

# Withstanding the Effect of Industry 4.0: The Role of High-Performance Work System and Management Philosophy

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**Abstract**— Coping with challenges posed by the extant IR 4.0 demands that small businesses should provide ‘added-value’ services, and products, or high quality and innovative products and services which could be possible through strategic development of employees. Drawing upon the findings of the extant literature, HPWS which is aligned with befitting management philosophy would help achieve enduring and enhanced performance culminated in provision of innovative goods and services. To offer context-based empirical insights on this issue, this study investigated the moderating role of management philosophy in the HPWS-performance nexus. The present study employed cross-sectional research approach in which data were collected from a sample of 518 of SME managers in Nigeria. Partial Least Squares Method (PLS) algorithm and bootstrapping technique were used to test the study’s hypotheses. Using product indicator approach, moderating effect of management philosophy was estimated. The findings signified a positive effect of HPWS on SME performance, and management philosophy was found to interact negatively with HPWS in enhancing performance. This result portrays presence of mismatch between managers’ philosophies and HPWS. Overall, the findings of the present study accentuate that HPWS which is aligned with befitting management philosophy would help achieve enduring and enhanced performance culminated in provision of innovative goods and services, with which the challenges posed by IR 4.0 will be withstood. Lastly, implications, limitations and suggestions for future research are discussed.

**Keywords**- *firm performance, HPWS, management philosophy, IR 4.0, Megatrends.*

## 1. Introduction

The Industry 4.0 (IR 4.0), which is otherwise known as fourth industrial revolution, makes a central aspect of Megatrends. This societal transformation constitutes huge transformative global forces with far-reaching effect on individuals, society, culture, business and economies [1]. This global trend has exerted profound influence on mobility of goods, capital and labor all over the world. Technological innovation embedded in the IR 4.0 is re-shaping commerce and industry across all sectors, as well as the work and life style of people.

This trend transforms the way businesses are being operated [1]. Small firms, which have already been threatened by a myriad of challenges deterrent to their ability to attain its full potentials, are left with no option other than aligning their policies and strategies with the IR 4.0, which demands that small businesses should provide ‘added-value’ services, and products, or high quality and innovative products and services [2] through strategic development of the firm’s rare, inimitable and non-substitutable internal resources, embodied – literally – in its workforce, the most important asset for (small) businesses [3], and through systematic and logic selection of HR practices that will build the human capital pool and stimulating the kinds of human behavior that constitute an advantage [4]. Human capital is the most important asset for (small) businesses, and fortified HRM forms a part of the crucial factors that guarantee continuous success of the (small) businesses and nation’s economy [3]. [5] noted that the success of any organization hinges on human resource of such organization. Human resource has the skills, knowledge and competencies required for the execution of organizational strategy and planning. It is a crucial to the enhancement of sustainable competitive advantages and enhanced firm performance, because improvement in technical competencies, productivity, and organizational performance are possible through the instrumentality of human resources which are equipped with the required skills, knowledge and competencies needed for the execution of organizational strategy and planning [6].

Moreover, strategic human resource management (SHRM) has been identified by researchers (e.g. [7],[8]) as a basis of competitive advantage and high performance. Strategic HR that enhance task, targets and performance are formed through the effective adoption of high performance work system (HPWS). HPWS have demonstrable benefits for firms that use them, helping firms to grow and increasing their productivity. The returns are most apparent for those small firms that invest in them and those that set formal

performance targets [9]. In addition, HPWS symbolizes an assertion that higher performance can be accomplished through a set of work practices for core workers in an organization (Boxall & Macky, 2009). Commonsensical analysis of HPWS concept signifies the existence of a bundle of work practices that stimulate, in many ways, higher organizational performance. Substantial studies (see [10], [11], [13]) have indicated that HPWS can enhance firm performance in several ways involving helping the firm to acquire and develop its human capital; structuring jobs in such a way as to encourage employee participation in process improvement; and motivating employees to direct their efforts in line with organizational goals. Nevertheless, the performance benefits of HRM practices has thus been somewhat equivocal [9]. Thus, it can be asserted that the relationship between HPWS and performance is contingent upon the effect of a third variable called contingent variable. Such variables have effects on the HPWS-Performance nexus [14]. Besides, the strategic orientations of firms also have bearing on the application of HR practices and effect on the firm's performance [15].

HPWS can be destructive or helpful because failure or success of HPWS depends on internal and external boundary conditions [16]. For that reason, the functions of the HRM is contingent upon the situations of the firm regardless of the size of the firm. It is then observed that management philosophy, otherwise known as managerial values, which is employee-oriented would reinforce the effectiveness of HPWS and in turn enhance performance (Marchington & Wilkinson, 2005). It has been found that management ideologies or values regarding employees have influence on the effectiveness of HPWS [17]. With this and underpinned by contingency theory's supposition that the context within which firms' functions matter most, it is therefore expected that management philosophy would moderate HPWS-firm performance nexus. On the basis of the foregoing, the present study formulates the following hypotheses:

1. HPWS would positively influence firm performance.
2. The positive effect of HPWS on firm performance would get stronger in the firms with employee-oriented management philosophy.

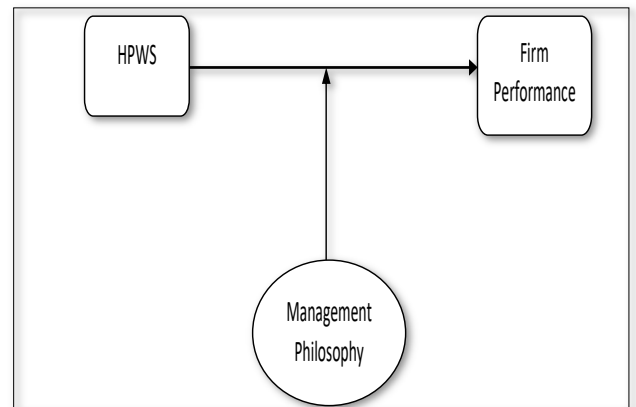


Figure 1. Research Model

## 2. Research Methodology

### 2.1 Sampling Design

Using cross sectional survey method, data were collected from a sample of 518 managers in Nigeria and analyzed via smart PLS 3 software packages, as this would guarantee that measurement errors are minimalized and duly taken care of. Using priori power analysis via G\*Power 3.1.2.9 software but underpinned by recommendations of [19] and [20], the sample size of the study is 518, and respondents were selected through quota sampling technique, given that the population is large (11, 044 firms) [21] and resources (time and money) is not adequate for the researchers [22]. Thus, 518 questionnaires were distributed to the respondents, but 372 completed questionnaires, representing 72% response rate, were returned and usable for further analysis. This response rate is considered adequate and sufficient, given the position of [23] that a response rate of 30% is sufficient for survey. Moreover, the analysis technique in the current study involved 2-step approach: Measurement and structural model [24], as this will guarantee valid and reliable results.

### 2.2 Research Procedure

With regards to the measurement of the variables of the present study, HPWS involves job design (HJA), non-financial reward (HFP), pay for performance (HPF), Employee Participation and Communication (HPC), and succession planning (HSP). The selected HR architectures to make up HPWS are unique because they have been recognized to enhance the capabilities and motivation of the employees since highly committed, well-motivated and qualified employees are

crucial to the survival and sustainability of firm [25], [26] Also, the practices are held to be force to that drives employee knowledge, skills and abilities (KSAs), employee motivation and creativity, and creative performance. Moreover, firm performance in the current research is measured using financial performance. Furthermore, measurement of HPWS was adapted from [2] and [27] management philosophy was adapted from [28] and [29]; and firm performance measures were adapted from [30]. The survey instruments included demographic information of the respondents (6 items) and the instruments of job design (3 items), non-financial reward (2 items), pay for performance (2 items), Employee Participation and Communication (5 items), and succession planning (5 items). With regards to the instruments of management philosophy and firm performance, 5 items belong to the former while 6 items belong the latter. All the measures of HPWS, management philosophy and firm performance are in reflective form. The scale for all the constructs, except firm performance, ranged from 1(strongly disagree) to 5(strongly agree). Firm performance was scaled using a 5-point interval scale bordering on 1=Very Weak; 2=Weak; 3=Not Sure; 4=Strong; 5=Very Strong. However, demographical variable was measured as categorical variable. This kind of interval scale is deemed fit for this study, going by the suggestion of [31].

### 3. DATA ANALYSIS

#### 3.1 Demographic and Descriptive Analysis

Bio-data of the respondents of the current study indicates that the sampled firms varied substantially in terms of their backgrounds, and this implies that the data used in the current study was from the respondents of diverse demographic backgrounds, and thus enriching generalizability of the result of the research. According to the bio-data, 137 (37%) respondents out of 372 respondents are executive directors in their respected firms while 94 (25%) and 44 (12%) are marketing managers and HR manager respectively. The remaining 97 (26%) respondents are either supervisors or line managers. Forty percent of the sampled firms are in Agriculture-related business, as 22% of them are firms dealing on construction, logistics, and oil Energy, 46 (12%) and 39 (11%) are workers in the firms transacting in computer, financial, manufacturing and info-tech, mechanical, and medical equipment. The

remaining firms, which are 57 (15%) in numbers, belong to Arts, Entertainment and Recreation or Water Supply, Sewage, Waste Management industries. In addition, majority of the firms sampled (40%) have been operating for a decade or less while 83 (22%) firms' years of operation ranged between 11-20 years, and 50 (13%) firms' years of operation ranged between 21-30 years. While 39 (11%) firms' years of operation ranged between 31-40 years, 53 (14%) firms have been in operation for more than four decades. In addition, the selected firms have different forms of ownership structure, 169 (45%) firms are owned by individual owners (sole proprietors), 70 (19%) firms are owned by two or more people called partners (partnership). A total of 82 (22%) firms among the selected firms are Private Limited Liability Companies, but 19 (5%) firms are cooperative companies. As 20 (5%) firms are faith-based organizations, the remaining 12 (3%) firms are franchise-based business. Concerning the number of employees in the respondents' firms, 348 (94%) firms have 100 employees or less. While 16 (4%) firms have between 101-150 employees, the remaining 8 (2%) firms have between 151-200 employees. Moreover, the total annual operating expenses accounted for by labor costs in 183 (49%) respondents' firms are 25% or less, while that of 129 (35%) firms ranged between 26-50%. While 52 (14%) firms' total annual operating expenses accounted for by labor costs ranged between 51-75%, only 8 (2%) firms have the total annual operating expenses accounted for by labor costs of more than 75%. Considering descriptive analysis of the latent constructs, all variables and their dimensions possessed mean values ranging from 4.54 to 6.76, and the standard deviation of all dimensions ranged from 0.710 to 1.06. These values of overall mean and standard deviation for all the variables and their dimensions are quite acceptable. Hence, it can be proven that the responses of the respondents clearly indicate an acceptable and satisfactory level of implementation with regard to all dimensions involving job design/autonomy, non-financial reward, pay-for-performance, employee participation and communication, management philosophy, and firm performance.

#### 3.2 Measurement Model Assessment

In this section, internal consistency reliability, convergent validity and reliability, and discriminant validity are vetted to satisfy the conditions required for constructs' reliability and validity ([32], [33]). Figure 2, Table 1, and Table 2 below shows the outputs from measurement model evaluation

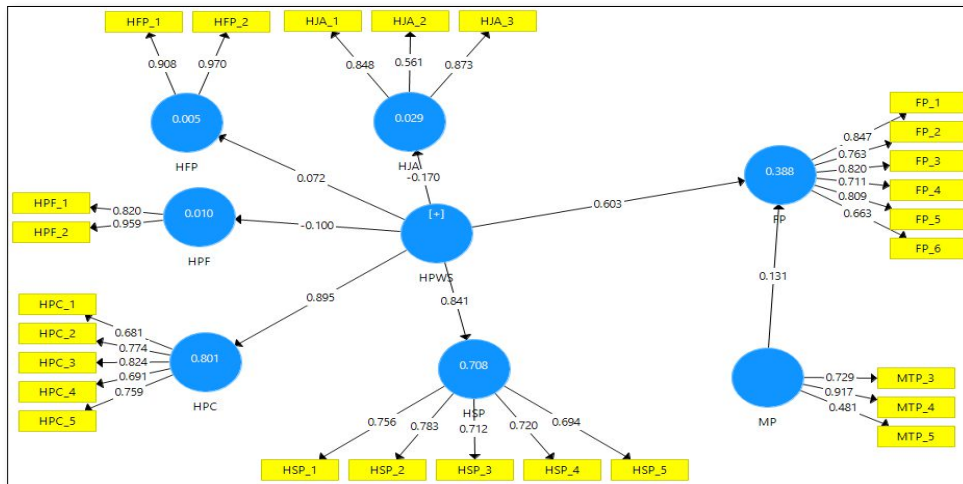


Figure 2. Measurement Model

Table 1. Internal Consistency and Convergent Validity

Constructs	Items	Loadings	CA	CR	AVE
Management Philosophy	MTP_3	0.729	0.624	0.764	0.535
	MTP_4	0.917			
	MTP_5	0.481			
Financial Performance	FP_1	0.847	0.863	0.897	0.595
	FP_2	0.767			
	FP_3	0.820			
	FP_4	0.711			
	FP_5	0.806			
	FP_6	0.661			
Non-Financial Rewards	HFP_1	0.908	0.875	0.937	0.882
	HFP_2	0.970			
Job Autonomy	HJA_1	0.848	0.753	0.812	0.599
	HJA_2	0.561			
	HJA_3	0.874			
Participation & Communication	HPC_1	0.681	0.801	0.863	0.559
	HPC_2	0.774			
	HPC_3	0.824			
	HPC_4	0.691			
	HPC_5	0.759			
Pay-For-Performance	HPF_1	0.820	0.768	0.886	0.796
	HPF_2	0.959			
Succession Planning	HSP_1	0.756	0.785	0.853	0.538
	HSP_2	0.783			
	HSP_3	0.712			
	HSP_4	0.720			
	HSP_5	0.694			

Note: AVE: Average Variance Extracted; CR: Composite Reliability; CA: Cronbach Alpha.

**Table 2.** Discriminant Validity (HTMT criterion)

Construcs	FP	HFP	HJA	HPC	HPF	HPWS	HSP	MP
FP								
HFP	0.115							
HJA	0.137	0.083						
HPC	0.595	0.092	0.125					
HPF	0.097	0.062	0.201	0.173				
HPWS	0.656	0.323	0.394	0.996	0.345			
HSP	0.665	0.087	0.217	0.810	0.131	0.940		
MP	0.189	0.165	0.191	0.145	0.157	0.275	0.165	

Note: HJA: Job Design/Autonomy; HFP: Non-Financial Reward; HPF: Pay-for-Performance; HPC: Employee Participation and Communication; HSP: Succession Planning; MP: Management Philosophy; FP: Financial Performance

**Table 3.** Confidence Intervals

Relationships	Original Sample (O)	P Values	5.0%	95.0%
HPWS -> FP	0.708	0.000	0.583	0.811
M.HPWS -> FP	0.198	0.000	0.108	0.301
M.HPWS -> HPWS	0.562	0.000	0.457	0.715
MP -> FP	0.157	0.001	0.085	0.244
MP -> HPWS	0.159	0.000	0.121	0.280
MP -> M. HPWS	0.307	0.000	0.173	0.451

Drawn upon Figure 2, Table 1, and Table 2, it is crystal clear that each item of the constructs shows higher value on their respective constructs, entails significantly and acceptably high loadings, and thus affirming the content validity of the constructs, except that 2 items from management philosophy, which fell below the threshold of 0.5 [32], [34] were deleted. Also, the constructs of the study have high levels of internal consistency reliability, as the composite reliability and Cronbach's alpha values of all the constructs are well above the threshold values of 0.7 and 0.6 respectively. The Average Variance Extracted (AVE) values of the reflective scales exceed the minimum requirements of 0.5 [32].

As for discriminant validity assessment, the re-trait-monotrait ratio (HTMT) of the correlations is adopted. HTMT is the ratio of the between-trait correlations to the within-trait correlations (Hair et al., 2017). The result in Table 2 confirms the discriminant validity of this study's constructs, as the HTMT values for all pairs of constructs in a matrix fell below the threshold value of 0.90. In addition to evaluation of the HTMT ratios, the HTMT values were tested via bootstrapping method (see Table 3) and found that they are significantly different from 1, and thus signify that the constructs of the study have discriminant validity [35]. Overall, having confirmed the content validity, convergent validity, and discriminant validity of the constructs of this research, it can then be claimed that the constructs' validity has been established in this study.

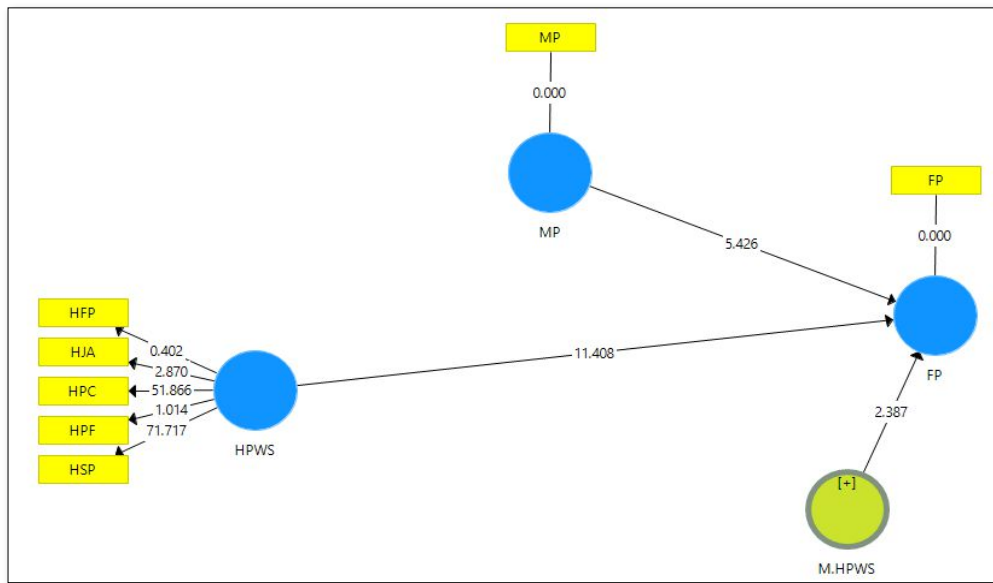


Figure 3. Structural Model

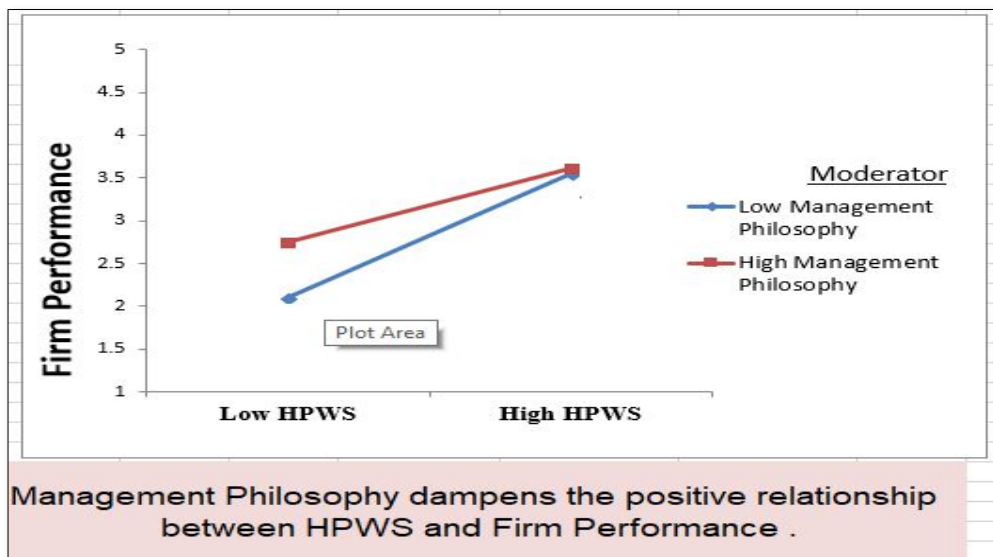


Figure 4. HPWS-MTP Interaction Effect on Firm Performance.

Table 4. Hypotheses Testing

Hypotheses	Beta	STD	TSTAT	P Values	Decision
HPWS -> FP	0.579	0.051	11.408	0.000***	Supported
M.HPWS -> FP	-0.144	0.061	2.387	0.009**	Not Supported
MP -> FP	0.179	0.033	5.426	0.000***	Supported

In Figure 3 and Table 4, the result of structural model and moderating effect testing are signified. R square value was 0.388 (See figure 2), and it indicated that, in the model, exogenous latent variables, involving HPWS and management philosophy explain 39% of the variance in the endogenous latent variable which is

moderate and acceptable (Cohen, 1988). With regards to testing the hypotheses, the direct path regarding relationship between HPWS and firm performance (HPWS -> PERF) is significant and positive ( $\beta = 0.579$ ,  $t = 11.408$ ,  $p < 0.01$ ). with this result, hypothesis 1 is supported.

Using product indicator approach, moderating effect of management philosophy was estimated and the result, as shown in Table 4 ( $\beta = -0.144$ ,  $t = 2.387$ ,  $p < 0.05$ ), that management philosophy moderates the relationship between HPWS and firm performance but not in the expected direction. This result signifies that positive nexus between HPWS and firm performance do not get stronger for firm with high employee-oriented management philosophy.

Furthermore, as hinted by [36], the result of the moderating effect of management philosophy on the relationship between HPWS and firm performance was tested further using interaction plot [37]. In Figure 4, it is shown that the interaction plot in which line tagged low MTP, which indicate lack of employee-oriented management philosophy, has a steeper gradient as against high MTP (presence of employee-oriented management philosophy). Therefore, the overall findings indicate that in a firm with high employee-oriented management philosophy, HPWS becomes less important for explaining performance while in a firm with less employee-oriented management philosophy, HPWS would increase in its importance for explaining performance.

In furtherance of the inferential analysis, the effect size of the exogenous constructs on the endogenous construct, firm performance was examined. The result indicates that firm performance is explained by HPWS and management philosophy with effect size ( $f^2$ ) of 0.08 and 0.62 respectively [38], [39], indicating that HPWS has small effect on firm performance while management philosophy has large effect on firm performance.

#### 4. DISCUSSION

The result regarding the positive effect of HPWS on firm performance accentuates the findings of the extant HPWS studies (e.g. [40] & [41], [30] & [42]). For example, [30], who conducted their research on the relationship between HPWS and organizational performance of small and medium enterprises (SMEs) in Nigeria via survey of 236 respondents confirm that management-rated HPWS influenced firm performance. This substantiates the earlier claim that HPWS form an indispensable part of the whole of competitive advantage and strategic HR architectures that enhance task, targets and performance of SMEs are formed through the effective adoption of high performance work system (HPWS).

Moreover, management philosophy moderates in HPWS- performance connection, but the result signifies that philosophies of SMEs' management do not

positively fortify the effectiveness of the HPWS-performance relationship. This result implies that in a firm with high employee-oriented management philosophy, HPWS becomes less important for explaining financial performance while in a firm with less employee-oriented management philosophy, HPWS would increase in its importance for explaining financial performance. Also, this result indicates presence of mismatch between managers' philosophies in the sampled firms and HPWS, and the consequent is that such philosophy would not reinforce and strengthen the impact of HPWS on the firm's performance. Thus, unfit managerial philosophy weakens the effect of HPWS on firm performance. This finding is consistent with contingency theory, which presupposes that organizational performance hinges on effective alignment of managerial attitudes and philosophy with crucial organizational practices (HPWS) [43].

#### 5. CONCLUSION

Coping with challenges posed by the extant IR 4.0 demands that small businesses should provide 'added-value' services, and products, or high quality and innovative products and services (Martinaityte, 2014). This will consequently culminate in enhanced firm performance. To achieve this, there is need for strategic development of the firm's rare, inimitable and non-substitutable workforce. An effective approach to human capital development is entrenchment of employee-oriented HPWS. Therefore, managers and the CEOs of the small businesses need to entrench HPWS that is employee-oriented. Likewise, the management of small firms should configure and implement HPWS via the strategy and values that can stimulate positive employee behavior and creativity rather than a process of work intensification which can induce negative responses from employees. Management philosophy is important because it reflects managers' mind-set, and promotion of any managerial practices or HR architectures is connected with fitting ideologies and philosophies of the managers. Thus, management philosophy and organizational practices (HPWS) should be aligned in order to guarantee enhanced firm performance. Although the results of the present study have advanced the body of knowledge in the HPWS research field, but it has a limitation which is connected with being a study that adopted a self-reporting approach to collect data from managers for investigation of moderating role of management philosophy in the relationship between HPWS and firm performance. Although, managers/owners are most effective and reliable pathway through which information about SMEs' internal processes can be got, this approach, despite its relevancy and usability, is

susceptible to likely raters' bias, and employees' perspective regarding firm performance and HPWS is necessary to be obtained for complete understanding.

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