Asian Journal of Social Science and Management Technology ISSN: 2313-7410 Volume 7, Issue 2, March-April, 2025 Available at www.ajssmt.com

# The Impact of Green Human Resource Management on Green Enterprise Image, Green Intellectual Capital as Mediator and Environmental Dynamics as Moderator

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**ABSTRACT**: As global environmental concerns rise, Taiwan has introduced a 2050 net-zero carbon roadmap, prompting companies to adopt green human resource management (GHRM) to enhance their green enterprise image. This study explores the relationship between GHRM and green enterprise image, examining whether environmental dynamism affects green intellectual capital, using Importance-Performance Matrix Analysis (IPMA) and multi-group analysis to compare small and medium-sized enterprises (SMEs) with large enterprises. A snowball sampling method surveyed 227 employees from companies implementing GHRM in Taiwan, analyzed using Smart PLS. Results indicate that GHRM positively influences green enterprise image, with green intellectual capital partially mediating the relationship. However, environmental dynamism has no moderating effect. Green relationship capital is a key driver of green enterprise image, whereas GHRM, though important, underperforms and requires improvement. Differences in the green relationship capital-green enterprise image link exist between SMEs and large enterprises. The study suggests that businesses should enhance GHRM processes, strengthen green intellectual capital, and refine human resource strategies to improve corporate sustainability, establish a stronger green enterprise image, and gain a competitive advantage in the market.

**Keywords** - green human resource management, green intellectual capital, green enterprise image, environmental dynamics

#### 1. Introduction

In 2015, the United Nations announced the "2030 Sustainable Development Goals" (SDGs), which set 17 core development goals, hoping that governments, organizations, and citizens can work together to find solutions to environmental problems. In response to the global trend of sustainable development, Taiwan has proposed the "Taiwan 2050 Net Zero Emission Roadmap", hoping to achieve environmental sustainability, improve corporate competitiveness, and create social welfare.

In this era of emphasizing "going green", organizations understand that in order to achieve sustainable management, they must not only pay attention to economic development, but also pay attention to environmental protection and social development. Therefore, enterprises have also begun to invest a lot of money and resources in green policies, through various measures of human resource management, hoping to establish a green enterprise image. According to the research of [1], today's consumers are inclined to buy green products, so companies are improving their traditional practices to create a green image in the hope of attracting more customers.

According to the 2022 survey report submitted by Zicheng United Accounting Firm (PwC), investors will pay more attention to the sustainability behavior and evaluation of enterprises in the future, and more than half of institutional investors will not invest in companies that do not carry out sustainability-related products. Therefore, this study aims to compare the differences between SMEs and large enterprises, and observe the differences between the two in terms of sustainable development.

With the advent of the knowledge economy, talent has become an important factor affecting competitiveness, and green human resource management has significant benefits for organizations to implement environmental policies [2]. John Kenneth Galbraith, a well-known economist in the United States, put forward the Intelligent Capital-based View (ICV) theory, which defines intellectual capital as sum of intangible assets owned by members of the organization, and these intangible assets can improve the competitive advantage of the organization [3]. It shows the importance of intellectual capital to the competitive the ness of enterprises. If we have a full understanding of how to use green human resource management to improve the green intellectual capital of the organization, and improve the management processes, products and services of the enterprise, it will help managers to manage and develop strategies for future challenges and improve the green image of the enterprise [4,5].

Environmental dynamics refers to the speed and uncertainty of changes in the external environment [6]. This concept is seen as an important factor in operations management and environmental management as it affects how an organization responds to changes in the external environment. Previous studies have found that environmental dynamics affect corporate strategies and decision-making, which means that enterprises will take into account the external environment factors when formulating strategies and plans, and choose the most suitable action plan according to these factors, which will affect the relationship between green human resource management practices and green intellectual capital, which illustrates the moderating effect of environmental dynamics.

In response to government regulations, Taiwanese enterprises are committed to the development of sustainable management policies, so this study hopes to explore the relationship between green human resource management and green enterprise image of Taiwanese enterprises, and the mediating role of green intellectual capital on green human resource management and green enterprise image, and study the impact of environmental dynamics on green human resource management and green intellectual capital, and finally conduct a multi-group analysis of different enterprise sizes.

## 2. LITERATURE REVIEW

According to the preface, this study explores the relevant literature, finds out the correlation between green human resource management, green intellectual capital (green human capital, green structural capital, green relationship capital), green enterprise image, and environmental dynamics, and uses these literatures as the basis for research hypotheses to establish research hypotheses.

#### 2.1. Green human resources management

The research of [7] regard green human resource management as a systematic human resource management process, which means that the concept of green is added to the human resource management process, such as: green recruitment and selection, green education and training, green reward system, green performance management, green employee participation, etc., to produce excellent environmental performance. Companies find that building a good enterprise image through environmental protection policies and practices can help attract customers, investors and job seekers in the long run, make their services and products more competitive in the competitive market, and establish a good enterprise image. Therefore, this study proposes the following hypotheses:

H1: Green human resource management has a positive impact on the green enterprise image.

## 2.2. Green intellectual capital

Green intellectual capital is the sum of the knowledge, capabilities and intangible assets of the organization related to environmental protection and sustainable development, and the green intellectual capital can create value for the enterprise. The research of [8] proposed that green intellectual capital can be divided into three aspects: green human capital, green structural capital, and green relationship capital, and green human capital is defined as the green professional knowledge, skills and experience possessed by employees within the organization. Green structured capital is defined as the organization's green structure, systems and decision-making processes within an organization. Green relationship capital is defined as the green interaction between an organization and external stakeholders, which is used to support the company's environmental goals, maintain the organization's enterprise image and social relations, and promote environmental sustainability and social responsibility.

Past studies have mentioned that green human resource management practices (e.g., green training and development, green discipline management) can be constructed for green intellectual capital, for example, organizations provide green training to enable employees to generate green human capital in green intellectual capital, improve their knowledge and skills related to environmental protection, and promote employees' enthusiasm for environmental protection behaviors [9], and when employees have good knowledge, skills and abilities in environmental protection, And the environmental protection actions taken in work and life, such as energy conservation and carbon reduction, garbage classification, water conservation, etc., not only show the company's sense of social responsibility, but also demonstrate the commitment to sustainable development in the corporate culture. Such positive actions not only enhance the company's image, but also inspire others to participate in environmental protection activities and further promote the adoption of green lifestyles. Therefore, this study proposes the following hypotheses:

- H2: Green human capital has a mediating effect on the relationship between green human resource management and green enterprise image.
- H3: Green relationship capital has a mediating effect on the relationship between green human resource management and green enterprise image.
- H4: Green structural capital has a mediating effect on the relationship between green human resource management and green enterprise image.

#### 2.3. Green enterprise image

Bathmanathan and Hironaka [5] define enterprise image as: "enterprise image is regarded as the perception of the organization by stakeholders of the organization," which is regarded as the establishment of a specific enterprise image in the minds of stakeholders, which may be affected by the company's products, culture, etc., and the green enterprise image can be regarded as the accumulation of the company's implementation of green measures. Previous studies have found that when enterprises invest resources in green management processes, they can not only improve the efficiency of the use of organizational resources, but also establish a good green enterprise image, improve the reputation of the enterprise and the loyalty of customers to the enterprise, which is one of the tools to help enterprises increase their social influence and market competitiveness.

#### 2.4. Environmental dynamism

Environmental dynamics refers to "the degree of unpredictability and instability caused by changes in the competitive market environment in which a business operates." [6]. When the external environment has uncertain risks, enterprises must accurately grasp the information of the external market, including the movements of relevant stakeholders, to deal with the business risks that may be brought about by the uncertain market environment. Only in this way can enterprises identify opportunities and avoid risks in the midst of uncertainty, make correct and effective sustainable development strategies, and achieve long-term stable operations [10].

In a highly uncertain environment, even if an organization has a green innovation strategy, it may not be able to realize its potential due to brain drain or insufficient human capital, resulting in an organization not being able to achieve a high level of human capital. At the same time, organizations may encounter a range of challenges, including the time it takes to acquire state-of-the-art technology. These factors can hinder an organization from establishing a high level of structural capital. In addition, even if a company wants to reform its green strategy, it may be difficult for a company to establish and maintain strong relationships with stakeholders, partners, and customers due to the uncertainty of the external environment, which in turn will affect the competitiveness and long-term development of the company. Therefore, this study proposes the following hypotheses:

- H5: Environmental dynamics have a moderating effect on the relationship between green human resource management and green human capital.
- H6: Environmental dynamics have a moderating effect on the relationship between green human resource management and green structural capital.
- H7: Environmental dynamics have a moderating effect on the relationship between green human resource management and green relationship capital.

#### 3. METHOD

#### 3.1. Conceptual framework

Based on the preface and literature review, the research framework is proposed, as shown in Fig. 1 below.



Figure 1. Research framework diagram

#### 3.2 Participants

The subjects of this study are employees of enterprises in Taiwan who have implemented green human resource management, and the sample is conducted in a snowball sampling manner. After eliminating missing data, the final sample contained 227 participant responses. As a global environmental protection goal, net-zero carbon emissions are of great significance to employees of enterprises in Taiwan who implement green human resource management. By supporting the company's energy conservation and emission reduction measures, the employees of these enterprises can actively participate in the realization of the net-zero carbon emission goal, promote the concept of environmental protection in work and life, influence the people around them to join the environmental protection action, form a good environmental protection atmosphere, and establish a green enterprise image. Studying the employees of enterprises implementing green human resource management in Taiwan can understand their feelings about the net-zero carbon emission goal, explore their role in environmental protection actions and influence on the enterprise image, and put forward corresponding research and policy recommendations.

## 3.3. Research tools

This study uses the questionnaire method to conduct the survey, the questionnaire adopts the questionnaire scale proposed by foreign scholars, and uses the back translation method to convert the English questionnaire questions into Chinese traditional, and then, this study conducts a pre-test analysis of the questionnaire used to ensure that the questionnaire is suitable for the measurement of variables in this study, this study will be based on the suggestion of [11], the number of subjects in the pre-test should be 5~10 times the number of questions in the subscale of the questionnaire with the most items, and the scale with the most items in this study is the green human resource management scale with a total of 18 questions. The number of pre-test questionnaires should be between 90~180 people, and finally 125 pre-test questionnaires were collected in this study.

The pre-test analysis is divided into three items, namely: (1) expert validity analysis: two experts and scholars and one practical expert are invited to review the questionnaire items and conduct semantic adjustment and deletion (2) Factor analysis: in order to verify whether the correspondence between the factors and the scale items is good, it is usually judged according to the Factor Loading value. If it is greater than 0.7, it reaches a significant level, and the table has good construct validity, and the factor load values of the scale items used in this study are all greater than 0.7. (3) Reliability analysis: In order to confirm the consistency and stability of the questionnaire test results, Cronbach's  $\alpha$  was used to test the reliability of the questionnaire, and the reliability coefficient above 0.7 represented good reliability, and the results showed that the Cronbach's  $\alpha$  values of each aspect of this study were between 0.881~0.976, indicating that the pretest scale used in this study had good reliability and internal consistency. After ensuring reliability and validity, a formal questionnaire was developed. The questionnaire contains six aspects, namely green human resource management, green human capital, green structural capital, green relationship capital, green enterprise image, and environmental dynamics.

# (1) Green Human Resource Management Scale

The scale of green human resource management is based on the questionnaire of [2], which asks questions such as: "Our company uses a green employer brand to attract green employees. (Enterprises recruit employees with the impression of sustainable environmental protection)" and so on, a total of 18 questions, using a 5-point Likert scale, the original scale of Cronbach's  $\alpha$  is 0.934, with good reliability.

## (2) Green Human Capital Scale

The Green Human Capital Questionnaire will refer to the questionnaire items used by [3], modified from [7], such as "Our employees have a positive contribution to environmental protection", etc., with a total of 5 questions, using a 5-point Likert scale, and the Cronbach's  $\alpha$  of the original scale is 0.884 with good reliability. (3) Green Structural Capital Scale

The Green Structured Capital Questionnaire will refer to the questionnaire items used by [3] modified from [7], such as "Our company has a complete environmental management system", etc., with a total of 7 questions, using a 5-point Likert scale, and Cronbach's  $\alpha$  of the original scale is 0.7654 with good reliability.

# (4) Green Relationship Capital Scale

The Green Relationship Capital Questionnaire will refer to the questionnaire items used by [3] modified from [7], such as "Our company has a stable cooperative relationship with suppliers in terms of environmental protection", etc., with a total of 3 questions, using a 5-point Likert scale, and the Cronbach's  $\alpha$  of the original scale of is 0.9587 with good reliability.

# (5) Green enterprise image Scale

The Green enterprise image Questionnaire will refer to the questionnaire items used by [4], such as "Our company has a satisfactory environmental reputation", etc., with a total of 4 questions, using a 5-point Likert scale and Cronbach's  $\alpha$  of the original scale is 0.918 with good reliability.

# (6) Environmental dynamics scale

The Environmental Dynamics Questionnaire will refer to the questionnaire items used by [6], such as "In our business environment, government regulations change very frequently", etc., with a total of 6 questions, using a 5-point Likert scale, Cronbach's  $\alpha$  of the original scale is 0.860 with good reliability.

## 3.4. Data analysis and processing

In this study, Smart PLS statistical software was used for data processing, sample data analysis, reliability analysis, validity analysis, structural equation model analysis, mediation effect analysis, moderation effect analysis, importance performance matrix analysis, and multi-group analysis.

## 4. **RESEARCH RESULTS**

## 4.1. Sample data analysis

The research subjects of this study are employees of Taiwanese enterprises as the subjects of the questionnaire distribution. According to the scholars' suggestion, it is believed that at least 100 samples must be collected for Structural equation modeling (SEM) analysis, so the number of samples recovered in this study should be greater than 100, and a total of 230 samples were actually recovered in this study, and 227 valid samples were recovered, which exceeded the number recommended by scholars and had verification power. In order to compare the differences between SMEs and large enterprises, the effective sample was divided into SMEs and large enterprises, with SMEs having less than 200 employees. For large enterprises with more than 200 employees, the basic data items include gender, education degree, and seniority level.

Basic data	Type of business	category	Number	percentage
Gender	Small and	woman	84	59.1
	medium-sized	man	56	39.4
	busillesses	Not disclosed	2	1.5
	Large-sized	woman	41	48.2
	businesses	man	44	51.8
	Small and	Graduated from high school	35	24.6
	medium-sized	College graduate	82	57.8
Education	busillesses	Master's Degree	25	17.6
degree	Large-sized businesses	Graduated from high school	11	12.9
		College graduate	49	57.7
		Master's Degree	25	29.4
Seniority level	Small and	0-3 years	42	29.6
	medium-sized	3-5 years	22	15.5
	businesses	5-10 years	27	19.0
		10-20 years	24	16.9
		More than 20 years	27	19.0
	Large-sized	0-3 years	26	30.6
	businesses	3-5 years	14	16.5
		5-10 years	7	8.2
		10-20 years	20	23.5
		More than 20 years	18	21.2

Table 1. Basic information of valid samples

#### 4.2. Structural equation model analysis

In this study, Structural equation modeling (SEM) was used to verify the model, which combined the techniques of factor analysis and path analysis, which can be used to explore the relationship between multiple facets, and

is suitable as a statistical method for exploratory research. The model is verified by using the Structural Equation Model (PLS-SEM) with partial least flat method, which has better ability to analyze the causal relationship between potential variables, and is not limited by the required number of samples and distribution patterns, and has good prediction and explanatory ability.

## (1) Measurement model analysis

After the analysis of the model in this study, the Cronbach's  $\alpha$  of each item was 0.899~0.979, which was a significant level. The combined reliability of the six facets ranged from 0.921~0.979, which was significant, and the average variant extraction of the six facets was between 0.707~0.915, which was significant, as shown in Table 2 below.

Variables	Cronbach's α	Composite Reliability (CR)	Mean Variant Extraction (AVE)
Green human resource management	0.917	0.926	0.707
Green human capital	0.950	0.950	0.834
Green structural capital	0.979	0.979	0.735
Green relationship Capital	0.899	0.921	0.764
Green enterprise image	0.966	0.967	0.829
Environment dynamics	0.953	0.953	0.915

Table 2. Cronbach'  $\alpha$ , combined reliability (CR) and average variable extraction of variables

Fornell and Larcker [12] proposed that the square root value of the mean variation extraction (AVE) of each facet had good discrimination validity when it exceeded the correlation coefficient between any two facets, and the results showed that the square root value of the average variation extraction of each facet in this study was greater than the correlation coefficient between any two facets, as shown in Table 3 below, indicating that the model in this study had differential validity.

-						
	Environment dynamics	Green human capital	Green human resource management	Green enterprise image	Green structural capital	Green relationship capital
Environment dynamics	0.841					
Green human capital	0.556	0.913				
Green human resource management	0.562	0.880	0.857			
Green enterprise image	0.498	0.720	0.667	0.874		
Green structural capital	0.568	0.874	0.860	0.742	0.910	
Green relationship capital	0.607	0.804	0.810	0.777	0.831	0.956

Table 3. Square roots of AVE and correlation coefficients for each facet

The Variance Inflation Factor (VIF) was used to test the multivariate collinearity to evaluate whether there was a high correlation between the items, and the results showed that the VIF of each group was less than 10, indicating that there was no collinearity between the items.

## (2) Structure model analysis

When performing structural model analysis, it is important to note that the model must not have collinearity problems. According to [13], when the coefficient of variation (VIF) between variables is less than 10, it means that there is no collinearity problem among the variables. The test results of this study showed that the VIF value of each path did not exceed 10, indicating that there was no serious problem of collinearity and would not affect the evaluation of path coefficients.

The PLS Algorithm of SmartPLS software can calculate the explanatory power ( $R^2$ ) of the self-variable term to the dependent variable, and the larger the value, the greater the explanatory power as shown in Fig. 2. The number of samples in this study is 227, the number of repeated sampling is 5000 times, and the path *t* value is greater than 1.96 means that the significant level is reached, as shown in Figure 2, the interpretation of green human resource management on green enterprise image is 64.6% ( $R^2$ =0.646), and the path coefficient is 0.200 and has a significant level ( $\beta$ =0.200, *t*=2.540, *p*=0.011<0.05), so the hypothesis H1 is supported.



Figure 2. Path diagram of the structural equation model

# 4.3. Analysis of mediation effect

This study refers to the mediation effect test proposed by [13], firstly, to examine whether the influence of the self-variable term on the dependent variable term is significant; Then, whether the influence of the self-variables on the mediator variables is significant; Finally, it is necessary to detect whether the mediated variable has a significant impact on the dependent variable. Hair *et al.* [13] proposed that the mediation effect can be divided into complete mediation, partial mediation, and no mediation according to the percentage of variation explanation (VAF), as shown in the Table 4, Table 5, and Table 6.

 Table 4. Analysis of the mediating effect of green human resource management, green human capital, and

 green enterprise image

5 1	0		
Path	Path coefficient	<i>p</i> -value	
Green human resource management $ ightarrow$ Green enterprise	0 200	0.011	
image	0.200	0.011	
Green human resource management $ ightarrow$ Green human capital	0.823	0.000	
Green human capital $ ightarrow$ Green enterprise image	0.244	0.009	
Indirect effect	0.823*0.24	4=0.201	
Total effect	0.200+0.201=0.401		
VAF	0.201/0.40	1=50.1%	

According to Table 4 above, it can be seen that green human resource management has a significant impact on green enterprise image ( $\beta$ =0.200, t=2.540, p=0.011<0.05); the effect of green human resource management on green human capital ( $\beta$ =0.823, t=21.316, p<0.05); The effect of green human capital on the green enterprise enterprises ( $\beta$ =0.244, t=3.870, p<0.05) reached a significant level, and it can be seen that the VAF of this path is 50.1%, which means that this path is partially mediated, so the hypothesis H2 of this study is valid.

Table 5. Analysis of the mediating effect of green human resource management, green relationship capital,
and green enterprise image

Path	Path coefficient	<i>p</i> -value
Green human resource management $ ightarrow$ Green enterprise image	0.200	0.011
Green human resource management $ ightarrow$ Green relationship capital	0.684	0.000
Green relationship capital $ ightarrow$ Green enterprise image	0.518	0.000
Indirect effect	0.684*(	0.518=0.354
Total effect	0.200+0	0.354=0.554
VAF	0.354/0	).554=63.9%

According to Table 5 above, it can be seen that green human resource management has a significant impact on green enterprise image ( $\beta$ =0.200, t=2.540, p<0.05); The impact of green human resource management on green relational capital ( $\beta$ =0.684, t=18.919, p<0.05); The VAF  $\beta$  of this path is 63.9%, which means that this path is partially mediated, so the hypothesis H3 of this study is valid.

Table 6. Analysis of the mediating effect of green human resource management, green structural capital,
and green enterprise image

Path	Path coefficient	<i>p</i> -value
Green human resource management → Green enterprise image	0.200	0.011
Green human resource management → Green structural capital	0.774	0.000
Green structural capital $ ightarrow$ Green enterprise image	0.271	0.004
Indirect effect	0.774*0.27	/1=0.210
Total effect	0.200+0.21	0=0.410
VAF	0.210/0.41	=51.2%

According to Table 6 above, it can be seen that green human resource management has a significant impact on green enterprise image ( $\beta$ =0.200, t=2.540, p<0.05); The impact of green human resource management on green structural capital ( $\beta$ =0.774, t=18.919, p<0.05); The VAF  $\beta$  of this path is 51.2%, which means that this path is partially mediated, so the hypothesis H4 of this study is valid.

Then, based on the mediation type and test process proposed by [14], it can be seen that the three mediation variables in this study are *complementary mediators*, which is consistent with the results of the above analysis.

# 4.4. The effect of the moderation

As shown in Table 7 below, the effects of environmental dynamics are not significant, and the moderating effect of environmental dynamics on green human resource management and green human capital ( $\beta$ =0.020, t=0.816, p>0.05) does not meet the significant standard, so the hypothesis H5 of this study is not valid. The moderating effect of environmental dynamics on green human resource management and green relationship capital ( $\beta$ =0.003, t=0.125, p>0.05) did not reach the significant standard, so the hypothesis H6 in this study was not valid. The moderating effect of environmental dynamics on green human resource management and green structural capital ( $\beta$ =0.048, t=1.667, p>0.05) did not reach the significant standard, so the hypothesis H7 in this study is not valid. It indicates that environmental dynamics have no moderating effect on the relationship between green human resource management and green intellectual capital.

Path	Path coefficient	Average	Standard deviation	t-value	p-value	Assumptions
Green human resource	0.020	0.021	0.025	0.816	0.415	H5
management $ imes$						Not Support
Environment dynamics						
ightarrowGreen human capital						
Green human resource	0.003	0.003	0.027	0.125	0.901	H6
management $ imes$						Not Support
Environment dynamics						
ightarrowGreen relationship						
capital						
Green human resource	0.048	0.048	0.029	1.667	0.096	H7
management $ imes$						Not Support
Environment dynamics						
ightarrowGreen structural capital						

## Table 7. Analysis of the effect of moderation

## 4.5. Analysis of the importance of performance and efficiency

In the field of management, the Importance Performance Matrix Analysis (IPMA) is often used to evaluate the importance of the performance matrix, which contains four quadrants, the X-axis is the importance and the Y-axis is the performance, which are the Quadrant 1: the strength retention area, which has high importance and high performance, and can be maintained; Quadrant 2: Over-emphasis areas, low in importance but high in performance, which can divert resources elsewhere; Quadrant 3: Minor improvement area, low importance, low performance, no special attention at this stage; Quadrant 4: Priority improvement area, high importance but low performance, need to pay more attention to improvement to avoid future risks. The results of this study are shown in Table 8 below to explore the importance and performance of each variable to the *green enterprise image*.

Variables	Importance	Performance
Green human resource management	0.179	57.243
Green human capital	0.244	56.236
Green structural capital	0.564	51.645
Green relationship capital	0.271	51.942
Environment dynamics	0.518	54.553

Table 8. Importance and performance of IPMA (green enterprise image)

As shown in Fig. 3 below, the average value of the calculated importance is 0.355, and the average value of performance is 54.32. The second quadrant is environmental dynamics and green human capital, indicating that they are of low importance but have high performance, the third quadrant is green structural capital, which is the project of minor improvement among all the impact variables, and the fourth quadrant is green human resource management, which is the variable of high importance but low performance, which needs to be improved and paid attention to.



Figure 3. Matrix diagram of IPMA mode

## 4.6. Multi-group analysis

In order to compare the differences between SMEs (SMEs) and large enterprises, the multi-group analysis (MGA) was used in this study. In this study, the reliability and validity analysis of SMEs and large enterprises showed that the Cronbach'  $\alpha$  of SMEs ranged from 0.896 to 0.986, the CR value ranged from 0.930 to 0.986, and the AVE value ranged from 0.748 to 0.918, all of which reached significant levels, indicating good reliability and validity. The Cronbach'  $\alpha$  of large enterprises ranged from 0.894 to 0.983, the CR value ranged from 0.914 to 0.965, and the AVE value ranged from 0.615 to 0.913, all of which reached significant levels, indicating good reliability and validity.

Based on the suggestions of Fornell and Larcker, the analysis of the square root value of the mean variation extraction (AVE) of each facet of SMEs and large enterprises shows that when the square root value of AVE exceeds the correlation coefficient between any two facets, it is said that both SMEs and large enterprises have good discrimination validity.

According to [13], the coefficient of expansion (VIF) of variation between variables can detect collinearity. The results show that the VIF value of each path does not exceed 10 for SMEs and large enterprises, indicating that there is no serious problem of collinearity, which will not affect the evaluation of path coefficients.

Fig. 4 shows the path diagram of the structural equation model of SMEs, and the interpretation of the self-variable term of SMEs on the green enterprise image is 62.7% ( $R^2=0.627$ ).



Figure 4. Path coefficient analysis of SMEs

Fig. 5 shows the path diagram of the structural equation model of large enterprises, and the interpretation of the self-variable term of large enterprises on the green enterprise image is 70.0% (R<sup>2</sup>=0.700).



0.109(0.109)

Figure 5. Path coefficient analysis of large enterprises

When performing multi-group analysis, the Permutation multigroup analysis function of SmartPLS software can be used, and the steps of evaluating invariance can be divided into three steps: (1) Measurement of configuration invariance (2) Measure component invariance and (3) test the composite mean and the equality of the number of variations, these steps can be used to check whether the study has established measurement invariance. Since the configuration invariance needs to check other things that do not involve statistics, such as model settings, the results of step 1 will not be displayed on SmartPLS, and the software will usually automatically establish the set invariance. Step 2 will examine whether the correlation between the two groups (SMEs and large enterprises) is significant, if the difference between the two groups is not significant, i.e. not significant, it means that there is no constituent invariance. The results of the study showed: The *p* value of each variable was greater than 0.05, indicating that it was not significant and that it had component invariance  $\circ$ 

In the third step, the trust interval will be used to test whether there is a difference between the composite mean and the variation between the two groups in this study, if it is not significant, it means that the difference is not large. The results of the study shown that the original difference values of each variable were between 2.5% and 97.5%, and the permutation p value was greater than 0.05, indicating that there was a composite average invariance. Variant measurements display that the original difference of most of the variables is between 2.5% and 97.5%, and the permutation p value is greater than 0.05, indicating that there is a variant invariance.

Then, using bootstrap MGA to analyze the path coefficient of each group, it can be found that none of the paths are significant, and only the p value of green relationship capital to green enterprise image is 0.042, which reaches a significant level, indicating that the enterprise size of SMEs and large enterprises will have an interactive effect on the relationship between green relationship capital and green enterprise image.

## 5. CONCLUSION AND RECOMMENDATIONS

## 5.1 Conclusion

Based on the results of statistical analysis, the results of the hypothesis verification of this study are shown in Table 9, and the conclusions of this study are presented.

Research hypothesis content	Assumptions
H1: Green human resource management has a positive impact on the green	Support
enterprise image	
H2: Green human capital has a mediating effect on the relationship between green	Support
human resource management and green enterprise image	
H3: Green relationship capital has a mediating effect on the relationship between	Support
green human resource management and green enterprise image	
H4: Green structural capital has a mediating effect on the relationship between green	Support
human resource management and green enterprise image	
H5: Environmental dynamics have a moderating effect on the relationship between	Not Support
green human resource management and green human capital	
H6: Environmental dynamics have a moderating effect on the relationship between	Not Support
green human resource management and green relationship capital	
H7: Environmental dynamics have a moderating effect on the relationship between	Not Support
green human resource management and green structural capital	

Table 9. Research Results

(1) The impact of green human resource management on the of green enterprise image

This study assumes that green human resource management has a positive impact on the of green enterprise image, and the results of statistical analysis show that the hypothesis is valid. In line with the arguments of previous research, when enterprises fulfill their social responsibility obligations in terms of sustainable development, they will show positive corporate behaviors that pay attention to environmental issues, create a good corporate image, and gain social recognition, indicating that if enterprises can make full use of green human resource management process practices when carrying out green policies, they can have good prediction results for green enterprise image.

In addition, this study explores the impact of green intellectual capital on the relationship between green human resource management and green enterprise image, and hypothesizes that the three aspects of green smart capital (i.e., green human resources, green structural capital, and green relationship capital) will have a mediating effect on the relationship between green human resource management and green enterprise image, and the results of statistical analysis show that all three hypotheses are valid. In line with previous studies, it is shown that green intellectual capital can help companies implement green policies to enhance their green enterprise image and increase their environmental performance.

The mediating effect of green human capital on green human resource management and green enterprise image is the same as the results of [15] study, when an organization uses green human resource management to treat every member of the organization as part of the knowledge team, the organization's ability to acquire, integrate, store, share and apply knowledge is greatly enhanced, indicating that the organization's green human resource management policy will affect the human capital within the organization. In addition, past scholars have shown that organizations cultivating an environmentally conscious culture can have a positive impact on a company's reputation. It means that the use of green human resource management to establish vision and values, affect internal human capital, and have a positive impact on the establishment of a green enterprise image.

Green structural capital will have a mediating effect on green human resource management and green enterprise image, which is the same as the 2023 study by [16], indicating that regularly revising the green management process within an enterprise can reflect the degree of greening of the enterprise and help the enterprise establish a green enterprise image. It means that enterprises can establish green structural capital by regularly reviewing whether the internal human resource management process market demand and regulatory norms, and then achieve the role of enhancing the green enterprises image.

In line with previous studies, [17] mentioned that choosing partners and suppliers who comply with environmental regulations can reduce the legal risks of enterprises in the process of operation, reduce the environmental pollution of the organization, and thus improve the image and reputation of the enterprise. It means that enterprises can establish a green vision through green human resource management, promote

cooperation with external stakeholders in compliance with environmental regulations, and enhance the green image of enterprises.

(2) The impact of environmental dynamics on the relationship between green human resource management and green intellectual capital

This study hypothesizes that environmental dynamics can affect the moderating effect of the three aspects of green human resource management and green intellectual capital (i.e., green human resources, green structural capital, and green relationship capital), and the results of statistical analysis show that none of the three hypotheses are valid. Unlike previous studies, the impact of environmental dynamics on the relationship between green human resource management and green intellectual capital is not significant.

According to [18], the results of this study show that in a rapidly changing environment, even if a company has good human resources, it does not guarantee that it can produce high performance, and the focus is on how to effectively deploy and strengthen internal human resources to cope with the rapidly changing environment. The effects of environmental dynamics were not significant.

This study hypothesizes that in a dynamic environment, there will be a moderating effect on green human resource management and green structural capital, and in a volatile environment, enterprises need to modify and adopt environmentally friendly management strategies from time to time, but the results of this study show that the impact of environmental dynamics is not significant for the subjects of this study.

According to previous scholars' research, in an environment with large environmental changes, investors' confidence in enterprises will be affected due to risk factors, and enterprises may face the problem of difficult financing, which will make enterprises suffer challenges in operation and management, but the results of this study show that the impact of environmental dynamics is not significant for the subjects of this study.

There may be two reasons why the results of the study are inconsistent with those of the past: first, the questionnaire of this study was distributed through the online platform, and the results of the study may be affected by the sample size of the study, resulting in different results from the previous literature; Second, external influencing factors such as science and technology, government regulations, etc., may have greater changes and impacts on some specific industries (such as manufacturing, finance, etc.), and the green human resource management within enterprises usually has a certain mode of operation, resulting in changes in the competitive market environment that have little impact on green intellectual capital.

#### (3) Research on different business sizes (SMEs and large enterprises)

This study analyzes the important performance matrix of SMEs and large enterprises, and finds that the difference between SMEs and large enterprises is that the green human capital of SMEs is located in the first quadrant, which means that for SMEs, the knowledge and skills of the members of the organization in the organization are more advantageous. This difference is caused by the fact that the division of departments is subtler, and the knowledge and skills possessed by the employees within the organization are more specialized. In addition, the results of this study show that the size of the enterprise will affect the relationship between green relationship capital and green enterprise image, and there is an interactive effect. External stakeholders are likely to place greater emphasis on the green enterprise image of large enterprises than SMEs. Large enterprises usually have a higher brand awareness, corporate image has a greater impact on it, at the same time, large enterprises also have more resources to invest in the construction and maintenance of corporate image, including marketing, public relations activities, social responsibility programs, etc., a good enterprise image can consolidate its market position, enhance brand loyalty, and can become a competitive advantage, attracting more customers and partners. SMEs usually have limited resources and cannot invest a lot of money in the construction of green enterprise image like large enterprises, each image management activity needs to be carefully budgeted to ensure efficiency and effectiveness, and green technology and sustainable practices often require a large initial investment, which is a challenge for SMEs with tight funds, the construction of green enterprise image is usually regarded as a long-term return investment, it is difficult to see significant results in the short term, and SMEs usually face greater survival pressure, Focusing on short-term profitability and survival, if the market or consumers do not have high demand for a company's green image, or lack government and policy support, SMEs will not have enough incentive to change their existing business methods, and they will be

more inclined to spend limited resources on production, marketing and daily operations, rather than investing in the construction of a green enterprise image.

## 5.2 Recommendations

Based on the above research conclusions, this study puts forward the research results, practical suggestions and future research suggestions of this study, and provides future academic research and enterprises as a reference.

- (1) The results of the study suggest
- Strengthen green human resource management

The results of this study show that green human resource management has an impact on the image of green enterprises, and enterprises should formulate sound green human resources policies and mechanisms, etc., and create a cultural atmosphere within the enterprise that supports environmental protection and sustainable development, so as to stimulate employees' recognition and participation in green goals.

• Strengthen the construction of green intellectual capital

The results of this study show that green intellectual capital has a mediating effect on the relationship between green human resource management and green enterprise image, indicating that enterprises should pay attention to the construction of green intellectual capital, which can start from various processes of human resource management, such as seeking talents in line with corporate values through green recruitment, and enhancing employees' knowledge and skills in environmental protection through green training, so as to enhance green human capital. And through the establishment of good human resource management procedures, to enhance the green structure capital, and then influence stakeholders, to establish a green enterprise image.

## (1) Practical advice

Based on the content of the questionnaire items, this study puts forward the following practical suggestions to strengthen their green human resource management, enhance their green image, and gain more advantages and recognition in the market competition:

• Develop a green HR policy: Clarify environmental responsibilities and requirements in job descriptions, educate candidates about the specifics and expectations of green jobs, and attract candidates who share these values.

• Provide green training and development: Conduct regular environmental protection training to enhance the knowledge and skills of practicing green management, design employee development plans, help master the latest green technology, and enhance environmental protection professional capabilities.

• Establish a green performance management system: Incorporate environmental protection indicators into the performance evaluation system, and establish a green reward mechanism to reward employees with outstanding performance in environmental protection work and motivate employees to participate in green management.

• Create a green corporate culture: create a cultural atmosphere that supports environmental protection and sustainable development within the enterprise, stimulate employees' recognition and participation in green goals through publicity, activities and training, and organize various environmental protection activities, such as tree planting and environmental cleaning, to enhance employees' environmental awareness and sense of responsibility.

• Establish transparent communication channels: Establish transparent communication channels to let employees understand the company's environmental protection policies and measures, and encourage them to make suggestions and feedback, regularly release the company's environmental protection report, show the company's efforts and achievements in environmental protection, and enhance the trust and support of the public and employees to the company.

(2) Recommendations for future research

• Cross-cultural sample comparison: This study aims at the employees of Taiwanese companies, and it is suggested that the relationship between green human resource management and green enterprise image of

enterprises in different countries or regions can be compared, and the influence of cultural factors on this relationship can be explored.

• Comparative study of different industries: This study does not collect sample data for specific industries, and it is suggested that the relationship between green human resource management and green enterprise image of enterprises in different industries (such as manufacturing, service, finance, etc.) can be compared, and the impact of different industries on this relationship can be discussed.

• Qualitative research methods: This study adopts a quantitative approach to research, and it is suggested that qualitative research methods, such as interviews or focus group discussions, can be used in the future to gain insight into the company's green human resource management practices and its impact on corporate image.

# (3) Research Limitations

• Limitations of the research sample: The research sample of this study is the employees of enterprises implementing green human resource management in Taiwan, due to the distribution method of the questionnaire, etc., the sampling sample has certain limitations, and representative samples can be selected in the future, such as employees or persons in charge of sustainable development units, to increase the representativeness of the study.

• Limitations of research methodology: This study uses the questionnaire method to collect data and statistics, which has a certain degree of subjective limitations, and the questionnaire items used in this study are all translated from foreign literature, which may not be fully consistent with the actual situation and culture of Taiwanese enterprises.

• Limitations on variable selection: This study considers green smart capital as a mediated variable and environmental dynamics as a moderating variable, and other mediated variables and moderating variables can be further explored in the future, such as environmental turbulence as a moderating variable, so as to have a more comprehensive understanding of the relationship between them.

# 6. **REFERENCES**

- [1] Gautam, P., Maheshwari, S., Kausar, A., & Jaggi, C. K. Sustainable retail model with preservation technology investment to moderate deterioration with environmental deliberations. *Journal of Cleaner Production*, *390*, 2023,136128.
- [2] Yusoff, Y. M., Nejati, M., Kee, D. M. H., & Amran, A. Linking Green Human Resource Management Practices to Environmental Performance in Hotel Industry. *Global Business Review*, *21(3)*, 2018.
- [3] Sumaryo, S., Hasanudin, A., Bastian, E., & Ramdhani, D. Level disclosure of green intellectual capital in Indonesian mining companies in order to save the Earth from carbon emissions. In *Proceedings of the International Conference on Sustainability in Technological, Environmental, Law, Management, Social and Economic*, 2023.
- [4] Alam, S. S., & Islam, K. Z. Examining the role of environmental corporate social responsibility in building green enterprise image and green competitive advantage. *International Journal of Corporate Social Responsibility*, 6(1):8, 2021.
- [5] Bathmanathan, V., & Hironaka, C. Sustainability and business: what is green enterprise image? In *IOP Conference Series: Earth and Environmental Science*, 2016.
- [6] Azadegan, A., Patel, P. C., Zangoueinezhad, A., & Linderman, K. The effect of environmental complexity and environmental dynamism on lean practices. *Journal of Operations Management, 31(4)*, 2013, 193-212.
- [6] Chaudhuri, R., Chatterjee, S., Gupta, S., & Kamble, S. Green supply chain technology and organization performance: Moderating role of environmental dynamism and product-service innovation capability. *Technovation*, *128*, 2023, 102857.
- [7] Marrucci, L., Daddi, T., & Iraldo, F. The contribution of green human resource management to the circular economy and performance of environmental certified organisations. *Journal of Cleaner Production*, *319*, 2021, 128859.
- [8] Chen, Y.-S. The positive effect of green intellectual capital on competitive advantages of firms. *Journal of Business Ethics*, 77(3), 2008, 271–286.

- [9] Nisar, Q. A., Haider, S., Ali, F., Jamshed, S., Ryu, K., & Gill, S. S. Green human resource management practices and environmental performance in Malaysian green hotels: The role of green intellectual capital and pro-environmental behavior. *Journal of Cleaner Production*, *311*, 2021, 127504.
- [10] Xu, Z. Environmental dynamics and corporate social responsibility: an empirical analysis based on Chinese manufacturing listed companies. *Sustainable Futures, 6*, 2023, 100124.
- [11] Gorsuch, R. L., & Venable, G. D.. Development of an "age universal" I-E scale. *Journal for the Scientific Study of Religion, 22(2),* 1983, 181-187.
- [12] Fornell, C., & Larcker, D. F. Structural equation models with unobservable variables and measurement error: algebra and statistics. *Journal of Marketing Research*, *18*(*3*), 1981, 382–388.
- [13] Hair, J. F., Ringle, C. M., & Sarstedt, M. PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*(*2*), 2011, 139-152.
- [14] Zhao, X., Lynch Jr, J. G., & Chen, Q. Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of consumer research*, *37*(*2*), 2010, 197-206.
- [15] Kong, E., & Thomson, S. B. An intellectual capital perspective of human resource strategies and practices. *Knowledge Management Research & Practice*, *7*(4), 2009, 356-364.
- [16] Khan, A., Li, C., Shahzad, M., & Sampene, A. K. (2023). Green effectual orientations to shape environmental performance through green innovation and environmental management initiatives under the influence of CSR commitment. *Environmental Science and Pollution Research*, *30*(*1*), 2205-2217.
- [17] Saeed, B. B., Afsar, B., Hafeez, S., Khan, I., Tahir, M., & Afridi, M. A. 2019. Promoting employee's proenvironmental behavior through green human resource management practices. *Corporate Social Responsibility and Environmental Management, 26(2)*: 424-438.
- [18] Forliano, C., Ferraris, A., Bivona, E., & Couturier, J. Pouring new wine into old bottles: A dynamic perspective of the interplay among environmental dynamism, capabilities development, and performance. *Journal of Business Research*, *142*, 2022, 448-463.

#### Acknowledgements

This work was financially supported by the "Institute for Research Excellence in Learning Sciences" of National Taiwan Normal University (NTNU) from The Featured Areas Research Center Program within the framework of the Higher Education Sprout Project by the Ministry of Education (MOE) in Taiwan, and sponsored by the National Science and Technology Council, Taiwan, R.O.C. (Grant Numbers: 109-2622-H003-004, 110-2622-H003-009, 110-2511-H003-023-MY3, 111-2622-H003-006)

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How to cite/reference this article: Hsien-Sheng Hsiao, Ya-Chin Kang, Ting-Hui Hsu, I-Hsiung Chang, The Impact of Green Human Resource Management on Green Enterprise Image, Green Intellectual Capital as Mediator and Environmental Dynamics as Moderator, *Asian. Jour. Social. Scie. Mgmt. Tech.* 2025; 7(2): 166-182.