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Drivers to green human resources management (GHRM) implementation: A Context of Cement Industry in Indonesia

Nuri Herachwati

Department of Management, Faculty of Economics and Business,
Universitas Airlangga, Indonesia.

**Corresponding author* Email: nuri-h@feb.unair.ac.id

Yatikal Hilyan

Department of Management, Faculty of Economics and Business,
Universitas Airlangga, Indonesia.

Email: yatikalhilyan@gmail.com

Pei-Kuan Lin

Department of Business Administration, Management College,
Asia University, Taiwan.

Email: linpk@asia.edu.tw

Edelweiss Jinan Ratu Khansa

Department of Management, Faculty of Economics and Business,
Universitas Airlangga, Indonesia.

Email: edelweissjinann@gmail.com

Jovi Sulistiawan

Department of Business Administration, Management College,
Asia University, Taiwan.

Department of Management, Faculty of Economics and Business,
Universitas Airlangga, Indonesia.

Email: jovisulistiawan@feb.unair.ac.id

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Abstract

Purpose: This study employed a resource-based view (RBV) to explain the company's existing resources as critical factors in implementing the GHRM transition. In addition to RBV, this study employed the stakeholder theory that stakeholder pressures prompt companies to implement GHRM activities. Moreover, this study aims to identify valid and reliable attributes associated with GHRM's drivers and establish practical improvement criteria. To do so, we propose seven aspects with 32 criteria derived from an analysis of the related previous research.

Design/Methodology/Approach: To achieve this research objective, a fuzzy Delphi method (FDM), fuzzy decision-making trial, and evaluation laboratory (DEMATEL) are utilized to determine the interrelationships among attributes.

Findings: This study revealed five aspects with seventeen valid criteria. The five aspects are association compliance, commitment from upper management and human resources are the most influential aspects.

Practical Implications: Firms must be aware that having a clear vision and being leader-change oriented is an important part of the top management's responsibility. In addition, shifting to GHRM need support from top management as part of their complete commitment to accomplish the strategies.

Originality/Value: This study investigates the drivers of GHRM in the cement industry in Indonesia by combining two theories: resource-based view and stakeholder theory. This study is highly related to decision sciences since this study's framework assists policymakers to decide what aspect to focus on.

Keywords: drivers, green human resource management, resource-based view, stakeholder theory, fuzzy decision-making trial and evaluation laboratory

JEL classifications: Q56, O15, L61

1. Introduction

Due to its essential nature, the cement industry in Indonesia is classified as a strategic commodity sector. Indonesia's cement production ranks among the top five worldwide (IISD, 2018). Indonesia's cement production capacity approached 114 million tons in 2019, while national cement consumption approached 70 million tons. As reported by the Indonesia Cement Association (ICA, 2020), cement prices tend to rise as construction expenditures in Indonesia rise. However, von Buchwaldt (2020) highlighted that the sector is currently confronted with intense rivalry and pressures that are not restricted to economic performance, such as emission levels, waste, health, safety, and the surrounding community. Green innovation strategies and procedures are now at the forefront of the worldwide movement to mitigate the effects of climate change and preserve the environment (Jiang et al., 2020; Tweneboa Kodua et al., 2022). Regarding this situation, there is a critical concern for incorporating climate preservation and supervision into the management of human capital, as it is convinced that human resources practices have great potential for incorporating sustainable issues (Tweneboa Kodua et al., 2022). Shafaei et al. (2020) green human resource management (GHRM) is defined as the practice of integrating environmentally friendly innovations and strategies into the core operations of an organization's human resource management system.

Human resource managers must strive to continuously improve resource allocations to develop green business ecosystems and increase the efficiency of businesses. Companies are becoming more aware that in order to develop strong social authenticity, it is necessary to have a sense of responsibility for the environment (Fayyazi et al., 2015). As a consequence, the majority of firms have moved their attention to environmental consciousness, the green awareness of their employees, and environmentally friendly business procedures, which are typically governed by stringent environmental standards. However, firms must allocate resources to transition from conventional HR practices to GHRM practices. From the perspective of the resource-based view (RBV), firms are subsets of valuable, rare, inimitable, and non-substitutable (VRIN) resources and capabilities that generate a long-term competitive advantage (Barney, 1991; Yusliza et al., 2017). Moreover, as one of the most theoretical lenses, RBV can be used to comprehend the greening of companies (Jabbour & de Sousa Jabbour, 2016). In addition, RBV facilitates an in-depth comprehension of how the organization's resources become the primary drivers for GHRM adoption.

Compared to developed countries, most organizations in developing countries are reluctant to adopt GHRM unless they perceive greater stakeholder demand. Shahzad et al. (2020) argued that stakeholder pressure is a crucial aspect of ecological governance and is quickly emerging to restrain organizations from participating in environmental preservation. Prior studies have pointed out the pressure exerted by stakeholders as a significant driver of organizational practices (Guerci et al., 2016; Shahzad et al., 2020). Moreover, Guerci et al. (2016) addressed that government regulators and customers are the two most important stakeholders when considering environmental issues. The pressure from these two stakeholder groups on environmental issues prompted the

company to adopt a more sustainable business model. It is due to increased customer concerns about environmental issues (Eweje, 2014; Guerci et al., 2016). In addition, firms must react to regulatory scrutiny because regulators can issue rules and regulations that affect how businesses are conducted or even collect taxes and other financial burdens on firms.

In this study, it is argued that resources and pressures exerted by stakeholders have a significant potential to facilitate the adoption of GHRM. Consequently, this study seeks to identify the firms' drivers for adopting GHRM based on the stakeholders' pressures and resource-based perspectives. However, aspects of stakeholders' pressures and resources are categorized as qualitative data but are frequently absent when valid and significant aspects are evaluated. In addition, this study is useful for comprehending the causal interrelationships between the features in GHRM and for providing answers to uncertain and complex cement industry situations (Wang et al., 2021). Our framework is highly related to decision science since it not only provides contributions for related fields but also helps organizations and policymakers to decide which aspect to focus on. A conceptual framework and methodology for determining and assessing the attributes have been established to answer the research study. We further adopt the Fuzzy Delphi Methods (FDM) and Fuzzy Decision-Making Trial and Evaluation Laboratory (Fuzzy DEMATEL) approaches for generating a causality relationship between attributes employing modifications as well as transforming the connection into an architecture for system structures (Bui et al., 2020; Pham et al., 2018).

The research questions of this study, as posed below:

RQ 1: What are the valid attributes?

RQ 2: What are the causal inter-relationships among the drivers in adopting GHRM?

RQ 3: What are the guidelines for uncertainty and complex situations to provide a cement industry?

The research is organized as follows: The second section examines the literature pertinent to the suggested approach and measures. Section 3 describes the technique utilized in this study, whereas Section 4 summarizes the findings. Section 5 covers the theoretical and practical consequences, and the last section ends with a review of the limitations and suggestions for future studies.

2. Literature Review

2.1 Green Human Resources Management (GHRM)

Green Human Resource Management (GHRM) serves as the conceptual foundation of this study. Green Human Resources Management (GHRM) is a set of HRM practices that aim to achieve green goals by incorporating environmental concerns into all HRM activities and promoting environmentally friendly principles, practices, and initiatives in the workplace (Renwick et al., 2013). Kehoe and Wright (2010) explain that positive employee perceptions of GHRM practices can increase employee commitment to the organization and employee awareness of environmentally conscious workplace behavior. This demonstrates that GHRM is intended to have

a substantial impact on the green behavior and green performance of employees, thereby influencing the organizational environment (Hameed et al., 2020; Rubel et al., 2021).

Wehrmeyer (2017), in his book "Greening People: Managing Green Human Resources and Environment," first invited scholars and practitioners to participate in the comprehension of GHRM. In addition, this concern for the environment led to the development of a system that governs environmental management and heightened the urgency to integrate HRM practices. The majority of studies regarded five GHRM criteria: green hiring and selection, green learning and development, green performance evaluation, green reward system, and green management of organizational culture (Gupta, 2018; Tang et al., 2018). Beginning with the recruiting or selection process and continuing all the way through performance evaluation, HRM activities are amenable to alignment with the environmental strategies of a business, which ultimately results in long-term, sustainable HRM (Renwick et al., 2013). Moreover, sustainable HRM entails implementing HRM practices and strategies that enable the attainment of financial, social, and ecological goals over the long term by minimizing adverse consequences (Bahuguna et al., 2022). In the end, environmental principles will be incorporated into HRM practices that promote the long-term social, physical, and economic well-being of employees (Molina-Azorin et al., 2021).

Several prior studies employed the ability-motivation-opportunity (AMO) theory in investigating GHRM. For instance, Anwar et al. (2020) examined the effect of GHRM on organizational citizenship behavior towards environment and environmental performance. Their study is based on AMO theory which proposed that HR practices enhance employees' ability, motivation, and involvement that will lead to OCB and enhance organizational performance. Singh et al. (2020) also utilized AMO theory as the foundation of their study. They argued that AMO theory serves as the rationale for why HR practices contribute to organizational performance. Amrutha and Geetha (2021) pointed out that HR practices enhance green performance through AMO theory. In addition, they emphasized that competitive green strategies produce a distinct pro-environmental behavior which in turn affects firm performance. Therefore, while AMO theory is useful in explaining the mechanism of how HR practices affect green performance, AMO mainly focuses on organizational practices and neglects other aspects which facilitate or hinder the adoption of GHRM.

2.2 The resource-based view (RBV)

RBV implies that a firm's competitive advantage resides in its valuable, rare, imperfectly imitable, and non-replaceable (VRIN) resources (Barney, 1991). Madhani (2010) describes VRIN to obtain a competitive edge and sustainable efficiency, where valuable means that the organization's resources are useless if they do not add value to the organization. In addition, resources are considered scarce if they are difficult to discover among the organization's competitors. Many organizations cannot gain a competitive advantage from resources that are easily accessible. The term imperfectly imitable refers to the impossibility of duplicating or imitating resources (Barney, 1991; Haldorai et al., 2022). There are a multitude of barriers that prevent products from being perfectly imitable. Some of these barriers include difficulty in acquiring resources, an uncertain

connection between capabilities and competitive advantage, or the multifaceted nature of resources that enable an organization to have a competitive advantage over another. In addition, given that resources are not interchangeable with other types of resources, it is impossible for competitors to reach the same level of efficiency by using a different set of resources in its place. It is impossible to make a substitution for a resource when there are no other options that can adequately take its place. This viewpoint is based on the idea that over time, diverse organizational resources lead to a sustainable competitive advantage (Barney, 1991; Haldorai et al., 2022). This competitive advantage can be achieved by organizations that use their resources to enhance their internal strengths and incapacitate their external environment's weaknesses (Haldorai et al., 2022).

Resources can be divided into three main categories: Physical resources, Human resources, and organizational resources (Iswan & Kihara, 2022). Physical Resources (PRs) are tangible assets that an organization utilizes to create value offerings and value propositions for its customers. Pee and Kankanhalli (2016) state that PR is typically acquired financially through buying or offering in exchange for monetary value. PR typically includes plant and equipment, raw materials, financial instruments, position, and information technology (David-West et al., 2018). Human Resources (HR) is essential in the industry because organizations require a great deal of creativity and expertise in these fields. This includes all employees as well as their training, experience, intelligence, knowledge, and skills (Pereira & Bamel, 2021). Human Resources is essentially a summary of collaborative capabilities in terms of competencies, capacities and skills, knowledge, combined skills, and knowledge (David-West et al., 2018). Organizational resources (OR) consist of practices that coordinate human and physical resources in productive ways, such as organizational structures, planning processes, and management information systems.

2.3 Stakeholder Theory (ST)

According to Clarkson (1995), stakeholders are individuals or groups that have a vested interest in the interaction between an organization and its constituents. Moreover, according to Savage et al. (2010), stakeholders are defined as persons or groups that have a stake in or interest in the activities of a company and the ability to apply direct or indirect pressure on organizational practices. Stakeholder theory has been widely acknowledged as a key theory for understanding why organizations adopt and implement particular HRM practices, which contain the assumption that managers must recognize the existence of numerous stakeholders and be able to comprehend the unique interests of each stakeholder (Guerci et al., 2016). In considering various HRM policies and practices, it is crucial for a manager to consider and align the organization's multiple interests (Dipboye, 2007; Guerci et al., 2016). Moreover, the majority of studies on stakeholder theory in corporate environmentalism assume that customer pressure and regulatory pressure represent external stakeholder groups, whereas employees represent internal stakeholder groups (Saleem et al., 2020). Guerci et al. (2016) found that government regulators and customers are the two most important stakeholders when considering environmental issues, therefore in this study, we focus on regulatory and customer pressures as external drivers for the company to adopt GHRM practices.

Regulatory pressures are authoritative mechanisms or forms of coercive regulations imposed by regulatory bodies that demand compliance from individuals or organizations (Hwang et al., 2016). Strict environmental regulation is a major incentive for businesses to engage in pro-environmental conduct (Schmitz et al., 2019). Environmental regulation mandates that organizations provide government environmental rules and policies, thereby encouraging organizations to engage in environmental responsibility and implement green innovation. Organizations and companies are subject to the required environmental rules and regulations that are enforced by the authorities (Li et al., 2018). On the other side, the authorities also promote environmentally friendly organizations through a number of rewards, such as establishing a special support program for green creativity and sponsoring green R&D firms. One example of this type of incentive is the establishment of a special support fund for innovative green practices (Zhang et al., 2019). These incentives and safeguards can effectively reduce the costs and risks associated with an organization's green innovation, thereby enhancing the green innovation initiative of the organization.

Customers exert greater environmental pressure on businesses than do suppliers, which will influence green innovation behavior (Peng et al., 2021). Customers whose organizations are currently beginning to adopt green initiatives tend to compel manufacturers to adopt these practices as well. Hwang et al. (2016) emphasized that customers exert demands on the organization to shift their business process to more environmentally friendly. Customers who are concerned about environmental issues may view environmental protection as a crucial criterion for purchasing a product. Businesses often get environmental certifications and permits, apply green management to their supply chains, and manufacture commodities with minimal emissions and low consumption of energy in order to satisfy the ecological demands of their consumers (Cheng & Shiu, 2012).

2.4 Proposed Attributes

Based on the relevant literature review, the authors consider seven aspect drivers in GHRM, namely: organizational resources (A1), physical resources (A2), regulatory compliance (A3), association compliance (A4), customer pressure (A5), top management commitment (A6), and human resources (A7). In these ten aspects, the writer identifies 33 GHRM criteria, which will be explained in the following.

Organizational resources (A1) play an important role as a factor that affects the organizational climate of active participation in implementing GHRM practices. Relationships with strategic partners can serve as an organizational resource for GHRM implementation. Transitioning from conventional HR management to GHRM necessitates adequate financial resources (C1). Investment in R&D (C2) can be supported by adequate financial resources, particularly for the development of environmentally friendly products and services in response to consumer demand (Haldorai et al., 2022). In addition, the organization's organizational culture is a resource for implementing GHRM. One of the organizational cultures that affect the implementation of GHRM is a culture that fosters learning and innovation (C3). A learning- and innovation-oriented organizational culture is required so that learning between individuals, teamwork, collaboration,

creativity, and knowledge dissemination can be effectively communicated (Naqshbandi et al., 2019). To encourage organizational innovation in implementing GHRM is a learning culture that promotes innovation (Maletic et al., 2015). Green business process (C4) is one of the characteristics of organizations in transition from traditional to environmentally focused management. When organizations comprehend the value to be gained, they will support the implementation of green business processes with environmental improvements. This consists of GHRM management that will generate environmental resources (Wu et al., 2019). A knowledge management system (C5) is considered as one of the organization's valuable assets. It is capable of creating value and achieving the organization's strategic objectives (Yee et al., 2019). Environmental management knowledge can be accumulated by knowledge management systems to facilitate the practice of identifying, creating, communicating, socializing, measuring, and enhancing internal knowledge to support strategic goals in implementing GHRM (Haldorai et al., 2022). GHRM is a collection of human resource activities focused on environmental and social impact therefore implementing GHRM necessitates a partnership with a strategic partner (C6) (Masri & Jaaron, 2017).

Physical resources (A2) are the infrastructure of a business that supports its operations. Because GHRM is a transition from traditional management, it requires support, one of which is readily accessible technology (access to advanced technology for GHRM) (C8). Human Resources Information System (HRIS) (C9) and digital technology are among the technologies that can be utilized in the application of the GHRM (Luthra et al., 2016; Mangla et al., 2015). Organizations have extremely complex human resource structures, necessitating an HRIS capable of designing and managing a network of HRM information systems that will be managed by the system. In the meantime, the application of digital technology (C10) in GHRM can facilitate organizations' responses to environmental changes by capturing, transforming, sharing, and analyzing data (Yang et al., 2021). Organizations require a conducive environment, exemplified by a green workspace (C7), to develop the most applicable technology. The green workspace is designed with sustainability and resource efficiency in mind to increase organizational productivity (Saeidi et al., 2022).

Regulatory compliance (A3) is pressure from authorities such as the government to formulate rules aimed at organizations for the purpose of implementing a sustainable organizational environment (Huang & Li, 2017). The organization's obligation to uphold predetermined standards is one of the pressures created (C12). To support GHRM, the authorities provide standards for environmentally friendly business practices (Gualandris & Kalchschmidt, 2014). In addition to government pressure, stakeholders have specific requirements that organizations must meet in order to adopt environmentally friendly business practices (C14). Environmentally irresponsible organizations will face fines and penalties in practice (C13). Negative reports (C15) are the logical consequence of organizations receiving fines and penalties for committing violations. This will lead to a loss of reputation and a poor evaluation in the annual report (Gualandris and Kalchschmidt, 2014).

Association compliance (A4) plays a crucial role in the organization's implementation of GHRM. Through professional associations, organizations can learn how and why to support the implementation of GHRM by taking a green approach (Colwell & Joshi, 2013). To promote sustainability in the industry, the Association encourages businesses to implement environmental responsibility (C16) (Ball & Craig, 2010). Encouragement can be provided in the form of requirements that an organization must meet to participate in the industry (C17). Being a member of an industry association is advantageous for organizations because it can aid in supporting the organization's activities, particularly in the implementation of GHRM. The Industry Association has an expectation (C18) that requires all industry organizations to be environmentally and socially responsible (Helmig et al., 2013).

Customer pressure (A5) refers to consumer demands that a company improve its performance, particularly in terms of its environmental and social performance (Hwang et al., 2016). Customer demands play a significant role in the organization's implementation of GHRM. Customers have certain requirements to ensure that a mutual understanding is maintained between the organization and the customer. Changes in consumer attitudes and ecological consciousness may result in a shift in customer requirements (C20) (Yong et al., 2019). When an organization is able to fulfill the customer's specifications, it must also ensure customer satisfaction (C21). GHRM is one of the environmentally friendly practices that can help businesses increase customer satisfaction (Malik et al., 2020). In order to support the achievement of customer satisfaction, businesses must increase public awareness of sustainable human resource management (C19). Promotion is accomplished by disseminating sufficient information to raise awareness about GHRM (Smol et al., 2018). It will result in a positive reputation for the organization, as it will have been able to meet the needs of its customers (C22). Customers will be retained, and new potential customers will be attracted by a positive reputation for environmental sustainability (Tosti-Kharas et al., 2016).

Top-level management that is concerned with the environment (A6) is more likely to implement a more environmentally friendly business process. The success of adopting GHRM which replaces traditional HR activities rely on the support of upper management to create and enhance green initiatives which in turn can enhance environmental performance (Ramadan & Safavi, 2022; Yang Spencer et al., 2013). In addition, it is not only the commitment towards the environment but also the leaders' change orientation (C24) towards GHRM that also become critical issues in implementing GHRM (Slankis, 2006). Iqbal et al. (2020) asserted that in order to successfully implement GHRM, the leader should possess sustainable leadership which is characterized as having broad system thinking (C26). Broad system thinking is a critical aspect for top management because it will provide psychological safety to the employees which stimulates employees' idea generation toward GHRM implementation. Social and environmental consciousness (C25) stimulated the ability of top management to link the organization with the environment so that GHRM in the organization could operate effectively (Slankis, 2006). Moreover, senior management will implement a proactive plan that incorporates sustainable HR (integration of sustainable HR into proactive plans) (C23) (Allais et al., 2017; George et al., 2016). The

organization's strategic plan can be accomplished by identifying its desired objectives. These objectives can be attained through a vision and mission that explains behavior in addressing social problems, including diverse environmental issues (C27) (Haddock-Millar et al., 2016).

Human resources (A7) are a human-centered aspect that contributes to GHRM by focusing on workforce development, workforce abilities, workforce motivation, and workforce opportunities (Mansoor et al., 2021). To create GHRM-focused human resources, organizations must engage in green job design (C32). Job design establishes a specialized position to manage green practices in businesses (Masri & Jaaron, 2017). Creating environmental awareness among employees (C30) by continuously communicating organizational goals and objectives to employees in relation to environmental issues is one strategy for realizing a GHRM-oriented human resources management system (Gupta, 2018). Communication may take the form of collaborative teamwork (C29). Teamwork must be implemented to support environmental protection within the organization (Haldorai et al., 2022). It is necessary to improve the health and safety of employees (C31) in order to create a safe environment for workers (Gupta, 2018; Haldorai et al., 2022). The organization's level of safety support contributes to the quality of its human resources which can affect the implementation of GHRM.

2.5 Case background

The cement industry is part of the active mining sector, which implies that natural resources are regularly consumed, resulting in a depletion of reserves. Indonesia will manufacture 65 billion metric tons of cement in 2021, up from 60 billion metric tons in 2020, making it the fifth-largest cement producer worldwide and the second-largest in Southeast Asia after Vietnam. Yet, the production of cement generates pollutants and wastes, such as hazardous toxic substance (B3) waste. In addition, the cement business is one of the most carbon-intensive industries, which is a developing concern given the detrimental effects of pollution and industrial waste on the quality of life.

However, it is anticipated that cement consumption in Indonesia will rise by 5.9% in 2021 and 1.24 % in the first quarter of 2022 due to community development and rising demand. The total yearly output capacity of the country's nine cement plants is 98.35 million tons. However, waste and emissions produced by the cement industry are increasing. In response, the government has adopted legislation to limit environmental damage, while industry organizations and consumers increase pressure for sustainability. To remain competitive and garner support from stakeholders, the cement industry must implement Green Human Resources Management (GHRM) to impact the green behavior and performance of its staff. Nevertheless, decision-makers in the cement sector face numerous obstacles in utilizing its resources, adhering to laws, reducing prices, and establishing a competitive edge.

3. Method

3.1. Data Collection

Purposive sampling was used to select experts, and the criteria for selection included the degree of experience as well as the level of involvement in GHRM in the cement industry. For the purpose of this study, a board consisting of thirty professionals was contacted through their respective professional email accounts. They were selected on the basis of their professional expertise and educational background in the cement business and human resources management sector in Indonesia. The professionals' average experience was 17.3 years. The demography of the respondents is shown in Table 1.

Table 1. Respondents' Attributes

	Positions	Educational background	Tenure	Type of organization (University/Industry)
1	Strategic Planning Sr	Bachelor	25	Industry
2	Business Development Sr	Master	13	Industry
3	Welfare Officer	Bachelor	28	Industry
4	CSR Comdev	Bachelor	27	Industry
5	Safety Monitoring	Bachelor	27	Industry
6	Group Restructuring Officer	Bachelor	25	Industry
7	Manager of Area Sales	Bachelor	12	Industry
8	Waste Management Officer	Bachelor	13	Industry
9	General Affairs Adm	Diploma	11	Industry
10	General Affairs Adm	Diploma	10	Industry
11	Internal Communication Sr	Master	12	Industry
12	Business Development Sr	Master	13	Industry
13	Professor	Ph.D	22	Academia
14	Professor	Ph.D	15	University
15	Professor	Ph.D	27	University
16	Asset Management Manager	Bachelor	26	Industry
17	Director of Finance and HR	Master	26	Industry
18	IT Development Manager	Bachelor	12	Industry
19	IT Development Manager	Bachelor	12	Industry
20	SPV of distribution plan	Bachelor	9	Industry
21	Assistant Professor	Ph.D	8	University
22	SCM Infrastructure MP	Bachelor	30	Industry
23	Group Restructuring Officer	Bachelor	25	Industry
24	IT Strategy Officer	Bachelor	25	Industry
25	Organization Transformation Director	Master	12	Industry

26	HR Manager	Master	11	Industry
27	Manager of Research and Development	Bachelor	12	Industry
28	Manager of Risk Management	Ph.D	13	Industry
29	Assistant Professor	Ph.D	9	University
30	Assistant Professor	Ph.D	9	University

3.2. Fuzzy Delphi Method (FDM)

The FDM was developed by combining the Delphi technique and the idea of fuzzy sets, with the aim of addressing the shortcomings of relying solely on expert judgment and enhancing the resilience of evaluations. (Ishikawa et al., 1993). By converting qualitative assessments of limited data into quantitative information, it can effectively save time and money (Bui et al., 2020).

Expert r has been given the responsibility of identifying the critical of particular features among a pool of n experts in the following manner: $r = (a_{ij}; b_{ij}; c_{ij})$, $i = 1, 2, 3, \dots, k$, $j = 1, 2, 3, \dots, l$, where r_j is the weight of e represented as $r_j = (a_j; b_j; c_j)$ with $a_j = \min(a_{ij})$, $s_j = (\prod_1^n m_{ij})^{1/n}$, and $m_j = \max(s_{ij})$. Subsequently, employing the guidelines outlined in Table 2, triangular fuzzy numbers (TFNs) are employed as a means of transforming linguistic assessments into fuzzy numbers.

Table 2. A table outlining the conversions of linguistic terms for FDM.

Phrases	Triangular Fuzzy Numbers (TFNs)
Extreme	(0.75, 1.0, 1.0)
Demonstrated	(0.5, 0.75, 1.0)
Strong	(0.25, 0.5, 0.75)
Medium	(0, 0.25, 0.5)
Fair	(0, 0, 0.25)

The values that come after this statement are employed for the purpose of convex fusion:

$$\begin{aligned}
 f_j &= a_j - \varepsilon(g_j - h_j), \\
 r_j &= t_j - \varepsilon(j - a_j), \\
 i &= 1, 2, 3, \dots, k,
 \end{aligned} \tag{1}$$

where $\varepsilon = [0,1]$ this implies whether the expert judgments are positive or negative. Fuzzy evaluation translates unclear information into numerical information F_b :

$$F_b = \int (f_j, r_j) = \sigma[f_j + (1 - \sigma)r_j] \tag{2}$$

where σ represents the good evaluation that the specialist has given on the state of stability. In light of this, the criterion can be attained by using the equation as follows: $R = (\sum_{b=1}^m F_b)/w$ for the native list of features. If $F_b \geq R$, factor b is valid. Alternatively, it is removed.

3.3. Fuzzy DEMATEL

In fuzzy DEMATEL, defuzzification is used to transform qualitative information into fuzzy textual data. To compute the sum of the weighting factors, membership functions that are fuzzy, denoted as $\tilde{e}_{xy}^n = (\tilde{e}_{1xy}^n, \tilde{e}_{2xy}^n, \tilde{e}_{3xy}^n)$. The right and left values can be calculated by finding the least and greatest fuzzy values respectively. Following that, the crisp values are transformed into an array of full connections to simplify the research findings by transferring them to a graphical representation. In conclusion, the process of classifying causes and effects requires assigning distinct elements to each in order to differentiate them from one another and determine the structural link between them.

A group of factors is presented $C = \{c1, c2, c3, \dots, cz\}$ and mathematical relationships are generated by comparing them in pairs. The crisp values are obtained by applying linguistic qualities that range from 'very low impact' (VLI) to 'very high impact' (VHI), and then the crisp results are computed using the information that is shown in Table 3. Taking into account that there are n professionals contributing to the process of making decisions, \tilde{e}_{ij}^n represents the relative importance that each expert places on their input n^{th} to i^{th} factor's effect on the j^{th} factor.

Table 3. TFNs linguistic parameter.

Parameter	Linguistic Variable	Corresponding Triangular Fuzzy Number (TFNs)
VLI	Very low impact	(0.0, 0.1, 0.3)
L	Low impact	(0.1, 0.3, 0.5)
M	Moderate impact	(0.3, 0.5, 0.7)
H	High impact	(0.5, 0.7, 0.9)
VHI	Very high impact	(0.7, 0.9, 1.0)

The following summarizes fuzzy numbers:

$$Q = (q\tilde{e}_{1xy}^n, q\tilde{e}_{2xy}^n, q\tilde{e}_{3xy}^n) = \left[\frac{(e_{1xy}^n - \min e_{1xy}^n)}{\Delta}, \frac{(e_{2xy}^n - \min e_{2xy}^n)}{\Delta}, \frac{(e_{3xy}^n)}{\Delta} \right] \quad (3)$$

where $\Delta = \max e_{3xy}^n - \min e_{1xy}^n$. The values that are used to determine the adjusted ratios of both the left (l) and right (r) sides are:

$$(l_{xy}^z, r_{xy}^z) = \left[\frac{(qe_{2xy}^n)}{(1+qe_{2xy}^n - qe_{1xy}^n)}, \frac{(qe_{3xy}^n)}{(1+qe_{3xy}^n - qe_{2xy}^n)} \right]. \quad (4)$$

Adjusted crisp values (cv) are formulated using

$$cv_{xy}^n = \frac{[l_{xy}^n(1-l_{xy}^n)+(r_{xy}^n)^2]}{(1-l_{xy}^n+r_{xy}^n)}. \quad (5)$$

Calculations for the synthesized crisp are made using the individual perspectives of each of the n respondents, and the results are aggregated in the following manner:

$$\tilde{e}_{xy}^n = \frac{(cv_{xy}^1+cv_{xy}^2+cv_{xy}^3+\dots+cv_{xy}^n)}{n}. \quad (6)$$

The first list of connections, called TU, is made in an $s \times s$, represents \tilde{e}_{xy}^n the impact of factor i on factor j , written as shows how much element i has a consequence on element j $TU = [\tilde{e}_{xy}^n]_{s \times s}$.

To construct the standardized direct relation matrix, the following method is utilized. (U):

$$R = \tau \otimes TU$$

$$\tau = \frac{1}{\max_{1 \leq i \leq n} \sum_{x=1}^n \tilde{e}_{xy}^n}. \quad (7)$$

The subsequent steps to acquiring the interdependence matrix (W) are:

$$W = U(I - U)^{-1}, \quad (8)$$

where W is $[w_{xy}]_{s \times s}$ $i, j = 1, 2, \dots, z$. The totals of the rows and columns of the interaction matrix are used to calculate the parameters for driving power (A) and dependent power (B), respectively:

$$A = \left[\sum_{x=1}^s w_{xy} \right]_{s \times s} = [w_x]_{s \times 1} \quad (9)$$

$$B = \left[\sum_{y=1}^s w_{xy} \right]_{s \times s} = [w_y]_{1 \times s}. \quad (10)$$

The method produces a cause-and-effect diagram, where the allocation of variables is determined by computing $[(A + B), (a - b)]$, which corresponds to the x and y axes. The relevance of the variables is demonstrated by the x -coordinate, which is written as $(a + b)$. In comparison, items are sorted into causality pairs based on their y -coordinates, which can be favorable or adverse and can range from 0 all the way up to 1. It is called a driver if the score obtained by subtracting a and b is larger than zero, and it is regarded as a consequence if the score is less than zero.

4. Result

4.1 FDM

As a consequence of FDM's analysis, the number of GHRM qualities that are reduced from 32 to 17, along with the threshold $R = 0.576$. Additionally, Table 4 lists the final acceptance criteria.

Table 4. Valid aspects and criteria.

Aspects		Criteria
A1	Organizational resources	C1 Sufficient budget
		C2 Investment in R&D
		C3 Learning culture stimulating innovation
		C4 Green Business Process
		C5 Knowledge management system
A2	Regulatory Pressure	C6 Product returns mechanism
		C7 Operational activities monitoring
		C8 Design for circular business and products
		C9 Negative reports for committing infraction
A3	Association Pressure	C10 Encouragement from association
		C11 Required to be environmentally and socially responsible
A4	Top Management Commitment	C12 Leaders change orientation
		C13 Social and environmental consciousness
		C14 Long-term environmental vision & mission
A5	Human Resources	C15 Employee expertise
		C16 Awareness of environmental issues
		C17 Green designing job position

4.2 Fuzzy Dematel

Table 2 was utilized in order to accomplish the translation of linguistic features into TFNs. The estimated mean of the crisp values for all of the participants was then utilized in the process of developing the matrix of derived directions that are presented in Table 5. After that, a matrix of complete interrelationships was developed; this matrix exemplifies the causal links that exist between the various components (as can be seen in Table 6). The diagram of causes and effects can be seen in Figure 1.

Table 5. Initial orientation matrix for aspects.

	A1	A2	A3	A4	A5
A1	0.706	0.547	0.459	0.454	0.379
A2	0.516	0.723	0.495	0.449	0.436
A3	0.594	0.487	0.699	0.516	0.509
A4	0.631	0.449	0.473	0.744	0.569
A5	0.492	0.456	0.486	0.535	0.706

Table 6. Total interrelation matrix and the link between causes and effects among the aspects.

	A1	A2	A3	A4	A5	α	β	$(\alpha + \beta)$	$(\alpha - \beta)$
A1	3.381	3.022	2.917	3.008	2.859	15.187	17.740	32.927	(2.554)
A2	3.408	3.176	3.018	3.097	2.968	15.666	16.019	31.685	(0.352)
A3	3.686	3.308	3.312	3.349	3.214	16.869	15.631	32.501	1.328
A4	3.780	3.364	3.295	3.508	3.307	17.254	16.173	33.427	1.081
A5	3.485	3.149	3.090	3.211	3.148	16.083	15.495	31.578	0.587

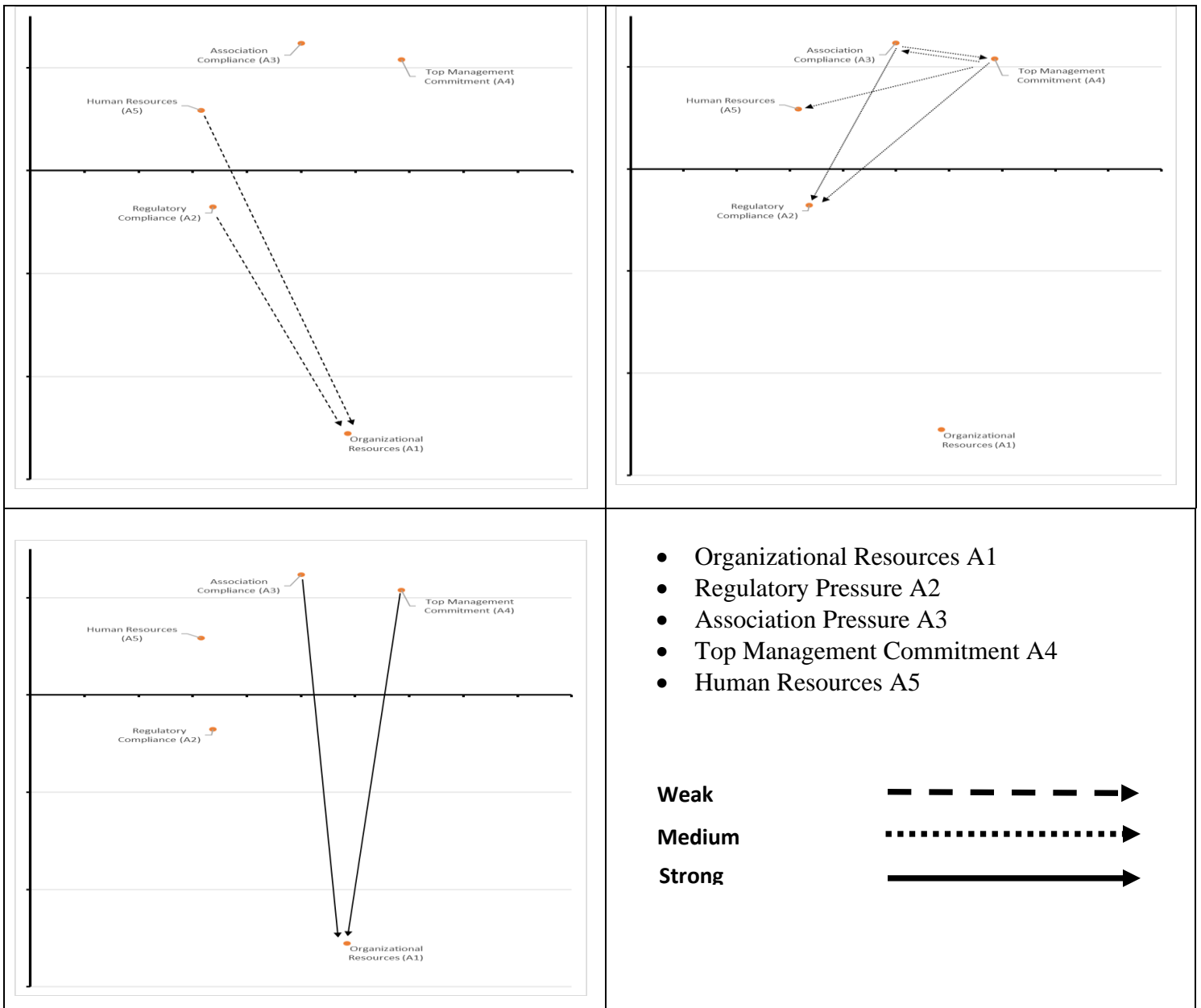


Figure 1. Interrelationship among aspects

Figure 1 shows that the following sub-dimensions are causes of GHRM: Association compliance (A3), Top Management Commitment (A5), and Human Resources (A4). It emphasizes that A3, A5, and A4 are critical areas to put emphasis on. In addition, an interaction matrix for the criteria was developed (Table 6), and causative linkages were analyzed (Table 8). According to the findings, the criteria C1, C9, C10, C11, C12, and C16 are considered to be causal, whereas the criteria C2, C3, C4, C5, C6, C7, C8, C13, C15, and C17 that are considered to be effect criteria can be found in Figure 2. Negative reports of committing violations (C9) are the most significant criterion within the motive group, leaders' change orientation (C12), long-term environmental vision and mission (C14), awareness of environmental issues (C16), and sufficient budget (C1). These criteria are defined as the characteristics that will serve as guidance for the transition from traditional HR to GHRM in the cement sector of Indonesia.

Table 7. Total interrelationship matrix among criteria.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
C1	0.333	0.335	0.339	0.341	0.311	0.317	0.331	0.331	0.317	0.316	0.304	0.329	0.379	0.333	0.337	0.327	0.332
C2	0.275	0.307	0.283	0.280	0.263	0.266	0.265	0.281	0.272	0.254	0.262	0.288	0.313	0.283	0.279	0.281	0.280
C3	0.288	0.304	0.329	0.302	0.281	0.287	0.279	0.298	0.285	0.276	0.275	0.301	0.349	0.297	0.301	0.292	0.303
C4	0.285	0.302	0.306	0.323	0.275	0.278	0.284	0.288	0.287	0.272	0.275	0.295	0.336	0.298	0.305	0.293	0.306
C5	0.268	0.280	0.288	0.274	0.280	0.264	0.255	0.274	0.263	0.250	0.249	0.285	0.301	0.275	0.273	0.267	0.274
C6	0.261	0.275	0.285	0.274	0.255	0.279	0.250	0.267	0.253	0.240	0.244	0.263	0.294	0.268	0.257	0.258	0.259
C7	0.255	0.279	0.283	0.268	0.258	0.271	0.293	0.269	0.266	0.257	0.254	0.285	0.316	0.276	0.279	0.276	0.281
C8	0.276	0.275	0.286	0.290	0.264	0.278	0.282	0.306	0.277	0.262	0.263	0.291	0.320	0.282	0.300	0.274	0.292
C9	0.359	0.375	0.384	0.379	0.347	0.357	0.357	0.358	0.362	0.342	0.340	0.375	0.428	0.367	0.374	0.365	0.373
C10	0.323	0.341	0.345	0.341	0.311	0.318	0.319	0.324	0.311	0.325	0.310	0.337	0.390	0.336	0.338	0.327	0.335
C11	0.284	0.290	0.311	0.304	0.283	0.279	0.287	0.293	0.284	0.274	0.298	0.310	0.342	0.307	0.305	0.303	0.312
C12	0.320	0.337	0.347	0.341	0.316	0.320	0.330	0.334	0.322	0.313	0.308	0.344	0.381	0.328	0.330	0.330	0.331
C13	0.341	0.355	0.358	0.351	0.328	0.340	0.344	0.355	0.335	0.329	0.320	0.348	0.456	0.348	0.353	0.337	0.348
C14	0.325	0.336	0.349	0.342	0.314	0.325	0.325	0.333	0.316	0.307	0.303	0.331	0.374	0.343	0.338	0.330	0.333
C15	0.284	0.290	0.290	0.300	0.276	0.273	0.281	0.292	0.279	0.266	0.268	0.303	0.331	0.296	0.293	0.289	0.296
C16	0.322	0.327	0.345	0.344	0.320	0.321	0.328	0.333	0.316	0.305	0.303	0.344	0.384	0.321	0.329	0.332	0.332
C17	0.295	0.304	0.303	0.317	0.286	0.289	0.299	0.305	0.291	0.290	0.283	0.309	0.347	0.301	0.310	0.299	0.309

Table 8. Evaluations of causality and impact for the criteria.

	D	R	D+R	D-R
C1	5.613	5.092	10.704	0.521
C2	4.732	5.310	10.042	(0.579)
C3	5.046	5.430	10.476	(0.385)
C4	5.008	5.371	10.379	(0.363)
C5	4.620	4.968	9.588	(0.349)
C6	4.482	5.063	9.544	(0.581)
C7	4.667	5.110	9.776	(0.443)
C8	4.817	5.240	10.057	(0.422)
C9	6.241	5.034	11.275	1.206
C10	5.634	4.876	10.510	0.758

C11	5.066	4.858	9.924	0.209
C12	5.630	5.339	10.969	0.292
C13	5.945	6.042	11.987	(0.097)
C14	5.622	5.259	10.881	0.363
C15	4.907	5.300	10.207	(0.393)
C16	5.605	5.179	10.784	0.426
C17	5.135	5.299	10.434	(0.164)

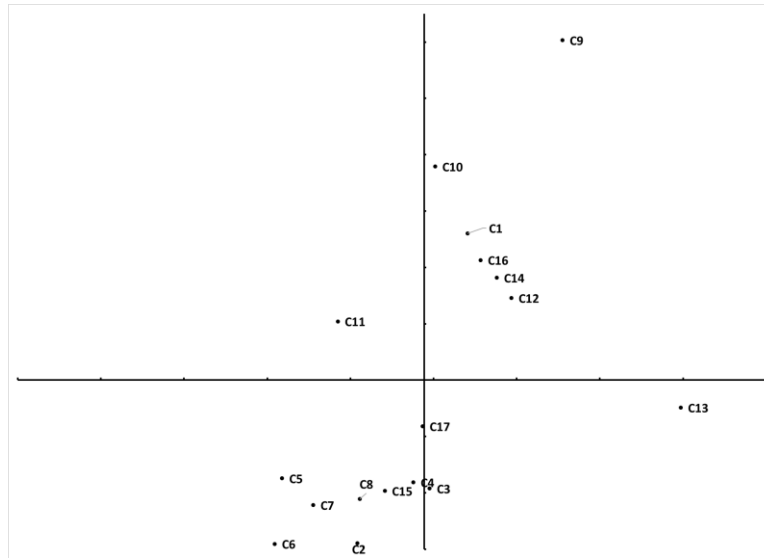


Figure 2. Causal and effects among criteria

5. Discussions

This section discusses the theoretical and practical implications of increasing theory and practice understanding.

5.1 Theoretical implications

This study shed some light on the body of knowledge by offering comprehension in theory related to GHRM. The firms should focus on the aspects which become the causal aspects. This study discovered that association compliance, top management commitment, and human resources play critical roles in supporting companies in implementing GHRM by looking at the situation through the prism of RBV and the stakeholder theory.

When it comes to having an effect on the manner in which GHRM is put into practice, the commitment of senior management becomes a key aspect. It implies that senior management's determination can propagate techniques with an emphasis on sustainability throughout the entire organization at all levels. The centrality of the involvement of high-level management as an essential factor in the successful practices of management strategies and environmental protection efforts in particular has been highlighted in previous studies as being particularly important (Obeidat et al., 2020). This study is confirming the findings of Haldorai et al. (2022), which is

anticipated that the commitment of upper management to the climate will increase the likelihood that GHRM will be implemented as the HR strategy in an organization. In addition, the results of this study are in line with the notion that the commitment of a company's executive management to concerns of environment and social consciousness is an indispensable asset that an organization ought to take advantage of when setting up GHRM systems. This idea is supported by the result of this study. The company's upper positions have a substantial amount of input into both the company's policy regarding GHRM and its day-to-day business functions (Slankis, 2006; Yang Spencer et al., 2013). The execution of top management commitment within organizations is vital for the implementation of GHRM practices and policies that support the environmental mission and objectives of enterprises. Consequently, top management is a crucial component of GHRM's growth and evolution.

The pressure brought on by industry associations is crucial in the adoption of GHRM, which uses its legitimation to build a healthy workplace. Our findings are in line with those of earlier research, which hypothesized that industry associations seem to mutually support one another and exert a direct influence on organizations, prompting them to adopt eco-friendly approaches to doing business in the form of GHRM compliance (Helmig et al., 2016). As secondary stakeholders, industry associations also evaluate the social and environmental outcomes of their members. It generates pressure on the organization and forces them to comply with the standard, while also tarnishing the reputation of organizations that do not conform to the standard. The findings of our study lend credence to the idea that companies should work to improve their public image by conforming to the requirements set forth by industry associations.

According to the findings of our study, human resources, and competencies emerged as key motivating factors for the business to implement GHRM practices. This finding lends support to earlier research that focused on green human capital, which refers to the employee's competencies that enable the firm to achieve environmental results that are desirable (Haldorai et al., 2022). Additionally, "green human capital" and "green relational capital" encouraged manufacturing companies to embrace GHRM. These factors contributed to the greening of the manufacturing sector. Similarly, Mansoor et al. (2021) noted that previous employment may have provided people with environmental expertise that can aid in the development of environmental understanding within the current organization. The employees' awareness and care for environmental issues push human resource departments to foster this type of expertise.

5.2 Managerial Implications

When transitioning towards new business models in GHRM, cement companies face basic hurdles in the form of uncertainty and the complexity of the issues they face. The results of this investigation determined numerous essential criteria namely, negative reports for committing infractions, leaders change orientation and long-term environmental vision and mission, awareness of environmental issues, and sufficient budget that can provide solutions for cement firms to adopt GHRM.

In order to transition to GHRM, cement companies needed support from upper management, as well as dedication and clarity of vision. It is absolutely necessary for businesses to adopt GHRM by putting this criterion into practice. To be more specific, businesses will be unable to properly implement GHRM if senior management does not provide the necessary support and dedication, in addition to having a distinct vision for the future. Due to this circumstance, the company will have a tough time achieving optimal efficiency and effectiveness by making use of the resources it already possesses. Because of this, the company will have a significant burden, will be unable to produce a sustainable environment, and will be unable to lessen its overall impact on the environment. Companies must realize the significance of the function at the highest management level and be aware that this is not simply a proposal that has to be completed. Instead, it is their responsibility to assist businesses in putting GHRM into action so that the goals they have set can be realized.

It would appear that a compelling direction is crucial for the effective use of GHRM in light of the fact that the desired vision is translated into a purpose, a set of goals, and initiatives that will be executed by all of the parties involved. On the other hand, if the vision is constructed in such a way that it is crystal clear what it is supposed to accomplish, then it can be accepted as having been successfully completed. As a result, businesses must back GHRM and show a strong commitment, in addition to working on the formation of a clear vision, so that it may be executed in a practical manner. If upper management is willing to aid in the form of dedication and a clear plan for the company's future, the company will adopt and implement a holistic GHRM framework. As a result, the performance achievement of the company will be able to be practically raised and sustained for the upcoming years. It is necessary for companies to recruit the best human capital and to develop and educate their existing employees for them to be able to encourage green behaviors. This is due to environmental knowledge and skills embedded in employees are essential for the cement industry to thrive GHRM. Cement manufacturers may increase their human resources by training people on environmental issues. In order to strengthen the effectiveness and capabilities of "green human capital" in the process of developing GHRM, managers may plan and implement environmental protection training programs for employees. It is the responsibility of managers to boost employee understanding of the positive influence that environmentally friendly activities have on environmental performance and the performance of sustainable organizations.

The Indonesian government is currently showing a significant amount of attention to environmental issues. As a result, the cement sector is required to comply with the laws and regulations established by the key stakeholders, specifically the government. Cement companies may avoid having unfavorable reviews for committing environmental infractions by ensuring they comply with the rules and regulations that govern the industry. When organizations are faced with the consequences of not acting in an ecologically responsible manner, it may push them to change their behavior. As a result, those in charge of formulating public policy ought to consider whether it would be smart to give firms the means to acquire and put into practice the knowledge and tools necessary to engage in environmentally responsible activities. In order to encourage the

implementation of green HRM practices that have a greater impact on environmental performance, policymakers might want to rethink the nature of the pressures they put on environmental issues. This would allow them to frame those pressures in a way that encourages their implementation. In this direction, public regulations that give negative reports to companies that commit environmental infractions could be one example of policies that motivate companies to implement GHRM.

In order for cement companies to successfully implement GHRM, having sufficient funds becomes an essential resource. Shifting from traditional HRM practices to GHRM requires financial investment, including the purchase of cutting-edge technology and the upskilling of staff members. Therefore, businesses need to figure out how they will secure their funding. Cement companies, for instance, can try to increase their market share by either penetrating new markets or expanding existing ones in order to increase their profits. When compared to the hurdles faced by small and medium-sized businesses, large and well-established cement companies face fewer obstacles when it comes to the allocation of funds. There is a high probability that the strategy that SMEs use to acquire the finances necessary to implement the GHRM will vary. It is strongly suggested that companies of a size ranging from small to medium establish partnerships with various financial institutions in order to optimize the use of the funding resources at their disposal.

6. Conclusions

Cement manufacturing in Indonesia is increasing alongside infrastructure spending. However, the industry is today confronted with both rising competition and challenges that extend beyond the performance of the economy and encompass both environmental and social concerns like emissions, waste, health, and safety. As the importance of human resources grows, the cement industry is trying to shift from traditional human resource management (HRM) to green human resource management (GHRM). The aim of this study is to identify the critical attributes in driving the industry by adopting GHRM from both the lens of stakeholder theory and the resource-based view. Our study is congruent with decision science because our study employed both FDM and FDEMATEL to help an organization focus on crucial aspects and criteria in shifting from traditional HR to GHRM. In order to acquire the correct characteristics, both the FDM and the FDEMATEL are used to investigate the interaction between the various attributes. In order to identify interrelationships among variables that show significance to both the practical and theoretical elements of GHRM, particularly in the cement industry in Indonesia, this study evaluated the linguistic preferences of industry experts. Specifically, this study focused on the preferences of experts working in Indonesia's cement industry.

In this study, we develop a proposition for a set of 32 criteria that can be used to organize seven different elements and employ the GHRM model that can be used to examine the 17 criteria and five parameters. The findings of this study provide evidence of the connection between causes and consequences. We find that association compliance, commitment from upper management, and

human resources are the causal aspects driving the GHRM implementation. Specifically, both association compliance and top management commitment strongly affect organizational resources and other aspects. On the other hand, we find that several criteria as critical criteria for the industry successfully implement GHRM and negative reports commit the infraction, leaders' change orientation, long-term environmental vision and mission, awareness of environmental issues, and sufficient budget. The present research has both academic and managerial inferences for cement companies, which require not just efficient and effective operations, but also an edge over rivals in order to achieve their long-term goals. The conceptual foundation of GHRM is made up of five different aspects and 17 different criteria. These aspects and criteria influence the progression of literature and indicate the success of a company's performance. In addition to this, the practical consequences of the findings in this paper are beneficial to cement companies in Indonesia. The findings of our paper infer that cement companies should have a clear vision and adopt the leader-change attitude which is an important responsibility for the top management. This will help cement companies achieve their corporate goals in GHRM. The findings of our paper also imply that cement companies should employ the adopted strategies and achieve their complete commitment by accomplishing our suggested plans. By doing this, businesses, their clients, and their investors are expected to receive massive earnings and gets good influence in the cement companies as a result of systematic and thorough correctness and precision.

However, there are still limitations on what can be concluded from this study. First, though the discussion of our findings can be used to incorporate both RBV and stakeholder theories as the lenses to establishing a helpful theoretical foundation to determine the drivers of GHRM adoption, it may not go into other issues in great detail. Both stakeholder theory and RBV are approaches to building a good theoretical structure. Moreover, in subsequent research, researchers could look more closely at the difficulties and limitations posed by GHRM, as well as their influence on the social, economic, and ecological aspects of sustainable performance, in order to obtain more comprehensive results. Second, the industry that was identified in this study was just Indonesia's cement industry. It is expected that in future studies it would be possible to spread it to other industries and make comparisons to other geographical locations connected to the use of GHRM so that the research model will be more generalizable. As there were only 30 respondents who were knowledgeable in their respective disciplines, the results that were produced may have been heavily influenced by objective evaluations. It is intended that future studies would increase the number of respondents in order to circumvent such issues as they arise. Lastly, using the results of this study especially related to the causality interrelationship among attributes as the foundation for future studies.

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