

Can HR analytics improve HR management practices impact on organizational performance? An empirical CB-SEM approach

CHRISTIAN DI PRIMA* ALBERTO FERRARIS*

Framing of the research. *In today's highly competitive business environment, organizations are constantly seeking ways to improve their performance and gain a competitive advantage (Abbate et al., 2019; Behl et al., 2022). To do so, one way that is increasingly deemed as crucial for organizations is to manage their human resources (HR) in a strategic way (Saviano, Maria Luisa et al., 2018; Ramos-González et al., 2022). In fact, to maximize their benefits, the HR practices implemented by organizations have to be aligned with their general strategy (Akwei and Nwachukwu, 2022). In order for this to happen, the HR departments of organizations are relying always more on new digital technologies. Among these, HR analytics has gained increasing attention in recent years (Di Prima and Ferraris, 2022; Margherita 2022). It is defined as «a proactive and systematic process for ethically gathering, analyzing, communicating and using evidence-based HR research and analytical insights to help organizations achieve their strategic objectives» (Falletta and Combs, 2021, p. 54). It is becoming an essential tool for HR professionals and business leaders alike, as it provides valuable insights into workforce trends (McCartney et al., 2021), identifies areas of improvement (Chalutz Ben-Gal, 2019), and helps to inform HR decisions (Marler and Boudreau, 2017). It also enables HR professionals and business leaders to understand employee behavior, to improve workforce planning, and to optimize HR practices to achieve organizational objectives (Tursunbayeva et al., 2018). By leveraging HR analytics, organizations can thus gain a competitive advantage by improving productivity (van der Togt and Rasmussen, 2017), employee engagement (Tursunbayeva et al. 2018), and retention rates (Chalutz Ben-Gal, 2019).*

In particular, HR analytics can positively moderate the relationship between HR management practices and organizational performance in several ways (Falletta and Combs, 2021). Firstly, HR analytics can provide organizations with real-time data and insights, which can help them to make more informed decisions about their HR practices (Cayrat and Boxall, 2022). This can lead to more effective HR practices, which in turn can lead to improved organizational performance (Rai and Singh, 2023). Secondly, HR analytics can help organizations to identify the specific HR management practices that are most effective in improving organizational performance. By analyzing HR data, organizations can identify which HR practices are most strongly associated with improved performance and focus their efforts on these practices (van der Togt and Rasmussen, 2017). This can lead to a more targeted approach to HR management, which can result in greater impact on organizational performance (Chalutz Ben-Gal, 2019). Thirdly, HR analytics can help organizations to identify areas for improvement in their HR practices. By analyzing HR data, organizations can identify areas where HR practices are not meeting expectations or are underperforming (Fernandez and Gallardo-Gallardo, 2021). This can help organizations to identify opportunities to improve their HR practices, which can lead to improved organizational performance. Finally, HR analytics can enable organizations to continuously monitor and evaluate the effectiveness of their HR practices. By collecting and analyzing HR data over time, organizations can identify changes in HR practices and their impact on organizational performance (Patre, 2016). This can help organizations to continuously improve their HR practices and maintain high levels of organizational performance over the long term. Overall, HR analytics can positively moderate the relationship between HR management practices and organizational performance by providing organizations with real-time data and insights, helping them to identify the most effective HR practices, identifying areas for improvement, and enabling continuous monitoring and evaluation of HR practices.

Despite the increasing interest in HR analytics by both academics and practitioners, some gaps can still be identified. First, previous research on HR analytics typically adopted a theoretical approach, without considering empirical evidence (Peeters et al., 2020). This is particularly true when it comes to HR analytics impact on organizational performance (Rasmussen and Ulrich, 2015; Marler and Boudreau, 2017; van der Togt and Rasmussen, 2017; McIver et al., 2018) thus calling for a more complete, evidence-based understanding of the link between the two constructs. A notable exception to this is represented by the recent contribution by McCartney and Fu (2022), who developed the first validated scale to measure HR analytics. However, as admitted by the two authors, their study presents some evident limitations which should be addressed by future research. In particular, they used a small sized,

* PhD Student in *Business and Management* – University of Torino and Vrije Universiteit Brussel
e-mail: christian.diprima@unito.it

• Full Professor of *Business Enterprise and Management* – University of Torino
e-mail: alberto.ferraris@unito.it

context-limited sample, as all examined organizations came from Ireland, thus exhorting future scholars to replicate their analysis in multi-industry, multi-sector and multi-country data sets.

Purpose of the paper. The objective of this study is to investigate from an empirical point of view the effect of an HR analytics data-driven approach guiding the implementation of HR management practices on the performance of organizations. More specifically, we will investigate the positive effect of four HR management practices (employee rewards and incentives, employee training, talent acquisition and knowledge sharing) on organizational performance, and the moderating effect of HR analytics on these relationships. By drawing on contingency theory applied to HR analytics (Harney, 2016), which claims that the HR management activities will increase their effectiveness accordingly with their degree of fitness with the specific organizational context, we hypothesize that:

H1: Employee rewards and incentives are positively related to organizational performance;

H2: Employee training is positively related to organizational performance;

H3: Talent acquisition is positively related to organizational performance;

H4: Knowledge sharing is positively related to organizational performance;

H5: HR analytics activities positively moderate the positive relationship between employee rewards and incentives and organizational performance;

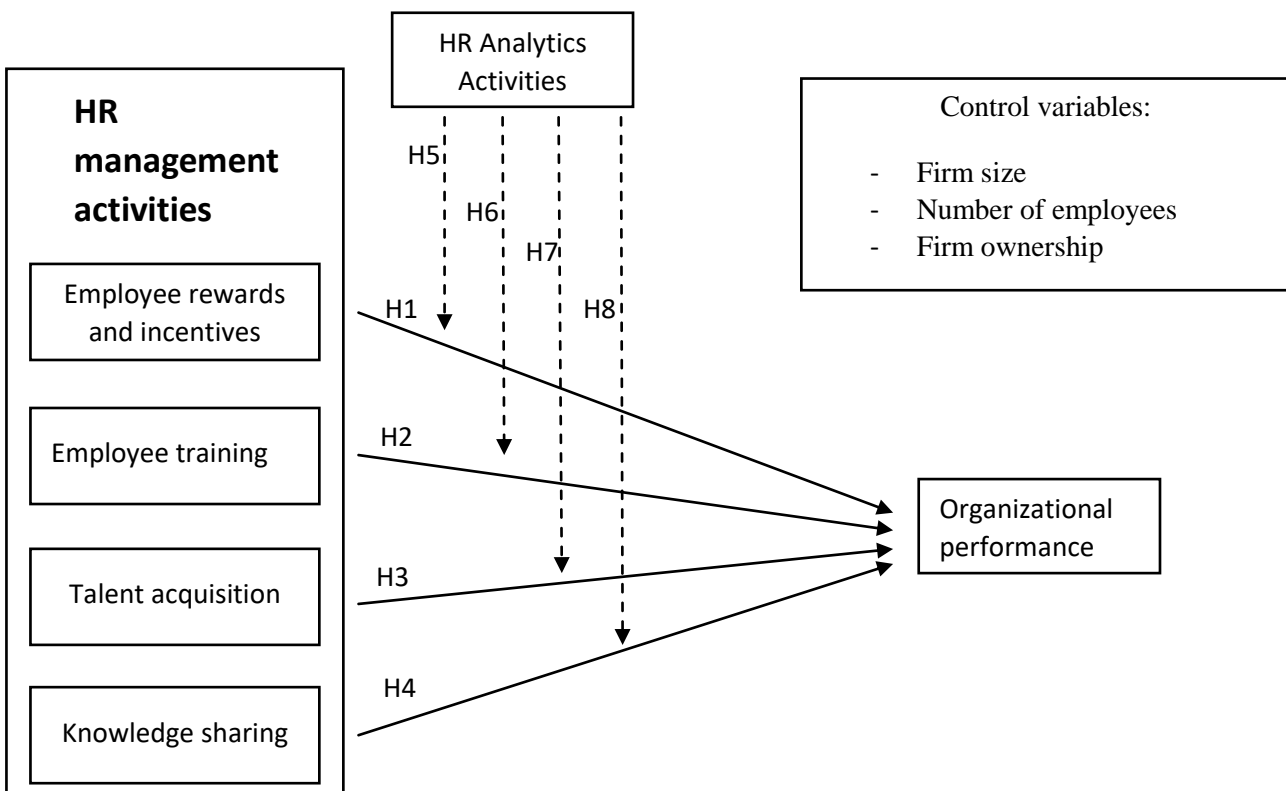
H6: HR analytics activities positively moderate the positive relationship between employee training and organizational performance;

H7: HR analytics activities positively moderate the positive relationship between talent acquisition and organizational performance;

H8: HR analytics activities positively moderate the positive relationship between knowledge sharing and organizational performance.

Our model and hypotheses are summarized in figure 1.

Fig. 1: Research Model and hypotheses



Methodology. We developed a self-administered survey to be completed by HR managers of European organizations which implemented HR analytics activities in the past three years. The online platform "Prolific" is being used to select participants which respect the aforementioned conditions and to deliver the questionnaire (Jabeen, et al. 2022).

Participants were informed that their answers will be anonymous, confidential, and used for scientific research exclusively. Attention check and reverse coded questions were inserted to assure answers' goodness. A pilot-test was conducted in collaboration with members of the Italian Association of Human Resource Directors (AIDP), from which emerged the need to rephrase the reverse coded questions to increase their clarity.

The questionnaire was developed by adapting items that had been previously validated in other studies to improve the validity and reliability of the study (Fink, 2003; Martin, 2005; Groves et al., 2013). For the same reason, each variable was assessed by using a multi-item structure, and their items were measured through a 5-points Likert scale

ranging from 1 (strongly disagree) to 5 (strongly agree), apart from organizational performance which will be measured through a 5-points Likert scale ranging from 1 (much worse) to 5 (much better) (Peter, 1979; Groves et al., 2013).

Employee rewards and incentives will be our first independent variable. It will be measured by 7 items taken from Heffernan et al. (2016). Employee training will be our second independent variable. It will be measured by a total of 8 items from Botelho (2020). Talent acquisition will be our third independent variable. It will be measured using 5 items from Mujtaba et al. (2022). Knowledge sharing will be our fourth independent variable. It will be assessed by 7 items all taken by Yang and Chen (2007)

Organizational performance will be our dependent variable. It will be analyzed based on two dimensions. The first will be operational performance and will be composed of two subdimension, product and service quality, which will be assessed by three items each, all taken by Akhtar et al. (2019). The second will be financial performance, and will be measured by three items taken by Kyrgidou and Spyropoulou (2013) and Real et al. (2014).

HR analytics will serve as the moderator of the relationship between the aforementioned HR management practices and organizational performance. It will be measured by a total of 14 items belonging to three main dimensions, namely high quality data, analytical competency and strategic ability to act. All items will be taken by McCartney and Fu (2022).

Finally, the model will include three control variables, which will be firm size (measured as the logarithm of sales) (Gimenez et al., 2012; Longoni and Cagliano, 2016), number of employees of the organization (Akhtar et al., 2019), and firm ownership (public vs private) (Do et al., 2018).

Data will be organized and processed through the IBM SPSS Statistics v.28 software, which will be used to derive the descriptive statistics and the correlation among variables, as well as to determine the normal distribution of data and that no multicollinearity or common method bias issues are present. SPSS AMOS v.28 will be then used to assess the validity and reliability of the measurement model, and to consequently verify the hypothesis. We will use the SEM technique to simultaneously assess multiple statistical relationship through visualization and model validation as, for example, in Chatterjee et al. (2022) or McCartney and Fu (2022). As it has been flagged as the most appropriate method for theory testing and confirmation in deductive studies (Hair Jr et al., 2017; Dash and Paul, 2021), a covariance based structural equation modelling (CB-SEM) will be used.

Results. As we are still in the data collection phase, analysis still have to be conducted. However, we can discuss about our expected results. First, we expect a positive relationship to exist between the aforementioned HR management practices and organizational performance. In fact, several studies already demonstrated the positive effect of employee rewards and incentives (Hussain et al., 2015), employee training (Omar and Mahmood, 2020), talent acquisition (Mujtaba et al., 2022) and knowledge sharing (Hsu, 2008) on organizational performance. More interestingly, we also expect HR analytics to positively moderate these relationships.

Regarding the relationship between employee rewards and incentives and organizational performance, HR analytics can provide insights into which rewards and incentives are most effective in motivating employees to improve their performance (van den Heuvel and Bondarouk, 2017). Through data analysis, organizations can identify which rewards and incentives are most effective for different employee groups and tailor their rewards and incentives programs accordingly (Chalutz Ben-Gal, 2019). This can lead to increased employee motivation, higher performance, and improved organizational performance. Consequently, we expect HR analytics to positively moderate the relationship between employee rewards and incentives and organizational performance.

In terms of employee training and organizational performance, HR analytics can provide insights into the effectiveness of training programs and identify areas for improvement (Barbar et al., 2019). By analyzing training data, organizations can evaluate the impact of training on employee performance and identify which training programs are most effective (Chalutz Ben-Gal, 2019). This can help organizations to design more effective training programs and ultimately improve organizational performance. Consequently, we expect HR analytics to positively moderate the relationship between employee training and organizational performance.

With regards to talent acquisition and organizational performance, HR analytics can help organizations to identify the best candidates for different job roles (Lam and Hawkes, 2017). By analyzing recruitment data, organizations can identify the most successful recruitment channels and recruitment sources for different positions (Chalutz Ben-Gal, 2019). This can help organizations to target their recruitment efforts more effectively and improve their recruitment and retention rates, which can lead to improved organizational performance. Consequently, we expect HR analytics to positively moderate the relationship between talent acquisition and organizational performance.

Finally, in terms of knowledge sharing and organizational performance, HR analytics can enable organizations to better manage their knowledge resources (Kashive and Khanna, 2022). By analyzing knowledge sharing data, organizations can identify knowledge gaps and opportunities for knowledge transfer and implement knowledge management strategies accordingly (Chaubey and Sahoo, 2019). This can lead to improved knowledge sharing and collaboration across different departments and teams, which can ultimately improve organizational performance. Consequently, we expect HR analytics to positively moderate the relationship between knowledge sharing and organizational performance.

Research limitations. This study presents some limitations which could be addressed by future research. First, our sample was composed of European organizations only. Future studies could replicate our research in other contexts to verify if some difference exist. Second, as our questionnaire was filled out by HR managers only, future studies could adopt a multistakeholder approach by taking into account the perspective of other HR analytics stakeholders as, for

example, the employees of the organization or the top management. Finally, as we adopted a cross-sectional design, future studies could adopt a longitudinal approach to collect data.

Managerial implications. This study will support practitioners from two main point of views. First, it will furnish them with useful insight regarding their HR management practices, as it will provide them with hints that will enable the maximization of their HR investments. Secondly, this study will provide HR professionals and business leaders with practical insights into how they can leverage HR analytics to improve the effectiveness of their HR practices and enhance organizational performance. In fact, the eventual confirmation of our hypotheses will further demonstrate the positive impact that HR analytics can produce not only within the HR management realm, but also on wider organizational outcomes as, in this case, organizational performance, thus furtherly increasing the acceptance of this practice at different organizational level. In fact, even if the popularity of HR analytics has been strongly increasing in the past years (McCartney and Fu, 2022), most organizations still not consider it as a relevant practice able to produce a real positive impact on them.

Originality of the paper. The contribution of this research will be threefold. First, it will contribute to HR management literature related to HR analytics by widening the number of studies that empirically investigated HR analytics impact on organizational performance. In fact, previous studies typically adopted a theoretical approach (Rasmussen and Ulrich, 2015; Marler and Boudreau, 2017; van der Togt and Rasmussen, 2017; McIver et al., 2018). By doing so, we will make a step forward towards a more complete, evidence-based understanding of the link between the two constructs. Secondly, we will answer the call by McCartney and Fu (2022), as we considered a larger, multi-industry, multi-sector and multi-country sample. By doing so, we will contribute to methodologically strengthen their conclusions, as we will demonstrate that they are generalizable not only to a wider, but also to a more heterogeneous sample. Finally, we will offer our contribution to contingency theory, as we will empirically demonstrate its applicability also with regards to a relative new topic as HR analytics.

Keywords: HR analytics; HR management; HR practices; CB-SEM; moderating effect

References

- ABBATE T., PRESENZA A., CESARONI F., MALEDDU M., SHEEHAN L. (2019), "Creativity and innovation in haute cuisine restaurants: factors affecting the creative process of Michelin-rated chefs", *Sinergie Italian Journal of Management*, pp. 109-124.
- AKHTAR P., FRYNAS J.G., MELLAHI K., ULLAH S. (2019), "Big Data-Savvy Teams' Skills, Big Data-Driven Actions and Business Performance", *British Journal of Management*, vol. 30, n. 2, pp. 252-271.
- AKWEI C., NWACHUKWU C. (2022), "An exploration of contextual factors affecting the nexus of competitive strategy and human resource management practices in Nigeria emerging economy context", *The International Journal of Human Resource Management*, pp. 1-44.
- BARBAR K., CHOUGHRI R., SOUBJAKI M. (2019), "The Impact of HR Analytics on the Training and Development Strategy - Private Sector Case Study in Lebanon", *Journal of Management and Strategy*, vol. 10, n. 3, p. 27.
- BEHL A., GAUR J., PEREIRA V., YADAV R., LAKER B. (2022), "Role of big data analytics capabilities to improve sustainable competitive advantage of MSME service firms during COVID-19 - A multi-theoretical approach", *Journal of Business Research*, vol. 148, pp. 378-389.
- BOTELHO C. (2020), "The influence of organizational culture and HRM on building innovative capability", *International Journal of Productivity and Performance Management*, vol. 69, n. 7, pp. 1373-1393.
- CAYRAT C., BOXALL P. (2022), "Exploring the phenomenon of HR analytics: a study of challenges, risks and impacts in 40 large companies", *Journal of Organizational Effectiveness: People and Performance*, vol. 9, n. 4, pp. 572-590.
- CHALUTZ BEN-GAL H. (2019), "An ROI-based review of HR analytics: practical implementation tools", *Personnel Review*, vol. 48, n. 6, pp. 1429-1448.
- CHATTERJEE S., CHAUDHURI R., VRONTIS D., SIACHOU E. (2022), "Examining the dark side of human resource analytics: an empirical investigation using the privacy calculus approach", *International Journal of Manpower*, vol. 43, n. 1, pp. 52-74.
- CHAUBEY A., SAHOO C.K. (2019), "Role of HR interventions in enhancing employee creativity and organizational innovation: an empirical study", *Industrial and Commercial Training*, vol. 51, n. 3, pp. 195-206.
- DASH G., PAUL J. (2021), "CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting", *Technological Forecasting and Social Change*, vol. 173, p. 121092.
- DI PRIMA C., FERRARIS A. (2022), "Save the planet, but do not leave people behind: an interdisciplinary data-driven approach to Social Sustainable Operations and HR Management", *Boosting knowledge & trust for a sustainable business: Electronic Conference Proceedings*. Presented at Boosting knowledge & trust for a sustainable business, Fondazione Cueim, Verona, p. 309-313.
- DO H., BUDHWAR P.S., PATEL C. (2018), "Relationship between innovation-led HR policy, strategy, and firm performance: A serial mediation investigation", *Human Resource Management*, vol. 57, n. 5, pp. 1271-1284.
- FALLETTA S.V., COMBS W.L. (2021), "The HR analytics cycle: a seven-step process for building evidence-based and ethical HR analytics capabilities", *Journal of Work-Applied Management*, vol. 13, n. 1, pp. 51-68.
- FERNANDEZ V., GALLARDO-GALLARDO E. (2021), "Tackling the HR digitalization challenge: key factors and barriers to HR analytics adoption", *Competitiveness Review: An International Business Journal*, vol. 31, n. 1, pp. 162-187.
- FINK A. (Ed) (2003), *The survey kit*, 2nd ed., Sage Publications, Thousand Oaks, Calif.
- GIMENEZ C., SIERRA V., RODON J. (2012), "Sustainable operations: Their impact on the triple bottom line", *International Journal of Production Economics*, vol. 140, n. 1, pp. 149-159.

- GROVES R.M., FOWLER F.J., COUPER M.P., LEPKOWSKI J.M., SINGER E., TOURANGEAU R. (2013), *Survey Methodology*, 2nd ed., Wiley, Hoboken.
- HAIR JR J.F., MATTHEWS L.M., MATTHEWS R.L., SARSTED M. (2017), “PLS-SEM or CB-SEM: updated guidelines on which method to use”, *International Journal of Multivariate Data Analysis*, vol. 1, n. 2, pp. 107-123.
- HARNEY B. (2016), “Contingency Theory”, *Encyclopedia of Human Resource Management*, pp. 72-73.
- HEFFERNAN M., HARNEY B., CAFFERKEY K., DUNDON T. (2016), “Exploring the HRM-performance relationship: the role of creativity climate and strategy”, *Employee Relations*, vol. 38, n. 3, pp. 438-462.
- VAN DEN HEUVEL S., BONDAROUK T. (2017), “The rise (and fall?) of HR analytics: A study into the future application, value, structure, and system support”, *Journal of Organizational Effectiveness: People and Performance*, vol. 4, n. 2, pp. 157-178.
- HSU I.C. (2008), “Knowledge sharing practices as a facilitating factor for improving organizational performance through human capital: A preliminary test”, *Expert Systems with Applications*, vol. 35, n. 3, pp. 1316-1326.
- HUSSAIN I., KHAN A., QURASHI A., QURAT-UL-AIN, SHABBIR A. (2015), “The Impact of Knowledge Sharing Enablers on Employees’ Performance: An Empirical Study on READ Foundation in Azad Jammu & Kashmir”, *Journal of Information & Knowledge Management*, vol. 14, n. 03, p. 1550020.
- JABEEN F., KAUR P., TALWAR S., MALODIA S., DHIR A. (2022), “I love you, but you let me down! How hate and retaliation damage customer-brand relationship”, *Technological Forecasting and Social Change*, vol. 174, p. 121183.
- KASHIVE N., KHANNA V.T. (2022), “Emerging HR analytics role in a crisis: an analysis of LinkedIn data”, *Competitiveness Review: An International Business Journal*.
- KYRGIDOU L.P., SPYROPOULOU S. (2013), “Drivers and Performance Outcomes of Innovativeness: An Empirical Study: Drivers and Performance Outcomes of Innovativeness”, *British Journal of Management*, vol. 24, n. 3, pp. 281-298.
- LAM S., HAWKES B. (2017), “From analytics to action: how Shell digitized recruitment”, *Strategic HR Review*, vol. 16, n. 2, pp. 76-80.
- LONGONI A., CAGLIANO R. (2016), “Human resource and customer benefits through sustainable operations”, *International Journal of Operations & Production Management*, vol. 36, n. 12, pp. 1719-1740.
- MARGHERITA A. (2022), “Human resources analytics: A systematization of research topics and directions for future research”, *Human Resource Management Review*, vol. 32, n. 2, p. 100795.
- MARLER J.H., BOUDREAU J.W. (2017), “An evidence-based review of HR Analytics”, *The International Journal of Human Resource Management*, vol. 28, n. 1, pp. 3-26.
- MARTIN E. (2005), “Survey Questionnaire Construction”, *Encyclopedia of Social Measurement*, vol. 13, pp. 723-732.
- MCCARTNEY S., FU N. (2022), “Bridging the gap: why, how and when HR analytics can impact organizational performance”, *Management Decision*, vol. 60, n. 13, pp. 25-47.
- MCCARTNEY S., MURPHY C., MCCARTHY J. (2021), “21st century HR: a competency model for the emerging role of HR Analysts”, *Personnel Review*, vol. 50, n. 6, pp. 1495-1513.
- MCIVER D., LENGNICK-HALL M.L., LENGNICK-HALL C.A. (2018), “A strategic approach to workforce analytics: Integrating science and agility”, *Business Horizons*, vol. 61, n. 3, pp. 397-407.
- MUJTABA M., MUBARIK M.S., SOOMRO K.A. (2022), “Measuring talent management: a proposed construct”, *Employee Relations: The International Journal*, vol. 44, n. 5, pp. 1192-1215.
- OMAR M.I., MAHMOOD N.H.N. (2020), “Mediating the effect of organizational culture on the relationship between training and development and organizational performance”, *Management Science Letters*, vol. 10, n. 16, pp. 3793-3800.
- PATRE S. (2016), “Six Thinking Hats Approach to HR Analytics”, *South Asian Journal of Human Resources Management*, vol. 3, n. 2, pp. 191-199.
- PEETERS T., PAAUWE J., VAN DE VOORDE K. (2020), “People analytics effectiveness: developing a framework”, *Journal of Organizational Effectiveness: People and Performance*, vol. 7, n. 2, pp. 203-219.
- PETER J.P. (1979), “Reliability: A Review of Psychometric Basics and Recent Marketing Practices”, *Journal of Marketing Research*, vol. 16, n. 1, pp. 6-17.
- RAI A., SINGH L.B. (2023), “Artificial Intelligence-based People Analytics Transforming Human Resource Management Practices”, in Tyagi P., Chilamkurti N., Grima S., Sood K., Balusamy B. (Eds). *The Adoption and Effect of Artificial Intelligence on Human Resources Management, Part A*, pp. 229-244.
- RAMOS-GONZÁLEZ M. DEL M., RUBIO-ANDRÉS M., SASTRE-CASTILLO M.Á. (2022), “Effects of socially responsible human resource management (SR-HRM) on innovation and reputation in entrepreneurial SMEs”, *International Entrepreneurship and Management Journal*, vol. 18, n. 3, pp. 1205-1233.
- RASMUSSEN T., ULRICH D. (2015), “Learning from practice: how HR analytics avoids being a management fad”, *Organizational Dynamics*, vol. 44, n. 3, pp. 236-242.
- REAL J.C., ROLDÁN J.L., LEAL A. (2014), “From Entrepreneurial Orientation and Learning Orientation to Business Performance: Analysing the Mediating Role of Organizational Learning and the Moderating Effects of Organizational Size: Entrepreneurial and Learning Orientation and Performance”, *British Journal of Management*, vol. 25, n. 2, pp. 186-208.
- SAVIANO M.L., POLESE F., CAPUTO F., WALLETZKY L. (2018), “The contribution of systems and service research to rethinking higher education programs: a T-shaped model”, *Sinergie Italian Journal of Management*, n. 104, pp. 51-70.
- VAN DER TOGT J., RASMUSSEN T.H. (2017), “Toward evidence-based HR”, *Journal of Organizational Effectiveness: People and Performance*, vol. 4, n. 2, pp. 127-132.
- TURSUNBAYEVA A., DI LAURO S., PAGLIARI C. (2018), “People analytics-A scoping review of conceptual boundaries and value propositions”, *International Journal of Information Management*, vol. 43, pp. 224-247.
- YANG C., CHEN L.-C. (2007), “Can organizational knowledge capabilities affect knowledge sharing behavior?”, *Journal of Information Science*, vol. 33, n. 1, pp. 95-109.