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Management Theory and Studies for Rural Business and Infrastructure Development
eISSN 2345-0355. 2025. Vol. 47. No. 1: 01-14
Article DOI: https://doi.org/10.15544/mts.2025.01

EXPLORING HUMAN RESOURCE MANAGEMENT CHALLENGES IN START-UP ECOSYSTEMS

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Received 03 01 2025; Accepted 21 01 2025

Abstract
A start-up involves creating a new company in an unpredictable environment with limited resources, and human resource management (HRM) is often undervalued in small firms. This review study emphasizes the significance of HRM in start-ups by 219 publications through Systematic Literature Network Analysis (SLNA) using the Scopus database. HRM critical challenge is focusing on the development of effective entrepreneurial teams. HRM in start-ups also includes modern processes and digital transformation, which can enhance performance and support sustainable development goals. The findings provide valuable insights for both practitioners and academics, suggesting tailored approaches to navigate the unique challenges faced by start-ups.

Keywords: *bibliometric analysis, human resource management (HRM), innovation, Start-up.*
JEL Codes: *M13, M54, O15, O32, L26.*

Introduction

A start-up is the actual process of beginning a firm in an uncertain climate (Wang et al., 2022). Start-ups are disrupting traditional marketplaces and displacing well-established players with innovative offerings (Edison et al., 2018). Start-ups frequently strive to scale their businesses by inventing breakthrough goods with restricted personnel and financial resources (Berg et al., 2020). Although start-ups have limited financial and human resources, they can use them to their advantage and overcome the disadvantages of being small and new (Ahmed et al., 2021).

Related to start-ups, discussing human resources necessitates developing proper HRM missions and practical applications to achieve the company's goals (Boudlaie et al., 2022). Hence, HRM may have strategic or non-strategic (operational) missions and goals, and its activities can also fall between the two.

HRM practices can catalyze innovation, which is vital for start-ups, by promoting and facilitating employees' innovative behaviors (Jebali & Meschitti, 2021). Creating an effective entrepreneurial team by hiring, growing, and retaining talented people (Dey et al., 2023) dramatically influences start-up success. Another critical function of HRM is increasing employee engagement and motivation, which are often inherent but can also greatly vary within entrepreneurial teams (Shane et al., 2003).

Building and maintaining a solid team is vital for any start-up since teams are crucial in understanding and carrying out the founder's

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vision (Todorova, 2019). However, more information about how the start-up team's structure influences performances in founder-led organizations (Hendricks et al., 2019). The entrepreneurial team is the driving force behind the entrepreneurial process; a critical success factor of the start-up process lies in the characteristics of the start-up team (Franke et al., 2008), also referred to as the entrepreneurial team (Kamm et al., 1990), new venture team (Klotz et al., 2014), founding team (Beckman, 2006), or the entrepreneurial top management team (Ferguson et al., 2016). Start-up teams immediately impact their organization's structure, mechanisms, and early processes, which have lasting effects that continue to influence the organization's strategy, survival, and competitive position, often long after most team members have left or been replaced (Beckman & Burton, 2008).

HRM may not play a strategic function in small businesses due to their size and limited number of members (Boudlaie et al., 2022). In contrast, innovative companies start small and straightforward; their structure and operations become more complex as they grow, requiring human resources and professional HRM practices (Gopinath & Poornappriya, 2020). While superior HRM practices can boost the development of start-ups (Baron & Hannan, 2003; Bendickson et al., 2017), HRM is still underappreciated and informal in small creative organizations because they resist imposing norms and regulations that they regard as threatening to their entrepreneurial spirit and flexibility (Wapshott & Mallett, 2015).

There needs to be a consistent view on the importance of HRM practices in new, innovative small firms. This inconsistency may stem from the nature of start-ups, including unproven and often unique business models, trial and error approach to development, uncertain market environment, and the changing role of HRM during the entrepreneurial process (Nascimento, 2017). The type of industry can also significantly impact the HR strategies start-ups may adopt (Çera et al., 2023).

Previous research shows that small enterprises are less likely to use formal HRM methods (Bartram, 2005), while innovative firms' HRM is vital in acquiring and sustaining qualified employees and supporting knowledge utilization (Boxall, 2003). Start-ups have received less attention from the HRM perspective. However, employees are an essential source of creativity for small creative enterprises, and unlocking their innovative potential requires targeted managerial action (McGuirk et al., 2015).

Start-ups are usually overlooked in HRM literature due to the assumption that they cannot provide complex HRM systems (Jebali & Meschitti, 2021). HRM is generally associated with additional costs and lack of flexibility, negatively affecting the day-to-day operations and planned performance of small companies with limited resources, such as startups (Chadwick et al., 2013). This pertinent view is challenged by Jebali & Meschitti (2021); and Rani (2021), who argue that the initial acceptance of suitable HRM methods assists talent acquisition and retention, encourages and promotes innovative behavior among employees by improving their motivation, morale, and thinking skills, and acts as a catalyst for innovation in start-up companies.

Accordingly, this bibliometric analysis aims to understand better the literature on the nexus between HRM and start-ups. Specifically, we examine RQ1: What are the characteristics of the most recent research trends and challenges on HRM in start-up firms? RQ2: How important is HRM to the development of innovative companies?

Research methods

Scopus was chosen for the study since it is a popular resource for literary research. The literature was chosen and evaluated using a Systematic Literature Network Analysis (SLNA) (Ejsmont et al., 2020). There are two main components to this SLNA approach (Figure 1). Firstly, we manage a systematic literature review (SLR) with a bibliographic network analysis. The SLR technique for additional data analysis assures that papers are selected. Using Global Citation Score (GCS) and Co-Occurrence Networks of Keywords allows for identifying novel and emerging research trends.

Additionally, this method enables a detailed description of the qualitative components suited for bibliometric study. The abstracts, keywords, and titles were all reviewed by queries. According to the content analysis, this strategy reduces study bias while improving the validity and repeatability of established constructs. VOSviewer (1.6.20) provides access to Scopus bibliometrics data for the analysis.

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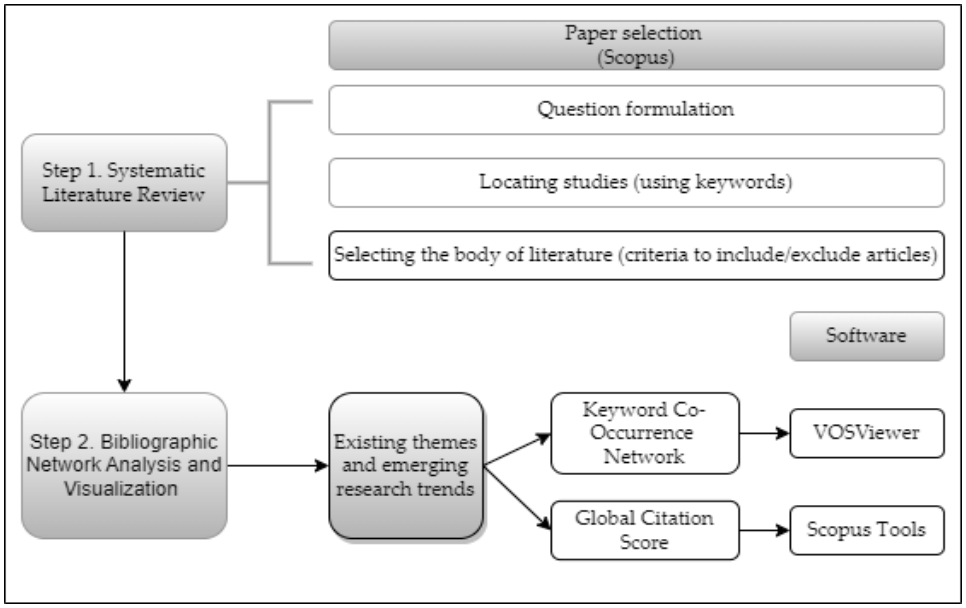

Figure 1. Systematic literature network analysis (SLNA) method

Results and discussion

The following query was prepared in December 2023 (31.12.2023) to identify the scientific sources found in Scopus at the intersection of Human Resource Management and start-ups: ((human resource management) AND (startup OR startups OR start-up)). When the search was conducted, Scopus contained 569 articles, but only 219 publications were published in the period considered, i.e., between 2018 and 2023 (Figure 2).

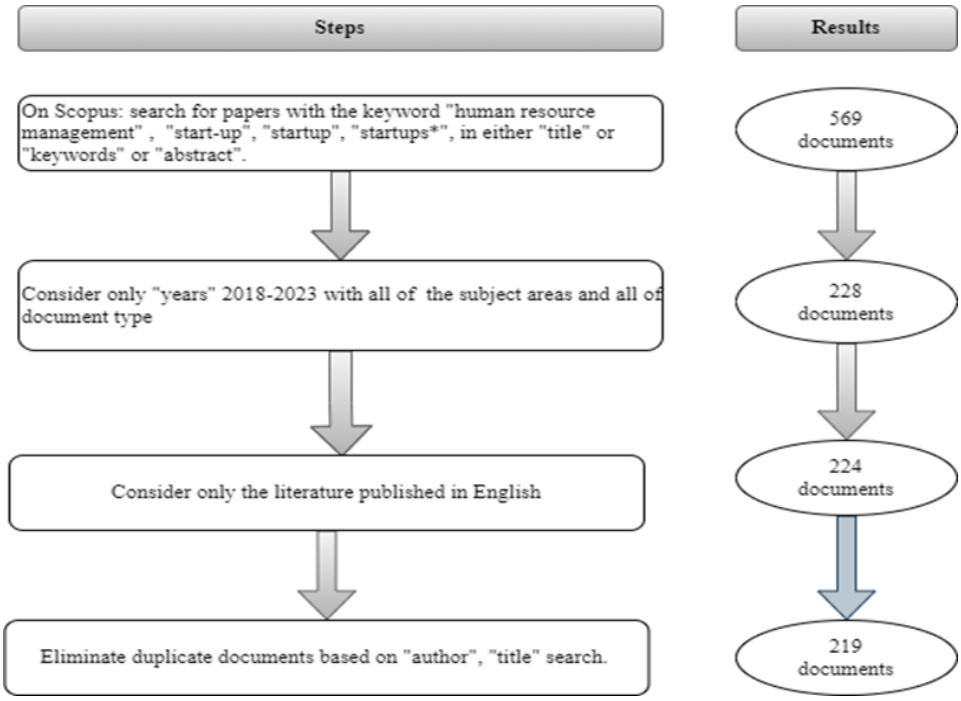

Figure 2. Paper selection procedures and result

The interest in this topic has fluctuated recently from 2018-2022. 2018, we found 18 papers, and in 2019, it increased to 46 papers. 2020 experienced a decline and produced 41 papers. Since 2021, it has continued to increase until 2022, with 48 papers and 51 papers, respectively. Only in April 2023, only 8 papers were produced. The United States published the most papers (53) (Figure 3), followed by India, Canada, and China (18, 13, and 12). Overall, 3% of papers are authored in Australia and New Zealand, 5% in Africa, 23% in Asia, 27% in North and South America, 35% in Europe, and 7% in other locations. The fact that the research has been conducted across continents and countries suggests that the subject is vital worldwide. Another explanation is that various countries (including the United States, India, Canada, and China) focus on growing human resources, start-ups, and entrepreneurship.

Figure 3. The frequency of publications by country of origin

Figure 4 shows the subject areas of the selected publications dominated by three areas: (1) business, management, and accounting; (2) engineering; and (3) computer science, with 71 (15.9%), 70 (15.77%), and 66 (14.8%), respectively. The subsequent areas are medicine, with 40 papers (9.01%); social sciences, with 35 papers (7.8%); decision sciences, with 27 papers (6.1%); and economics, econometrics, and finance, with 21 papers (4.7%).

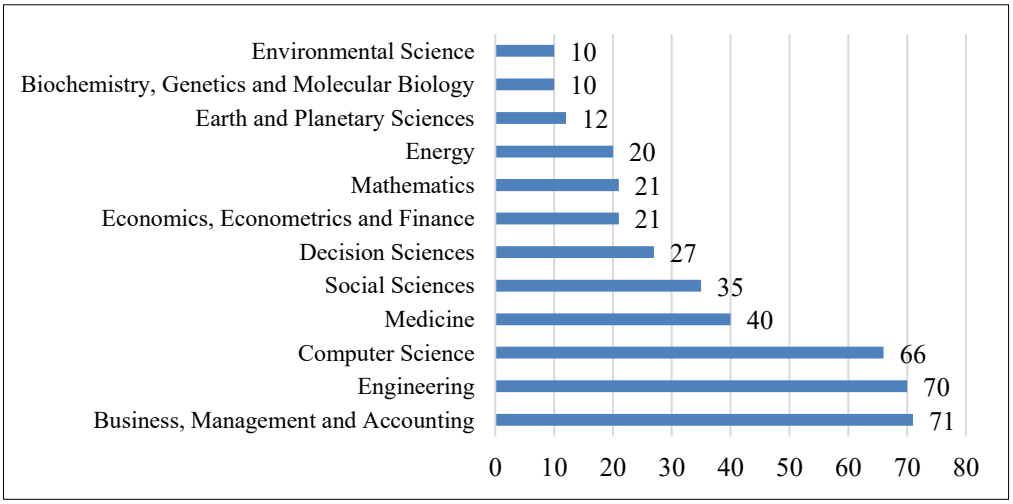

Figure 4. The Subject areas of selected papers

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Co-occurrence network analysis was used to evaluate the selected publications. The nodes in this network reflect the keywords, while the linkages demonstrate how frequently the keywords appear together throughout multiple articles (Ejsmont et al., 2020). The distance between two keywords in the visualization indicates the relationship in terms of co-occurrence. In general, the closer the keywords are, the stronger the relationship. The elements can be coloured in the overlapping display, with the default colours ranging from blue (lowest score) through green to yellow (highest score). The keywords highlighted in yellow (e.g., personal training, risk assessment and information processing) are the most recent research topics in chronological sequence (Figure 5).

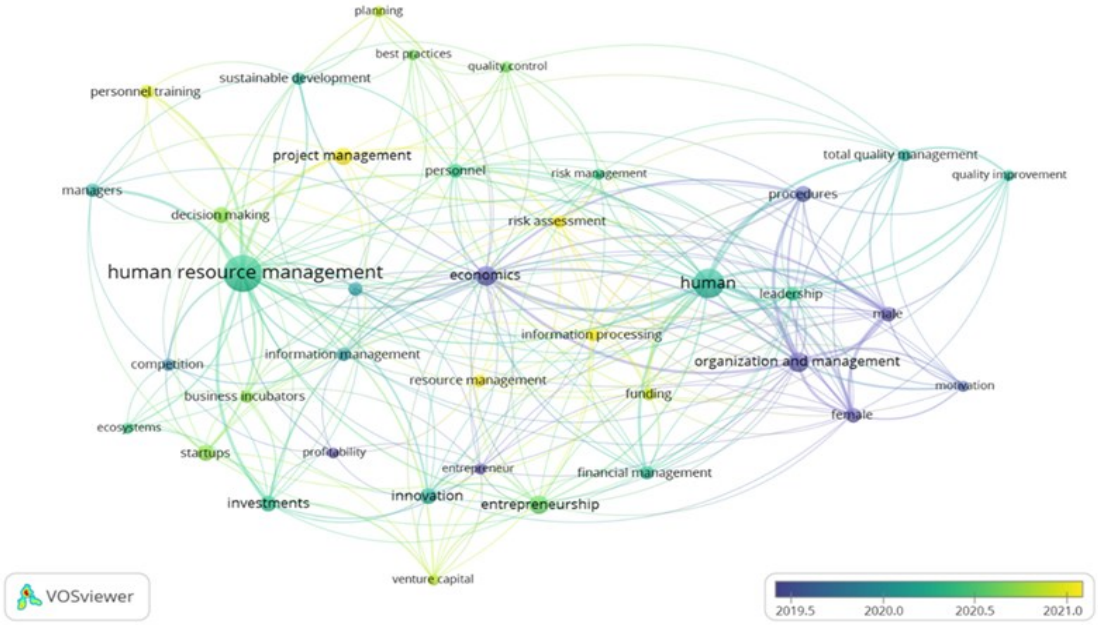

Figure 5. Co-occurrence overlay visualization using keywords

Thirty-eight items or nodes were conducted by VOSviewer and organized into four clusters. The complete keywords, clusters, total link strength, occurrence, and primary research areas of each cluster are presented in Table 1. The co-occurrence network had 260 linkages and a total link strength of 575. Based on Table 1, serially from clusters one to four, the keywords with the highest occurrence rate such as "Entrepreneurship" with 26 occurrences with a total of 17 links, "Female" with 52 occurrences with a total of 53 links, "Decision making" with 95 occurrences with a total of 27 links, "Economics" with 20 occurrences with a total of 68 links.

Table 1. Keyword-driven clusters of research topics

Cluster	Keyword	Total Link Strength	Occurrences	Main Research Topic
1	Entrepreneurship	17	26	Prioritizing successful entrepreneurial skills and innovative entrepreneurship
	Business incubators	18	18	
	Entrepreneur	14	18	
	Competition	16	13	
	Ecosystems	10	13	
	Information management	18	8	

2	Female Financial management Funding Human Information processing Leadership	53 25 22 144 24 31	52 20 12 11 11 9	Leadership, building and managing successful entrepreneurial teams
3	Decision making Human resource management Managers Personnel training Project management Risk assessment	27 109 16 12 25 21	95 14 12 9 9 6	Start-up human resource development in lean philosophy and concepts.
4	Economics Personnel Sustainable development Best practices Planning Quality control	68 24 16 10 10 16	20 8 6 5 5 5	The human resources processes and approaches to sustainable development.

Table 1 offers thorough information about keywords and clustering. The resulting clusters represent four main trends in the study topic. The co-occurrence of terms in the data set was then used to arrange the research subjects. *Cluster 1* is concerned with prioritizing successful entrepreneurial skills and innovative entrepreneurship. It is explained by a study (Hatthakijphong & Ting, 2019) that investigated the perceived worth of successful entrepreneurial skills among entrepreneurs and those thinking about starting a business. It discovered that company management and critical thinking skills are essential success factors for entrepreneurs and wannabe entrepreneurs. Unlike entrepreneurs, aspiring ones are undervalued persistence and overvalued creativity, innovation, and human capital. Vnoučková (2018)confirmed that proactive development behavior promotes growth and innovation. HRM may help innovation in the context of start-ups; it argues that early adoption of effective HRM practices can catalyze creativity because they are a powerful way of methodically supporting and facilitating employees' inventive manners (Jebali & Meschitti, 2021). Furthermore, (Salamzadeh and Dana, 2021) present the central liabilities of start-ups and identify six significant categories of difficulties, including finance, HRM, support measures and processes, marketing, and crisis management.

Cluster 2 focuses on leadership, building and managing successful entrepreneurial teams. (Todorova, 2019) argues that efforts to launch new start-ups rely significantly on teams and networks. The study (Pu et al., 2022)demonstrates that start-up managers can boost their employees' affective commitment by emphasizing entrepreneurial leadership and merging organizational career improvement chances. Employees' silent information-sharing behavior is encouraged, with implications for knowledge and human resource management in start-ups. Furthermore, concerning leadership in shifting business models toward a circular economy, this study (Trigkas et al., 2020) outlines the primary methods, business strategies, and measures industry leaders use to transition to the circular economy (CE).

Cluster 3 focuses on start-up human resource development in lean philosophy and concepts. Vukadinovic et al. (2019) propose an early human resources management (EHRM) model that is based on a proactive approach to human resources and is influenced by existing pillar frameworks of lean-based world-class manufacturing (WCM) and total productive maintenance (TPM). The EHRM model was developed by combining early management and human resource development concepts, and it employs the vertical start-up (VSU) concepts to significantly reduce the period required to achieve strong potential and reach the desired level of knowledge and capabilities of human resources in industrial systems. According to the findings, (Edison et al., 2018) discuss an internal start-up that can be established from the top down by management or from the bottom up by employees, each of which faces unique hurdles. Top management support and a cross-

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functional team are highlighted as essential accelerators and impediments to using lean start-ups in large firms. (Glock et al., 2019) address detailed learning curves that are a valuable tool for managerial decision-making in production and operations management because they can illustrate worker performance improvement due to repetitions or experience. (Guyader & Piscicelli, 2019) contribute to our understanding of the emergence of sharing with the business model portfolio, which consists of six critical resources (customer support, user data, platform technology, member community, local management team, and partners) and three key capabilities (technology upgrades, user engagement, and leveraging community assets). They are utilized in conjunction and applied across company models and geographic regions to improve matchmaking quality, promote expansion, and boost revenues.

Cluster 4 concerns human resources processes and approaches organizations to the ideal of sustainable development. The study (Kuzior et al., 2022) was founded on the notion that the digitization of work and human resource processes will help firms achieve the goal of sustainable development. Based on their findings, the authors hypothesized a positive association between digitization and increased organizational sustainability. This conclusion is essential for human resources specialists and can refer to a broader business strategy. The configuration and skills of the management team are critical factors in steady growth and are more flexible than other resources, such as capital size and product volume. (Harada & Sengoku, 2019). However, the management team's characteristics and dynamics must be better understood, resulting in limited value creation. (Conti & Graham, 2020) investigate how important venture capitalists (VCs) affect CEO replacement in start-ups. The data indicate that CEO turnover is linked to higher export innovation and survival performance in start-ups, with experienced outsider CEO replacements having the most incredible survival rates. In addition, this is one of the first studies (Aswale & Waghmare, 2022) to explore HR aspects and best practices through organizational structure, talent development and promotions, and organizational culture in small enterprises.

A Global Citation Score (GCS) indicator shows the total citations received across the Scopus database, and it can be used to identify the most influential papers (Ejsmont et al., 2020). Studies with a great GCS value are original or significantly impact the topic since the work is cited in multiple other studies. Table 2 shows the top cited 10 papers based on normalized GCS values.

Table 2. Ranking the top 10 most referenced articles based on normalized GCS scores

Rank	Title	Authors	Pub. Year	Journal	App. in CNA	GCS	Norm GCS*
1	Think human, act digital: Activating data-driven orientation in innovative start-ups.	Visvizi A., Troisi O., Grimaldi M., Loia F.	2021	European Journal of Innovation Management	Yes	17	4.33
2	The coronavirus (COVID-19) pandemic: Challenges among Iranian start-ups	Salamzadeh A., Dana L.P.	2021	Journal of Small Business and Entrepreneurship	Yes	54	3.67
3	The sustainability of public health interventions in schools: A systematic review	Herlitz L., MacIntyre H., Osborn T., Bonell C.	2020	Implementation Science	Yes	92	2.75
4	How does urban agglomeration integration promote entrepreneurship in China? Evidence from regional human capital spillovers and market integration	Zheng S., Du R.	2020	Cities	Yes	48	1.75
5	Capacities of a business incuba-	Wang Z., He Q.,	2020	Technological Fore-	Yes	31	1.75

	tor and regional innovation performance	Xia S., Sarpong D., Xiong A., Maas G.		casting and Social Change			
6	Digitalization of Work and Human Resources Processes as a Way to Create a Sustainable and Ethical Organization	Kuzior A., Kettler K., Rab L.	2022	Energies	Yes	20	1.5
7	Applications of learning curves in production and operations management: A systematic literature review	Glock C.H., Grosse E.H., Jaber M.Y., Smunt T.L.	2019	Computers and Industrial Engineering	No	85	1.4
8	Circular economy. The Greek industry leaders' way toward a transformational shift	Trigkas M., Karagouni G., Mpyrou K., Papadopoulos I.	2020	Resources, Conservation, and Recycling	Yes	12	0.75
9	Life cycle energy and environmental impacts of a solid oxide fuel cell micro-CHP system for residential application	Longo S., Cellura M., Guarino F., Brunaccini G., Ferraro M.	2019	Science of the Total Environment	Yes	35	0.6
10	Achieving Agility and Quality in product development - an empirical study of hardware start-ups	Berg V., Birkeland J., Nguyen-Duc A., Pappas I.O., Jaccheri L.	2020	Journal of Systems and Software	No	17	0.5

**Citation for 2023/Years since the adoption.*

According to the normalized GCS analysis results in Table 2, most breakthrough research forms primary citation coexistence networks. It is supported by the fact that 8 of the 10 publications with the highest normalized GCS belong to the four most essential groups identified during the citation co-occurrence analysis (Table 1). However, the normalized GCS ranks obtained using the two separate techniques will differ slightly (Ejsmont et al., 2020). There are articles with low GCS (for example, yet high normalized GCS values. Otherwise, there are articles with high GCS (Glock et al., 2019) and low normalized GCS values.

The first and second papers are part of the most cited cluster. Papers are widely cited in the years immediately following their publication. The papers (Salamzadeh & Dana, 2021; Visvizi et al., 2021) are especially noteworthy since they include many normalized GCS. This criterion could signal that these papers are revolutionary studies defining potential research fields. Visvizi et al. (2021) explore the determinants of innovation management in modern data-driven firms and suggest that data-driven businesses that integrate human talent, a strategy view, and proactive management are more effective at driving innovation. Salamzadeh and Dana (2021) present the major problems of start-ups and discover that six critical types of challenges must be managed, including HRM.

Only one paper in Table 2 (Glock et al., 2019) is a review or conceptual paper. It discusses a comprehensive systematic review of learning curves, a valuable tool for managerial decision-making in production and operations management. The worker performance improvement due to repetitions or experience may be worth exploring the priorities and strategies of start-ups that prioritize stability and consistency over rapid growth and change, as it is essential to consider any potential negative impacts on employee morale and burnout when constantly adapting to new processes and procedures. Finally, addressing concerns from employees who may need help to keep up with the learning curve and feel left behind should be a priority and addressed thoughtfully.

The study presents a detailed summary of the different perspectives and developments in research on human resource management in start-ups during the last five years. This research used two stages of analysis: Stage one was a systematic review process, and stage two was a visualization analysis. Stage 1 ensured that all relevant data was identified, and stage 2 revealed new perspectives on interconnectedness and trends in the field.

Research trends on HRM and start-up perspective in the last five years have focused on the following topics: (1) Prioritizing successful entrepreneurial skills and innovative entre-

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preneurship (Edison et al., 2018; Salamzadeh & Dana, 2021; Vukadinovic et al., 2019; Zheng & Du, 2020). (2) Leadership, building and managing successful entrepreneurial teams (Fillol et al., 2019; Herlitz et al., 2020; Vukadinovic et al., 2019). (3) Start-up human resource development in lean philosophy and concepts (Salamzadeh & Dana, 2021; Visvizi et al., 2021; Vukadinovic et al., 2019; Zheng & Du, 2020). (4) The human resource processes and methods for sustainable development (Conti & Graham, 2020; Kuzior et al., 2022; Trigkas et al., 2020; Vukadinovic et al., 2019). The latest literature highlights certain critical aspects and challenges of HRM's influence on the growth of start-ups:

Communication between start-up founders and employees

Boudlaie et al. (2022) emphasize the importance of communication between the start-up manager and his team about the mission and main goals of the company and how to achieve them, delegating authority to employees when creativity, innovation, and freedom of action are needed to achieve the goals, creating a specific framework when a unique framework is needed to achieve the goals and mission. In addition, start-up managers must consider their financial capabilities, the size of their team, and the nature of their activities to assess HRM practices for the growth and development of their organization (Prexl, 2019). Managers should discuss with their employees ways to improve HRM practices regarding the tools or methods implemented (Boudlaie et al., 2022). Another important part is that managers should identify what motivates and satisfies employees to improve the level of HRM practices, one of which is the provision of additional incentives to employees.

Intrapreneurship concept in start-ups

Intrapreneurship encourages increased employee engagement in their organization, allowing them to develop and experiment proactively, creatively, and innovatively (Almeida & Miguel-Oliveira, 2022). Intrapreneurship relates to the involvement of employees in following the company's goals by taking the initiative to do something new by using innovation and creativity to develop a concept into a profitable business within the organizational environment (Atari & Prause, 2019). Intrapreneurship gives teams the freedom and authority to create and commercialize new products and technology (Prexl, 2019). Start-ups are designed to expand and proliferate quickly, and with limited resources, the role of intrapreneurship is important (Almeida & Miguel-Oliveira, 2022). Understanding the intrapreneurship phenomenon requires an understanding of the start-ups' scale. A start-up of medium scale is more likely to foster intrapreneurship techniques than micro and small-sized firms.

This class of start-ups also devotes more outstanding money and time resources to these initiatives. Employee academic qualifications are another factor in identifying diverse start-up behaviors. Start-ups with an equal number of graduates and non-graduated personnel have greater hurdles in growing intrapreneurship activities. On the other hand, start-ups with more outstanding human capital qualifications support the formation of intrapreneurship projects while providing financial and time conditions for developing these activities (Almeida & Miguel-Oliveira, 2022).

The issues of gaining corporate buy-in and incorporating individual innovation into the business structure are connected (Prexl, 2019). This study grouped them around two primary stakeholders, management and intrapreneurs: (1) Persuade management to allow staff autonomy. (2) Identify and attract a critical mass of enthusiastic intrapreneurs.

Based on empirical evidence, Atari & Prause (2019) investigated and developed the concept of 'lean intrapreneurship' by incorporating lean start-up approaches and hypothesis-driven entrepreneurship principles into networked business structures while addressing the necessary framework conditions for successful innovation implementation. By implementing the lean intrapreneurship methodology, mature businesses rediscover their ability to invent innovative ideas into new innovative business models and processes evolutionarily.

Recruiting proper employees

Attracting the appropriate personnel is crucial for start-ups, especially those with limited resources (Weiss & Marques, 2018). During its early phases, start-ups recruit employees from universities, friends, industry groups, or social networks (Rocha & Grilli, 2023). Aside from internal obstacles, current industry improvements drive demand for specialized and interdisciplinary talent (Weiss & Marques, 2018). Start-up founders and human resources professionals must overcome three major problems in recruitment: (1) Determining what is needed. Identify knowledge or skill shortages, taking a short to medium-term view. (2) Avoiding a shortage of potential candidates and interested parties with the right qualifications or experience. (3) Learning about and preparing for roles where the required skills are unavailable. (4) Identifying and matching the best-fit candidate to the job requirements.

Start-ups with talent management techniques may improve competitive performance (Kongrode et al., 2023). Human capital paired with dynamic talent management and marketing capabilities can support start-ups increase market, innovation, and competitive financial performance to meet the competent needs of consumers, employees, and investors.

Proper timing of start-up employee recruitment

Growth frequently involves start-ups acquiring extra competencies that were outside the initial team. Entrepreneurs and start-up managers must expand their company's capabilities as it grows. There is a window of opportunity for successful recruitment during the first three to four years after the company's creation to achieve considerable business growth (Grillitsch & Schubert, 2021). Recruiting new skills after this period is linked to slower business growth. As a result, the findings encourage a recruiting strategy in which necessary skills are recruited as early as possible.

The level of formality between start-up managers and employees

The claim is that informality may increase staff productivity and creativity, contributing to start-ups' growth and success. However, it is critical to thoroughly assess the possible benefits and drawbacks of such an approach and establish whether it is consistent with the organization's aims and values. Despite its effectiveness in improving team relationships, informality has a negative impact on start-up performance due to resistance to formalization (Abo Keir, 2019).

High commitment and high-performance work systems for Start-ups

A high-commitment work system increases the likelihood of a start-up's initial public offering (IPO). It decreases the likelihood of failure, primarily by focusing on rising employee involvement through promotions, training, and profit sharing. High-performance work systems are supposed to encourage team members' autonomy, which is done through flexible work, decentralized decision-making, self-managed teams, and an open communication system (Abo Keir, 2019).

Implementation of Green Human Resource Management (GHRM)

GHRM is a new idea that has gained popularity worldwide, even though no complete definition exists (Al-Abbadi & Abu Rumman, 2023). Adopting vital HR management techniques may help start-up businesses achieve various Sustainable Development Goals (Priyanka et al., 2023). By selecting appropriate HR practices for the firm, we may formalize the procedures, create a suitable internal work environment, and avoid critical issues.

Conclusion

The primary goal of this study was to investigate the most recent research trends and challenges in the connection between human resource management (HRM) and start-ups. The result of the research identified four significant trends: (1) Start-up human resource development in lean philosophy and concepts. There is a focus on redefining the approach to delivering and developing the human resources needed for today's industrial operations, i.e., applying lean concepts and principles to start-ups (Vukadinovic et al., 2019), according to the definition of a start-up, which states that start-ups are young companies in an uncertain environment, the most significant difficulty in a start-up is to reduce uncertainty (Wang et al., 2022). (2) Second, establishing and managing effective entrepreneurial teams is a crucial issue to resolve

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within start-ups. (Hitt et al., 2011) proposed a theory that explains and forecasts value generation in entrepreneurial enterprises. They discuss how team inputs and structure impact team outputs, such as value creation, and suggest that more than simply understanding the inputs is required.

They underline the significance of understanding the team's external and internal operations and context. A recent meta-analysis of research on entrepreneurial teams (Jin et al., 2017) shows that entrepreneurial team features, such as team diversity and size, are strong predictors of team effectiveness. (3) Third, successful and innovative entrepreneurial skills should be prioritized. HRM can provide innovation in the setting of start-ups (Visvizi et al., 2021). It contends that early adoption of proper HRM practices can stimulate innovation by providing a powerful tool for systematically supporting and facilitating employees' innovative activities. (4) Fourth, the human resources procedures and methods for sustainable development. As businesses strive to meet sustainable development goals, there has been focused on digitizing work and human resource operations (Kuzior et al., 2022).

HRM in start-ups plays an essential role in supporting sustainability through several means (Sreenivasan & Suresh, 2023). Start-ups can use sustainable HRM techniques to boost employee engagement. This involvement might result in a more substantial commitment to sustainable practices within the organization. Sustainable HRM strategies assist to increase staff retention rates (Sreenivasan & Suresh, 2023). Retaining competent and experienced staff lowers turnover costs and assures the long-term success of initiatives. Sustainable HRM prioritizes employee well-being and satisfaction, and it increases total employee satisfaction (Sreenivasan & Suresh, 2023). Delighted employees are more likely to support sustainability efforts and contribute to the company's long-term success.

The findings have various consequences for practitioners and academics in the field of HRM in start-ups. This study helps academics gain a more comprehensive grasp of start-up research development, particularly around HRM in start-ups, highlighting possible directions for further research. This study is significant for start-up practitioners in terms of employing HRM aspects and excellent practices to manage the staff and achieve optimum efficacy in their start-ups. However, HRM approaches designed for large firms cannot be used for start-ups. The start-up workforce has a unique, changeable environment and limits that must be addressed differently. Likewise, the volatility inherent in start-ups has ramifications and changes for the workforce, necessitating a distinct HRM strategy. This study has significant drawbacks. First, the study is based on Scopus bibliographic data imports. Using a specific database may alter bibliometric analysis results (Mongeon & Paul-Hus, 2016). As a result, the findings may vary depending on the database used. Second, the limited access to the materials prevented the inclusion of several critical pieces. Future researchers examining the subject may consider it. Third, some articles reviewed focus more on start-ups as one of their main objectives and include discussions for established companies.

This study explores the role of HRM in the success of start-ups, discussing how effective human resource management can lead to better employee retention, productivity, and growth. Additionally, it could highlight the unique challenges that start-ups face in terms of HRM, such as limited resources, finances, and the need for flexible policies. Further research should investigate how to overcome financial constraints in start-ups to overcome the difficulties of implementing human resource management in start-ups due to high implementation costs. Venture capital (VC) is one funding option to explore, as it is a critical component of a thriving entrepreneurial climate (Becsky-Nagy & Fazekas, 2023). The government's participation in the VC sector has become a significant stimulant for the entrepreneurial ecosystem of young and innovative enterprises (Fazekas & Becsky-Nagy, 2021).

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