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INNOVATION-ENHANCING HIGH-PERFORMANCE WORK PRACTICES IN MALAYSIAN R&D ORGANIZATIONS: MYTH OR REALITY?

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ABSTRACT

Numerous Malaysia policies underscore the need to build exceptional R&D capabilities as the key economic driver. This study acknowledges the influence of high-performance work practices (HPWP) on R&D innovativeness. Underpinned by social exchange theory, this study investigates the implementation of innovation-enhancing HPWP in

Malaysian R&D organisations and their relationship with project performance. Survey data on R&D project performance and six dimensions of innovation-enhancing HPWP were collected from 210 project leaders and members. Results suggested that innovation-enhancing HPWP implementation is still low as HPWP might be a relatively unknown practice in the R&D sector. Nevertheless, four HPWP dimensions were significant predictors of R&D project performance: employee recruitment, performance appraisal, reward and compensation, and employee participation. These findings will guide managers in developing relevant HPWPs to foster innovativeness. This includes a comprehensive audit of existing R&D people, processes, and products, and how these three `Ps' can be streamlined into an innovation-enhancing HPWP.

Keywords: High-performance work practices, HPWP, R&D project performance, innovation, Malaysia.

INTRODUCTION

After 65 years of independence, Malaysia continues to transform into an innovation-based economy to boost its socio-economic growth. In an innovation-based economy, innovation via research and development (R&D) is vital (Rehman et al., 2021). Innovations that stem from R&D allow companies to develop or enhance their products and services, making them more competitive compared to their rivals. Through R&D, companies can improve their technologies and processes, hence reducing marginal costs, maximising profit, and achieving business sustainability. Besides that, countries worldwide have witnessed an unbelievable collaborative global R&D effort to develop vaccines to fight against the lethal COVID-19 pandemic. The vaccination programs managed to slow down the spread of this deadly disease, which has put enormous pressure on healthcare systems and destructive impact on people's livelihoods and the economy. As R&D has proven to become the backbone of the economy and societal well-being, various national policies such as the Twelfth Malaysia Plan (2021-2025) (Economic Planning Unit [EPU], 2021) and the 10-10 Malaysian Science, Technology, Innovation and Economic (MySTIE) Framework (2020) greatly emphasise the necessity to build exceptional R&D talents (Ismail, 2020).

Despite an abundance of talent, R&D has yet to become the key driver of Malaysian economic growth. The country's innovative capability is still insufficient to provide a competitive edge because the existing knowledge stocks are mostly at absorptive and adaptive levels (Ismail, 2020). This is evident in Malaysia's 53rd position out of 131 in 'Knowledge Workers' of the Global Innovation Index 2020 (Dutta et. al., 2020). In addition, highly skilled workers, including R&D professionals, comprised only 24.4 percent of the Malaysian workforce in 2019. This figure is still far off from the Eleventh Malaysia Plan target of 35 percent by the year 2020 (EPU, 2016). Furthermore, Malaysia is still not able to sufficiently produce innovations since only 15 percent of intellectual property rights (IPR) registered at the Malaysian Intellectual Property Corporation of Malaysia (MyIPO) are developed by local talents compared to 80 percent in Japan (Kaur, 2019). To become a developed country like Japan, Malaysia should strive to achieve a local IPR target of at least 40 percent-50 percent. Hence, there must be a concerted effort by the government, industry, academia, and non-governmental bodies, in developing and retaining R&D talents. At the organizational level, this study acknowledged the role that high-performance work practices (HPWP) can play in fostering R&D and innovativeness. Using social exchange theory as the theoretical foundation, this paper explored the implementation of innovation-enhancing HPWP in Malaysian R&D organisations. It also analysed dimensions of HPWP which significantly influence R&D project performance.

LITERATURE REVIEW

High-performance Work Practices

From the strategic human resource management perspective, conventional human resource (HR) practices tend to be individual-based, i.e., they are not strategically aligned with each other and are not transformational in nature. This model might not be consistent with the innovative ambitions of R&D organisations. Furthermore, managing R&D talents has its own challenges. R&D professionals are involved in multi-faceted tasks that ultimately mould into distinct career paths such as technical, managerial, project-based, and entrepreneurial paths. At the same time, the R&D environment

involves rapid technological advancement. Thus, more flexible HR practices are needed to tackle the dynamic shifts in R&D organizations' competitive strategies (Asmawi et al., 2015).

High-performance work practices (HPWP) are a selective set of HR practices that are carefully combined or bundled around a specific objective, resulting in a synergistic effect whereby individual practices strengthen one another to eventually improve organisational performance. In other words, HPWP is deliberately designed through the integration and configuration of complementary human resource practices. The goal is to improve employee capabilities, commitment, and performance, so much so that they become a sustainable source of organisational competitive advantage. Studies suggested HPWP is a relevant HR strategy to foster innovativeness in R&D (Chowhan et al., 2017). HPWP is linked to both product and process innovation and knowledge capabilities of the firms (Gritti & Leoni, 2012; Rehman et al., 2020). HPWP motivates employees to take part in innovative and cooperative work, which results in developing knowledge within the organization (Atapattu, 2018). Berber and Lekovic (2013) argued the importance of analysing HPWP as a key element of R&D management since a highly innovative and creative workforce can help to improve business performance through the generation of new ideas and development of superior products, services, and work processes.

Theoretical Foundation

Social Exchange Theory

This study bases its theoretical foundation in social exchange theory (SET). SET centres on the notion that individuals' behaviours can be altered through a social exchange between an organization and its employees (Gouldner, 1960; Blau, 1964). Social exchanges are 'discretionary behaviours' resulting from an organization's treatment of its employees, with the assumption that such beneficial treatment will eventually be reciprocated. While commercial relationships call for a legally binding contract, social exchanges are founded on a collective sense of personal responsibility, gratitude, and trust (Gouldner, 1960).

Social exchanges begin when organizations openly recognize their employees' contributions and socio-emotional needs in various ways,

such as learning opportunities, career mobility, attractive rewards, and employee benefits. When employees perceive that they are being acknowledged and supported by the organization, they will gladly reciprocate in positive ways, such as enhanced productivity, teamwork, and innovativeness (Ogbonnaya & Messersmith, 2019; Korff et al., 2017; Werbel & Johnson, 2001). Through SET, HPWP can be used to shape employee attitudes and innovative behaviours (Pahos et al., 2021; Ostroff & Bowen, 2016), as well as the overall organizational culture. Instead of a 'hard' and controlling approach to increase efficiency using rules and regulations, HPWP takes on the 'soft' approach, which includes employee empowerment, open communication, training and development, selective hiring, teamwork, excellent rewards, and acknowledgement of employee contributions (Gould-Williams & Davies, 2005). All these are key ingredients to boost innovation among R&D talents.

Dimensions of Innovation-Enhancing HPWP

One bundle of HR practices is good only under a certain environment or with a particular group of employees (Wood, 1999; Tamkin, 2004). The same HPWP bundle might not be suitable in different organizational contexts or types of employees. The success of HPWP lies in the firm's ability to configure value-adding human resource bundles that differentiate the firm from its competitors (Massersmith & Guthrie, 2010). Based on this premise, this study identified six dimensions of HR practices that form a dedicated bundle of innovation-enhancing HPWP (Jiang & Liu, 2015; Prieto & Pérez-Santana, 2014; Lepak & Snell, 2002) suitable for R&D organizations. The six dimensions are employee recruitment, training and development, performance appraisal, rewards and compensation, employee participation, and job design.

HPWP-Oriented Employee Recruitment

To design a complimentary and synergistic HPWP bundle, there must be a dedicated recruitment strategy to attract highly qualified R&D professionals (Shahzad et al., 2019). Recruiting employees of this stature will enrich the exploration and exploitation of new knowledge, thus resulting in better project performance (Markus & Kongsted, 2013). The recruitment process must evaluate specific education

levels, technical skills and scientific knowledge that are critical for the R&D positions. In addition, human skills such as leadership, project management, problem-solving and teamwork are equally essential. Hence, it is vital for managers to include these elements when designing R&D jobs and to strictly evaluate these measures when selecting new employees. According to SET, organizations that are perceived to proactively invest in acquiring the best talents will, in turn, be reciprocated with higher employee commitment, dedication, and individual performance (Juhdi & Hashim, 2018). Thus, the first hypothesis is as follows:

H_1: HPWP-oriented employee recruitment positively influences R&D project performance.

HPWP-Oriented Training and Development

In HPWP, selective recruitment is bundled with an innovation-centric training and development program (Prieto & Pérez-Santana, 2014; Shahzad et al., 2019). Since technology changes rapidly, researchers need to continuously upgrade their skills and competencies. Likewise, project leaders need to be trained in various interpersonal (e.g., team-building, problem-solving, communication skills) and leadership skills as they must mobilize their teams and engage with different stakeholders (Asmawi et al., 2015). Additionally, organizations can develop a collaborative learning environment where people are free to nurture collective expansive thinking and cross-fertilization of innovative ideas (Kabaday et al., 2015; Vidal-Salazar et al., 2012). Creativity and innovation can be cultivated when researchers are open to various worldviews and information. Based on these arguments, the proposed second hypothesis was derived as follows:

H_2: HPWP-oriented training and development positively influence R&D project performance.

HPWP-Oriented Performance Appraisal

After the provision of training and development, performance appraisal is another element of innovation-enhancing HPWP (Prieto & Pérez-Santana, 2014). It involves evaluating employee performance and developing a career plan for performance improvement (Shahzad

et al., 2019). Regular appraisal ensures that individual and project performances are aligned with organizational goals (Asmawi et al., 2015). The appraisal session becomes a learning process where consistent feedback from project leaders will result in members self-regulating their behaviours accordingly (Odoardi, 2015). Nevertheless, a poorly executed appraisal system will fail to accurately assess the individual's performance. The whole idea of performance appraisal is not about rewarding reward "performing" employees and punishing the "incompetent" ones. It is also a platform to facilitate the mediocre performers to do better. Therefore, the third hypothesis was developed as follows:

H_3: HPWP-oriented performance appraisal positively influences R&D project performance.

HPWP-Oriented Rewards and Compensation

Innovation-focused HPWP must include attractive rewards and compensations. To cultivate innovation, organizations can encourage researchers to work on risky projects. Risk-taking is an essential R&D attribute as it promotes the development of new and uncertain ideas, which often lead to radical and disruptive innovations (Giaccone & Magnusson, 2021). By offering exceptional compensation packages, job security, and flexible work assignments (Asmawi & Mohan, 2011; Ashton & Sung, 2002), companies will be able to allay employees' fear of embarking on highly risky projects.

On the other hand, researchers who proactively share new ideas and those who effectively transform these ideas into innovative products must be properly acknowledged and rewarded. Knowledge-sharing activities can be nurtured through appropriate monetary incentives or social recognition (Asmawi et al., 2015; Ramli & Senin, 2021). Similarly, researchers who successfully develop innovative products are eligible for royalty payments coming from R&D commercialization (Asmawi et al., 2015). The fourth hypothesis can therefore be presented as follows:

H_4: HPWP-oriented rewards and compensation positively influence R&D project performance.

HPWP-Oriented Employee Participation

To have a successful work relationship, SET underscores the need to develop trust between employees and employers. R&D organizations can build trust and foster an innovative culture when researchers are encouraged to participate in decision making and problem solving (Shahzad et al., 2019). Employee participation suggests that the organization appreciates its employees' voices, creative ideas, and solutions (Cortes & Herrmann, 2020). Employee participation can be channelled through various platforms such as regular project meetings, quality circles, proposal pitches, social media engagements and town hall meetings. Employee participation will ensure the flow of innovative ideas to address user needs and tackle the challenges that arise from developing new products or services (Jiménez-Jiménez & Sanz-Valle, 2011). Greater participation, coupled with a clear strategic direction and adequate resources, will allow R&D project teams to increase responsive actions and self-initiatives. This will make the organization operate like an autonomous and entrepreneurial firm. Hence, the fifth hypothesis is as follows:

H_5: HPWP-oriented employee participation positively influences R&D project performance.

HPWP-Oriented Job Design

Creative jobs should be collaborative and empowering. R&D organizations should configure appropriate job designs where researchers are being put in the right position and equipped with the necessary competencies and resources. On top of that, organizations need to be designed in such a way that employees can be fully engaged, empowered, and synergised. Innovation-enhancing job designs include autonomous teams, flat organization structures, decentralized authority, cross-functional teams, and short-term job assignments (e.g., R&D projects, job rotations) (Jiang & Liu, 2015; Evans & Davis, 2005). In addition, it was found that firms focusing on decentralized organizational structures and employee empowerment, as indicated in the use of task autonomy and flexible working hours, tend to generate more product innovations (Seeck & Diehl, 2017). These fluid job designs allow R&D projects to improve speed and responsiveness, thereby increasing organizations' agility in a volatile

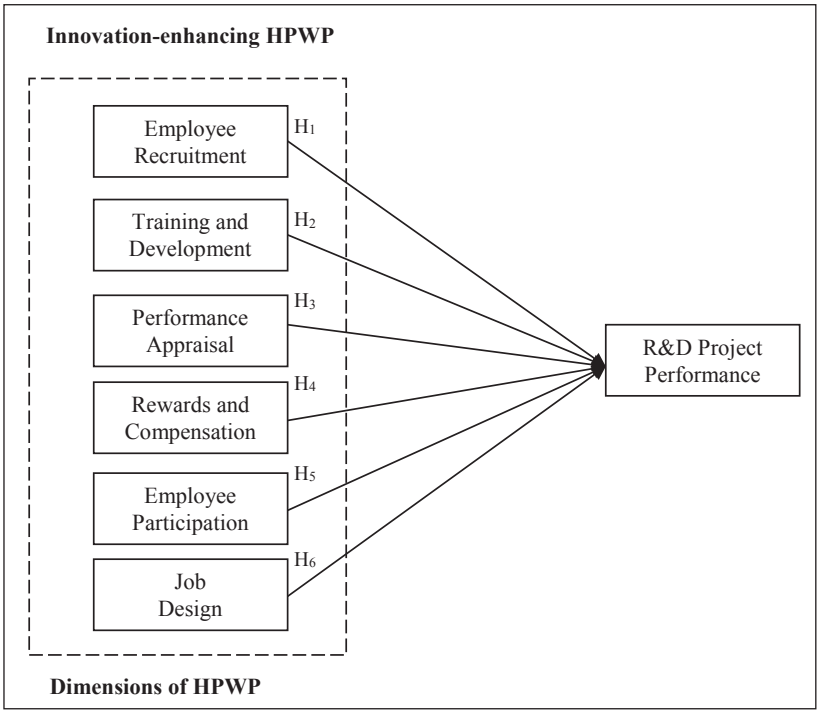
operating environment (Asmawi et al., 2015). Therefore, the sixth hypothesis was proposed:

H_6: HPWP-oriented job design positively influences R&D project performance.

In brief, the study's conceptual framework is depicted in Figure 1.

Figure 1

Conceptual Framework for the Study



RESEARCH METHODOLOGY

Measurement Items

The measurement items consist of demographic data, R&D project information, R&D project performance and six dimensions of

innovation-enhancing HPWP. This study focused only on R&D project performance since it is the most suitable level to examine how certain human resource approaches, such as HPWP, directly influence the work quality of R&D professionals. There are nine adapted items on R&D project performance (Shenhar et al., 2001). Since these items were created in the industrial context, another three items were included to measure 'knowledge generation' and 'human capital development' to reflect more basic research activities in universities and government research institutes (Asmawi, 2008). To investigate the differences in R&D project performance, these twelve measures were further split into three groups: customer fulfilment, business success, and knowledge and human capital development. A total of 27 measures for the six dimensions of HPWP were adapted from extant studies (Prieto & Pérez-Santana, 2014; Lepak & Snell, 2002; Hornsby et al., 2002). These items were rated on a five-point Likert scale (1- strongly disagree to 5 - strongly agree). Cronbach's alpha test revealed that all constructs had reliability coefficients ranging from 0.734 to 0.872. The full list of the measurement items can be found in Appendix 1.

Data Collection

Using judgment sampling, R&D project leaders and members were sampled to give information on HPWP and R&D project performance. This type of sampling was deployed as this study only wanted to obtain the views from R&D project leaders and members since they are the specific group of employees who perform R&D activities and are directly affected by the deployment of any HR policies in R&D organizations. In addition, as R&D project performance is the dependent variable in this study, the R&D project leaders and members were considered appropriate respondents as they could access their own R&D project data. They were employees of government research institutes (GRI), universities, R&D companies, and R&D units within companies. This study deliberately split R&D units from R&D companies, as the former are designed as a supporting unit in a larger firm. Unlike R&D companies, being a supporting unit may imply that R&D is not the main business activity, and they may not have the ability to implement their own HPWP program. G*Power software was used for sample size calculation. Based on six predictors, a medium effect size of 0.15, an α error probability of 5 percent and a power of 0.8 (Faul, 2009), the minimum sample size was 98.

A printed, self-administered questionnaire was used to collect the data. First, a background company check was done to ensure the companies had formal R&D activities. This check included inspecting the company website and calling the companies to seek informed consent to collect the data. The questionnaire forms were only distributed to organizations that gave oral permission to conduct the survey. The researcher verbally explained the study objectives and enlisted the cooperation of the company representatives to distribute the questionnaire to their R&D project leaders and members. Tokens of appreciation were given for their voluntary participation. Packets containing five sets of questionnaires were delivered to 16 GRI, 19 private R&D companies and 12 universities, which amounted to 47 R&D organizations. The individuals' informed consent was assumed from the voluntary survey participation. From the 235 survey forms, only 210 were found to be usable (89% response rate). The survey data are openly available at Asmawi et al. (2021).

RESULTS

This section first presents the descriptive analysis of the characteristics of respondents and R&D project details (as presented in Table 1 and Table 2, respectively).

Table 1

Characteristics of Respondents (n=210)

	Count	%		*Count*	%
Role			*Ownership Nationality*		
R&D Project Leader	88	42	Malaysian	202	96
R&D Project Member	122	58	Other	8	4
Length of Service			*Organization Type*		
Less than 5 years	77	37	Universities	56	27
5 to 10 years	63	30	Government Research Institutes	61	29
11 to 15 years	34	16	R&D Companies	38	18
More than 15 years	36	17	R&D Unit within Companies	55	26

The study further analysed the patterns of R&D project performance in different types of R&D organizations. The summary of results is presented in Table 3. In this study, there is no common set of R&D project performance indicators applicable in all four types of organizations, namely government research institutes, R&D companies, R&D units and universities.

Table 2

R&D Project Details (n=210)

	Count	%		Count	%
No. of Team Members			*Project Duration*		
Less than 10 persons	152	72	Less than 12 months	54	26
10 to 20 persons	41	20	12 to 24 months	97	46
21 to 30 persons	6	3	25 to 36 months	35	17
More than 30 persons	11	5	More than 36 months	24	11
Project Budget (RM)			*Area of Research*		
250,000 and below	103	49	Technology & Engineering	92	44
250,001-500,000	45	21	Life Sciences	366	17
500,001-750,000	8	4	Social Sciences	21	10
750,001-1,000,000	7	3	Business Management	15	7
More than RM 1,000,000	47	22	Mathematical Sciences	2	1
			Others	32	15

Table 3

Patterns of R&D Project Performance

R&D organizations	R&D Project Performance
Universities	• Research is more fundamental and is traditionally linked to knowledge discovery. • Fulfilling grant provider requirements is the only common performance measure across all university R&D projects. • Another important measure is producing scientific publication with at least 61% of the respondents meeting the target.

(continued)

R&D organizations	R&D Project Performance
GRI	• To advance the growth of specific industries (e.g., palm oil, rubber) which are the mainstay of the Malaysian economy. • Focuses on achieving the project target of fulfilling grant provider requirement. • Strives to fulfill customer requirement and develop new solutions for their customers who are smallholders and small companies that do not have access to sophisticated technologies.
R&D Companies	• To solve external customer problems, fulfill their business needs and eventually achieve profitability. • 80% of the R&D companies fulfilled their projects' target to solve customers' problems, fulfil customer requirements, and consequently achieve customer satisfaction. • About 50%-60% managed to achieve the targeted return-on-investment (ROI) and commercialization revenue.
R&D Units	• R&D units within companies (in-house research) are established by companies to create value in their business. • Moderately meet the objectives to fulfil internal customer requirement and solving customer problems. • Focus less on developing new intellectual property as they might have less resources to create and manage new intellectual property rights.

As illustrated in Table 4, the patterns of innovation-enhancing HPWP implementation in R&D projects across all organisations are presented. In general, the extent of HPWP implementation throughout these R&D organisations is still low. One reason is that these organizations might still be practising traditional, and individual-based HR practices. Additionally, HPWP is still a comparatively unknown practice in R&D organizations, as reflected by the scant HPWP reports in the Malaysian R&D context. The mean scores for most HPWP items are between 3.00 (neither disagree nor agree) and 4.00 (agree).

The study then conducted a correlation analysis between HPWP dimensions and R&D project performance. Table 5 shows that all six innovation-enhancing HPWP dimensions have significant correlations with R&D project performance. Nevertheless, further investigation shows that all R-values indicate low to moderate correlations (0.209-0.351).

Table 4

Patterns of HPWP Implementation

Innovation-enhancing HPWP	Extend of implementation in R&D projects
HPWP-oriented employee recruitment	• Low to moderate scores were found in all items in this dimension. • All R&D organizations focus on selecting the right applicants for R&D positions. • R&D companies & R&D units focus more on previous industry experience as selection criteria (Mean=3.84-3.92). • The ability to work in a team is an important selection criterion in R&D units and R&D companies, although the scores are only moderate (Mean=4.03-4.05).
HPWP-oriented training and development	• Low to moderate scores were found in all items in this dimension. • Regular training and development are available, although the scores are moderate. • A mentoring system between junior and senior team members is found in all R&D organizations, although the scores are low (3.29-3.59).
HPWP-oriented performance appraisal	• Low to moderate scores were found in all items in this dimension. • Team-based performance appraisal is more common in R&D companies and R&D units, even though the scores are only moderate (Mean= 3.76-3.80). • Regular performance feedback is most widespread in R&D companies.
HPWP-oriented rewards and compensation	• Low scores were found on incentives for new and innovative ideas in all organizations (Mean= 3.15-3.73) • Low scores were also found on the ability to come up with innovative ideas as a promotion criterion (Mean= 3.16-3.52). • Rewarding researchers based on both individual and team performance is more prevalent in all R&D organizations; also, the score is moderate. • Recognitions for championing new and risky projects are not that common across all organizations.

(continued)

Innovation-enhancing HPWP	Extend of implementation in R&D projects
HPWP-oriented employee participation	• Researchers across all organizations can give their suggestions for R&D projects and wider organizational issues. • Only moderate scores were found on all items under this dimension (Mean=3.73-4.20).
HPWP-oriented job design	• Job rotations are not that common across all organizations (Mean= 2.92-3.24) • Only moderate scores are found on the existence of cross-functional teams and internal/external collaboration (Mean= 3.53-3.95)

Table 5

Correlation Analysis

	Inter-correlations[a]						
Variables	RPP	HER	HTD	HPA	HRC	HEP	HJD
RPP	1.000						
HER	0.253	1.000					
HTD	0.351	0.665	1.000				
HPA	0.347	0.581	0.654	1.000			
HRC	0.269	0.352	0.448	0.498	1.000		
HEP	0.209	0.450	0.508	0.503	0.515	1.000	
HJD	0.307	0.485	0.582	0.632	0.534	0.540	1.000

[a]All correlations are significant at *p<0.001(1-tailed)

RPP = R&D Project Performance

HER = HPWP-oriented Employee Recruitment

HTD = HPWP-oriented Training and Development

HPA = HPWP-oriented Performance Appraisal

HRC = HPWP-oriented Rewards and Compensation

HEP = HPWP-oriented Employee Participation

HJD = HPWP-oriented Job Design

Twelve sets of regression analysis were then conducted to test the hypotheses and to identify dimensions of innovation-enhancing HPWP, which significantly influence twelve R&D project performance indicators. These twelve R&D project performance measures were further divided into three groups: customer fulfilment, business success, and knowledge and human capital development. Tables 6, 7 and 8 present the results of the regression analysis for each group.

Out of six HPWP dimensions, four were found to significantly influence R&D project performance. These were HPWP-oriented employee recruitment, performance appraisal, reward and compensation, and employee participation. However, there was no single HPWP dimension that significantly influenced all twelve R&D project performance indicators.

Table 6

Regression Analysis between Innovation-Enhancing HPWP and R&D Project Performance (Customer Fulfilment)

Model	Independent variables	Dependent variable R&D Project Performance (Customer fulfilment)			
		Fulfil customer requirement	Fulfil grant provider requirement	Solve customer problems	Achieve customer satisfaction
1	HPWP-oriented Employee Recruitment	0.041*	0.134	0.021*	0.003*
	HPWP-oriented Training and Development	0.926	0.592	0.712	0.908
	HPWP-oriented Performance Appraisal	0.006*	0.079**	0.277	0.122
	HPWP-oriented Rewards and Compensation	0.288	0.093**	0.372	0.353
	HPWP-oriented Employee Participation	0.734	0.775	0.817	0.582
	HPWP-oriented Job Design	0.121	0.616	0.876	0.148
	R^2	0.114	0.084	0.076	0.112
	Adj. R^2	0.081	0.053	0.041	0.079

Note: *p <0.05, ** p <0.1

In Table 6, HPWP-oriented employee recruitment significantly influenced the indicators 'fulfil customer requirement,' 'solve customer problems,' and 'achieve customer satisfaction'. HPWP-oriented performance appraisal significantly influenced 'fulfil customer requirement,' and 'fulfilling grant provider requirement'. On the other hand, HPWP-oriented reward and compensation only significantly predicted 'fulfilling grant provider requirement'.

Table 7

Regression Analysis between Innovation-Enhancing HPWP and R&D Project Performance (Business Success)

Model	Independent variables	Dependent variable R&D Project Performance (Business Success) Achieve targeted ROI	Achieve targeted commercialization revenue	Develop new technology	Create new products	Develop new solutions
1	HPWP-oriented Employee Recruitment	0.01*	0.03*	0.25	0.13	0.04*
	HPWP-oriented Training and Development	0.86	0.47	0.34	0.56	0.21
	HPWP-oriented Performance Appraisal	0.25	0.35	0.05*	0.57	0.84
	HPWP-oriented Rewards and Compensation	0.47	0.97	0.02*	0.37	0.74
	HPWP-oriented Employee Participation	0.66	0.89	0.08**	0.96	0.69
	HPWP-oriented Job Design	0.70	0.42	0.69	0.49	0.31
	R^2	0.16	0.20	0.11	0.08	0.09
	Adj. R^2	0.13	0.16	0.08	0.04	0.06

Note: **p* <0.05, ** p <0.1

Table 7 describes the regression analysis between innovation-enhancing HPWP and R&D project performance (business success). HPWP-oriented employee recruitment significantly influenced the indicators 'achieve targeted ROI', 'achieve commercialization revenue' and 'develop new solutions.' HPWP-oriented performance appraisal, HPWP-oriented reward and compensation, and HPWP-oriented employee participation all significantly influenced 'develop new technology'.

Table 8 explains the regression analysis between innovation-enhancing HPWP and R&D project performance (knowledge and human capital development). There are only two significant predictors here. Both HPWP-oriented performance appraisal and HPWP-oriented employee participation significantly predicted the development of intellectual

properties. Further examination showed that the significant R-square values in Tables 6, 7 and 8 were low, ranging from 0.076-0.20. This means that the innovation-enhancing HPWP dimensions only influenced 7.6 percent to 20 percent of the variation in R&D project performance. In summary, there was no single HPWP dimension that significantly influenced all twelve R&D project performance indicators. Hence, H_1, H_3, H_4 and H_5 were partially supported. H_2 and H_6 were rejected.

Table 8

Regression Analysis between Innovation-Enhancing HPWP and R&D Project Performance (Knowledge and Human Capital Development)

Model	Independent variables	Dependent variable R&D Project Performance (Knowledge and human capital development)		
		Develop new intellectual properties	Produce scientific publications	Produce postgraduate students
1	HPWP-oriented Employee Recruitment	0.57	0.25	0.30
	HPWP-oriented Training and Development	0.73	0.28	0.57
	HPWP-oriented Performance Appraisal	0.09**	0.71	0.27
	HPWP-oriented Rewards and Compensation	0.19	0.94	0.69
	HPWP-oriented Employee Participation	0.09**	0.43	0.60
	HPWP-oriented Job Design	0.28	0.97	0.67
	R^2	0.16	0.03	0.07
	Adj. R^2	0.11	-0.01	0.02

Note: *p <0.05, ** p <0.1

DISCUSSIONS AND IMPLICATIONS

Descriptive analyses revealed that the implementation of innovation-enhancing HPWP in R&D projects across all organizations is still low.

One explanation is that HPWP is still a relatively unknown practice in R&D organizations. This is evident from the limited HPWP research and practitioner literature in the Malaysian R&D context. Despite the low levels of HPWP implementation, four HPWP dimensions were significant predictors of R&D project performance: employee recruitment, performance appraisal, reward and compensation, and employee participation. The work culture in Malaysian public and private organizations puts great emphasis on key performance indicators (KPI) as a tool in performance management (Jamaluddin et al., 2019). This KPI culture might explain why performance appraisal is a significant component of innovation-enhancing HPWP. To make HPWP more effective, HR managers need to train researchers on the critical skillsets that contribute to the attainment of their KPI and later reward them for their innovativeness.

Different business models result in different types of R&D projects and the ensuing performance indicators in these R&D organizations. The results show that some R&D projects do more basic research, especially in universities. Still, there were university R&D projects that focused on market needs, like the projects in GRI, R&D companies and R&D units. Similarly, R&D projects are influenced by their organization's business environment. R&D projects in rapidly growing sectors, such as telecommunication and manufacturing, are forced to constantly develop new technologies in contrast with other comparatively stable industries. R&D activities can also vary as they involve different clients from government bodies, holding companies or small and medium-sized enterprises. Distinct activities will entail special skillsets and functional knowledge. As a result, HR managers need to strategically design relevant bundles of HPWP to enhance innovation. Ideally, HPWP can become more effective if the bundled HR practices are custom-made to the requirements of individual R&D projects. However, this is not possible due to short-term project durations and the wide spectrum of research activities. This finding concurs with the view that most HPWPs do not have a significant effect on project performance, as opposed to operational business environment (Zwikael et al., 2010). Since R&D projects are temporary, HPWP implementation might not be financially feasible and not worth the effort invested.

This research contributes to the HPWP literature by extending the Social Exchange Theory (SET) to Malaysian R&D professionals in

R&D project teams. This research contributes knowledge on how innovative-centric HPWP dimensions (employee recruitment, training and development, performance appraisal, reward and compensation, employee participation and job design) can lead to greater R&D project performance. This study fulfils the literature gap for more empirical research on HPWP within the context of Malaysian R&D organizations.

As R&D activities have become the key economic enabler, it is now imperative for R&D organizations to assess the effectiveness of their existing HR strategies to boost innovation capacity. This study revealed that HPWP is not a common practice in R&D organizations, as depicted by the low level of innovation-enhancing HPWP in R&D projects. The wide spectrum of R&D activities, short project duration, and the contribution of multiple cross-functional stakeholders pose a challenge when developing specific bundles of innovation-enhancing HPWP in R&D projects. Instead of implementing HPWP at the R&D project level, a more feasible option would be to implement it among the divisions involved in the innovative value chain.

CONCLUSION, LIMITATIONS, AND DIRECTIONS FOR FUTURE RESEARCH

The findings will assist managers in developing synergistic HR practices that will foster innovative behaviours. This guide includes a comprehensive HR audit on existing R&D people, processes, products and how these three `Ps' can be streamlined into an innovation-enhancing HPWP. Due to time constraints, the questionnaire in this study was not preceded by interviews with HR managers from these R&D organizations. Therefore, this study was not able to accurately identify whether these R&D organizations strategically implemented a formal innovation-enhancing HPWP program or conventional HR practices. As the respondents were R&D project leaders and members, the findings became too narrow within one functional perspective. A mixed method design is more appropriate to explore the HPWP implementation in different types of R&D organizations. It is critical to investigate whether HR managers are familiar with the HPWP concept and to find answers to 'why' organizations implement a formal HPWP program and 'how' they select the right HR practices

to be bundled together. As innovation success depends on multiple stakeholder contributions, it is also paramount to measure HPWP from cross-functional perspectives (Yang et al., 2015).

In the regression analysis, the low R-square values (7.6% to 20%) show that these HPWP dimensions influence only a modest percentage of the R&D project performance. Future research should examine other direct and indirect antecedents of R&D project performance in Malaysian R&D organizations. These factors include task complexities, project deliverables, team dynamics and composition, working conditions and management policies, among others. R&D projects can become more complicated when they involve collaboration with external partners. Underlying organization differences such as divergent routines, procedures, objectives, and policies that exist between partners might impede project performance (Barbosa et al., 2021).

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