HR metrics (absenteeism ratio, ROI of training, turnover ratio, cost per hire etc.) is……..(Very High, High, Average, Low, Very Low)					

VH – Very High

H - High

N – Neutral

VL – Very Low

L – Low

Scale of Measurement

10 – 18 - Very low level of HR analytics competencies of HR professionals

19 – 26 - Low level of HR analytics competencies of HR professionals

27 – 34 - Moderate level of HR analytics competencies of HR professionals

35 – 42 - High level of HR analytics competencies of HR professionals

43 – 50 - Very high level of HR analytics competencies of HR professionals