Developing a Human Resource Analytics (HRA) competency framework for enhancing Return on Investment (ROI): An empirical investigation

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Abstract

The study of the relationship between existing HRA competency and Return on investment (ROI) is a relevant theme. Though the role of employee-related elements of HRA (such as capabilities, motivation and opportunity; CMO) in influencing financial outcomes is relevant, there is no empirical evidence analysing the influence of these variables in the HRA competency-ROI relationship. Using a sample of HR professionals (n = 230) in private organizations in Bangalore, India, this paper tested the hypothesized model using SEM. The present paper examined the mediating effects of capability, motivation and opportunity on the relationship between the existing HRA competency and ROI. Likewise, this study tested the differential effect of capability, motivation and opportunity on ROI. The findings of the study identified a positive and significant relationship between existing HRA competency, employee motivation and ROI. Besides, 'opportunity' was identified as a significant mediator of the link between existing HRA competency and ROI. Concerning the differential effect of the individual employee-related variables, the present study revealed that 'opportunity' was more strongly related to ROI than 'motivation'. As one of the first, this paper presents a framework that explains how HRA competency influences ROI through CMO.

Keywords

HRA competency, capability, motivation, opportunity, Return on investment

1   Introduction

In recent times, many organizations are following a trend of evidence-based assessment of organizational performance to support various business aspects with the use of data analytics (Holsapple et al., 2014; Chong and Shi, 2015). Notwithstanding some amount of delay, the human resource management (HRM) department of some organizations has initiated to combine its perception, experience and instinct with the new trend of analytics (Strohmeier et al., 2015; Falletta and Combs, 2020). Data analytics contribute a key part to understand and optimize strategic outcomes at individual and organizational levels, among a host of other practical applications (Edwards and Edwards, 2019). Interest in using data analytics to

render organizations into a more comprehensible form is growing (Gandomi and Haider, 2015). Within this context, the term 'HR analytics (HRA)'– or what is also known as workforce, people, human capital, or talent analytics has been growing in HRM and leadership circles (Deloitte, 2017), which has been existing there for years (Kaufman, 2014; Rasmussen and Ulrich, 2015; Van der Togt and Rasmussen, 2017). HRA is denoted as the 'must have' skill within the HRM profession for creating a pathway to expand the strategic influence of the HRM function (CIPD, 2013). According to Marler and Boudreau (2017), HRA extends beyond the scope of HRM benchmark and includes the utilization of sophisticated technology-based analytical, descriptive and visual data sets related to HR functions and business performance, supported by employee assessment and performance data to improve HR strategy and establish evidence-based business outcomes.

HRA literature has shown that the use of analytical practices within the HRM system is considered to enhance employees' capabilities, motivation and opportunity (hereafter addressed as CMO) to contribute, which, in turn, is associated with positive business outcomes such as return on investments (henceforth ROI) (Levenson, 2011; Pape, 2016). HRA, within the HRD department, acts as a core function enabling organizations achieve competitive success by anticipating future ROI utilizing existing data (Boudreau et al., 2005; Naula, 2015). HRA-driven focus on ROI provides business insights and helps decision-makers to make better business decisions (Ben-Gal, 2019). Thus, HRA can be used to address demanding business issues, for instance, to execute Know Your Customer (KYC) policies as a means of protection against financial economic crime, the ING bank was looking for skilled personnel for roles like documentation and data, customer file enhancement, identity verification, transaction screening and structural solutions. However, owing to the lack of people with such skill sets in the global business market, the bank's HRA team inspected the capabilities and knowledge of their entire employee base to identify suitable employees to fit into such job profiles at the KYC division. This enabled the company to achieve its objective and provided internal employees the opportunity as well as motivated them to grow into new roles, that otherwise were not expected (Peeters et al., 2020).

Many of the present, as well as the future business transformations, are intended to be driven by the progressive field of technology-based developments and increased availability of data within HRM. Together with the digitalization of HRM, opportunities are being provided for HR personnel to leverage the technology-driven generation of data to support HRM and ROI. Stimulated by the success of organizations, in parallel with improved employee-based outcomes like productivity and performance, HRA is rapidly becoming mainstream and gradually considered as a requisite HRM tool (Fecheyr-Lippens et al., 2015; Boston Consulting Group, 2014). Despite its potential and hype among practitioners, leaders, technology vendors and scholars (Guzzo et al., 2015; Boudreau and Cascio, 2017; Huselid, 2018), the effectiveness of HRA is not well-understood.

Although prior research has demonstrated the mechanism through which existing HRA competency relates to some business outcomes, it remains unclear as to how HRA relates to more distal (financial) outcomes at the organizational level (Holsapple et al., 2014; Pape, 2016). Despite the growing connection between data analytics and HR disciplines, there is

very limited empirical evidence to support how HRA influences ROI to fuel effective business decisions (Rauf et al., 2016; Zeidan and Itani, 2020). This is challenging given the different theoretical perspectives that might highlight the significance of related outcomes (Angrave et al., 2016; Levenson, 2018). Moreover, despite the relevance of several elements of HRA at an individual level (such as capabilities, motivation and opportunity) in influencing financial outcomes (Levenson, 2011), there is still a lack of empirical literature analysing the role of the mediating variables at an individual level in the relationship between HRA and ROI (Chuang and Liao, 2010; Levenson and Fink, 2017). Besides, empirical studies analysing the relationships between the CMO components at the individual level within the HR system are scarce and scattered and mainly involve the use of specific mediating variables (capability and motivation), but not opportunity (Jiang et al., 2012). The contribution of the 'opportunity' element has been largely neglected in the scholastic literature (reviewed in Jiang et al., 2013), irrespective of its significance in financial outcomes (Blumberg and Pringle, 1982). Furthermore, existing studies assume that the components of HRA exert equal effects on outcomes under investigation. However, this assumption is recently challenged and argued that different ingredients related to HRA may have a differential effect on the same outcome (Levenson and Fink, 2017). While it is believed that all the elements are important for a successful HRA team and the success of an organization, it may turn out that some elements are less critical than others (Peeters et al., 2020). Given the growing interest in the area, it is argued that the development of an empirical framework based on the available HRA literature is both appropriate and a significant initial step to provide insights into what it takes to derive a successful business outcome like ROI.

Thus, in the quest of empiricism to address the above research gaps, the present paper aimed an empirically explore the intermediate role of the employee CMO in the relationship between HRA and ROI from an HR professional perspective. Also, this study aimed to contribute to the existing literature about the differential effects of the employee capability, motivation and opportunity of HRA on ROI. In doing so, a theoretical model on a sample of HR professionals in private organizations in Bangalore is developed and tested. Accordingly, the study framed the hypotheses based on the theoretical model.

2   Hypotheses formulation

The CMO theoretical perspective guided the present study. Previous theoretical studies suggest that ROI is an important tool that may assist HR managers and stakeholders in decision making (Philips, 2012; Bukhari et al., 2017). Baudreu and Ramstad (2006) established the role of CMO model in yielding favorable HRA-based business outcomes. Acito and Khatri (2014) developed a framework to implement HRA to improve business efficiency. Moreover, Kryscynski et al. (2018) pointed that 'opportunity' played a substantial role in determining the association between HRA and organizational performance. Besides, it is also argued that capability, motivation and opportunity may play different roles in improving business outcomes (Jiang et al., 2012; Ben-gal, 2019). The present study examines the relationship between HRA competency and ROI from a CMO-based perspective

(Levenson, 2011) since such framework has not been conducted in the light of good academic research and also because such a perspective can increase the chances of the utilization of HRA in organizations (Fink, 2010; Xiu et al., 2017). Consequently, the following hypotheses have been framed in the present study:

- *H1: Capability of employees mediates the effect of existing HRA competency on ROI.*
- *H2: Motivation of employees mediate the effect of existing HRA competency on ROI*
- *H3: Opportunity provided to employees mediate the effect of existing HRA competency on ROI*

3   Materials and Method

The study adopted a descriptive and explanatory approach. The descriptive nature highlighted the relationship among the study variables that were based on replicable scientific approaches. The explanatory approach is intended to explain the possible reasons for HRA to improve ROI through employee CMO and the differential effect of CMO on ROI.

3.1   Research Instrument and sampling

The study adopted a quantitative research method as the current study intended to establish the effects of the mediating variables (employee CMO) on the relationship between the independent variable (existing HRA competency) and dependent variable (ROI). A well-structured survey questionnaire with a set of standardized questions was used as the research instrument. The degree of perception of HR professionals on the questions regarding 'their capability and the level of motivation' have been rated based on a 5-point Likert scale from "not at all true = 1" to "a great extent = 5". In the case of 'opportunities provided by their HR managers', questions were rated on a 5-point Likert scale from "never = 1" to "always = 5". Questions regarding 'the effect of HRA competency on ROI' were rated on a 5-point Likert scale from Strongly Disagree (SDA) to strongly agree (SA). A pilot study was conducted (n = 50) from sampled organizations in Bangalore to establish high reliability and validity of the research instrument using Chronbach's alpha and exploratory factor analysis (EFA) using principal component extraction (PCA) method with varimax rotation. The results of the pilot study demonstrated the appropriateness of the questionnaire in terms of reliability and validity. The final research instrument was obtained after some minor modifications from the pilot study and actual data was collected from June to November 2019.

The study adopted simple random sampling where the employees who use HRA software across India were considered as the general population. Due to inaccessibility to the entire population, the study population consisted of HR professionals using HRA software in private organizations in Bangalore, India. The final sample for the study comprised 230 valid responses.

3.2   Data analysis

The AMOS software program (version 21) was used to interpret and analyse data in the present study. Hypothesis testing and the model were accomplished using structural equation modelling (SEM) to examine the direct, indirect and total effects (Wiratchai, 1999).

4 Results

4.1 Structural model evaluation

Regarding the theoretical framework, the model of SEM is shown in Figure 1. The findings demonstrated an overall good model fit with the empirical data ($\chi2/df = 4.486$; RFI = 0.781; CFI = 0.867; NFI = 0.733; IFI = 0.859; TLI = 0.887; and RMSEA = 0.078) within the fit indices level (Kline, 2016). Figure 1 shows the structural proposed model proposing the mediation effect of capability, motivation and opportunity on the existing HRA competency-ROI link. In this model, the path from existing HRA competency and CMO as well as the path from CMO to ROI was found statistically significant and in the same direction, suggesting that the result supports the proposed theoretical model. The study also found that all the standardized regression weights between the items and latent constructs, except for the path between capability and ROI, were statistically significant at P values < 0.05 and < 0.001.
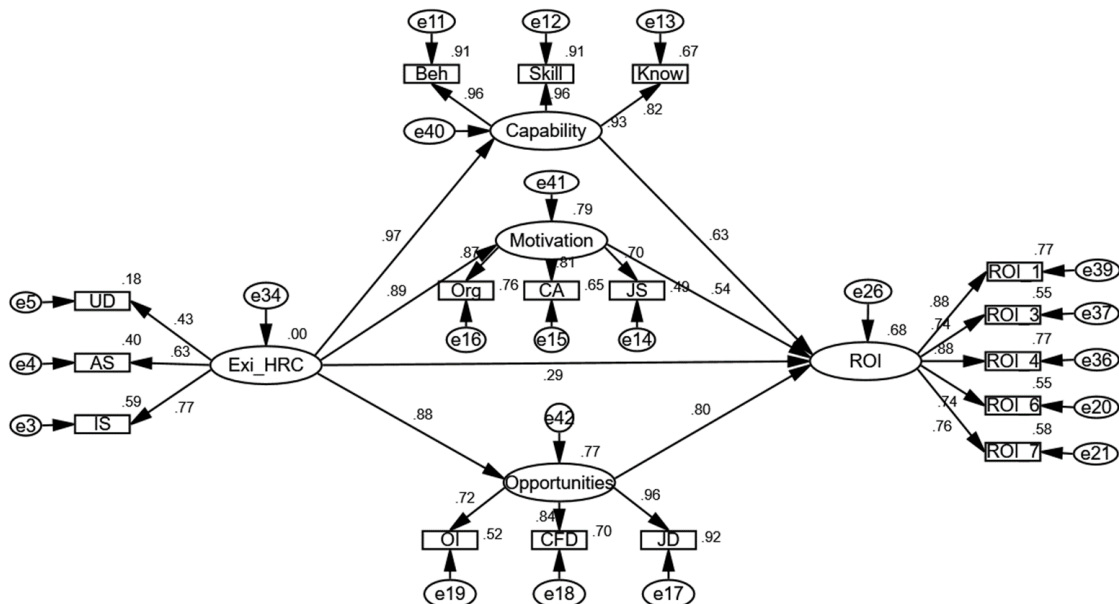

Figure 1: Results of analysis of SEM of the existing HRA competency (Exi_HRC), capability, motivation, opportunities and Return on Investment (ROI).

Note: Exi_HRC = Existing HRA competency, UD = Understanding of data, AS = Analytical skills, IS = Interpretation skills; Beh = Behavior, Know = Knowledge; Org = Organization fit, CA = Creative analytics, JS = Job satisfaction; OI = Organization infrastructure, CFD = Cross-functional dynamics, JD = Job design

4.2 Hypotheses testing

SEM was utilized to test the hypotheses of the study. Hypotheses 1, 2 and 3 predict that employees' capability, motivation and opportunity mediates the effect of existing HRA competency on ROI. We obtained the total, direct and indirect effects of existing HRA competency on ROI from the estimates in SEM (Table 1). The total effects of existing HRA competency on ROI are .967, .887 and .877 for capability, motivation and opportunity, respectively (p < 0.01). Table 1 demonstrated that the introduction of 'motivation' increased the effect of existing HRA competency on ROI ($\beta = 0.541$, p < .001) and it is significant, therefore 'motivation' plays a full mediation role, supporting hypothesis 2. Similarly, the

introduction of 'opportunity' significantly increased the effect of existing HRA competency on ROI (β = 0.803, p < .001), therefore 'opportunity' plays a full mediation role, supporting hypothesis 3. However, the introduction of 'capability' did not significantly mediate the effect of existing HRA competency on ROI, thereby rejecting hypothesis 1. The squared multiple correlations (%R^2) for structural equations predicting employee capability (93.5%), motivation (76.9%), opportunity (78.8%) and ROI (68.5%) indicate that the final model explained a moderate amount of variance in these variables.

Table 1: The total, direct and indirect effects of existing HRA competency on ROI

Structural paths	Total Effect	Direct Effect	Indirect Effects	%R^2	Result
Exi_HRC> Capability > ROI	0.967**	0.285	0.629	93.5	No mediation
Exi_HRC> Motivation > ROI	0.887**	0.285	0.541***	76.9	Full mediation
Exi_HRC> Opportunities> ROI	0.877**	0.285	0.803***	78.8	Full mediation

** P value < 0.01, ***P value < 0.001

As shown in Table 2, opportunity and motivation significantly affect ROI. The SEM analysis result demonstrated that the regression coefficient of 'opportunity' (β = 0.803, p < 0.001) was significantly larger than the coefficient of 'motivation' (β = 0.541, p < 0.05). Moreover, the analyses of relative weights indicate that 'opportunity' explained the larger percentage of variance in ROI (78.8%) followed by 'motivation' (76.9%). However, 'capability' explained the largest percentage of variance in ROI (93.5%); but it was not significant.

Table 2: Results of differential effects of capability, motivation and opportunity on ROI

Structural path	β	S.E	C.R	P value	Result
ROI<--Capability	0.629	0.456	1.072	.284	Not significant
ROI<--Motivation	.541	.257	2.415	*	Significant
ROI<--Opportunity	.803	.129	3.927	***	Significant

*P value < 0.05; ***P value < 0.001

5   Discussion and conclusion

Previous studies have found that HRA have a positive influence on employees' capabilities, motivation and opportunities to participate, but no evidence was found to support the relationship between these three employee-related variables to distal business outcomes like ROI. The incorporation of the CMO-based model in this study allows the integration of mediating variables in a single framework and thus facilitates extending earlier frameworks for the mediating variables in the existing HRA competency-ROI link.

As it was hypothesized, the findings of the present study supported full mediation. Specifically, it was found that employee motivation positively mediated the relationship between existing HRA competency and ROI, indicating that effective implementation of HRA enables to motivate employees to contribute to organizational performance and in

return improves ROI (Aral et al., 2012). In a study by Appelbaum et al. (2000), it was argued that successful business outcome is not just driven by strategy and service or product alone, but also through effective management of its employees. The investment in employees and treating them as assets motivates them to exert more effort on their work, which in turn, improves financial business outcomes (Kim, 2005; Liao et al., 2009). Moreover, this study identified a positive and significant relationship between existing HRA competency, employee opportunity and ROI. Similar positive mediating influences of 'opportunity' were observed in previous studies (Aryee et al., 2012; Ehrnrooth and Bjorkman, 2012). Largely, the findings of the study established that motivation and opportunity are strong predictors of organizational ROI.

Finally, the present study also examined the differential effect of the three employee-related variables (capability, motivation and opportunity) separately on ROI. An earlier study that differentiated among capability, motivation and opportunity (Appelbaum et al., 2000) according to the employee CMO component proposed that these classifications were intended to maximize. The findings of the present study partially support this proposition. This study identified 'opportunity' of employees as the most important driver in improving ROI. This indicates that HRA practices empower employees to use their skills to contribute to business goals, such as improved ROI. This result is similar to the findings by Ehrnrooth and Bjorkman, (2012) and Beltran-Martin and Bou-Llusar (2018) but contradicts the finding by Jiang et al. (2012). However, in the context of private organizations, providing opportunities to participate is considered to be particularly relevant to improve business outcomes (Cabello-Medina et al., 2011). Moreover, the findings of this study supported that 'motivation' has a significant and positive effect on ROI. HRA practices that motivate employees to perform better and increase the maximum possibilities to utilize their skills will assist in improving ROI (Minbaeva, 2017). However, the present study did not find an empirical support for the influence of employee capability on ROI. The general tendency in the HRM literature to measure employee capabilities as the occupational self-efficacy concept may explain this result (Knies and Leisink, 2014).

Understanding the nexus between existing HRA competency and ROI is one of the continuing goals of practitioners and academicians. Conclusively, this paper is one of the first to contribute to the body of knowledge in the existing HRA competency-ROI debate using employees' capability, motivation and opportunity as the mediating variables in private organizations and partially supported the mediation approach.

6 Limitations and future directives

The present study is not without limitations. First, the cross-sectional nature of the study did not provide the opportunity to analyse the cause-effect influences. Thus, longitudinal studies in the future might provide strong causality and sound conclusion. Second, the sampled population for this study is the same for all the constructs (existing HRA competency, CMO and ROI) which may lead to a common method difference. Third, this study measured ROI subjectively and analysing the existing HRA competency-ROI link was based on an individual level. Future studies can incorporate a multi-level (at organizational and individual

levels) approach in contributing to the HRA competency-ROI debate. Lastly, the present study considered one sector and did not focus on the cultural aspect in analysing the mediating relationships.

References

1. Acito, F., & Khatri, V. (2014). Business analytics: Why now and what next? *Business Horizons, 57*(5), 565-570.

2. Angrave, D., Charlwood, A., Kirkpatrick, I., Lawrence, M., & Stuart, M. (2016). HR and analytics: why HR is set to fail the big data challenge. *Human Resource Management Journal*, *26*(1), 1-11.

3. Appelbaum, E., Bailey, T., Berg, P., Kalleberg, A. L., & Bailey, T. A. (2000). *Manufacturing advantage: Why high-performance work systems pay off*. Cornell University Press, Ithaca, NY.

4. Aral, S., Brynjolfsson, E., & Wu, L. (2010). Three-Way Complementarities: Performance Pay, HR Analytics and Information Technology. *Management Science, 58*(5), 913-931.

5. Aryee, S., Walumbwa, F. O., Seidu, E. Y., & Otaye, L. E. (2012). Impact of high-performance work systems on individual-and branch-level performance: test of a multilevel model of intermediate linkages. *Journal of applied psychology*, *97*(2), 287.

6. Beltrán-Martín, I., & Bou-Llusar, J. C. (2018). Examining the intermediate role of employee abilities, motivation and opportunities to participate in the relationship between HR bundles and employee performance. *BRQ Business Research Quarterly*, *21*(2), 99-110.

7. Ben-Gal, H. C. (2019). An ROI-based review of HR analytics: practical implementation tools. *Personnel Review*. DOI 10.1108/PR-11-2017-0362

8. Blumberg, M., & Pringle, C. D. (1982). The missing opportunity in organizational research: Some implications for a theory of work performance. *Academy of management Review*, *7*(4), 560-569.

9. Boston Consulting Group. (2014). *Creating People Advantage 2014-2015*. The Boston Consulting Group, Inc., Boston, MA.

10. Boudreau, J. W., & Ramstad, P. M. (2005). Talentship, talent segmentation, and sustainability: A new HR decision science paradigm for a new strategy definition. *Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management*, *44*(2), 129-136.

11. Boudreau, J. W., & Ramstad, P. M. (2006). *Talentship and human resource measurement and analysis: From ROI to strategic organizational change*. University of Southern California, Los Angeles, CA.

12. Boudreau, J., & Cascio, W. (2017). Human capital analytics: why are we not there?. *Journal of Organizational Effectiveness: People and Performance*, *4*(2), 119-126.

13. Bukhari, H., Andreatta, P., Goldiez, B., & Rabelo, L. (2017). A framework for determining the return on investment of simulation-based training in health care. *Inquiry: The Journal of Health Care Organization, Provision, and Financing*, *54*, 0046958016687176.

14. Cabello-Medina, C., López-Cabrales, Á., & Valle-Cabrera, R. (2011). Leveraging the innovative performance of human capital through HRM and social capital in Spanish firms. *The International Journal of Human Resource Management*, *22*(04), 807-828.

15. Chong, D., & Shi, H. (2015). Big data analytics: a literature review. *Journal of Management Analytics*, *2*(3), 175-201.

16. Chuang, C. H., & Liao, H. U. I. (2010). Strategic human resource management in service context: Taking care of business by taking care of employees and customers. *Personnel psychology*, *63*(1), 153-196.

17. CIPD. (2013). *Talent Analytics and Big Data – The Challenge for HR*. Chartered Institute for Personnel and Development, London.

18. Deloitte (2017). *2017 Deloitte Global Human Capital Trends report: Rewriting the rules for the digital age.*

19. Edwards, M.R., & Edwards, K. (2019). *Predictive HR Analytics: Mastering the HR Metric*. 2nd ed., Kogan Page Ltd, London.

20. Ehrnrooth, M., & Björkman, I. (2012). An integrative HRM process theorization: Beyond signalling effects and mutual gains. *Journal of Management Studies*, *49*(6), 1109-1135.

21. Falletta, S. V., & Combs, W. L. (2020). The HR analytics cycle: a seven-step process for building evidence-based and ethical HR analytics capabilities. *Journal of Work-Applied Management*.

22. Fecheyr-Lippens, B., Schaninger, B., & Tanner, K. (2015). Power to the new people analytics. *McKinsey Quarterly*, *51*(1), 61-63.

23. Fink, A. A. (2010). New trends in human capital research and analytics. *People and Strategy*, *33*(2), 14.

24. Gandomi, A., & Haider, M. (2015). Beyond the hype: Big data concepts, methods, and analytics. *International Journal of Human Resource Management, 35*(2), 137-144.

25. Guzzo, R. A., Fink, A. A., King, E., Tonidandel, S., & Landis, R. S. (2015). Big data recommendations for industrial-organizational psychology. *Industrial and Organizational Psychology*, *8*(4), 491-508.

26. Holsapple, C., Lee-Post, A., & Pakath, R. (2014). A unified foundation for business analytics. *Decision Support Systems*, *64*, 130-141.

27. Huselid, M. A. (2018). The science and practice of workforce analytics: Introduction to the HRM special issue. *Human Resource Management*, *57*(3), 679-684.

28. Jiang, K., Lepak, D. P., Hu, J., & Baer, J. C. (2012). How does human resource management influence organizational outcomes? A meta-analytic investigation of mediating mechanisms. *Academy of management Journal*, *55*(6), 1264-1294.

29. Jiang, K., Takeuchi, R., Lepak, D.P. (2013). Where do we go from here? New perspectives on the black box in strategic human resource management research. *Journal of Management Studies*, *50*, 1448-1480.

30. Kaufman, B. E. (2014). The historical development of American HRM broadly viewed. *Human Resource Management Review*, *24*(3), 196-218.

31. Kim, S. (2004). Individual-level factors and organizational performance in government organizations. *Journal of Public Administration Research and Theory*, *15*(2), 245-261.

32. Kline, R. B. (2016). *Principles and practice of structural equation modeling*. Guilford publications, New York.

33. Knies, E., & Leisink, P. (2014). Linking people management and extra- role behaviour: results of a longitudinal study. *Human Resource Management Journal*, *24*(1), 57-76.

34. Kryscynski, D., Reeves, C., Stice- Lusvardi, R., Ulrich, M., & Russell, G. (2018). Analytical abilities and the performance of HR professionals. *Human Resource Management*, *57*(3), 715-738.

35. Levenson, A. (2011). Using targeted analytics to improve talent decisions. *People and Strategy*, *34*(2), 34.

36. Levenson, A. (2018). Using workforce analytics to improve strategy execution. *Human Resource Management*, *57*(3), 685-700.

37. Levenson, A., & Fink, A. (2017). Human capital analytics: too much data and analysis, not enough models and business insights. *Journal of Organizational Effectiveness: People and Performance*, *4*(2), 145-156.

38. Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR Analytics. *The International Journal of Human Resource Management*, *28*(1), 3-26.

39. Minbaeva, D. B. (2017). Building credible human capital analytics for organizational competitive advantage. *Human Resource Management*, *57*(3), 701-713.

40. Naula, S. (2015). HR analytics: its use, techniques and impact. *International Journal of Research in Commerce & Management,* (8), 47-52.

41. Pape, T. (2016). Prioritising data items for business analytics: Framework and application to human resources. *European Journal of Operational Research*, *252*(2), 687-698.

42. Peeters, T., Paauwe, J., & Van De Voorde, K. (2020). People analytics effectiveness: developing a framework. *Journal of Organizational Effectiveness: People and Performance*, *7*(2), 203-219.

43. Philips, J.J. (2012). *Return On Investment in Training and Performance Improvement Programs*. Routledge.

44. Rasmussen, T., & Ulrich, D. (2015). Learning from practice: how HR analytics avoids being a management fad. *Organizational Dynamics*, *44*(3), 236-242.

45. Rauf, A., Gulzar, S., & Baig, J. (2016). Measuring the effectiveness of HR metrics on return on investment-an empirical study on Pakistani organizations.

46. Strohmeier, S. (2015). Analysen der Human Resource Intelligence und Analytics. In *Human Resource Intelligence und Analytics* (pp. 3-47). Springer Gabler, Wiesbaden.

47. van der Togt, J., & Rasmussen, T. H. (2017). Toward evidence-based HR. *Journal of Organizational Effectiveness: People and Performance*, 4(2), 127-132.

48. Wiratchai, N. (1999). *LISREL model: Statistics for research* (3rd d ed.). Chulalongkorn University Press, Bangkok, Thailand.

49. Xiu, L., Liang, X., Chen, Z., & Xu, W. (2017). Strategic flexibility, innovative HR practices, and firm performance. *Personnel Review*.

50. Zeidan, S., & Itani, N. (2020). HR Analytics and Organizational Effectiveness. *International Journal on Emerging Technologies*, *11*(2), 683-688.