



Investigating the Effect of High-Performance Work Systems (HPWS) on Organizational Performance

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ABSTRACT

Research on high-performance work systems (HPWS) has revealed a potential correlation between human resource management practices and organizational performance. However, most recent studies have primarily focused on developed countries, with limited representation from developing countries. Therefore, this study aims to investigate the impact of HPWS, based on the AMO model (ability-motivation-opportunity), on financial, operational, and HR outcomes using scientific research journals in Iran's management field. The analysis includes 145 articles published between 2008 and 2019, which were examined through the meta-analysis method. The results demonstrate a positive effect of high-performance work systems on organizational performance. Additionally, HPWS practices exhibit a positive influence on financial and operational outcomes. However, the impact of HPWS practices on HR outcomes did not yield conclusive evidence. This study contributes to existing knowledge by categorizing organizational performance into three distinct outcomes and exploring the influence of these three HRM practices on such outcomes.

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1. Introduction

Introduction In response to the challenges posed by globalization, organizations have recognized the value of their human resources as a sustainable competitive advantage. Consequently, the significance of human resource management (HRM) has grown within the knowledge-based economy and dynamic global environment. While traditional HRM studies have focused on individual HR practices when examining their impact on employees and organizational outcomes, a strategic perspective of HRM emphasizes the implementation of high-performance work systems (HPWS) (Jiang et al., 2012). HPWS is regarded as a set of HR practices designed to enhance employees' abilities, motivation, and collaboration, ultimately leading to increased job satisfaction, organizational commitment, and overall performance (Zhai & Tian, 2019). Jiang et al. (2012) conducted a credible study using the AMO model to identify the dimensions of HPWS. According to this model, HPWS defines employee performance as a product of three main components: ability, motivation, and opportunity (Subramony, 2009; Gardner et al., 2011; Jiang et al., 2012). The model posits that performance is contingent on employees' abilities, their motivation, and their opportunities to participate, with the relationship between these dimensions predicting various organizational outcomes. Despite evidence supporting the positive relationship between HRM and organizational performance (Huselid, 1995; Zhang et al., 2012), we aim to investigate this relationship for the following reasons: Over the past decades, a substantial volume of literature has examined the relationship between human resource management practices and organizational performance, with many studies reporting a positive correlation.

However, some studies have indicated that despite these benefits, HRM practices can increase personnel costs, job demands, and employee pressures in the workplace, and the effectiveness of HRM practices is contingent upon various contextual factors (Datta et al., 2005; Ehrnrooth & Bjorkman, 2012). To reconcile these contradictory findings, researchers have conducted meta-analyses to gather evidence from recent years. Most of these meta-analyses have focused on individual HRM practices and have not explored HRM practices as an integrated system.

This paper aims to investigate the impact of HRM practices as an integrated system, specifically HPWS, on organizational performance. Furthermore, the majority of previous studies on HPWS have been conducted in developed countries (Budhwar & Debrah, 2010; Muduli, 2015), with limited contributions from developing countries. Given the unique contexts of each country, the effectiveness of HPWS may vary due to diverse cultural and institutional factors that influence job relationships within organizations (Wood et al., 2012; Reiche et al., 2018).

Despite the growing attention to HPWS in recent years, there is a lack of research conducted in Iran. Existing research in Iran has been predominantly theoretical, focusing on defining and explaining the features and reasons for implementing HPWS. Additionally, while extensive research has been conducted on HRM practices, the findings lack a holistic perspective, and the separate effects of individual human resource practices on a wide range of organizational performance outcomes have not been studied. Consequently, the scientific community faces scattered information and the need for an integrated view in this area. Therefore, the present study aims to investigate HPWS in Iran using a meta-analysis approach, which offers higher generalizability. The study seeks to answer the question of how high-performance work systems, from the perspectives of ability, motivation, and opportunity, impact operational, financial, and HR components of organizational performance.

2. Theoretical Background and Hypotheses Development

2.1 High-Performance Work System (HPWS)

Although researchers have not reached a consensus on the definition of high-performance work systems, it has been widely discussed. The HPWS can be defined as a set of separate but complementary HR practices that focus on gaining competitive advantages to improve productivity and profitability (Chow et al., 2013). Another proposal suggests that HPWS is a set of human resource management practices that can improve organizational performance by promoting abilities, motivation, and involvement (Datta et al., 2005; Tang et al., 2017). Various researchers have focused on the relationship between HPWS and organizational performance (Zhu et al., 2018; Zhai & Tian, 2019; Karunarathna, 2021). The presence of an HPWS is associated with increased profits, sales, and profitability (Chow et al., 2013), lower turnover (Batt, 2002), as well as increased involvement and commitment (Gong et al., 2009). Both the behavioral perspective and the resource-based perspective

have discussed how HPWS affects performance. Based on the behavioral perspective, HPWS affects performance by controlling people's behavior. Performance improves if employees have the necessary motivation and ability to align their behavior with the organization's goals (Lee et al., 2017).

To strengthen the motivation and ability of employees, Jiang et al. (2012) suggest related HR practices such as performance management, rewards, benefits, promotions, career development, and job security. Additionally, the resource-based view emphasizes that organizations should have knowledgeable, skilled, and experienced employees and develop these capabilities through practices such as education and training (Subramaniam & Youndt, 2005). In this regard, Jiang et al. (2012) provide HR practices such as comprehensive recruitment, careful selection, training, flexible job design, work teams, participation, and information sharing. Based on these two views, the impact of HPWS on organizational performance becomes clearer, and the necessary practices to guide employees' behaviors and influence performance are understood. Therefore, we examine the following primary hypothesis:

Hypothesis 1: High-performance work systems have a positive effect on organizational performance.

Thus, in HPWS, practices can be decomposed into ability-enhancing, motivation-enhancing, and opportunity-enhancing practices (Edgar et al., 2020). This classification is introduced under the AMO model. By focusing on this model, HR systems seeking to maximize performance can use this classification to increase motivation, skill, and engagement opportunities. Several studies have accepted and validated this model (Liao et al., 2009; Subramony, 2009; Jiang et al., 2012; Edgar et al., 2020; Karunarathna, 2021). Scholars have drawn upon the AMO framework of HRM to decompose HPWS into three components: ability-enhancing, motivation-enhancing, and opportunity-enhancing practices (Subramony, 2009; Gardner et al., 2011; Jiang et al., 2012). Ability-enhancing practices include recruitment, selection, and training (Okorogu, 2015). Motivation-enhancing practices refer to practices that motivate employees, such as performance appraisal, development, competitive compensation, incentives and rewards, benefits and promotions, career development, and job security. Opportunity-enhancing practices can be defined as methods such as flexible job design, work teams, employee involvement, formal grievance and complaint procedures, and information sharing (Jiang et al., 2012; Okorogu, 2015). Additionally, Jiang et al. (2012) and Paauwe (2009) have confirmed the validity of the AMO model and reported that the general principles of AMO exist in examining the relationship between HPWS and organizational performance. However, no study has been done to evaluate the practical application of this model in Iran. Therefore, we use Jiang et al. (2012)'s AMO model in Iran and the study aims to identify the relationship between HPWS and organizational performance based on the AMO model in the context of Iranian organizations.

2.2 Organizational Performance

Organizational performance refers to the outcomes of an organization's operations. Defining and understanding performance is a complex concept. Richard et al. (2009) consider organizational performance to encompass three areas: financial performance, product market performance, and shareholder return. Several studies have identified organizational performance as effectiveness, efficiency, and outcomes (Boyatzis & Ratti, 2009; Ryan et al., 2009). Guest (1997) suggests using the term "outcome" instead of "performance." Jiang et al. (2012) categorized organizational outcomes as a) financial outcomes, b) operational outcomes, and c) voluntary turnover (HR outcomes). However, Dyer and Reeves (1995) previously made these distinctions. Voluntary turnover is a part of human resource outcomes and refers to the process in which employees leave a business or organization. Turnover intention can be voluntary or involuntary. Voluntary turnover occurs when a person voluntarily leaves the organization, while involuntary turnover occurs when a person is fired due to poor or improper performance (Basariya et al., 2019). Financial outcomes are significant determinants of organizational performance and indicate the realization of economic goals for organizations (Bhuiyan et al., 2015). They include profits, sales, market share, return on assets, return on equity, return on investment, return on sales, market return, sales growth, and overall financial performance. Operational outcomes are related to the goals of organizational operations, such as productivity, product quality, service quality, and innovation. Operational outcomes evaluate the quality of

planning, implementation, and effectiveness of management practices (Merwe et al., 2020). This research examines the performance of human resources in three dimensions in more detail.

The main challenge for companies today is how to maximize financial and organizational performance, as well as how to retain and motivate employees to apply their knowledge and skills effectively. HRM practices can increase organizational performance through recruitment and selection, employee training and development opportunities, performance-based rewards, and employee participation in strategic goals. Various studies have examined this relationship. Several studies have assessed the relationship between ability-enhancing HR practices and employee turnover. For example, increasing training has been found to reduce employee turnover (Malek et al., 2018), and the positive impact of upward job transition on turnover via external employability has been confirmed, but the influence of internal employability on voluntary turnover is not confirmed (Nelissen et al., 2017). Thus, we hypothesize that:

Hypothesis 2: Ability-enhancing HR practices have a positive effect on voluntary turnover.

Employee turnover rates have been found to be significantly related to some motivation-enhancing practices. For example, there is a negative correlation between performance appraisal and the rate of voluntary turnover (Selden et al., 2013; Batt & Colvin, 2011), and a negative relationship between service compensation and voluntary turnover (Faems et al., 2005; Ghebregiorgis & Karsten, 2007). Additionally, a positive relationship has been found between service compensation and employee retention (Ngo et al., 1998). Thus, more effective performance appraisal and compensation practices make employees less likely to leave their jobs. Therefore, we hypothesize that:

Hypothesis 3: Motivation-enhancing HR practices have a positive effect on voluntary turnover.

To retain employees, organizations must find ways to increase their job satisfaction. For example, team working can achieve this (Hee & Ling, 2011) and reduce turnover (Jinman, 2008). Information sharing is also inversely related to the rate of turnover. This practice ensures that everyone is in a constructive organizational environment where the intention of turnover is low (Okorogu, 2015). Based on this, we assume:

Hypothesis 4: Opportunity-enhancing HR practices have a positive effect on voluntary turnover.

Several studies have confirmed the effective influence of HRM practices on financial performance. The positive relationship between the hiring and training practices of the organization and its financial outcomes is confirmed by (Okorogu, 2015). Training, through the development of skills for future growth, leads to increased profitability (Hendiarto et al., 2021). Based on this, we assume:

Hypothesis 5: Ability-enhancing HR practices have a positive effect on financial outcomes.

Adam et al. (2019) showed that executive compensation on financial performance is partially supported. Also, Yan and Sloan (2014) confirmed the impact of employee compensation on financial performance. Based on the confirmation of previous studies, we assume:

Hypothesis 6: Motivation-enhancing HR practices have a positive effect on financial outcomes.

The positive relationship between employee participation in work teams and financial performance has been confirmed (Akhtar & Ding, 2008; Faems et al., 2005). The effect of HRM practices on firm profitability was examined by Hyde et al. (2008), but their results were weak concerning these two variables. Also, Javadin and Farahi (2012) have stated that there is a weak correlation between job design and job development, and financial performance. To assess the strength of the evidence presented, the following hypothesis will be examined:

Hypothesis 7: Opportunity-enhancing HR practices have a positive effect on financial outcomes.

In the following, Okorogu (2015) proved that training has a positive effect on employee performance, customer satisfaction, and productivity. The link between the domestic labor market and customer satisfaction was confirmed by Batt and Colvin (2011) and Liao and Chuang (2004).

However, Doaei et al. (2012) rejected the link between employee selection and organizational performance. Considering the contradictory results, we examine the following hypothesis:

Hypothesis 8: Ability-enhancing HR practices have a positive effect on operational outcomes.

Furthermore, providing appropriate rewards and opportunities for career advancement increases job satisfaction and is reflected in performance. The performance appraisal and job security are associated with performance (Akhtar & Ding, 2008). The relationship between rewards and customer satisfaction is confirmed by Batt and Colvin (2011). However, Sanjari et al. (2015) did not confirm the relationship between employee development and employee performance. To examine this relationship, we assume:

Hypothesis 9: Motivation-enhancing HR practices have a positive effect on operational outcomes.

Finally, the findings of Gambi et al. (2020) show that teamwork practices can influence innovation by involving employees and self-management teams. According to Ye et al. (2021), employee innovation is directly affected by knowledge sharing and absorption. Based on the findings of Meher and Mishra (2021), knowledge sharing affects employee performance by mediating organizational learning. However, in 2009, Oreyzi and Sabahi did not report the relationship between job design and organizational performance. So, we examine the following hypothesis:

Hypothesis 10: Opportunity-enhancing HR practices have a positive effect on operational outcomes.

3. Methodology

In recent years, with the growth of research and the information explosion, it has become impossible to have complete mastery over all aspects of a particular field. As a result, there has been an expansion in research that systematically synthesizes the findings of independent studies on a specific topic. No single study can provide definitive conclusions about a social phenomenon. Therefore, there is a need for quantitative hybrid research to cover a large population and report generalizable results (Okorogu, 2015). The meta-analysis method helps researchers discover new relationships by combining the results of conducted studies. In recent decades, numerous studies have examined the relationship between HR practices and organizational performance because organizations have realized that a comprehensive human resources system can significantly impact different parts of the organization, particularly its performance. In Iran, the implementation of effective HRM practices has been considered in light of this understanding. However, we have observed varied results, and such variation in the findings indicates the need for hybrid research to reach specific conclusions. In this regard, the present study employs the meta-analysis method to achieve this goal. Additionally, based on the findings of research in the field of comparative research on human resource management, which indicates the significant effect of institutional factors (Wood et al., 2012) and cultural factors (Reiche et al., 2018) on human resource practices in different societies, this study aims to control these factors by examining research conducted within the institutional context of Iranian society. The data were collected from scientific research journals of management in Iran.

3.1 Data collection

In the data collection section, we first obtained the list of research journals from the website of the Ministry of Science, Research, and Technology. Then, we reviewed all articles with relevant titles and variables published from 2008 to 2019 from the 57 scientific research journals of management in Iran through a census approach. We identified articles to be included in our review using three main approaches, as illustrated in Figure 1. Firstly, articles that simultaneously investigate the dimensions of HR systems as an independent variable and the dimensions of organizational performance as a dependent variable were selected. Secondly, articles that reported sample sizes were considered. Thirdly, articles that directly reported the (r) index (correlation) or included it in conceptual models as a coefficient of the path were included. Among the collection of 57 journals and 2594 articles in the field of human resources and behavior, 39 journals and 145 articles were utilized.

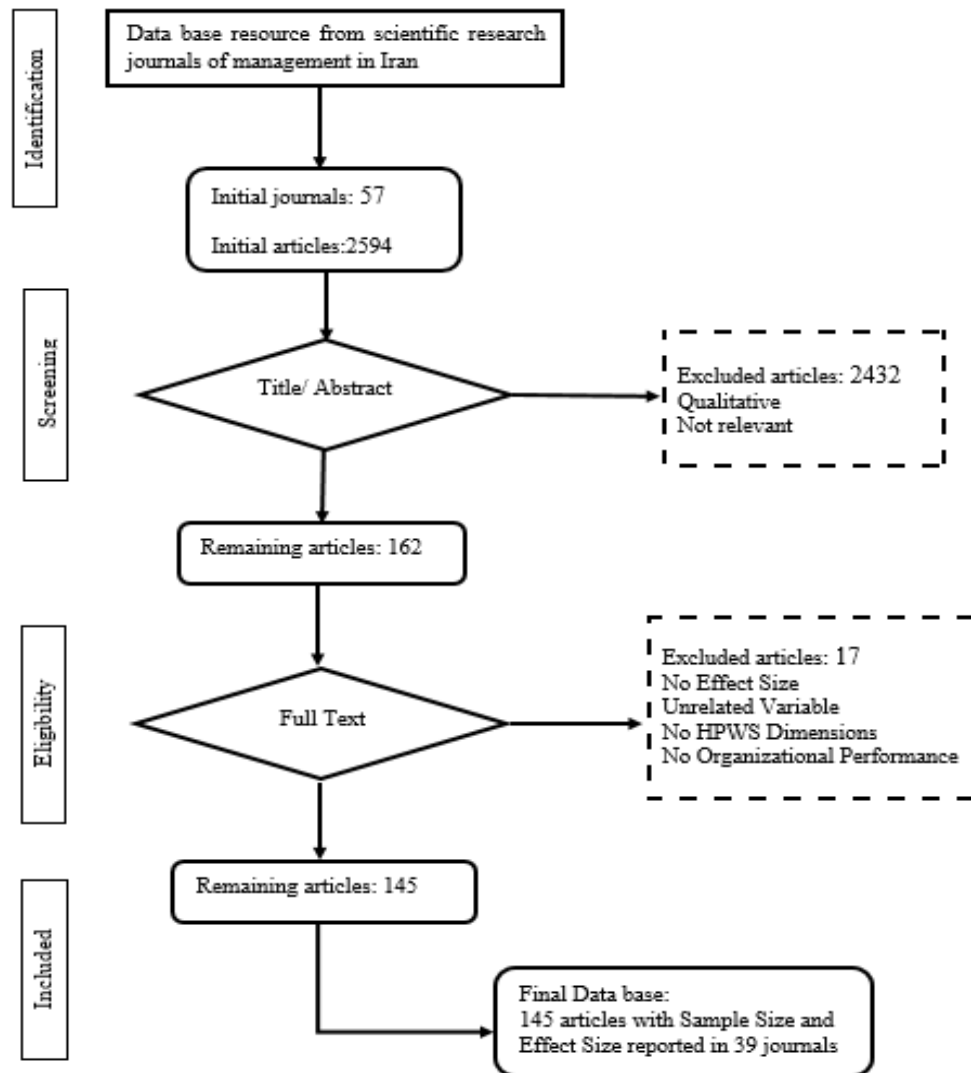


Figure 1. Sampling Process

3.2 Variables

3.2.1 Three dimensions of HR systems

According to the AMO model, practices are categorized into three dimensions: ability-enhancing, motivation-enhancing, and opportunity-enhancing. The ability-enhancing practice includes comprehensive recruitment, appropriate selection, and training. The motivation-enhancing practice encompasses performance appraisal, competitive compensation, incentives and rewards, benefits and promotions, career development, and job security. The opportunity-enhancing practice involves work teams, employee involvement, flexible job design, complaint procedures, and information sharing.

3.2.2 Three dimensions of organizational performance

Following the AMO model of Jiang et al. (2012), organizational performance is classified into three outcomes: financial, operational, and voluntary turnover. Financial outcomes include profits, sales, market share, return on assets, return on equity, return on investment, return on sales, market return, sales growth, and overall financial performance. Operational outcomes are related to the goals of organizational operations, such as productivity, product quality, service quality, innovation, and operational performance. Voluntary turnover is defined as an HR outcome. The resulting conceptual model illustrating the relationships between these variables is presented in Figure 2.

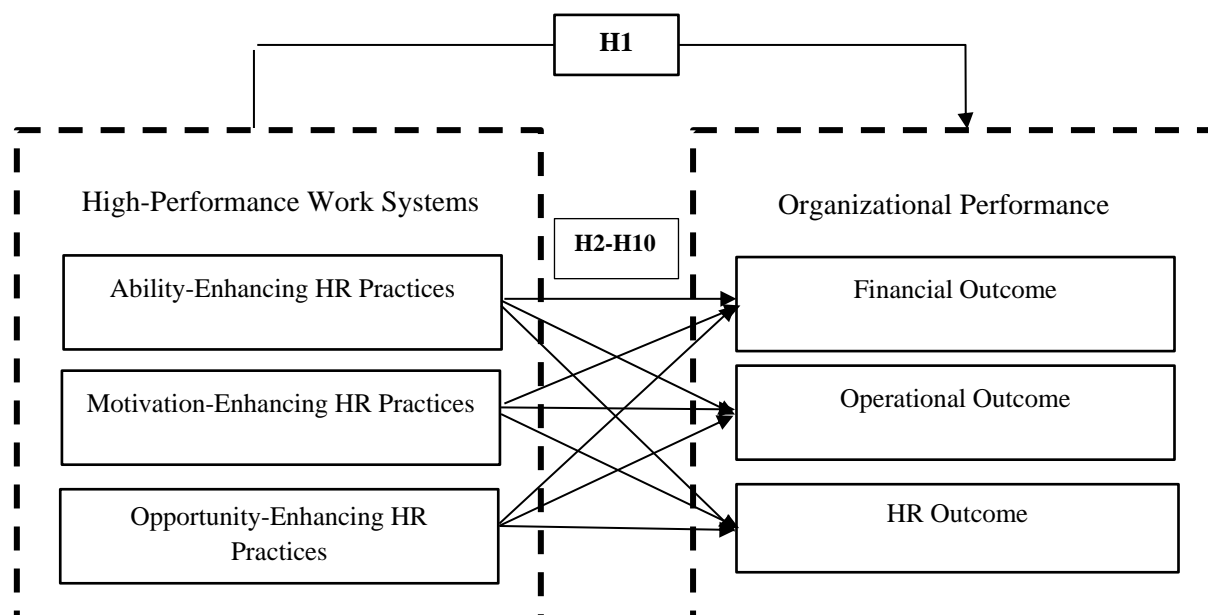


Figure 2. Conceptual Model

3.3 Meta-analysis

The data were analyzed using CMA2 software and the effect size calculation technique. The effect size is the primary method in meta-analysis that combines results by converting statistics into indicators (r). For inferential analysis, the meta-analysis assumptions were first examined. A Funnel plot was used to assess publication bias, and the heterogeneity of studies was investigated through Q and I -squared tests. Due to the heterogeneity between studies, a random-effects method was employed to synthesize the results and report the effect size. In cases of high heterogeneity, the results of the random-effects model are more generalizable than the fixed-effects model. Cohen's (1998) interpretive system was utilized to interpret the results, where an effect size of more than 0.5 is considered high, between 0.3 and 0.5 is medium, and less than 0.3 is low. Furthermore, Duval & Tweedie's procedure (Duval & Tweedie, 2000) and Orwin's Fail-safe N test (Orwin, 1983) were employed to determine the number of necessary studies to ensure the robustness of the research findings.

3.4 Investigating the homogeneity of studies

Heterogeneity in meta-analysis relates to the diversity of results in the initial studies. In this study, the I -squared method is used to assess heterogeneity. The I test measures the proportion of variability due to heterogeneity. Values of I at 25%, 50%, and 75% are interpreted as low, medium, and high heterogeneity, respectively. The Heterogeneity test is also utilized to determine the appropriate model. Meta-analysis employs two statistical models: the fixed-effect model and the random-effects model. Despite the heterogeneity in the results of the initial studies, a random-effects model should be used, assuming that the effect size in the initial research varies. If the results indicate homogeneity, a fixed-effect model is employed. As shown in Table 1, there is a high level of heterogeneity (96.41) in the effect measurements of the initial research. Consequently, the continuation of the analysis process should adopt the random-effects model due to the high heterogeneity observed among the studies.

Table 1. Test the heterogeneity of the research model

I-squared	Q	P-value	Df
96/29	8878/74	0/000	329

3.5 Bias Analysis

To assess the validity and accuracy of the meta-analysis, diffusion bias tests were conducted, including Duval & Tweedie's test and Orwin's Fail-safe N test. The Orwin test determines the number of studies needed to reduce statistical test errors in the meta-analysis. If this number exceeds the number of studies used in the meta-analysis, it indicates the absence of diffusion bias. Based on the results shown

in Table 2, it can be observed that the number of studies in Orwin's test exceeds the number of research studies, indicating no diffusion bias. Duval and Tweedie's procedure (Duval & Tweedie, 2000) relies on the symmetry/asymmetry of the funnel plot, demonstrating the number of studies required for funnel plot symmetry. According to the results presented in Table 2, there is no need to include additional studies, indicating a comprehensive meta-analysis. Additionally, as shown in Figure 3, the funnel plot exhibits approximate symmetry, further supporting the absence of publication bias. Studies with low standard error cluster at the top of the funnel, indicating no publication bias. However, as studies move towards the bottom of the funnel, their standard error increases, potentially leading to publication bias.

Table 2. The reports of diffusion bias

The report of Orwin test					
Number missing studies needed to bring correlation under 0.2	Mean correlation in missing studies	Criterion for a trivial correlation	Correlation in observed studies	P value for observed studies	Z value for observed studies
827	0.01	0.2	0.42	0.000	104.71
The report of Duval & Tweedie trim					
Random model	Number of studies required	Point estimation	Lower limit	Upper limit	Q
The value of observations	0	0.43	0.39	0.47	8571.247
Adjusted value	0	0.43	0.39	0.47	8571.247

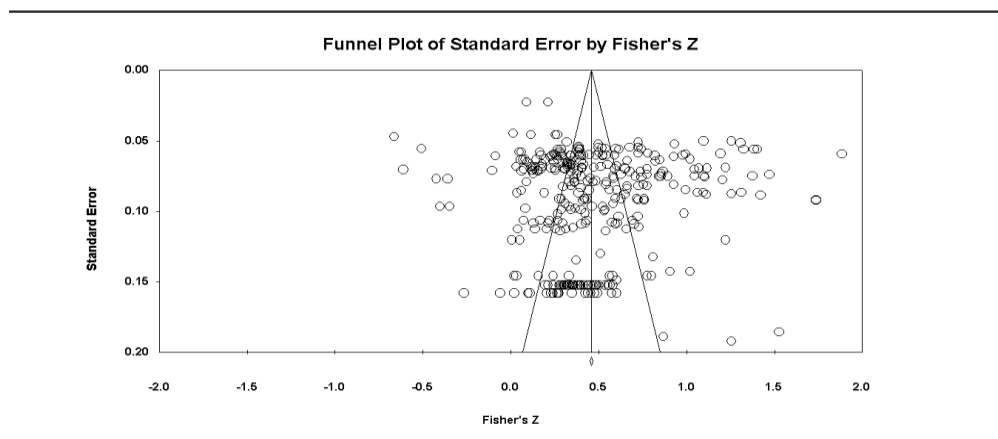


Figure 3. Funnel plot of diffusion bias

4. Testing hypotheses and result

The table below shows the results of examining the hypotheses.

Table 3. The effects of HPWS dimensions on organizational performance

Predictors	The dependent variable	Effect size	Lower limit	Upper limit	Z	P-value
High-Performance Work Systems	organizational performance	0.43	0.401	0.471	21.233	0.000
Ability-enhancing practices	financial	0.39	0.25	0.51	5.21	0.000
Motivation-enhancing practices	financial	0.27	0.09	0.42	2.97	0.000
Opportunity-enhancing practices	financial	0.50	0.26	0.67	3.92	0.000
Ability-enhancing practices	operational	0.43	0.33	0.52	7.91	0.000
Motivation-enhancing practices	operational	0.38	0.32	0.44	11.10	0.000
Opportunity-enhancing practices	operational	0.51	0.47	0.56	18.67	0.000
Ability-enhancing practices	voluntary turnover	0.07	-0.22	0.36	0.51	0.608
Motivation-enhancing practices	voluntary turnover	0.12	-0.12	0.34	0.96	0.333
Opportunity-enhancing practices	voluntary turnover	0.06	-0.10	0.22	0.70	0.482

The results indicate that Hypothesis 1 is confirmed (Table 3). According to the (AMO) model, High-Performance Work Systems (HPWS) have a significant and positive effect on organizational performance ($r = 0.43$, $p < 0.05$). This result suggests that as the HPWS status improves, we can

expect to see an improvement in organizational performance. Furthermore, all dimensions of Human Resource Management System (HRMS) practices have a significant and positive effect on financial outcomes (H2, H3 & H4). The effect sizes of ability-enhancing, motivation-enhancing, and opportunity-enhancing practices on financial outcomes are ($r = 0.39, p < 0.05$), ($r = 0.27, p < 0.05$), and ($r = 0.50, p < 0.05$), respectively. Similarly, all dimensions of HRMS practices have a significant and positive effect on operational outcomes (H5, H6 & H7). The effect sizes of ability-enhancing, motivation-enhancing, and opportunity-enhancing practices on financial outcomes are ($r = 0.43, p < 0.05$), ($r = 0.38, p < 0.05$), and ($r = 0.51, p < 0.05$), respectively. Finally, no significant effect was found between HRMS practices and voluntary turnover, and Hypotheses 8, 9, and 10 were not confirmed ($p > 0.05$). This indicates that focusing on HRMS practices has not been able to justify changes in voluntary turnover.

5. Discussion

Our findings can be discussed in four parts. Firstly, the High-Performance Work Systems (HPWS) have a positive effect on organizational performance. In other words, HRM practices can be considered factors that promote abilities, motivation, opportunities, and empowerment. This finding is consistent with the findings of previous studies by Jiang et al. (2012), Siddique et al. (2019), Rani et al. (2021), and Mahdy & Alhadi (2021). Therefore, the confirmation of this influence in the context of this research contributes to the existing findings.

Secondly, ability-enhancing, motivation-enhancing, and opportunity-enhancing practices have a positive impact on financial outcomes. These results support the evidence from previous observations by Huselid (1995), Takeuchi et al. (2007), and Jiang et al. (2012). Various studies have emphasized this relationship in different ways, as highlighted by Akhtar & Ding (2008), Okorogu (2015), and Adam et al. (2019).

Thirdly, ability-enhancing, motivation-enhancing, and opportunity-enhancing practices have a positive impact on operational outcomes. This finding is consistent with the findings of Vermeeren et al. (2014), Shin and Konrad (2017), Jiang et al. (2012), and Bello-Pintado (2015).

Fourthly, it is surprising to find no significant results regarding the effect of HPWS practices individually on voluntary turnover. This finding contradicts previous studies that suggested a positive impact of HR practices on voluntary turnover, as indicated by Gardner et al. (2011), Jiang et al. (2012), and Almutawa et al. (2016). It is recommended that future research explore moderating variables that affect the relationship between HR practices and employee turnover.

5.1 Managerial

Implications This research also has practical implications. Firstly, the findings show that the use of the three dimensions of human resources is associated with an increase in financial results. Therefore, the results of this study provide insights for managers on how to enhance the benefits of investing in human resource management. Based on the results, organizations should invest in HR practices to increase employees' abilities and motivation in order to reduce voluntary turnover and achieve operational and financial goals. In this regard, organizations are advised to focus on recruitment, selection, and training practices to enhance employees' abilities, and rely on performance evaluation, compensation systems, job design, and employee participation practices to improve HR motivation. By employing modern recruitment methods, specialized training, information sharing within team activities, and incentive compensation systems, organizations can attract high-caliber employees. Proper implementation of HR practices motivates employees to align their work with the organizational strategy and promotes creativity, leading to a dynamic organization. Emphasizing training practices allows organizations to continuously learn and adapt, enabling them to better meet customer needs, identify market opportunities, and provide suitable products, thereby improving economic and financial profitability as well as increasing sales. Furthermore, the importance of the justice index (a crucial factor in increasing trust, commitment, and job satisfaction) amplifies the value of performance appraisal. Through performance appraisal, training needs and outstanding employees can be identified, and the results can serve as criteria for increased compensation and benefits, ultimately enhancing the justice index within the organization. Additionally, organizations should pay more attention to complaint handling methods and information sharing mechanisms to reduce

voluntary turnover. Better information sharing and effective complaint handling create informed employees who are less likely to desire job changes. Ultimately, managers should invest in human capital and prioritize HPWS to enhance organizational performance.

5.2 Limitations

The findings of this study show a high degree of heterogeneity in the distribution of articles. This heterogeneity can be due to the existence of moderating variables that affect the relationship between the independent variable and the dependent variable. Therefore, it is suggested that future research examines the moderator variable and by conducting more extensive research to provide valuable information for the use of practices in the service of human resource managers.

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