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# The Effect of Human Resource Analytics on Organizational Performance: Insights from Ethiopia

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**Abstract:** Strategic human resource management plays a crucial role in fostering long-term organizational performance through data-driven decision-making. Human Resource Analytics (HRA), using advanced business intelligence and integrated reporting tools, provides insights that optimize decision-making and strategy alignment. Despite its potential, the impact of HRA on organizational performance remains insufficiently explored. This study addresses this gap by examining the effects of HRA on organizational performance in Ethiopian organizations. A quantitative research design was employed, utilizing a survey method to collect data from 269 valid responses across 55 organizations in Addis Ababa, Ethiopia. Structural Equation Modeling (SEM) via SmartPLS 3.0 software was used for data analysis. The findings reveal that HRA significantly enhances organizational performance, with this relationship mediated by strategic alignment between HR and organizational goals. Additionally, firm size was found to moderate the impact of HRA on performance, with larger firms deriving greater benefits. The results suggest that HRA serves as a powerful driver of enhanced organizational performance, with larger firms potentially reaping even greater benefits from its implementation. These results also underscore the importance of strategic alignment in leveraging HRA for improved performance, particularly in the context of Ethiopian organizations, where HRA adoption is still evolving. This study offers practical implications for organizations seeking to enhance workforce management and performance through data-driven HR strategies.

**Keywords:** human resource analytics (HRA); organizational performance; organizational strategic alignment; Ethiopia

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## 1. Introduction

In today's rapidly evolving business environment, companies face increasing challenges in workforce management and performance optimization. Many organizations, particularly those lacking advanced technologies, rely on intuition or fragmented data for critical HR decisions [1]. This reliance can result in inefficient HR practices, high employee turnover, and misalignment between HR functions and broader organizational goals, ultimately hindering organizational performance.

Organizations are progressively adopting data-driven decision-making to address these challenges, facilitated by advancements in HR technologies. These innovations have transformed HR management, enabling organizations to make informed, evidence-based decisions that align HR activities with their overall business strategy [2–4].

Human resource analytics has emerged as a vital tool, allowing firms to derive actionable insights from HR metrics to enhance workforce management and organizational performance [5,6]. The discipline is not a recent development; its roots can be traced

back to the early 20th century when industrial psychologists first monitored and analyzed employee performance to enhance productivity [7,8]. Marler and Boudreau (2017) define human resource analytics as an HR practice that employs information technology to examine data using descriptive, visual, and statistical techniques. It focuses on HR processes, human capital, organizational performance, and external economic challenges, with the objective of analyzing business outcomes and fostering data-driven decision-making [7]. Bassi (2011) and Gaspar (2021) highlight that HRA involves applying an evidence-based approach to decision-making in personnel-centric business domains [9,10].

HRA employs a wide range of tools and methodologies, from basic HR metrics reporting to complex predictive modeling. Its growing prominence as a strategic tool stems from its ability to generate actionable insights, enhance operational efficiency, and drive organizational success [11]. However, human resource analytics is not merely about acquiring and processing HR data; it also requires applying research designs and advanced statistical techniques to uncover solutions and support evidence-based decisions. This aligns with the resource-based theory, which emphasizes leveraging internal capabilities to achieve a competitive edge [12].

Organizational performance refers to a company's capacity to achieve its goals efficiently while optimizing resource utilization and minimizing employee strain [13]. It is typically assessed using financial and non-financial indicators. Ref. [14] describes organizational performance as an organization's ability to achieve its goals through effective resource utilization.

Several paradigms exist for evaluating organizational performance. These include financial success, market performance, shareholder return, operational efficiency, and other critical outcomes that contribute to overall financial growth [15]. Furthermore, Ref. [16] emphasizes the importance of fostering long-term relationships with stakeholders such as suppliers, consumers, and employees—in achieving sustainable organizational success.

Organizational effectiveness is another key component of performance encompassing customer satisfaction, operational efficiency, and competitive advantage. El-Kassar and Singh (2019) argue that aligning HR functions with an organization's operational systems is crucial for producing favorable outcomes. High-performing firms typically exhibit strong innovation, low turnover rates, and high employee satisfaction [13]. Ultimately, improving organizational performance involves achieving efficiency, sustainability, and continuous innovation.

One of the key benefits of human resource analytics is its ability to strengthen both horizontal and vertical alignment within organizations. Aligning HR activities with strategic objectives fosters cohesion across functional units, ultimately enhancing overall organizational performance [17]. Human resource analytics provides actionable insights into how HR-related events impact immediate business outcomes [18–20].

Organizational strategic alignment refers to the degree to which an organization's goals and HR actions are integrated to achieve common objectives [21]. Applying analytics to HR enhances this alignment, bridging HR strategies with corporate objectives at multiple levels [17].

Human resource analytics ensures that HRM practices directly contribute to business success [12,22,23]. For instance, it helps identify critical roles and skill sets needed to meet strategic goals, facilitating targeted recruitment and development initiatives [24].

Despite its promise, many firms struggle to fully realize the benefits of human resource analytics due to its poor integration into strategic decision-making processes. This results in missed opportunities for improving recruitment, retention, and performance management [25].

While substantial theoretical research exists, empirical studies on this topic remain limited. This underscores the crucial role of human resource analytics transforming human resources from a primarily administrative function to a strategic partner within organi-

zations [17]. In Ethiopia, there is a significant research gap regarding human resource analytics, with limited studies exploring its adoption, effectiveness, or impact on organizational performance. This gap restricts our understanding of how human resource analytics practices from developed economies can be effectively translated into the context of developing nations. McCartney and Fu (2022) also highlight the lack of empirical evidence on human resource analytics' impact suggesting that future research should operationalize constructs such as HR alignment, integration, and credibility to examine their relation to HR analytics [26]. Further studies could also examine the factors that mediate the relation between human resource analytics adoption and key organizational outcomes [19].

Beyond these research gaps, the organizational environment plays a crucial role in determining the effectiveness of human resource analytics. For example, human resource analytics and organizational strategic alignment often serve as intermediaries, linking human resource analytics to overall performance by incorporating data-driven insights into key business strategy. However, the success of this alignment varies greatly depending on firm-specific characteristics, such as the organization's size. Larger organizations typically possess greater resources, data, and infrastructure to support advanced HR analytics, while smaller firms may face constraints that limit their ability to fully utilize analytics. As Falletta (2014) and Chan et al. (2006) point out, larger firms benefit from decentralized structures, resource availability, and established alignment processes, which enable their ability to sustain strategic alignment across the organization [27,28].

*Research Questions*

Recent studies have highlighted the growing importance of human resource analytics in improving organizational decision-making and performance [7,29,30]. However, the extent to which human resource analytics directly impacts organizational performance remains a topic of debate. Some scholars argue that its effectiveness depends on the level of strategic alignment within the firm [17,22]. Furthermore, business size may influence how human resource analytics is integrated into strategic decision-making processes, thereby affecting its overall impact [27,31]. To address these gaps, this study examines the following research questions:

- How does human resource analytics affect organizational performance?
- How does human resource analytics–organizational strategic alignment influence the relationship between human resource analytics and organizational performance?
- How does firm size moderate the relationship between human resource analytics and human resource analytics–organizational strategic alignment?
- How does the efficacy of human resource analytics mediate the relationship between human resource analytics–organizational strategic alignment and organizational performance?

This study investigates the influence of human resource analytics on organizational performance, with a specific focus on the mediating role of human resource analytics–organizational strategic alignment and the moderating effect of firm size within Ethiopian organizations. Additionally, it explores how the efficacy of human resource analytics mediates the relationship between human resource analytics–organizational strategic alignment and organizational performance. By focusing on Ethiopian organizations, this research aims to address existing gaps in the literature and provide valuable insights into the implementation and impact of human resource analytics in emerging markets. Data were collected from companies utilizing HR automation technologies, such as HRIS, ERP systems, and human resource analytics. HR departments were stratified by size, and survey quotas were established accordingly. The questionnaires were distributed to HR professionals at various organizational levels to ensure a broad and diverse representation. Structural equation modeling (SEM) was employed to test the relationships and assess both mediation and moderation effects.

The structure of the study is as follows: Section 1 provides an introduction, detailing the background and research problem. Section 2 offers a comprehensive review of the relevant literature and develops the hypotheses. Section 3 outlines the research methodology, including data collection, sampling, and measurement techniques. Section 4 presents the results of the study, followed by a discussion of the findings in Section 5, which also includes the conclusions and implications of the research.

## 2. Review Literature and Hypothesis Development

Human resource analytics is an emerging discipline that incorporates data science into human resource management, reflecting the broader trend of utilizing data-driven methods for decision-making. Marler and Boudreau (2017) describe human resource analytics as a practice within human resources that utilizes information technology to analyze data through descriptive, visual, and statistical methods [7]. This approach has gained traction as a strategic tool due to its capacity to generate actionable insights, improve operational efficiency, and drive organizational success [11]. By employing big data and complex statistical models, human resource analytics enables firms to evaluate the efficiency of HR policies, enhance people management procedures, and make quality decisions regarding employee engagement, turnover, and performance [32].

Human resource analytics is more than just gathering and processing HR data; it also involves using research designs and sophisticated statistical tools to find solutions and support evidence-based decisions, aligning with the resource-based view to gain a competitive advantage [33]. As a dynamic and evolving field, human resource analytics gathers and analyzes workforce-related data to enhance organizational success. It examines the relationship between people-oriented policies and practices, providing insights that help organizations gain and sustain competitive advantages [34]. The strategic importance of human resource analytics is underscored by its ability to move beyond traditional HR metrics, such as employee turnover rates, toward more sophisticated analyses that can forecast workforce needs and identify performance drivers [30]. This evolution signifies a transition from traditional administrative HR functions to a more integrated role in strategic management, with human resource analytics playing a crucial role in aligning human capital strategies with the organization's broader strategic objectives [35].

### *2.1. Previous Studies on HR Analytics and Organizational Performance*

A growing body of literature confirms that HR analytics plays a crucial role in improving organizational performance. The authors in [36] discovered that applying HR analytics resulted in significant increases in customer satisfaction, service efficiency, and employee retention in the US service industry. Similarly, Nocker and Sena (2019) [37] highlighted key methods through which HR analytics enhances HR operations and, consequently, overall organizational performance. Their findings show that technical analytics skills, data access, and the ability to exploit analytical insights are significant elements in moderating the association between human resource analytics and business success. The study by [30] provides strong empirical evidence that human capital analytics is an important driver of corporate performance. It underlines the importance of moving away from traditional HR measures (such as turnover rates) and toward advanced predictive analytics to achieve a competitive advantage and improve financial performance.

Gayathri (2022) [38] found a substantial positive association between HRA competency, staff motivation, and return on investment (ROI) in private firms in Bangalore, India. Notably, the study discovered that, while motivation is an important driver in improving organizational performance, 'opportunity' acts as a stronger mediator in the HRA competency–ROI link. This study enhances our understanding of how human resource

analytics capabilities can translate into meaningful financial returns by establishing a framework that emphasizes the significance of the Capability, Motivation, and Opportunity (CMO) model in HR analytics.

The importance of human resource analytics in strategic human resource management has also been explored. Sivathanu and Pillai (2020) [39] proposed that using technology for talent management improves talent analytics, which, in turn, fosters strategic human resource management and the establishment of a high-performing talent pipeline. Organizations can gain a competitive edge by cultivating personnel competencies that align with long-term company strategy. This is consistent with Samson and Bhanugopan's (2022) [40] findings, which show that strategic human capital analytics, when integrated into an organization's performance measurement and management system, has a direct impact on organizational and market performance. Their findings emphasize the importance of executive decision-making quality as a determinant in maximizing the benefits of human resource analytics. Furthermore, Minbaeva (2018) [19] demonstrated how strengthening human capital analytics as an organizational competency leads to sustainable competitive advantage and higher performance outcomes. This supports the idea that human resource analytics, when carefully integrated into the HR function, can enhance decision-making and align labor initiatives with broader corporate goals.

Recent research has expanded the application of HR analytics to sustainable business practices and employee engagement. Mahmood, Ahmed, and Philbin (2023) [16] examine the role of green human resource management and big data analytics in boosting organizational performance through efficient resource management. Their findings revealed that big data analytics moderates the relationship between GHRM practices and business performance, particularly by improving employees' perceptions of green health and safety programs. These findings indicate that integrating human resource analytics with sustainability strategies can enhance both employee well-being and business efficiency.

Similarly, Di Prima et al. (2024) [41] found that HR analytics serves as a positive moderator between socially sustainable operating practices (SSOP) and employee motivation and engagement. Their findings highlight how firms can address social concerns through a data-driven approach, enabling them to anticipate risks, improve workforce satisfaction, and ensure business continuity. This proactive use of human resource analytics in sustainability-focused HRM complements broader efforts to align HR operations with corporate social responsibility (CSR) goals.

The application of HR analytics in evidence-based management (EBM) has also been explored. McCartney and Fu (2021) [42] found that access to HR technology facilitates HR analytics, which supports EBM and, ultimately, enhances organizational performance. Similarly, Siddiqua, Abaker, and Afnan (2023) [43] found that firms that include HR analytics in evidence-based decision-making frameworks see considerable increases in strategic workforce planning and operational efficiency. These findings support the notion that human resource analytics is more than just a data-processing tool; it is a strategic competence that informs decision-making at all levels of the business.

Existing research shows that human resource analytics improves organizational performance through a variety of channels, including better decision-making, labor optimization, sustainability integration, and strategic human capital management. Table 1 summarizes key empirical studies that explore the impact of HR analytics on organizational outcomes across different contexts. However, the majority of studies were undertaken in Western and Asian environments, leaving little data on the uptake and effectiveness of human resource analytics in African firms. Given the disparities in technology infrastructure, managerial capacities, and data availability between areas, further research is needed to determine how human resource analytics can be effectively deployed in developing economies like Ethiopia.

**Table 1.** Summary of key empirical studies on human resource analytics and organizational outcomes.

| Author | IDV | Mediator | Moderator | DV | Methods | Findings | Context |
|---|---|---|---|---|---|---|---|
| [36] | People analytics | | | Business performance | Case study | Confirmed that usage of HR analytics increases customer satisfaction, service speed rose by 30 s, new hire attrition was dramatically reduced, and sales grew by 5%. | United States |
| [41] | Social sustainable operations practices | Employee motivation, employee engagement | HR analytics | Employee retention | Survey | They affirmed that the application of HR analytics positively influences the relationship between socially sustainable operational practices and employee motivation and engagement. | European companies |
| [38] | HR analytics | Employee (CMO) | | ROI | Survey | Discovered a favorable and significant association between existing HRA competency, employee motivation, and ROI. | Bangalore, India |
| [39] | Usage of HR analytics | | | Organizational performance | Grounded theory approach | It was discovered that talent analytics and SHRM result in the development of a high-performing talent pool, which adds to organizational success. | India |
| [37] | Talent analytics | | | Organizational performance | Case study | Identify major pathways via which the implementation of talent analytics might improve the performance of the HR function and eventually the whole business. | |
| [43] | HR analytics, evidence-based decision | | | Organizational performance | | Confirm the recommended chain model, which argues that having access to human resource technology enables HR analytics and evidence-based management decision-making, resulting in improved performance. | Bangladesh |
| [40] | strategic human capital analytics | Managerial decision-making | | Organizational performance | Survey | Suggest that managerial decision-making impacts the effectiveness of strategic human capital analytics in improving organizational and market performance. | Australia |
| [16] | green human resource management | | Big data analytics | Organizational performance | Survey | Strengthens our understanding of how GHRM practices significantly influence organizational performance, as well as the use of big data analytics to maximize the benefits of GHRM and improve organizational efficiency. | Pakistan |

**Table 1.** *Cont.*

| Author | IDV | Mediator | Moderator | DV | Methods | Findings | Context |
|---|---|---|---|---|---|---|---|
| [42] | HR analytics | Organizational EBM | | Organizational performance | Survey | The study's findings complement the hypothesized chain model, indicating that access to HR technology enables HR analytics and EBM, leading to improved organizational performance. | Ireland |
| [30] | Human Capital analytics | | | Business Performance | Case study | Investing in talent through the service–profit chain and people equity models can significantly improve sales, profit, employee happiness, and turnover rates. | United States |
| [44] | HR analytics | | | Organizational performance | Thematic analysis | The study found that HR analytics may improve employee performance, productivity, and talent retention for ongoing growth and effectiveness. | Ghana |
| [45] | HR Analytics capabilities | Innovative capability | Technological Turbulence | Organizational performance | Survey | It has been confirmed that HR analytics capabilities improve organizational performance significantly. This link is mediated by innovative capabilities, but technological turbulence moderates innovation's impact on performance. | India |

### *2.2. Background on Business Organizations in Ethiopia*

Over the past two decades, Ethiopia has made significant social and economic progress, achieving an average growth rate of 10.4% from 2004 to 2019, positioning it among the fastest-growing economies in sub-Saharan Africa [46]. Despite these gains, Ethiopia remains a low-income country, with agriculture and services dominating its economy (36.7% and 47.3% of GDP, respectively), while the industrial sector lags at 16.7%. The government's ambition to attain lower-middle-income status by 2025 hinges on bridging critical gaps in productivity, technology adoption, and innovation [47]. Ethiopia's economic structure is characterized by a heavy reliance on micro, small, and medium enterprises (MSMEs), which constitute 1.5 million businesses, employ 4.5 million workers, and generate ETB 40.7 billion monthly [48]. However, Ethiopia lags behind its regional peers in entrepreneurial culture, managerial capabilities, and business dynamism, as reflected in the Global Competitiveness Index. Furthermore, the country trails behind its neighbors in technology adoption and innovation [46]. Ethiopian firms face significant challenges in adopting both general business and sector-specific technologies, with innovation activity varying substantially between small and large firms. Larger firms dominate innovation efforts, while smaller firms contribute less [47].

Human resource analytics adoption remains in its early stages due to systemic challenges, including technological constraints such as frequent power outages, unstable Internet connectivity, and limited technical infrastructure [46]. Only 34% of firms in the economy have Internet access, with penetration particularly low among small firms (23%) compared to large firms (80%). Furthermore, many Ethiopian firms depend on foreign HRMS technologies,

which often lack alignment with local business needs, leading to challenges in technology transfer, customization, and system management due to inadequate local expertise [49].

Cultural factors further shape Ethiopia's organizational landscape. Hierarchical structures are prevalent, with decision-making authority concentrated at the top. Leadership tends to rely on intuition and personal experience rather than data-driven approaches [50]. This tendency can limit the integration of HR analytics into strategic decision-making, as leaders may prioritize personal judgment over analytical insights.

### 2.3. Theoretical Framework

This study draws on the Resource-Based View (RBV) theory [51] and the Strategic Alignment Model (SAM) [21] to form its theoretical foundation. These two perspectives offer a complementary approach to understanding human resource analytics as a valuable organizational resource that drives organizational performance while also examining the mediating function of strategic alignment in strengthening this relationship. Together, RBV and SAM provide deeper insights into the interaction among human resource analytics, strategic alignment, and organizational performance.

The Resource-Based View (RBV) is a strategic management concept that describes how a firm's internal resources and capabilities provide a sustained competitive advantage [51]. This concept relies on two fundamental assumptions: resource heterogeneity, which posits that organizations have unique resources and competencies, and resource immobility, which suggests that these resources are not readily transferable or replicated by competitors [52]. Whereas the SAM, introduced by [21], emphasizes the integration between an organization's business strategy and its information technology strategy. This alignment framework has been pivotal in shaping how organizations approach the relationship between business and technology [21,53].

According to the RBV and SAM frameworks, human resource analytics act as a socially intricate system supporting decision-making and persuasion, allowing organizations to develop dynamic capabilities that contribute to a long-term competitive advantage [54]. However, this advantage can be fully realized only when human resource analytics are strategically aligned with organizational goals. The RBV contends that a firm's differentiation arises from distinctive resources that are valued, rare, unique, and well-organized [51]. These resources, encompassing physical, human, and organizational capital, are foundational in creating long-term competitive capabilities [51]. Human resource analytics aligns with this concept as a unique and important resource that is challenging to duplicate or mimic. As a result, human resource analytics supports both HR and business strategies, driving superior organizational performance [55]. Advanced analytical capabilities, particularly among firms with skilled human resource analytics professionals [56], distinguish firms by enabling more effective predictions, cost reductions, and profitability improvements [57,58]. By leveraging high-quality HR data, organizations can generate actionable insights that significantly enhance organizational value creation [59].

The efficient adoption of human resource analytics involves specialized knowledge in data analysis, statistical modeling, and HR domain experience, combined with access to advanced analytics tools and data sources [19,59,60]. However, achieving these elements is challenging for many HR departments, which often face limitations such as inadequate technology adoption, substandard data quality, limited resources, insufficient analytical proficiency, and minimal backing from top management [42]. The scarcity of these resources and capabilities makes human resource analytics a rare and valuable tool for organizations seeking a competitive edge.

The unique combination of skills, technologies, and processes involved in implementing human resource analytics initiatives can be difficult for competitors to replicate.

Organizations that have invested in building a strong human resource analytics capability create barriers to imitation. Furthermore, the organizational culture, data infrastructure, and strategic alignment necessary for effective human resource analytics implementation are complex and not easily duplicated. Huselid (1995) contends that if a firm's HR policies align with its competitive strategy, these practices can serve as a source of competitiveness [61]. The uniqueness of human resource analytics as a resource amplifies its strategic significance within the firm.

The Strategic Alignment Model demonstrates that corporate performance depends on the integration of company strategy, IT strategy, organizational infrastructure, and IT systems and procedures [21]. This approach underscores the importance of aligning an organization's culture, workforce, structure, and governance with its strategic goals [62,63]. The SAM extends the RBV by positing that the potential of human resource analytics is fully realized only when it is integrated within strategic goals, effectively aligning with business objectives. In this view, human resource analytics serves as a strategic capability that leverages an organization's distinct resources and data-driven culture to drive meaningful insights and performance improvements [64]. By aligning HR practices with competitive strategy, organizations transform human resource analytics into a source of competitive advantage [17,61,65]. Firms that integrate human resource analytics are better positioned to enhance talent management, streamline decision-making, and optimize performance outcomes, utilizing analytics to generate actionable insights.

The strategic alignment of HRM strategies and practices has been shown to correlate with improved firm performance, significantly impacting overall organizational success [66]. Further, research highlights the importance of big data analytics, including HR analytics, in integrating diverse data sources to facilitate informed business decisions [67,68]. The RBV is applied here to explain how human resource analytics creates value and enhances organizational performance. It helps to understand how different organizational resources and competencies contribute to the successful adoption and utilization of HR analytics, leading to improved capabilities and performance [54]. In today's competitive environment, a unified, data-driven approach to human capital management is essential for improving efficiency and making strategic human capital decisions [69].

In conclusion, this study employs the RBV and SAM frameworks to analyze how HR analytics, as a strategic capability, mediates the association between HR analytics–organizational strategic alignment and organizational performance. By using particular organizational resources, it strives to boost competitive advantage and overall performance.

### *2.4. Human Resource Analytics and Organizational Performance*

The HR profession has evolved significantly, moving from traditional administrative roles to becoming a strategic driver of organizational success [4,8]. This transition is driven by technology improvements and the rising capacities of data analytics [3,4,70,71]. Big data analytics capabilities, including data sourcing, access, integration, analytical proficiency, and human resources, combined with organizational readiness elements like an articulated analytics strategy, managerial backing, financial assets, and employee involvement, improve informed decision-making and organizational effectiveness [72].

Human resource analytics can greatly enhance both individual and organizational performance by identifying areas where resources like money, time, and effort can be used more efficiently [73]. It also helps organizations allocate resources more efficiently, identify strategic HR priorities, and foster sustainable, data-driven strategies for long-term success [20,30]. It optimizes workforce management by analyzing historical data and real-time metrics, improving talent acquisition, employee engagement, and retention, all of which support sustained organizational success [74]. Additionally, human resource

analytics aligns HR strategies with business objectives, driving positive business outcomes through improved employee experiences and performance [70,71].

Studies show that analytics-driven management links directly to enhanced organizational performance, sales growth, and competitive advantage [75,76]. By enabling proactive workforce planning, cost efficiency, and data-informed managerial strategies, human resource analytics supports sustainable revenue growth and optimized organizational operations [35,58].

Human resource analytics catalyzes organizational performance, enabling executives to monitor and enhance performance through a balanced headcount, cost control, and service delivery. It empowers organizations to identify and nurture top talent, retain key employees, and address retention challenges [77]. Research by Opatha (2020) confirmed that human resource analytics improves efficiency, cost-effectiveness, and overall productivity, ultimately leading to heightened organizational performance and profitability [12].

Human resource analytics is valuable for improving employee performance, forecasting workforce needs, and linking workforce utilization to strategic goals, driving business performance [78]. Despite the proof of its benefits, more study is needed to identify the key criteria for effective human resource analytics deployment [7]. Therefore, we raise the following hypothesis.

**H1.** *Human resource analytics (HRA) has a positive effect on organizational performance.*

### *2.5. HRA–Organizational Strategic Alignment as a Mediator*

The effective utilization of big data in human resources focuses on creating a strategic link between human capital and profitability, hence presenting human resources as a catalyst for a competitive edge [79]. This connection is vital for aligning HR strategies with broader business objectives to maximize the value derived from HR initiatives. Organizational strategic alignment refers to the association of the strategic objectives of an organization with its internal resources, procedures, and competencies [21]. This alignment fosters synergy across different functions and processes, ensuring that goals at individual, team, departmental, and organizational levels are consistently aligned.

In organizations where HR practices closely support corporate strategy, human resource analytics becomes a powerful tool for informing decisions that directly advance business objectives, such as optimizing workforce planning [65]. For human resource analytics to have a real impact, its insights must extend beyond HR to influence broader organizational strategy. By designing analytics projects that involve cross-functional collaboration, human resource analytics generates meaningful insights that support strategic decision-making [80].

Strategic alignment serves as a bridge between human resource analytics and improved organizational performance by ensuring that the insights generated through human resource analytics are relevant and actionable [81]. Today, human resource analytics focuses on key workforce metrics that align workforce strategies with business outcomes, solidifying HR's role in strategic decision-making. It increases the relationship between workforce strategy and overall business success by discovering cost-saving options, improving top talent retention, and increasing workforce productivity and efficiency [65]. Tracking and measuring strategic outcomes enables HR to collaborate effectively with finance and strategy teams, establishing a shared language that ensures HR metrics are relevant and actionable for top management [17]. Just as effective alignment between IT and business strategies drives value creation [82], aligning human resource analytics with organizational strategies is essential for achieving superior performance.

Research indicates that adopting strategically oriented HR programs positively impacts business performance by enabling more efficient workforce allocation. With today's tools, techniques, and analytical capabilities, HR professionals have the opportunity to position themselves as strategic partners by aligning HR strategy with business goals across the

organization [83]. For human resource analytics to make a meaningful impact on business outcomes, it must consistently align with the organization's broader strategy, thus promoting synergy across functional units and raising overall performance [22]. By leveraging data-driven decision-making supported by evidence from human resource analytics and various performance metrics, organizations can make significant advancements and surpass their competitors [5,6].

Aligning human resource analytics with strategic objectives allows companies to use data-driven insights for better HR decisions, contributing to business goals. This integration ensures human resource analytics is part of the overall strategy, leading to more effective HR practices [84]. Effective use of human resource analytics can help execute business strategy by aligning workforce initiatives with organizational goals [24]. While many leading companies are advancing in HR analytics, Ref. [85] caution that misalignment between human resource analytics and organizational strategy may undermine HR's potential impact, affecting both organizational and employee outcomes. Aligning human resource analytics with a broader organizational strategy is therefore essential for maximizing its effectiveness and ensuring sustainable business performance.

### *2.6. Efficacy in Using HR Analytics as a Mediator*

Efficacy in using HR analytics mediates the relationship between HR analytics–organizational strategic alignment and organizational performance. The concept of efficacy in using HR analytics refers to the effectiveness of the process and practices through which an organization applies HR analytics to achieve its performance objectives. It demonstrates the organization's capacity to use data-driven insights from HR analytics to make better strategic decisions and improve HR operations. Organizations with high efficacy in using HR analytics often benefit from improved employee performance, higher retention rates, and overall gains in organizational effectiveness [86]. Companies that successfully implement HR analytics tools and methodologies capture relevant data, utilize advanced analytical techniques, and ensure that decision-makers recognize the strategic value of these insights. Consequently, organizations committed to HR analytics foster a culture where the analytical skills of HR professionals significantly enhance both HR and organizational performance [57,87].

A solid information technology infrastructure and a qualified analytics team are required for quickly gathering, processing, and analyzing HR data, automating repetitive tasks; and providing innovative products and solutions [56,88,89]. When human resource analytics is closely aligned with strategic objectives, it bolsters decision-making capabilities and enhances the effectiveness of HR practices [19]. This alignment optimizes HR functions and results in measurable improvements in organizational performance, underscoring the importance of embedding HR analytics within strategic frameworks [60].

The ability to leverage human resource analytics to influence human resource and business strategy and generate superior results for organizations is insufficient to provide a competitive edge for companies that can execute at this stage [55]. Organizations that excel in HR analytics have a well-defined HR strategy and make targeted analytic investments. As the organization matures, it is expected that these focus areas will evolve accordingly [55].

In this study, efficacy in using HR analytics is proposed as a key mediating factor between HR analytics–organizational strategic alignment and organizational performance. This alignment optimizes HR functions, leading to measurable improvements in organizational performance, reinforcing the importance of embedding HR analytics within strategic frameworks. Therefore, we propose the following hypothesis.

**H2.** *The effect of human resource analytics on organizational performance is serially mediated by HR analytics–organizational strategic alignment and firm efficacy in using HRA.*

### *2.7. Firm Size as a Moderator Between HR Analytics and HR Analytics–Organizational Strategic Alignment*

Firm size significantly moderates the successful implementation of HR analytics in enhancing organizational strategic alignment and performance outcomes [90]. Larger firms typically have the resources, infrastructure, and expertise needed to implement human resource analytics on a broad scale, which enhances their ability to align human resource analytics practices with strategic goals [27]. These organizations are often equipped with advanced data systems, which strengthens their capacity to leverage human resource analytics effectively, enabling them to attract and retain a high-quality workforce that supports a competitive edge [91]. As a result, human resource analytics has a greater influence on larger businesses that can make investments in essential tools and knowledge. This impact is particularly pronounced in sectors that rely on technical and data-driven processes, such as high-tech industries, biotechnology, and retail, where successful examples of human resource analytics adoption are frequently observed [27].

In contrast, smaller firms frequently encounter limitations in terms of resources and technological capabilities, which can hinder the successful deployment of human resource analytics. Their capacity constraints may impede the effective integration and utilization of human resource analytics, ultimately reducing the overall efficacy of their analytics efforts [65]. Furthermore, human resources practices at small to medium-sized businesses have been cautious about integrating human resource analytics due to resource constraints and a lack of technical understanding [66]. El-Kassar and Singh, (2019) further noted that the ability of big data insights to enhance innovation capabilities within SMEs through HRM practices remains uncertain [92]. Small businesses frequently lack quality HR data as well as the analytical skills needed to apply big data methods to smaller datasets, making it difficult to translate insights into measurable business consequences [37]. Moreover, Ben-gal (2019) highlights a clear connection between the level of investment in human resource analytics and company performance, suggesting that larger firms generally derive greater value from human resource analytics due to their investment capacity [93].

However, some studies indicate that firm size may have an opposite moderating effect on strategic alignment. Larger companies frequently show higher levels of diversification and formalization, as seen by decentralized decision-making procedures and complicated communication arrangements. This bureaucratic structure can impede strategic responses and even hamper them [94]. Conversely, smaller firms may demonstrate agility that allows for quicker decision-making and innovation but are typically less equipped to leverage big data analytics effectively. As a result, larger organizations are often better positioned to combine external market resources with their internal big data assets [31]. Thus, the link between firm size, HR analytics, and strategy alignment is multifaceted, presenting both opportunities and challenges that vary significantly across organizational contexts. Therefore, we raise the following hypothesis.

**H3.** *Firm size moderates the correlation between human resource analytics and HR analytics–organizational strategic alignment.*

Figure 1 proposes the overall model.

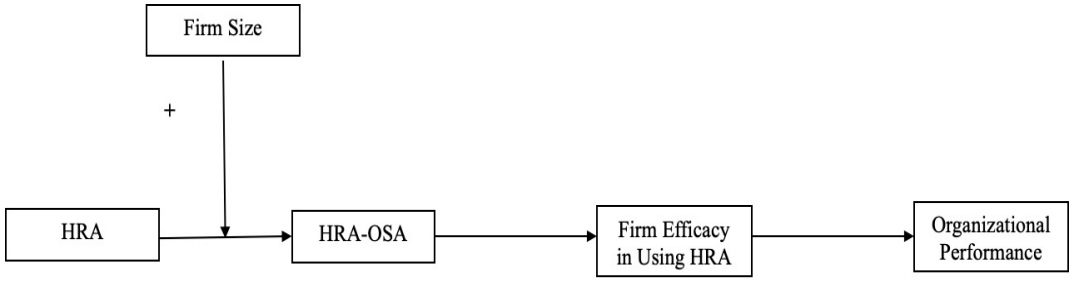



**Figure 1.** Conceptual model.

## 3. Research Methodology

### *3.1. Data Collection Procedures*

This study collects data from Ethiopian organizations using a quantitative research design and survey approach.

The data-gathering procedure consisted of several steps and used a variety of sampling strategies to ensure representativeness while accommodating practical restrictions.

1. Sampling Strategy

Sampling is the process of collecting a small number of individuals from an overall population to estimate the characteristics of the entire group. It has two major advantages: it enables speedier data collection while also lowering costs [95]. The choice of sampling method is influenced by the study's aims, objectives, and key research questions [96,97].

For this study, a non-probability, multi-stage sampling strategy was used, integrating stratified, quota, and convenience sampling methods. Organizations were stratified by size and sector. Quota sampling ensured proportional representation of HR roles, including senior managers, mid-level professionals, and entry-level staff. Larger HR departments contributed more respondents to maintain proportionality.

Ethiopia has approximately 1.5 million registered enterprises [48]; however, only a small fraction have adopted automated HR systems [46]. A preliminary assessment, conducted in collaboration with ERP/HRIS software suppliers and the Ethiopian Ministry of Innovation and Technology, identified 55 companies implementing HR automation. Given the study's focus on HR analytics, these companies were purposefully selected as they represent organizations utilizing automated HR functions. Within these 55 companies, we identified 1186 HR professionals stationed at their headquarters in Addis Ababa. This targeted sampling approach ensures alignment with the research objectives while acknowledging the limited adoption of HR technology in Ethiopia.

The sample size was estimated using Yamane's (1967) [98] formula for a population of 1186 HR professionals, yielding a needed sample of 399 respondents with a 95% confidence level and a 0.05 margin of error. Samples were distributed between firms using proportional allocation based on the size of the HR department.

2. Data Collection Process

The data-gathering approach was carefully planned to acquire detailed information from firms that have implemented HR automation. Companies were selected based on their use of automated HR functions, such as HR Information Systems, Enterprise Resource Planning, and those applying HR analytics. To facilitate collaboration with the selected organizations, a letter of endorsement was obtained from a recognized academic institution.

With the endorsement in hand, companies were then approached with letters of cooperation, and upon receiving their permission, the data collection process commenced. Human resource departments were stratified based on the number of employees to establish sampling quotas: for departments with over 100 employees, the target was set at 50 to 60 survey responses;

for those with 60 to 90 employees, 35 to 40 responses; for departments with 40 to 60 employees, 20 to 25 responses; and departments with fewer than 20 employees, an exhaustive census was conducted.

Questionnaires were randomly distributed to HR employees available during office visits, minimizing selection bias while ensuring practical data collection. The target population included HR professionals from diverse industries, roles, and experience levels, ensuring robust and representative data.

## 3. Demographic Profile of the Respondents

The demographic profile of the respondents provides valuable insights into the composition of the valid sample. As shown in Table 2, gender distribution shows a slight male predominance, with 41.1% female and 59.1% male respondents. Age-wise, the majority (53.2%) fall within the 25–34 age range, followed by 29.7% aged 35–44, 20.8% aged 41–50, and 11.9% aged 45–54, while only 2.2% are 55 and above, indicating a predominantly young workforce. Educational attainment is high, with 53.2% holding a Bachelor's degree, 42.8% a Master's degree, 3.7% a diploma, and 0.4% a Doctorate, reflecting a well-educated sample. Job roles are diverse, with 29.7% frontline employees, 12.3% generalists, 36.1% experts, 13.8% managers, and 3% directors. Organizational size varies, with 42% of respondents working in companies with over 15,000 employees, while others are distributed across smaller firms. Sector-wise, 44.6% are from banking, 26.4% from the service industry, 13.8% from telecommunications, and the remainder from finance, healthcare, manufacturing, and other industries.

**Table 2.** Demographic profile of the respondents.

| Dimension | Category | Frequency | Percentage |
|---|---|---|---|
| Gender | Female | 110 | 40.9% |
| | Male | 159 | 59.1% |
| Age | 18–24 | 8 | 3.0% |
| | 25–34 | 143 | 53.2% |
| | 35–44 | 80 | 29.7% |
| | 45–54 | 32 | 11.9% |
| | 55+ | 6 | 2.2% |
| Education | Diploma | 10 | 3.7% |
| | Bachelor's Degree | 143 | 53.2% |
| | Master's Degree | 115 | 42.8% |
| | Doctorate Degree | 1 | 0.4% |
| Sector | Banking | 120 | 44.6% |
| | Service Industry | 71 | 26.4% |
| | Telecommunications | 37 | 13.8% |
| | Health | 10 | 3.7% |
| | Finance/Insurance | 19 | 7.1% |
| | Manufacturing | 8 | 3.0% |
| | Others | 4 | 1.5% |
| Position | Front-line Employee | 80 | 29.7% |
| | Generalist | 33 | 12.3% |
| | Expertise | 97 | 36.1% |
| | Manager | 37 | 13.8% |
| | Director | 8 | 3.0% |
| | Other | 14 | 5.2% |
| Organization Size | 100–499 | 22 | 8.2% |
| | 500–999 | 14 | 5.2% |
| | 1000–4999 | 51 | 19.0% |
| | 5000–9999 | 24 | 8.9% |
| | 10,000–14,999 | 44 | 16.4% |
| | 15,000+ | 114 | 42.4% |

### 3.2. Measurement

The survey questionnaire utilized in this study, as summarized in Table 1, was developed using previously validated multi-item scales to ensure reliability and validity. The constructs related to human resource analytics (HRA) were assessed using a binary scale (Yes/No) to determine whether specific human resource analytics practices were implemented in the organization. These practices included dimensions such as functionality (e.g., basic reporting or advanced business driver analytics) adapted from [99,100], statistical methodologies (e.g., univariate or multivariate techniques) adapted from [86,101], the scope of collected data (e.g., workforce statistics and productivity measures) adapted from [99,100,102], and organizational embeddedness (e.g., ad hoc usage or full-time integration) adapted from [99,100].

The scores for each dimension were determined by assigning a score based on the level of sophistication achieved. Scores ranged from 0 (no practices implemented) to 4 (all practices fully implemented and advanced). An overall human resource analytics score was then computed by averaging the scores across all dimensions, yielding a standardized score ranging from 0 to 4. This approach provided a more nuanced and comprehensive measure of human resource analytics implementation, capturing the degree of sophistication and integration within each organization.

The total number of employees within the company was used to calculate firm size, using scales developed by [28,94]. This measure enabled straightforward comparisons across organizations of varying sizes. The HR Analytics–Organizational Strategic Alignment (HRA-OSA) constructs were assessed using a 7-point Likert scale (1 = "Strongly Disagree", 7 = "Strongly Agree") adapted from [22,103]. Items evaluated whether human resource analytics plans were connected with the company's mission, goals, and strategy.

Efficacy in using human resource analytics was assessed using a 7-point Likert scale based on [104]. Items included statements about how human resource analytics improved productivity, task efficiency, and overall usefulness in respondents' jobs.

Organizational performance was assessed using a 7-point Likert scale adapted from [105]. Items included measures of success, market share, growth rate, profitability, and innovation.

### 3.3. Ethical Considerations

This study thoroughly addressed ethical considerations to meet research ethics standards. Participants received a comprehensive statement on the cover page of the questionnaire outlining the study's purpose, their role, and their rights. This statement underscored their entitlement to voluntarily engage or disengage at any point without repercussions, thereby guaranteeing that informed consent was implicitly secured.

To ensure confidentiality and anonymity, all personal identifiers were removed from the data, and the findings were presented in a way that protected the participants' identities.

### 3.4. Analytical Strategy

To assess the impact of human resource analytics on organizational performance, we aggregated the data at the firm level for analysis. First, we examined the reliability and validity of the variables by testing Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Second, since all the measurements are evaluated through a survey approach, it leaves the potential that the independent variables are correlated with each other. We employed the Variance Inflation Factor (VIF) for detecting multicollinearity and Common Method Bias (CMB) [106,107]. Furthermore, we applied the PLS-SEM approach for the statistical analysis because the literature recommends that PLS-SEM is more suitable for model explanation and prediction. In addition, PLS-SEM is

less constrained by distributional properties, sample size, or model identification [108,109]. We used SmartPLS 3.0 for the structural model.

## 4. Results

### *4.1. Measurement Model*

The quality of the measurement model was assessed by evaluating construct reliability and validity. Unlike CB-SEM, PLS-SEM lacks a universal goodness-of-fit measure [110]. Henseler and Sarstedt [111] argued that the goodness-of-fit (GoF) index is neither conceptually nor empirically valid for assessing PLS-SEM models. Additionally, [112] noted that traditional fit indices are ineffective in detecting model misspecifications in applied research.

Given these limitations, PLS-SEM prioritizes construct validity and reliability over global fit indices [109]. Key evaluation criteria include (1) Reliability and Convergent Validity (Composite Reliability, Average Variance Extracted), (2) Discriminant Validity (Fornell–Larcker Criterion, HTMT), (3) Indicator Multicollinearity (VIF values), and (4) Common Method Bias (Full Collinearity Test). As shown in Table 3, these measures enhance the robustness and practical relevance of the model.

**Table 3.** Source of measurement and items.

| Construct | Dimension | Sources | Items |
| --- | --- | --- | --- |
| HR analytics | Functionality of Human Resource Analytics (FHRA) | [99,100] | Basic HR reporting (e.g., data from ERP and HCM systems such as turnover and employee satisfaction)<br>HR value-added metrics (e.g., insight into performance ratings and recruitment process effectiveness)<br>Integrated talent management metrics (e.g., combined information such as percentage of higher performers retention)<br>HR business driver analytics (e.g., business impact of HR measures such as impact of employee turnover on financial performance) |
| | Statistical methodology (SM) | [86,101] | Basic univariate statistics (mean median, mode, percentiles, standard deviation, etc.)<br>Advanced univariate statistics (correlation, skewness, differences in means, distribution of a variable, etc.)<br>Basic multivariate statistics (ANOVA, factor analysis, regression, logit/probit, survival/hazard analysis, etc.)<br>Advanced multivariate statistics (structural equations, fixed-effects models, maximum likelihood models, etc., used for testing direct and indirect effects of variables on one another) |
| | Collected data (CD) | [102] | Workforce statistics (e.g., gender, age, absenteeism, job type, ethnic origin)<br>Measures of people's skills/values (e.g., index of key qualities such as experience, knowledge and skills, competencies and attitudes, values, potential, performance, employee engagement)<br>Financial ratios relating to people and productivity (e.g., sales/head or revenue/costs)<br>Measures of efficiency and effectiveness of the HR function (e.g., cost ratios, rates of participation, and efficiency and effectiveness of processes such as appraisal, recruitment, succession planning, and training) |
| | Organizational Embeddedness | [99,100] | On an ad hoc basis<br>Once per period (e.g., week, month, quarter, year)<br>Part-time<br>Full-time |

**Table 3.** *Cont.*

| Construct | Dimension | Sources | Items |
| --- | --- | --- | --- |
| HR analytics–organizational strategic alignment (HRA-OSA) | NA | [22,103] | The human resource analytics plan aligns with the company's mission, goals, objectives, and strategies<br>The human resource analytics plan contains quantified goals and objectives<br>The human resource analytics plan contains detailed action plans/strategies that support company direction<br>We prioritize major big data analytics investments by the expected impact on business performance |
| Efficacy in Using HRA | NA | [104,113] | Using human resource analytics will increase our chances of getting a raise<br>Using human resource analytics will increase our productivity<br>Using human resource analytics will enable us to accomplish tasks more quickly<br>I find human resource analytics to be useful in our job |
| Firm Size | NA | [28,94] | How many employees work in your company? |
| Organizational Performance (OP) | NA | [105] | Our company is more successful.<br>Our company has a greater market share.<br>Our company is growing faster.<br>Our company is more profitable.<br>Our company is more innovative |

#### 4.1.1. Reliability and Convergent Validity

Mark (1996) defines reliability as the stability and consistency with which a measurement device operates [114]. The core concept of reliability is consistency; an instrument is regarded as trustworthy if it produces the same results when administered multiple times. Cronbach's Alpha and CR are two standard approaches for assessing reliability. As shown in Table 4, all constructs demonstrated strong reliability, with Cronbach's Alpha values ranging from 0.740 (HRA) to 0.923 (OP) and CR scores between 0.832 (HRA) and 0.962 (HRA-OSA). These values exceed the recommended threshold of 0.70 [109], confirming that the measurement model is internally consistent.

**Table 4.** Reliability and Construct Convergent Validity.

| Constructs | Cronbach's Alpha | Composite Reliability (CR) | Average Variance Extracted (AVE) |
| --- | --- | --- | --- |
| Efficacy | 0.883 | 0.920 | 0.742 |
| HRA | 0.740 | 0.832 | 0.558 |
| HRA-OSA | 0.896 | 0.928 | 0.763 |
| OP | 0.923 | 0.941 | 0.763 |
| Firm-Size | NA | NA | NA |

Convergent validity evaluates the extent to which multiple measures of the same concept are correlated and effectively capture the underlying construct [115]. Following Fornell and Larcker (1981) [116], we assessed this via the AVE, where values $\geq 0.50$ indicate sufficient convergence. Table 4 presents the AVE values for each construct, all of which exceed the 0.50 benchmark, thereby confirming convergent validity. This suggests that the measurement items successfully converge to represent their respective constructs.

#### 4.1.2. Discriminant Validity

Discriminant validity is the extent to which measures of different ideas are distinct. The premise is that if two or more concepts are separate, accurate assessments of each should not show a substantial correlation [115]. A widely accepted method for evaluating discriminant

validity is the Fornell–Larcker criterion [116], which states that the square root of the AVE for a given construct should be greater than its correlation with any other construct. As presented in Table 5, the diagonal values (highlighted in bold and italic) represent the square root of the AVE for each construct, while the off-diagonal values denote inter-construct correlations. The results indicate that for each construct, the diagonal value is higher than any corresponding off-diagonal values, demonstrating strong discriminant validity.

**Table 5.** Discriminant validity Fornell–Larcker criteria.

| Constructs | Efficacy | Firm-Size | HRA | HRA-OSA | OP |
|---|---|---|---|---|---|
| Efficacy | ***0.861*** | | | | |
| Firm-Size | 0.199 | 1 | | | |
| HRA | 0.178 | 0.294 | ***0.747*** | | |
| HRA-OSA | 0.281 | 0.297 | 0.362 | ***0.874*** | |
| OP | 0.394 | 0.56 | 0.16 | 0.534 | ***0.874*** |

Note: The bold numbers on the diagonal reflect the square root of the AVE for each construct, while the off-diagonal values represent the correlations between them.

#### 4.1.3. Indicator Multicollinearity

The VIF is a widely used statistic in structural equation modeling [117] for detecting multicollinearity. Hair et al. (2012) stated that a VIF value exceeding five indicates problematic multicollinearity [107]. As indicated in Table 6, all VIF values fall below the critical threshold of five, except for HRA-OSA2, which demonstrated a higher-than-recommended VIF score. To avoid potential multicollinearity problems and boost the model's reliability, HRA-OSA2 was removed from the analysis. The final results imply that multicollinearity is not a concern for this study, as all retained indicators maintain acceptable levels of variance inflation.

**Table 6.** Multicollinearity Statistics (VIF) for indicators.

| Indicators | VIF |
|---|---|
| CD | 1.305 |
| FHRA | 1.618 |
| OE | 1.289 |
| SM | 1.621 |
| EFFICACY1 | 2.905 |
| EFFICACY2 | 4.074 |
| EFFICACY3 | 2.587 |
| EFFICACY4 | 2.104 |
| HRAOSA1 | 3.637 |
| HRAOSA2 | 6.152 |
| HRAOSA3 | 2.518 |
| HRAOSA4 | 1.985 |
| OP1 | 3.464 |
| OP2 | 3.212 |
| OP3 | 3.14 |
| OP4 | 3.065 |
| OP5 | 3.211 |

#### 4.1.4. Common Method Bias

Common method bias (CMB) was examined by assessing the VIF values of the inner model. According to Kock (2015), a VIF value less than 3.3 implies that CMB is unlikely to influence the results [118]. As shown in Table 7, all inner model constructs have VIF values that are far lower than the 3.3 threshold, indicating that CMB is not an issue and that the conclusions are robust and credible.

**Table 7.** Inner VIF values for the variables.

| Variables | Inner VIF Value |
|---|---|
| Efficacy | 1.000 |
| Firm-size | 1.090 |
| HRA | 1.087 |
| HRA-OSA | 1.000 |
| HRA × Firm-Size | 1.004 |

### *4.2. Structural Modal Assessment*

After assessing the measurement model, we evaluated the structural model by examining the path coefficients and their statistical significance in the relationships between the study's constructs. As shown in Table 8, the results presented the path coefficients and direct effects for the tested relationships.

**Table 8.** Path coefficient estimates.

| Direct Effect | Beta Coefficient | Standard Deviation | T Statistics | *p* Values | Results |
|---|---|---|---|---|---|
| Efficacy -> OP | 0.275 | 0.134 | 2.051 | 0.020 | Supported |
| Firm-size -> HRA-OSA | 0.177 | 0.14 | 1.259 | 0.104 | Rejected |
| HRA -> HRA-OSA | 0.316 | 0.149 | 2.124 | 0.017 | Supported |
| HRA -> OP | 0.066 | 0.137 | 0.479 | 0.316 | Rejected |
| HRA-OSA -> Efficacy | 0.271 | 0.115 | 2.353 | 0.009 | Supported |

The analysis revealed that human resource analytics did not have a significant impact on organizational performance ($\beta = 0.066$, $t = 0.476$, $p > 0.05$). This finding suggests that, in this study, the direct relationship between human resource analytics and performance was not supported. It is possible that other factors, such as the implementation context or mediating variables, may explain the lack of significance. Similarly, firm size did not significantly affect HRA-OSA ($\beta = 0.177$, $t = 1.259$, $p > 0.05$), indicating that firm size did not play a direct role in the alignment of human resource analytics with organizational strategy in this sample.

In contrast, other relationships were supported by the analysis. Human resource analytics significantly had a significant positive effect on HRA-OSA ($\beta = 0.316$, $t = 2.124$, $p = 0.017$), indicating that the integration of human resource analytics practices significantly influences how well these practices align with organizational goals and strategy. Furthermore, HRA-OSA significantly affected the efficacy of human resource analytics ($\beta = 0.271$, $t = 2.353$, $p = 0.009$), suggesting that organizations with stronger strategic alignment of human resource analytics are more likely to experience its effective use in day-to-day operations. Lastly, the analysis confirmed a significant positive effect of the efficacy of human resource analytics on organizational performance ($\beta = 0.275$, $t = 2.051$, $p = 0.020$), highlighting that the more effectively HR analytics are used, the better the organizational performance outcomes. These results underscore the critical role of strategic alignment and the effective use of HR analytics in driving performance. While no significant direct relationship was found between HR analytics and organizational performance, the significant effects through HRA-OSA and efficacy indicate the importance of aligning HR analytics with organizational strategy and leveraging its potential for improving performance.

These results, detailed in the path coefficient table below, highlight the interplay between HR analytics, strategic alignment, and organizational performance while revealing areas where proposed effects were not observed.

Mediation and Interaction Analyses

The mediation and interaction analyses reveal several significant indirect effects, highlighting how human resource analytics, firm size, human resource analytics–organizational strategic alignment, and efficacy interact to influence organizational performance. As shown in Table 9, the analysis shows that the pathway from HRA to OP through HRA-OSA is significant, with a coefficient of (β = 0.152, t = 1.942, $p$ = 0.026), confirming that HRA-OSA acts as a critical mediator. This finding emphasizes the importance of strategically aligning human resource analytics with organizational objectives to improve performance outcomes. The pathway from HRA to efficacy through HRA-OSA is partially supported, with a coefficient of (β = 0.086, t = 1.440, $p$ = 0.075), suggesting that while HRA-OSA contributes to enhancing efficacy in using HR analytics, the effect is not strong, which implies that additional factors may also influence efficacy.

**Table 9.** Results of mediation analysis.

| Specific Indirect Effect | Beta Coefficient | Standard Deviation | T Statistics | $p$ Values | Results |
|---|---|---|---|---|---|
| Firm-size -> HRA-OSA -> Efficacy | 0.048 | 0.056 | 0.861 | 0.195 | Rejected |
| HRA -> HRA-OSA -> OP | 0.152 | 0.078 | 1.942 | 0.026 | Supported |
| HRA -> HRA-OSA -> Efficacy | 0.086 | 0.059 | 1.44 | 0.075 | Marginally Supported |
| HRA×Firm-Size -> HRA-OSA -> Efficacy | 0.091 | 0.055 | 1.648 | 0.05 | Supported |
| Firm-size -> HRA-OSA -> Efficacy -> OP | 0.013 | 0.014 | 0.956 | 0.17 | Rejected |
| HRA -> HRA-OSA -> Efficacy -> OP | 0.024 | 0.02 | 1.176 | 0.12 | Rejected |
| HRA-OSA -> Efficacy -> OP | 0.119 | 0.063 | 1.876 | 0.030 | Supported |
| HRA×Firm-Size -> HRA-OSA -> Efficacy -> OP | 0.025 | 0.018 | 1.382 | 0.084 | Marginally Supported |

Note: HRA = HR analytics, HRA-OSA = HR analytics–Organizational Strategic alignment, and OP = organizational performance.

The interaction between HRA and firm size affecting OP through HRA-OSA and efficacy is marginally supported (β = 0.025, t = 1.382, $p$ = 0.084), suggesting that firm size may play a nuanced role in moderating the indirect effect of HRA on OP. Additionally, the interaction effect of HRA and firm size on efficacy through HRA-OSA is significant (β = 0.091, t = 1.648, $p$ = 0.050). This indicates that larger organizations, with greater resources and capabilities, benefit more from strategic alignment in enhancing the efficacy of human resource analytics.

However, the pathway from firm size to efficacy through HRA-OSA is not significant (β = 0.048, t = 0.861, $p$ = 0.195), showing that firm size alone does not significantly enhance efficacy, which indicates that other factors such as infrastructure and strategic initiatives play a larger role. Similarly, the pathway from firm size to OP through HRA-OSA and efficacy is not significant (β = 0.013, t = 0.956, $p$ = 0.170), indicating that firm size does not directly impact performance outcomes through these mediators.

The combined indirect effect of HRA on OP through both HRA-OSA and efficacy is also not supported, with a coefficient of (β = 0.024, t = 1.176, $p$ = 0.120). This suggests that while HRA-OSA and efficacy are important individually, their combined mediating effect on OP appears limited, likely due to barriers in translating analytics into performance improvements.

## 5. Discussions

The study's findings show the complex and substantial links between human resource analytics, HR analytics–organizational strategic alignment, company size, human resource analytics efficacy, and organizational performance. The results demonstrate that HRA does not have a direct effect on performance but operates through strategic alignment (β = 0.152, t = 1.942, $p$ = 0.026). This underscores the notion that data analytics alone is insufficient; rather, its integration into strategic frameworks is what drives performance improvements. These findings support previous studies of Wu et al. (2015) and Yayla and Hu (2012), which sug-

gest that strategic alignment between analytics and business objectives is critical for achieving performance gains [119,120]. Akter et al. (2016) also suggest that HR analytics' value extends beyond predictive insights, contributing to overall strategic decision-making [22]. However, the findings contrast with studies reporting direct HR analytics effects [20,74,121]. This divergence may reflect contextual differences: in Ethiopia's nascent HR tech landscape [46], alignment acts as a "gatekeeper" to translate analytics into actionable insights.

Additionally, the relationship between HR analytics–organizational strategic alignment and organizational performance through efficacy in using human resource analytics ($\beta = 0.074$, $p = 0.046$) confirms that not only alignment but also the effective use of human resource analytics implementation drives performance improvements. This underscores the value of a culture where human resource analytics capabilities support strategic decisions [87], providing a competitive advantage to firms that achieve high efficacy in HRA application [55].

The role of firm size as a moderator provides valuable insights, with larger organizations demonstrating stronger relationships between HRA-OSA and efficacy, as reflected by the significant interaction effect ($\beta = 0.100$, $t = 1.648$, $p = 0.05$). Additionally, the marginally significant effect of firm size on organizational performance through HRA-OSA and efficacy ($\beta = 0.025$, $t = 1.382$, $p = 0.084$) further underscores the importance of organizational scale. This study aligns with Falletta (2014) [27], who noted that successful firms frequently utilize advanced human resource analytics approaches to develop strategic competencies and gain a competitive advantage. Larger organizations typically have the resources, technology, and expertise to effectively integrate human resource analytics into their strategic goals, putting them in a better position for attracting and retaining top talent, which is crucial to their long-term competitiveness [91].

Human resource analytics has a minimal direct effect on organizational performance ($\beta = 0.479$, $p > 0.05$), suggesting that the potential of human resource analytics is fully realized only when its outputs are strategically aligned with organizational objectives. This indirect impact highlights the importance for organizations to integrate human resource analytics within their strategic decision-making processes to optimize operational efficacy. For optimal impact, analytics initiatives should be directly linked to HR processes, evidencing their value to business outcomes not just through activities but through measurable results [64]. Lawler et al. (2004) similarly noted that, while many leading firms are improving their analytics skills, HR's position as a strategic partner is incomplete without alignment [85].

### *5.1. Theoretical Implications*

This study contributes to the theoretical discourse on the resource-based view and strategic alignment model by reinforcing the notion that organizational success is contingent on both scarce and valuable resources and their alignment with strategic goals. While prior literature emphasizes direct links between HRA and performance [30,55,73], our findings reveal that HRA alone does not directly enhance performance unless integrated with organizational strategy. This nuance extends RBV theory by showing that merely possessing rare resources (e.g., analytics tools) is insufficient; their strategic integration is paramount [22].

Aligning human resource analytics with strategic objectives enables businesses to employ data-driven insights to make HR decisions that support business objectives, resulting in more effective HR practices [84]. Our empirical study confirms that integrating human resource analytics into strategic alignment frameworks improves organizational performance [21]. This is consistent with resource-based and strategic alignment theories, which propose that integrating fundamental skills such as human resource analytics with strategic priorities leads to improved performance outcomes. More congruence between company objectives and human resource analytics promotes more synergy across functional units, hence improving

organizational performance [22]. Aligning human resource analytics with strategic objectives enables businesses to employ data-driven insights to make better HR choices, ultimately contributing to business goals. This integration combines human resource analytics into the overall strategy, leading to more effective HR practices [84].

Notably, the moderating role of firm size raises a challenge to the universality of strategic alignment benefits. Larger organizations with greater infrastructure leverage HRA more successfully, while smaller firms have restrictions on data quality and analytical capacity [37]. This finding aligns with resource-based theory, which asserts that firms with superior capabilities are more proficient at attaining competitive advantages [27,122] but contradicts studies assuming the scalability of HRA across firm sizes. Our research elucidates how the organizational environment influences the effectiveness of HRA, thereby refining strategic alignment theory and underscoring that alignment is not a universal remedy but a dynamic process shaped by firm-specific resources.

Finally, our findings underscore that achieving the full benefits of human resource analytics requires both accuracy and strategic integration. Organizations that demonstrate high efficacy in using human resource analytics enjoy improvements in employee performance, retention, and overall organizational effectiveness [86]. Firms that successfully implement human resource analytics tools and methods capture relevant data, utilize advanced analytical techniques, and embed these insights into decision-making. This not only raises the profile of HR within the organization but also fosters a culture of analytical competency, where HR's strategic insights directly contribute to organizational success [87].

### *5.2. Practical Implications*

The findings have important implications for HR practitioners, particularly in Ethiopia and other emerging economies. First, the study highlights the need to align HR analytics with business strategy to maximize its impact. Strategic alignment fosters cohesion between HR functions and business objectives, enabling data-driven insights that contribute to performance [64]. This calls for closer collaboration between HR, IT, and executive teams to ensure that analytics initiatives are strategically oriented.

Second, the significant effect of firm size as a moderator highlights the importance of resource allocation in human resource analytics positioning. While larger organizations may have the required infrastructure to fully leverage HR analytics, smaller firms should focus on selected, high-impact areas where data-driven insights can deliver the greatest benefit. This method ensures that even resource-constrained organizations can benefit from HR analytics without necessitating large-scale reforms.

Third, cultivating a data-driven culture is essential for maximizing human resource analytics potential across all organizational levels. Executives and managers should advocate for analytics-informed decision-making and reward analytical thinking, investing in training to embed human resource analytics as a strategic function. This cultural shift promotes evidence-based management and reinforces HR's strategic value.

Fourth, this study emphasizes the relevance of human resource analytics efficacy, implying that firms must spend not just on analytics technologies but also on training the skills needed to effectively comprehend and implement analytics insights. Organizations seeking to maintain a competitive advantage should prioritize embedding human resource analytics into core decision-making processes, as firms that achieve this integration are better positioned to attract and retain high-quality talent, foster strategic HR partnerships, and realize performance improvements.

### *5.3. Limitations and Future Research Directions*

Even with the insightful findings, this study possesses several limitations. First, the research is mostly based on data from Ethiopian organizations, which may limit the findings' applicability to other cultural and economic contexts. Second, the study depends on data provided by respondents, which may be biased due to social preference and faulty recall. Third, the study's cross-sectional methodology prevents the analysis of causal relationships across time. Finally, because this study did not include industry-specific variances, future research may investigate how sectoral variables influence the association between human resource analytics, strategic alignment, and performance results.

To solve these limitations, future studies could adopt a variety of approaches. Longitudinal research is needed to investigate the causal links between human resource analytics, strategic alignment, and organizational success over time. Furthermore, broadening the research to encompass a variety of cultural and economic circumstances will improve the findings' generalizability. Future research should look into additional mediating or moderating factors, such as organizational culture, managerial approaches, and technological capabilities, to gain a better understanding of how human resource analytics affects performance. Furthermore, research on small to medium-sized firms (SMEs) may highlight how resource-constrained organizations might employ analytics to improve strategic alignment and performance.

### *5.4. Conclusions*

This study sheds light on the relationship between HR analytics, strategy alignment, and organizational success. Our findings demonstrate that, while human resource analytics has considerable potential to improve business performance, its benefits are only realized when strategically matched with organizational goals. This highlights the necessity of embedding human resource analytics within broader strategic frameworks to maximize its effectiveness.

Furthermore, the study underscores the moderating effect of firm size, indicating that bigger organizations can better exploit human resource analytics due to superior resources and infrastructure. This conclusion emphasizes the significance of tailoring human resource analytics solutions to specific organizational capabilities and constraints. Smaller firms, in particular, should focus on targeted, high-impact applications of HR analytics rather than large-scale implementations.

From a theoretical standpoint, this study broadens resource-based and strategic alignment theories by proving that the impact of human resource analytics is dependent on its alignment with company strategy. It challenges the assumption that analytics alone can drive performance improvements and instead emphasizes the importance of alignment as a mediating factor. Practically, it provides concrete recommendations for HR professionals, arguing for strategic integration, cross-functional collaboration, and the development of analytical capabilities to maximize the efficacy of human resource analytics.

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