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Resolution of barriers to Green Human Resources Management through its drivers in the textile sector of an emerging economy[1]*

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Abstract

Green HRM is vital in organizations' sustainability policies, seen as a recent research trend. This paper aims to identify the five most important drivers and critical barriers to Green HRM implementation in Pakistan's textile industry. Data were collected from a group of Pakistan's textile industry experts, and the Fuzzy Delphi and Fuzzy AHP methods were used to examine the results. The findings reveal that the most critical five drivers of Green HRM implementation are improvement in company image, maximum use of resources, reduced waste, stimulation of growth and innovation, top management support, and work-life balance. The results further explore the five critical barriers: difficulty and complexity in green technology adoption, lack of organizational support, employee resistance, and lack of culture and knowledge of individuals. This analysis is valuable to researchers by highlighting research gaps and making specific suggestions on Green HRM research. This study proposes a detailed research structure for future studies, particularly implementation recommendations for Green HRM practices. Organizations should adequately evaluate the green culture and work-life balance of employees. They can also support and engage employees in a green environment and manage organizational sustainability performance. Using different methods, this research may also be carried out in the future, especially comparing the various drivers and barriers of Green HRM of small and large companies in Pakistan. In this research, new barriers and drivers are used in this context. The paper takes a detailed look at analyzing drivers and barriers of Green HRM implementation in an organization through DELPHI and MCDM techniques. This research paper acknowledges that Green HRM implementation's most crucial aspects are the organization's barriers and drivers. An organization applies the DELPHI technique to validate known barriers and drivers of Green HRM execution. This research aims to develop the source of information within the literature on drivers and barriers of Green human resource management execution in an organization and the collection of organizational sustainability performance.

Keywords: Green Human Resources Management, Drivers of Green HRM, Barriers of Green HRM, Fuzzy Delphi method, Fuzzy AHP method.

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1. Introduction

Environmental academics and policymakers worldwide agree on the causes of the worsening environmental condition (Rajabpour, Fathi, & Torabi, 2022). The whole world is being confronted with unprecedented environmental concerns. Environmental degradation and climate change have created substantial worldwide challenges in the last decade, including natural catastrophes (droughts, heat waves, and wildfires), resulting in economic losses (Sharma, Sakhuja, & Nijjer, 2022). Climate change, or environmental change, is a shift in weather patterns that occurs over a long period (Mat et al., 2020). Global warming and climate change have dramatically affected people's lives in recent decades, requiring firms to pay greater attention to environmental problems (Darvazeh, Mooseloo, Aeini, Vandchali, & Tirkolaee, 2022). Climate change's negative consequences have been seen in many facets of human lives, indicating that appropriate management of the situation and reducing its negative consequences on society would be complex (Mat et al., 2019). As a result, many businesses have adopted environmental management systems and green initiatives to reduce the environmental impact of their regular operations (Rajabpour et al., 2022). The set of strategies aimed at encouraging environmentally conscious actions and beliefs among an organization's staff and the workers who set the tone for green performance is Green human resource management (GHRM)(Awan, Dunnan, Jamil, & Gul, 2022).

Green HRM uses human resource management initiatives to facilitate efficient resource utilization throughout the company and encourage environmental performance more specifically (Marhatta & Adhikari, 2013). Green HRM became necessary in the twenty-first century as many environmental problems were documented, including global climate change, carbon emissions, and economic disparity caused by businesses' improper use of natural resources as raw materials and the development of harmful greenhouse gas emissions. Over the past decade, Green human resource management has developed quickly in academics and business. Increasing awareness of the environment has directed human resources to adopt Green human resource practices, emphasizing a paper-free environment, carbon footprint reduction, and waste management (Ahmad, 2015). Green HRM is a related phenomenon for understanding the relationship between a firm's operations that affect the environment with the creation, design, influence, and implementation of human resource management systems (Ren, Tang, & Jackson, 2018). Green HRM has emerged as an essential instrument for implementing green approaches and accomplishing green performance objectives within the organization. There is a need for Green HRM development in an organization to implement environmental sustainability into their business model (Ren et al., 2018). Further, GHRM methods boost productivity and staff dedication to enhance environmental effectiveness. The GHRM method involves shifting the HRM system's values, procedures, and practices to prioritize environmental safety. As a result, GHRM is crucial to the long-term success of businesses (Amjad et al., 2021). Organizations should hire people who care about the environment and are committed to green thinking. Human resources with a green mindset can help an organization develop a green culture and reach a high environmental performance by making employees aware of how important it is to follow green policies (Alipour, Nazari-Shirkouhi, Sangari, & Vandchali, 2022).

The movement towards sustainable organizational performance has made Green HRM a new trend in effective management, merging and enhancing environmental management with sustainable performance (Al Kerdawy, 2019). In this era, organizations face many challenges, but one of the most critical problems is caused by ecological concerns (Mousa & Othman, 2020). Many firms are attempting to discover how to minimize harmful environmental effects and enhance the

organization's sustainable performance simultaneously (Ahmad, 2015). Businesses may gain economically, environmentally, and socially by implementing environmental policies since they help them work toward a more sustainable future (Malik et al., 2022). The firms have taken a significant step towards Green HRM and have engaged in green initiatives. Generally, these initiatives concentrate on employee safety and health. For instance, sustainable initiatives would increase the environmental productivity of enterprises (Rezaei-Moghaddam, 2016). Green human resource management leads to increased business engagement, working better, encouraging innovations, and enhanced invention and creativity (Likhitkar & Verma, 2017). Developing an environment-friendly workforce creates a sustainable competitive edge by innovative problem-solving and growing employees' motivation to develop the organization.

Organizations have developed natural, cultural, and legal aspects of the environment and their supply chain partners into their everyday operations. Sustainable policies allow businesses to be creative in fulfilling social and environmental standards without affecting economic performance (Sancha, Wong, & Gimenez, 2019). Green HRM activities give companies a realistic way to develop human capital, improve their environment, and increase sustainable development (Roscoe, Subramanian, Jabbour, & Chong, 2019). Haddock-Millar, Sanyal, and Müller-Camen (2016) stated that green human resource management aligns with the business's green priorities with HR practices, for instance, recruiting, training, selection performance, and rewards. Green HRM is a business practice to establish a safer and healthier working environment (Yusoff, 2016). This is also a part of the green management implementation to protect the ecological balance and the natural environment within organizations (Goswami & Ranjan, 2015). GHRM can improve working conditions for businesses and their employees. The so-called "green pays" theory suggests that a company's environmental sustainability is correlated with its financial success (Renwick, Redman, & Maguire, 2013).

Recent research has associated Green HRM with overall sustainability success in organizations and various environmental management aspects (Chaudhary, 2019). Most empirical studies at the macro and organizational levels have examined Green HRM (Ren et al., 2018). Several organizations have accepted their roles in protecting the environment, and ISO 14001 has been implemented in their policies and procedures by adopting multiple green policies like corporate social responsibility and environmental management strategies. Green HRM plays a significant role in an organization as it implements other activities like green marketing, green production, green supply chain, and green management (Mishra, Sarkar, & Kiranmai, 2014). It is usually believed that Green human resource management gives multiple benefits to an organization, like attraction and retention of the workforce (V. Muster & U. Schrader, 2011), reducing cost, enhancing environmental performance (Y. J. Kim, Kim, Choi, & Phetvaroon, 2019), improving efficiency, accomplishing organizational sustainability (Mishra et al., 2014) and developing a competitive edge (Carmona-Moreno, Céspedes-Lorente, & Martinez-del-Rio, 2012). Organizations that perform their activities according to sustainable standards and foster environmental well-being are called green companies. The word 'green' refers to environmental knowledge, well-being for the climate, living healthy, prosperity, plants and nature etc. The significance of the green idea for companies is that success cannot be evaluated strictly based on economic conceptualization alone, but rather more generally, including social and environmental factors.

Internationally, there is a dearth of research connecting GHRM with business success. The Pakistani textile export industry is struggling due to the severe environmental concerns now

confronting the Pakistani industrial sector. There is a need for further research on the effect of GHRM practices on the environmental efficiency of Pakistan's textile industry since there are currently only a small number of accessible works on the topic. Most industrialized nations have successfully adopted environmental rules in response to rising pollution levels. However, developing countries like Pakistan struggle to enforce environmental legislation due to a lack of comprehensive planning and organizational support and the difficulty and complexity of adopting green technologies. One of humanity's most pressing problems in the twenty-first century is ensuring that the planet can support future generations (Amjad et al., 2021). Both professionals and academics are interested in the relationship between GHRM and an organization's success in terms of sustainability (Amjad et al., 2021). The relationship between GHRM practices and organizational sustainability is studied by Amjad et al. (2021), who examine the moderating effect of environmental and employee performance. Green human resource management (GHRM) is the source of a company's positive reputation as an employer, as shown by Yasin, Huseynova, and Atif (2022). Previous studies identified several factors as significant impediments to the widespread adoption of GHRM practices. These include a lack of comprehensive strategies, high implementation costs, and an indeterminate value placed on environmental considerations. Creating a company that can weather sustainable growth, especially one that practices Green HRM, is no simple feat. Green HRM has several implementation challenges, including internal and external factors. Organizations that improve their sustainable performance could attract more desirable employees and boost their public image. This research is distinct from earlier works since it will focus on factors not previously explored. The role of green human resource management in the textile industry's organizations' sustainability performance is still largely unexplored. This research reviews the relevant literature using the DELPHI and MCDM method, identifies the drivers of, and hurdles to, Green HRM adoption by businesses. The purpose of this study is to identify the most crucial factors and barriers to Green HRM implementation within a firm.

Considering the importance as mentioned earlier, this study will answer the following research question (RQ):

RQ: what are the most critical barriers and drivers of Green HRM application in an organization?

Intending to answer the question mentioned above, the specific objective of this investigation is to:

1. To ascertain the barriers and drivers of Green HRM application in an organization through literature

2. To validate the identified barriers and drivers of Green HRM execution in an organization using the DELPHI technique.

3. To recognize the essential features of barriers and drivers of Green HRM execution in an organization using the MCDM technique.

The remainder of the paper is organized as follows. Initially, we discussed a literature review to identify the barriers and drivers of Green HRM and Organizational Sustainability, followed by methodology, result analysis, discussion, theoretical implication, and practical and managerial implication. The last part presents the conclusions, shortcomings, and future research prospects.

2. Literature Review

2.1 Cognitive-Affective Processing System Theory

Walter Mischel and Yuichi Shoda proposed a human personality model in 1995, known as CAPS (cognitive-affective processing system theory) (Dweck & Research, 2021). Personality is considered a stable system based on cognitive and affective features. Firstly, this processes information according to the situation and then utilizes the information to develop behaviors (Dingess, Wilt, Models, & Theories, 2020). Every individual has a different set of personal constructs that give directions to the person's perceptions and thoughts. This concept develops two elements of CAP: a person's interpretation of the world is essential because it indicates how a person can react in different situations. The second feature is about the process of CAPS, it processes feelings, goals, and thoughts all together on separate, multiple paths which interact with one and all occasions, and the outcome of these two features is the behavior of the person (Carducci et al., 2020). This theory has five central cognitive-affective units (CAUs): the person's general feelings, cognitions, and affects. The cognitive social learning theory is the original and first version of the cognitive-affective processing system theory. In this theory, four out of five factors had been recognized: encoding, beliefs and expectancy, self-regulatory plans and competencies, and values and goals (Mischel, 1973). Afterward, Mischel added the physiological states as the fifth factor in this model: emotions and feelings. As per CAPS, mental representation is a part of the personality system that leads toward consistency in the behavior that becomes the person's characteristics (Silu Chen, Jiang, Li, Gao, & Health, 2021). According to Higgins (1998), an organization is considered a unit, and it can activate and process the behavior and personality of a person via cognitive, motivational, and affective mediating operations that happen within similar kinds of units.

2.2 Green Human Resource Management

The term "green HRM" refers to the degree to which HRM processes are environmentally friendly, whereas implementing "green" HRM needs adjustments to be made at each step of the HRM process. Green HRM is an approach to human resource management that emphasizes creating an eco-friendly workplace and encouraging environmentally conscious attitudes among employees (Bombiak & Marciniuk-Kluska, 2018). Employee education and motivation to take action to reduce harm to the environment inside and outside the workplace are two of the most critical outcomes of GHRM initiatives. GHRM practices combine rules, regulations, and activities that incorporate diverse stakeholders' involvement in green initiatives (Islam, Jantan, Yusoff, Chong, & Hossain, 2020). GHRM practices encourage enterprises to use green practices in their work to meet their green goals, which promotes green behavior from their employees. Past studies have suggested that GHRM practices can affect the behaviors and attitudes of employees, such as their environmental performance, their behavior toward the environment, and their capabilities to come up with innovative ways to help the environment. As green creativity serves as the driving force behind innovation, it also paves the way for new and helpful ideas to be implemented to create environmentally friendly services and products (Hameed et al., 2021). Therefore, green training is crucial for improving workers' skills to do a better job since learned green competencies are valued more highly than innate green competencies (Shoaib, Abbas, Yousaf, Zámečník, Ahmed, & Saqib, 2021). GHRM is anticipated to provide internal advantages to the firm, such as increased organizational performance, employee engagement, and green human capital. Moreover, in a company that focuses on green human resources, if workers are content with their jobs, they will be more likely to engage in eco-behavior freely (Pham, Vo-Thanh, & Tučková, 2022). Green HRM bolsters trust, respect, and knowledge sharing, which considers

the greater good of society and focuses on the needs of its workforce. Value co-creation is something that can only flourish in a learning enterprise. This may accelerate inclusion and long-term sustainability (Mukhuty, Upadhyay, & Rothwell, 2022). Consequently, human resource management is identified by transforming ordinary employees by putting green behavioral intentions into their performance in achieving organizational goals and adding to sustainable development (M. Pinzone, M. Guerci, E. Lettieri, & D. Huisingh, 2019). Yu, Chavez, Feng, Wong, and Fynes (2020) argue that businesses that adopt a Green Human Resource Management strategy are more likely to have their staff launch environmental projects in collaboration with their customers, suppliers, and other supply chain partners (Suchek, Fernandes, Kraus, Filser, & Sjögrén, 2021; Trujillo-Gallego, Sarache, & Sellitto, 2021; Yalçın, 2022)

Similarly, organizations' sustainable performance may also benefit from adopting Green Human Resource Management (GHRM) strategies (Klein, Deutz, & Ramos, 2022; Lahane & Kant, 2021). Specifically, GHRM encompasses all activities that promote a firm's economic, ecological, and societal (in terms of personnel security, healthcare, equality, and wellbeing) sustainability components from an employee's viewpoint in light of corporate sustainability criteria (Benevene & Buonomo, 2020; T.-D. Bui, Tseng, Tseng, & Lim, 2022). Some of the recent studies emphasizing Green human resource management include W.-K. Chen, Nalluri, Hung, Chang, and Lin (2021), which focuses on CE and environmentally friendly practices, Pham et al. (2022) evaluated the implementation of GHRM and its advantages in hotels with a star rating of 4 or 5 in developing countries, Jia, Liu, Chin, and Hu (2018) Workers' pro-environmental behavior (PEB) and environmental transformational leadership (ETL) in Kazakhstan were examined to see whether there was any moderating effect of green human resource management (GHRM), Goel, Mehta, Kumar, and Castaño (2022) highlighted eleven obstacles in implementing the GHRM "strategy," ten in the area of “policies,” nine in the area of “process.” Eight in the area of “guideline formulation,” Zhao et al. (2021) investigated the mechanisms that contribute to the influence of green human resource management and corporate social responsibility on the sustainable performance of organizations.

2.3 Organizational Sustainability Performance

Recently, there has been a rise in the demand that businesses prioritize long-term viability and transparency in their operations by paying close attention to the economic, social, and environmental aspects of sustainability (Grecu, Ciobotea, & Florea, 2020). The grave ecological predicament calls for a long-term strategy to protect the environment now and in the future. The idea of sustainability establishes harmony between human civilization and the natural world. Sustainability is a concept that has influenced the way industries do business by focusing their attention on protecting the natural world (Agarwal, Tyagi, & Garg, 2021). Many modern companies feel compelled to report on their sustainability efforts, making their sustainability performance a significant evaluation metric. An organization's credibility, bonds with key constituents, and even worker output may all benefit from proactive sustainability efforts (Lee & Ha-Brookshire, 2017). Organization sustainability management is also a company strategy designed to shape the corporation's financial, societal, and environmental effects, which has consequences for the firm in long-term sustainable development. Secondly, it makes a valuable involvement in sustainable growth (Schaltegger, Burritt, & Petersen, 2017). Today's corporate leaders and decision-makers understand the importance of environmental and sustainability aspects in ensuring their companies' continued success (Khan et al., 2021). Companies that emphasize employee participation increase the likelihood that their staff will be able to use their

skills and knowledge in environmentally conscious ways, such as by taking part in green initiatives at work and providing novel solutions for issues like waste minimization and resource optimization. Successful implementation of GHRM methods can boost environmental efficiency (Úbeda-García, Claver-Cortés, Marco-Lajara, & Zaragoza-Sáez, 2021). Any business that cares about its long-term viability should plan for the future and evaluate its sustainability performance with an emphasis on lowering risk and minimizing uncertainty (Grecu et al., 2020). Therefore, businesses must track their sustainable performance instead of only their operational and economic measures to boost their sustainability performance (Ali, Kaur, & Khan, 2022).

Additionally, products that incorporate a high level of sustainability could benefit from a reduced value-added tax (Neves & Marques, 2022). In addition, companies that manage their resources in an environmentally responsible manner may discover other avenues via which they might make profits (Dulia, Ali, Garshasbi, & Kabir, 2021). Some of the recent studies emphasizing in Green human resource management includes Dey, Bhattacharjee, Mahmood, Uddin, and Biswas (2022) that explores how ethical leadership influences long-term economic success by way of ethical atmosphere, voluntary environmental behavior, and workers' biospheric values, Thaher and Jaaron (2022) sustainable strategic planning and management (SSPM) in a developing nation environment was outlined, along with its effect on the long-term viability of participating organizations, Espino-Rodríguez and Taha (2022) investigates the influence that innovativeness of suppliers has on supply chain integration and performance, as well as the function that supply chain integration plays as a mediator between supply chain innovativeness and performance and Alraja, Imran, Khashab, and Shah (2022) integrates the Technology Organization Environment (TOE) and Resource Based View (RBV) models to test how sustainable green practices can deal with the TOE factors when they affect sustainable performance. The goal is to create a "holistic framework" for achieving sustainable performance in small and medium-sized enterprises (SMEs).

2.4 Factors of Drivers and Barriers of Green HRM and Organizational Sustainability

Green human resource management implementation is essential. It is argued that the drivers and barriers can affect green human resource management practices. Various factors of drivers and barriers may help in effectively executing Green HRM in organizations. These drivers and barriers are defined below.

2.5 Drivers (D)

1. Competitive Advantage (D1)

The competitive advantage is a non-observable and necessarily challenging concept. A firm's capacity to generate greater economic profits than its lesser productive competitors (Sigalas & Economou, 2013).

2. Environmental Consideration (D2)

In this context, general environmental considerations that make everyone concentrate on doing the best for the environment seem to play a significant role (Gatersleben, Steg, & Vlek, 2002).

3. Environmental Orientation (D3)

Environmental orientation facilitates an effective system of values within the organization of environmental interest and helps workers realize the importance of environmental problems (Guerci & Carollo, 2016).

4. Green safety and health (D4)

Environmental safety and health emphasize workers' lives through environmentally friendly safety and health procedures (Shah, 2019).

5. Green labor relations and employee involvement (D5)

Union behavior and labor relations would promote members' engagement and participation in green proposals, events, problem-solving groups, and green ideas (Renwick et al., 2013).

6. Work-life balance (D6)

Green principles, approaches, and activities characterize balanced work life as an individual's balance of work and home life (V. Muster & U. Schrader, 2011).

7. Top management support (D7)

Environmental sustainability programs' effectiveness depends on higher management support through employee empowerment and promoting change (Zoogah, 2011).

8. Stimulation of Growth and Innovation (D8)

Green HRM promotes new, pioneering thoughts or strategies that facilitate quality development techniques and procedural improvements (Maini & Kaur, 2019).

9. Maximum use of Resources and Reduction of Wastage (D9)

An organization incorporating the principles of GHRM will efficiently use its resources and minimize waste to the highest possible level (Prasad, 2013).

10. Improvement in Company Image (D10)

It is clear that if an organization works on Green HRM, its image will be boosted as it becomes a green environment company with CSR initiatives for a constructive and healthy environment (Renwick et al., 2013).

2.6 Barriers (B)

1. Difficulty and complexity in green technology adoption (B1)

Innovation complexity reflects how an organization perceives the technology to be complicated to recognize and implement. Green technology needs several experiences for adoption. It is challenging to learn green practices (Rogers, 2002).

2. Lack of organizational support (B2)

Lack of organizational support may cause organizational unwillingness to implement changes. If an employee thinks the organization would help him perform a particular job (e.g., enhancing online qualification), they will perform an actual job (H. J. Kim, Shin, & Umbreit, 2007).

3. Employee resistance (B3)

Resistance as a behavior is defined as an action or inaction against the change. Resistance, in some way, is intended to support the employee from the expected, unexpected or real consequences of change (Bolognese, 2002).

4. Lack of culture (B4)

An organization's culture is the collection of simple principles developed by a corporate set to resolve the external changes and internal implementation problems lacking in implementing GHRM processes and policies (Schein, 1984).

5. Knowledge of individuals (B5)

If employees do not know the green HRM practices, it will affect the organization (Fielding & Head, 2012; Levine & Strube, 2012).

6. Education and Training (B6)

Effective organization in teaching and encouraging employees to have more environmentally conscious actions and behave in a greener way. The training will prepare the company's green workforce (SY Chen, Tien, Chen, & Lee, 2012; Fernández, Junquera, & Ordiz, 2003; Jafri, 2012; Sathyapriya, Kanimozhi, & Adhilakshmi, 2013).

7. Upbringing and Personality (B7)

The activity reveals how someone's attitude impacts the climate and ecological behavior (Krajhanzl, 2010).

8. Lack of technical support (B8)

This often ensures too little technical assistance due to a lack of resources, leaving them overworked and unwilling to fulfill the employee’s demands (Cuban, Kirkpatrick, & Peck, 2001).

9. The lack of a comprehensive plan (B9)

Comprehensive plans accelerate the design of a community, township, county, town, or nation by identifying group aims, strategies, and built-in practices. Most firms allow planning and Plan actions consistent with a mandated comprehensive strategic plan (Meck, 2002).

2.7 Literature summary and contribution

The literature illustrates an increasing focus and emphasis on drivers and barriers of Green HRM implementation as the origin and starting point for productive organizations to maintain and boost their sustainability performance. Green HRM encourages green policies by raising employees' awareness and engagement about environmental sustainability issues. Green HRM helps in the sustainable development success of an organization. It is an essential indicator as several of today's organizations have been obligated to reflect on their social and environmental performance. Green HRM will ensure that the organization while doing business, does not cause harm to the natural surroundings where there is no alternative. Green HRM will make organizations recognize that they should not disturb natural harmony for any short-term gain. Green HRM implementation is essential to establishing human resource programs that match the environment and the organization's long-term goals and objectives.

In the previous research, some barriers and drivers, like lack of unclear value of green HRM, lack of green HRM infrastructures, lack of employee support, economic consideration, and public relation strategy, are used as barriers and drivers of green HRM implementation. This research uses new barriers and drivers: lack of knowledge, organization support, training and education,

competitive advantage, top management support, work-life balance, etc. In this context, the paper takes a detailed look at analyzing drivers and barriers of Green HRM implementation in an organization through DELPHI and MCDM techniques. This research paper acknowledges that Green HRM implementation's most essential aspects are the organization's barriers and drivers. An organization applies the DELPHI technique to validate known barriers and drivers of Green HRM execution. This research aims to develop the source of information within the literature on drivers and barriers of Green human resource management execution in an organization and the collection of organizational sustainability performance.

2.8 Data Collection

The survey's respondents were experts from the different textile industries of Pakistan. We defined and compiled a list of barriers and drivers from the available literature impacting Green HRM's implementation in Pakistan's textile sector. After the list of drivers and barriers was established, the Delphi approach was used to analyze the key drivers and barriers based on the panel of experts' opinions. In order to collect data, we used the Delphi survey approach. Delphi is essentially a method that structures the group communication process and makes the process more efficient. Thus, the Delphi method encourages a group of people to tackle a complex problem (Okoli & Pawlowski, 2004).

Emails were sent to various major textile companies. Their permission was asked to engage in this GHRM research. When industries interested in participating in the study responded, the authors asked them to pick experts from different backgrounds and divisions with permission from their HR departments. In order to answer the questionnaire for the driver and barriers of Green HRM, the industries chose the experts they thought were best suited. The questionnaire was sent to the experts with directions about filling out the questionnaire, and to enhance the responses, the author called the head expert to provide verbal feedback to collect the correct results.

In this research, we used an analysis methodology to gather and prioritize information relating to the characteristics that influence the consistency of Green HRM implementation barriers and drivers centered on expert opinions. The experts provided answers to two sets of questionnaires. The first set was directed to rank the drivers and barriers of Green HRM on the Fuzzy Delphi method, and the second set was required to rate the drivers and barriers of Green HRM using the Fuzzy AHP method.

2.9 Case Study

Pakistan's textile industry is the country's most important industrial sector and is also developing. Historically, the textile sector was regarded as the country's lifeline regarding employment creation and foreign exchange. The industry ranks second in Pakistan regarding employment growth and ninth in exporting textile goods to other Asian nations. This accounts for 8.5 percent of the national annual GDP as of 2018, and textile goods saw an increase of approximately 12.8 percent in the year ending 2018. According to statistics, the sector was valued at USD 7.72 billion on a semi-annual measure at the start of 2018, up 7.18 percent from the previous year (Memon, Aziz, & Qayyum, 2020). The Pakistani textile industry has shown its existence by reacting promptly to foreign market demands, underlined by the increasing international emphasis on fashion and variety in textile products. This is also evident from the growth of national exports. Small capital and the lack of government funding have caused slower growth in the Pakistani textile industry, while international exposure and equal recognition have been obtained because of their remarkable

ability and efficiency in attracting international buyers (Kazmi & Takala, 2014). One of the significant contributors to exports in Pakistan is the textile industry. Textile in Pakistan accounts for 50 to 60 percent of its overall garment exports and uses 40 percent of its total labor force. Experts still feel the textile industry has not delivered its 100 percent and can achieve well after succeeding in its full potential. According to Global Village Space News, Pakistani textiles make up slightly less than 5 percent of global textile exports. The textile industry will also play a key role in regenerating the country's economy by increasing the quality and amount of textile goods and emphasizing better-end products (Memon et al., 2020). Textile production is essential to Pakistan's economy. Pakistan's textile sector is the country's second-biggest export earner. As a result, the textile and garment sector contributes significantly to the national economy. However, consumers in other countries purchasing textiles are growing concerned about environmental protection. All of their vendors must adhere to strict environmental policies. This means that textile factories must consider the environmental concerns of their global clientele. Further, it is widely acknowledged that the textile industry's dwindling exports are primarily due to environmental issues. These factors highlight the need to study green environmental HRM practices in Pakistan's textile industry to inform and train workers about preserving the country's natural resources.

Insert Table 2 Demographics of the surveyed experts in the supplementary file here

Survey participants were provided questionnaires with information for analysis and comparison. The supplementary file contains a preview of the questionnaire with questions from the survey. For each of the criteria, the survey also included a brief explanation that provided the respondent with sufficient information on the factors determined by the different drivers and barriers of Green HRM.

3. Methodology

The Fuzzy Delphi Method (FDM) and Fuzzy AHP approach are applied to the expert pool that defines the most important drivers and barriers of Green HRM implementation in Pakistan's textile industry. Researchers often use both of these approaches. Recent work by Rajabpour et al. (2022) in green HRM uses fuzzy AHP to examine the barriers to green HRM and provide potential solutions. Fuzzy Delphi was also utilized by Parng et al. (2021) to assess sustainable human resource management qualities and to illustrate the causal interrelationships between these attributes. Bui et al. (2020) also used the fuzzy Delphi technique to determine real challenges to sustainable solid waste management. Additionally, Khatoon et al. (2022) used fuzzy AHP (FAHP) to investigate the impact of the respective dimension of GHRM practices on environmental sustainability.

3.1 Data Collection

This research uses Fuzzy Delphi and Fuzzy AHP techniques to identify the top five drivers and barriers to green HRM adoption in Pakistan's textile sector. Several drivers and barriers to green HRM implementation in Pakistan's textile sector were identified in the first phase. The drivers and barriers for green HRM were chosen based on a literature review and consultation with industry professionals. The literature searches included peer-reviewed publications from reputable sources, such as Scopus, Web of Science, and Google scholar. The search terms include 'green HRM obstacles,' 'green HRM drivers,' and multi-criteria decision-making. Then, experts were invited to

assess the drivers and obstacles within Pakistan's textile sector. Five professionals participated in the study, including two academics and three field specialists. The academic responders were chosen based on their research papers and knowledge of green HRM. Similarly, the field experts included managers, HR generalists, and HR specialists from various commercial textile companies in Pakistan. We have got the emails of experts through LinkedIn. The official list of ten drivers and nine obstacles was determined after consulting with specialists. Then, a survey questionnaire was used to obtain more data for this research. The questions were divided into three distinct categories. The first segment consisted of demographic inquiries. In the second segment, weights are assigned to drivers and barriers. The last stage required evaluating each option against all drivers and obstacles. The survey questions used to assess all criteria and options are included in the supplementary file. Next, the Delphi technique is used to determine the most significant drivers and barriers within the context of Pakistan. The Fuzzy AHP approach is then used to determine the weights and ranking of drivers and barriers for the effective implementation of green HRM practices. The data was collected from June to December 2021.

3.2 Justification of the FDM-AHP method

FDM is a technique that incorporates the Delphi method with fuzzy theory. FDM focuses mainly on uncertainty and linguistic variations. The triangular fuzzy number (of fuzzy theory) is used to overcome the limitations of the standard Delphi approach, which may yield just 50 percent of the essential information (Tsai, Lee, Lee, Chen, & Liu, 2020). The combination given by FDM has the benefit of decreasing the number of interviews and the duration of the inquiry, as well as providing a more comprehensive representation of the expertise of experts. In other words, the FDM may translate expert views into accurate numbers to meet demand and deliver added advantages relating to decision-making duration and costs (T. D. Bui, Tsai, Tseng, & Ali, 2020). Consequently, if the Fuzzy theory could be incorporated into the Delphi Method, in addition to the benefit that the result achieved might be comparable to that gained by the conventional Delphi Method, the repetition period for surveys could be shortened, resulting in a reduction in both time and resources. Particularly, the specific characteristics of each expert could be represented, and their professional knowledge could be handled more properly and appropriately (Wu & Fang, 2011).

AHP is a multi-criteria decision-making process that presupposes expert judgment and employs precise numbers, disregarding linguistic ambiguity. AHP may only be deemed a successful problem-solving technique if the expert views are characterized by competence, conformity, and sensitivity. However, AHP does not account for the ambiguity of an individual's judgment. Consequently, ambiguity and vagueness occur in many decision-making processes (Akbar et al., 2020). The AHP approach may be used with fuzzy set theory to eliminate the bias, uncertainty, and imprecision inherent in subjective evaluations. The fuzzy AHP technique is intended to prioritize the ranking of alternatives. Fuzzy AHP is a decision support system designed to assist decision-makers in making better decisions based on explicit and implicit criteria, often known as tangible and intangible criteria (Tavana, Shaabani, Mansouri Mohammadabadi, & Varzgani, 2021). When the preferences of the decision-makers are not expressed by clear values, fuzzy-AHP can be used. In fuzzy-AHP, a pairwise comparison matrix is employed to describe the decision

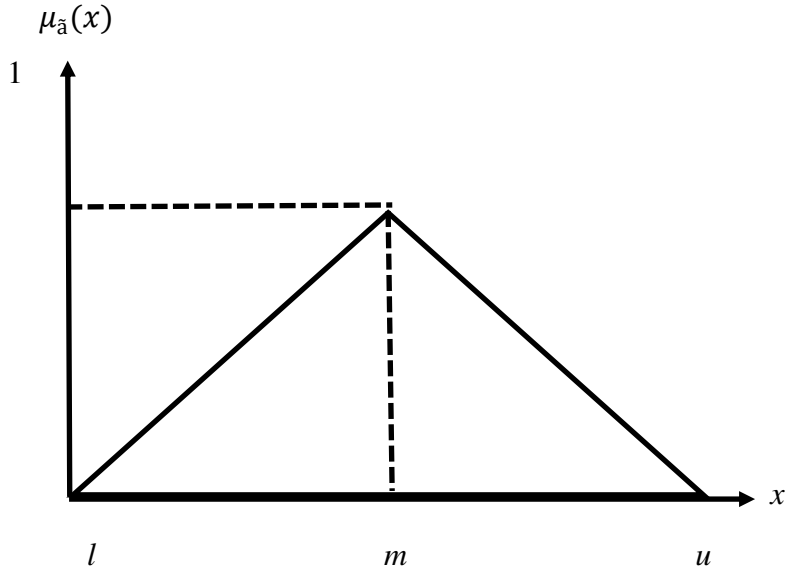
makers' views using a language scale (Gupta, Raj, Gupta, & Sharma, 2022). In this work, the Fuzzy-based AHP is used to reduce the size of the decision issue. This is because fuzzy set theory facilitates the resolution of partial information and quantifiable problems in a fuzzy environment (Zhou, Xu, & Muhammad Shaikh, 2019).

3.3 Fuzzy triangular numbers

It is the idea of influencing human reactions to resolve the lack of clarity and unsureness. A Fuzzy set is a group of objects with a selection scale. A normal distribution characterizes the framework by assigning a membership degree of zero to each object (Zadeh, 1965). Fuzzy sets are helpful methods for formulating judgmental problems that can be subjective or imprecise with the available information (Cengiz, Ufuk, & Ziya, 2003). The fuzzy set method transforms statistical words like good, very good, bad, and very bad into fuzzy numbers (Awasthi, Chauhan, Omrani, & Panahi, 2011). According to their consistency in computing, researchers often use Triangular Fuzzy Numbers (TFNs). A Fuzzy number ã ϵ [0, 1] is a Fuzzy Triangular Number (TFN) if its membership function is:

$$\mu_{\tilde{a}}(x) = \begin{cases} 0, x \leq l \\ \frac{x-l}{m-l}, l < x < m \\ \frac{u-x}{u-m}, m < x < u \\ 0, x > m \end{cases} \quad (1)$$

From Eq. (1), *l* and *u* are the fuzzy lower and upper values.



Number *a* and *m* is the mean. Figure 1 illustrates the TFN membership function.

Mathematical operations on fuzzy numbers $\tilde{a}_1$ and $\tilde{a}_2$ are defined as:

$$\tilde{a}_1 = (l_1, m_1, u_1) \quad (2)$$

$$\tilde{a}_2 = (l_2, m_2, u_2) \quad (3)$$

$$\tilde{a}_1 \oplus \tilde{a}_2 = (l_1 + l_2, m_1 + m_2, u_1 + u_2) \quad (4)$$

$$\tilde{a}_1 \otimes \tilde{a}_2 = (l_1 l_2, m_1 m_2, u_1 u_2) \quad (5)$$

$$\tilde{a}^{-1} = \left(\frac{1}{u_1}, \frac{1}{m_1}, \frac{1}{l_1}\right) \quad (6)$$

$$\frac{\tilde{a}_1}{\tilde{a}_2} = \left(\frac{l_1}{u_2}, \frac{m_1}{m_2}, \frac{u_1}{l_2}\right) \quad (7)$$

Fuzzy set theory imitates thinking processes that make decisions using unknown knowledge. In order to deal with the uncertainty of human decisions, the combined Delphi and AHP approaches of this research apply fuzzy sets.

3.4 Fuzzy Delphi method

Researchers are using the Delphi method to promote agreement among experts. The Fuzzy Delphi (FDM) system originates from the standard Delphi approach and the Fuzzy set principle (Ishikawa et al., 1993). This study uses FDM to rank drivers and barriers of Green HRM.

The four steps of the FDM method are:

- ❖ Experts were identified for data collection.
- ❖ Establishing and aggregating fuzzy triangular numbers.
- ❖ The data was Defuzzify.
- ❖ Evaluation of screen indexes.

3.5 Collect Opinions

The questionnaires utilized linguistic variables to assess the experts' assessment scores for the value of increasing the consistency factor. "Extremely agree," "Agree," "Neutral," "Disagree," and "Extremely disagree."

3.6 Triangular fuzzy numbers and aggregation

The method transforms the semantic measurements into fuzzy triangular numbers. C. C. Chang, Liang, Shu, and Tsai (2015) noticed that the use of a five-point triangular fuzzy system, as outlined in table 3

Insert Table 3 Linguistic terms and corresponding TFNs for the importance weight of criteria (Tseng, 2011) in the supplementary file here

For example, in Table 3, if an analyst chooses "extremely agree," then the TFN is (0.7, 0.9, 1), FDM-approach followed by Hsu, Lee, and Kreng (2010). The accumulated views then are:

$$\tilde{a}_j = \left(\overset{min}{i}\{l_{ij}\}, \frac{1}{n}\sum_{i=1}^{n} m_i, \overset{max}{i}\{u_{ij}\}\right) = (l_j, m_j, u_j); = 1,2,\dots,k; j = 1,2,\dots.,n. \quad (8)$$

However, *lj*, *mj*, and *uj* are the lowest number, the mathematical average, and the highest Fuzzy Number components. Meanwhile, indexes i and j describe the specialists and the drivers and barriers of Green HRM.

3.7 Defuzzification

There are many advanced and powerful Defuzzification frameworks. The center of gravity theory is one of the simplest techniques, so that:

$$a_j = \frac{l_j + m_j + u_j}{3}, j = 1,2,\dots,k \quad (9)$$

For every TFN $\tilde{a}_j = l_j + m_j + u_j$ consequently, a_j is a Defuzzify (crisp) number that evaluates all the professionals' consolidated perceptions on the efficacy of a measure of drivers and barriers of Green HRM.

3.8 Screening the criteria

The method considers the gap between the average of a particular expert's views and the average views from all the experts to normalize the fuzzy numbers. The reviewer then sent the test results to each professional to change his previous remarks or give new perspectives based on the differences in the average view of Green HRM drivers and barriers. The following rationale chooses the final consistency drivers and barriers after the Defuzzification, so that:

- If $aj \geq \alpha$, then factor j is added as drivers and barriers for the next stage.
- If $aj < \alpha$, then factor j is omitted.

The Cronbach threshold of α=0.7 is chosen. In other words, if the crisp number of each driver and barrier of Green HRM exceeds or is equal to 0.7, it is considered an evaluation factor; otherwise, it is omitted. The iteration proceeds to the point where the mean of each driver's and barrier value differs. This value is less than or equal to 0.1 for the previous iteration.

3.9 Fuzzy Analytic Hierarchy Process (FAHP)

AHP is a standard method of addressing complex decisions for various engineering and management projects. AHP is commonly used by practitioners and researchers (Pedroso, Bermann, & Sanches-Pereira, 2018). A complex problem is categorized into sub-problems, such that several parameters related to a subsidiary problem can be found in any hierarchy. The Analytic Hierarchy Process includes distinguishing parameters and sub-criteria for a nine-point scale. However, this approach is often questioned because it is ambiguous and unclear on the discrete scale (Chan & Kumar, 2007). As contextualized in Table 4, a solution is provided to this problem to add a TFN to every linguistic scale.

Insert Table 4 Linguistic scale in the supplementary file here

To cope with the impreciseness of expert views, FAHP applies fuzzy logic to the AHP process. In this study, the authors employ an extent analysis approach for implementing the fuzzy AHP method (D.-Y. Chang, 1996). The approach contrasts the value of parameters for the primary purpose and the alternatives for each criterion in pairs. The standards for this analysis are the consistency drivers and barriers of Green HRM.

The five steps of the FAHP procedure below are:

- Definition of the problem.
- Set up the hierarchy structure.
- Pairwise comparisons.
- Fuzzy calculation of weight per criteria.
- Determine the weights and alternatives of the criteria.

3.10 Problem definition

The goal is to identify and rank the drivers and barriers to Green HRM implementation in Pakistan's textile industry.

3.11 Hierarchy structure setup

In the study of dynamic processes, hierarchical structures facilitate faster access to preferred decisions (D.-Y. Chang, 1996). The goal is at the heart of the FAHP process, and the key criterion, sub-criteria, and alternatives are available for that reason.

3.12 Pairwise comparisons

Comparisons in pairs include language responses where specialists conclude one object's relative value to another based on their expertise and experience. First, accompanying each pairwise comparison contrasts the drivers of Green HRM concerning the primary goal. The process then compares Green HRM's barriers concerning Green HRM. The linguistic scales and relevant fuzzy numbers are described in Table 4. After translating the linguistic variables into TFNs, an expert matrix for pair comparison is organized:

$$\widetilde{M^k} = \begin{bmatrix} \widetilde{M_{11}^k} & \widetilde{M_{12}^k} & \dots\dots \widetilde{M_{1n}^k} \\ \widetilde{M_{21}^k} & \widetilde{M_{22}^k} & \dots\dots \widetilde{M_{2n}^k} \\ \vdots & \vdots & \vdots \\ \widetilde{M_{n1}^k} & \widetilde{M_{n2}^k} & \dots\dots \widetilde{M_{nn}^k} \end{bmatrix} \quad (10)$$

Where the cells determine the maximum value of the i^{th} drivers of Green HRM for k^{th} decision-maker over the j^{th} drivers of Green HRM. In the case of n drivers of Green HRM and m decision-makers, the metrics are i, j =1,...n, and k=1, ..., m, where l_{ij}, m_{ij}, u_{ij} are real numbers with the constraint that $l_{ij} \leq m_{ij} \leq u_{ij}$ alternate.

Using the geometric mean, calculation of the average preferences for each factor:

$$\widetilde{M_{ij}} = \left[\prod_{k=1}^{m} \widetilde{M}_{ijk}\right]^{1/k} \quad (11)$$

The integrated fuzzy comparison matrix is then transformed into the following:

$$\widetilde{M} = \begin{bmatrix} \widetilde{M_{11}} & \dots & \widetilde{M_{1n}} \\ \vdots & \ddots & \vdots \\ \widetilde{M_{n1}} & \cdots & \widetilde{M_{nn}} \end{bmatrix} \quad (12)$$

3.13 Consistency of pairwise comparisons

Only when removed from consistent matrices are the priorities meaningful. Consistency means that the similarities are closer to rational than random choices of pairs. This study is based on a consistency index (CI) derived from the eigenvalues system (Saaty, 2004). This is coupled with measuring the continuity of fuzzy comparison in pairs (Gogus & Boucher, 1998). The method steps are as follows:

Step 1: Triangular fuzzy matrices converted into two separate matrices with the following representation of the TFNs are:

$$A_{ij} = \left(l_{ij}.m_{ij}, u_{ij}\right) \quad (13)$$

The medium numbers of the fuzzy triangular matrix generate the first matrix:

$$A_m = \left[m_{ij}\right] \quad (14)$$

The second matrix is generated with the geometric mean (GM) for the upper and lower bounds of the triangular fuzzy matrix:

$$A_g = \left[\sqrt{u_{ij} \times l_{ij}}\right] \quad (15)$$

Step 2: Calculate each matrix weight vector (w^m *and* w^g) and the corresponding major-specific values(λ_{max}^m *and* λ_{max}^w) as follows:

$$\mathrm{M} \times w^m = (\lambda_{max}^m \times w^m) \quad (16)$$

$$\mathrm{M} \times w^g = (\lambda_{max}^g \times w^g) \quad (17)$$

The explanation for the largest value is:

$$\lambda_{max}^{m} = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} m_{ij}\left(w_j^m \div w_i^m\right) \quad (18)$$

$$\lambda_{max}^{g} = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n}\sqrt{u_{ij} \times l_{ij}}\left(w_j^g \div w_i^g\right) \quad (19)$$

Step 3: For every matrix, measure the consistency index $\left(CI_m \text{ and } CI_g\right)$:

$$CI_m = \frac{\lambda_{max}^{m} - n}{n-1} \quad (20)$$

$$CI_g = \frac{\lambda_{max}^{g} - n}{n-1} \quad (21)$$

Where n represents the dimension of the matrix.

Step 4: Calculate the matrix's consistency ratio (CR) as a function of the CI and a random index (RI) such that:

$$CR_m = CI_m \div RI_m \quad (22)$$

$$CR_g = CI_g \div RI_g \quad (23)$$

The process obtains random indexes (Table 5) with a sample size of 400 (Gogus & Boucher, 1998). When the $CR_m \text{ and } CR_g$ values fall below 0.1, the decisions matrices are identical. Subjective decisions may produce consistency ratios above 10% (Saaty, 2004).

3.14 Fuzzy weight determination

In this study, an analysis of the weight of TFNs is used to evaluate each of the drivers and barriers of Green HRM about the final objective. This approach defines X=$\{x_1, x_2, \ldots . x_n\}$ as a set of U=$\{g_1, g_2, \ldots . g_n\}$ as a set of objectives. For every object, you can display the m values of the goals in $M_{gi^1}, M_{gi^2}, \ldots . , M_{gi^m}$ Where i=1, 2,... n. The TFN values are all M_{gi^j}, (j=1, 2,…, m) (D.-Y. Chang, 1996).

The extent analysis of D.-Y. Chang (1996) consists of the following:

Step 1: The degree of possibilities S_2 and S_1 is calculated:

$$S_i = \sum_{j=1}^{m} M_{gi}^{j} \otimes \left(\sum_{i=1}^{n}\sum_{j=1}^{m} M_{gi}^{j}\right)^{-1} \quad (24)$$

Where $\Sigma_{j=1}^{\ m} M_{gi}^{j} = \left(\sum_{j=1}^{\ m} l_j, \sum_{j=1}^{\ m} m_j, \sum_{j=1}^{\ m} u_j\right)$

Insert Table 5 Random Index in the supplementary file here

$$\left(\sum_{i=1}^{n}\sum_{j=1}^{m} M_{gi}^{j}\right)^{-1} = \left(\frac{1}{\sum_{i=1}^{n}\sum_{j=1}^{m} u_i}, \frac{1}{\sum_{i=1}^{n}\sum_{j=1}^{m} m_i} \cdot \frac{1}{\sum_{i=1}^{n}\sum_{j=1}^{m} l_i}\right)$$

Step 2: Calculate the probability degrees S_2 and S_1 after S_2 and S_1 are determined in step 1

$$V\left(S_2 \geq S_1\right) = sup_{y \geq x}[\min \mu_{S2}(y), \mu_{S1}(x)] \quad (25)$$

Eq. (25) can also be denoted by Eqs. (26) and (27).

$$V\left(S_2 \geq S_1\right) = highest\left(S_1 \cap S_2\right) = \mu_{S2}(d) \quad (26)$$

$$\mu_{S2}(d) = \begin{cases} 1 \text{ if } m_2 \geq m_1 \\ 0 \text{ if } l_1 \geq u_2 \\ \frac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)} otherwise \end{cases} \quad (27)$$

Where d is the S_2 and S_1 cross over the abscissa mark.

Step 3: Calculate the degree of potential to be greater than k convex fuzzy numbers Si (Eq. 28) Convex fuzzy numbers.

$$V\ (S\ \geq\ S_1, S_2, \ldots., S_k) = min\ V\ (S\ \geq\ S_i), i = 1,2, \ldots., k \quad (28)$$

Step 4: For each comparison matrix measure, the weight vector is as follows:

$$W_k' = \left(d\ (p_1^k), w\ (p_2^k), \ldots., (p_n^k)\right)^T \quad (29)$$

Let $d\ (p_i^k) = \min V\ (S_i^k \geq\ S_j^k)$ for k = 1,2,…n; k ≠ i, where p_{ik} is the i^{th} element of the k^{th} level, j = 1,2,….,n, j ≠ i. The normalized weight vector is:

$$W_k = \left(w\ (p_1^k), w\ (p_2^k), \ldots\ldots, w\ (p_n^k)\right)^T \quad (30)$$

3.15 The weights of criteria and alternatives

The final weight of the drivers and barriers of Green HRM is produced. The alternatives with greater weights rate higher in value to accomplish the goal based on the measured data.

4. Result Analysis

4.1 Fuzzy Delphi method

Initially, the drivers of Green HRM implementation are competitive advantages (D1), environmental consideration (D2), environmental orientation (D3), green safety and health (D4), green labor relations and employee involvement (D5), work-life balance (D6), top management support (D7), stimulation of growth and innovation (D8), maximum use of resources and reduction of wastage (D9), and improvement in company image (D10). **Table 6** outlines, after Defuzzification and sampling, the crisp numbers reflecting the experts' aggregate views.

4.2 Insert Table 6 Aggregate opinion ranking of drivers of Green HRM in the supplementary file here

Green HRM implementation barriers are difficulty and complexity in green technology adoption (B1), lack of organizational support (B2), employee resistance (B3), lack of culture (B4), knowledge of individuals (B5), education and training (B6), upbringing and personality (B7), lack of technical support (B8), and the lack of a comprehensive plan (B9). **Table 7** outlines, after Defuzzification and sampling, the crisp numbers reflecting the experts' experts' gate views.

4.3 Insert Table 7 Aggregate opinion ranking of barriers of Green HRM in the supplementary file here

The results show the Defuzzify (crisp) number of the aggregate fuzzy scale of all drivers and barriers of Green HRM implementation.

4.4 Fuzzy analytic hierarchy process

The data was obtained and summarized in the first equations (10), (11), and (12) questionnaires, including contrasts in pairs (Tables 8 and 9). The first section of the table includes matrices of comparative rankings in pairs for all standard drivers and Green HRM barriers concerning the main objective.

Insert Table 8 Fuzzy pairwise comparison matrices corresponding to the drivers of Green HRM in the supplementary file here

Insert Table 9 Fuzzy pairwise comparison matrices corresponding to the barriers of Green HRM in the supplementary file here

Insert Table 10, Fuzzy Geometric Mean of Green HRM Drivers, in the supplementary file here

Insert Table 11, Fuzzy Weights of Green HRM Drivers, in the supplementary file here

Insert Table 12 Average Normalized Weight Criterion (Ni) of Green HRM Drivers in the supplementary file here

Insert Table 13 Fuzzy Geometric Mean of Green HRM Barriers in the supplementary file here

Insert Table 14, Fuzzy Weights of Green HRM Barriers, in the supplementary file here

Insert Table 15 Average Normalized Weight Criterion (Ni) of Green HRM Drivers in the supplementary file here

The remainder of Tables 8 and 9 contain the pairwise comparison between drivers and the barriers of Green HRM implementation. Provided that the dimensions of the pairwise comparison matrices are ten drivers of Green HRM and nine Green HRM barriers, the values for RIm and RIg from Table 5 are 1.4095 and 0.4455 of the respective dimensions of the matrices and 1.3793 and 0.4348 for both.

Based on the results summarized in Table 8, *improvement in company image (D10)* was identified as the driver of Green HRM with the first-ranking **(0.318)**, *Maximum use of Resources and Reduction of Wastage (D9)* was identified as the second-ranking **(0.202)**, *Stimulation of Growth and Innovation (D8)* was identified as the third-ranking **(0.151)**, *Top management support (D7)* was identified with the fourth-ranking **(0.116)**, *Work-life balance (D6)* was identified with the fifth-ranking **(0.069)**. Based on the results summarized in Table 9, *difficulty and complexity in green technology adoption (B1)* **(0.358)** were identified as the highest-ranking of all the given Green HRM implementation barriers in Pakistan's Textile Industry. The second-ranked barrier is the lack of organizational support (B2) (0.246) for Green HRM implementation. *Employee resistance (B3)* **(0.147)** is the third-ranking barrier. *Lack of culture (B4)* **(0.092)** was identified as the fourth-ranking barrier, and *knowledge of individuals (B5)* **(0.059)** was the fifth-ranking of Green HRM barrier in Pakistan's textile Industry.

5. Discussion

This paper contributes its purpose to the emerging Green HRM literature by exploring the most important drivers and barriers of Green HRM in the Textile sector of Pakistan. According to the result, the first five drivers of Green HRM implementation are improvement of company image (D10), Maximum use of resources and reduced waste (D9), stimulation of growth and innovations (D8), Top management support (D7), and Work-life balance (D6). The first driver improvement in company image (D10) implicates easy implementation of Green HRM provided that the workers are aware of green behavior, utilize resources more efficiently, and realize how to be environmentally responsible. In such a case, improving the company's green image would be easier. Employee ecological behavior (EEB) boosts a company's public image when Green-HRM

initiatives are carried out effectively and employees are educated on managing the environment sustainably (Farooq et al., 2021). The second driver, maximum use of resources and reduced wastage (D9), requires that Green HRM implementation within an organization achieve greater productivity, lower costs, and minimize waste. For example, (Yuriev, Boiral, & Guillaumie, 2020) emphasized the significance of environmental management systems and the importance of green practices. Employees may help the environment in several ways by being encouraged to recycle, limiting their use of resources like power and water at work, and being given opportunities to volunteer outside work (Farooq, Yusliza, Muhammad, Omar, & Mat, 2022). The third driver, stimulation of growth and innovation (D8), entails that Green HRM activity are implemented for new creative innovations and practices that enable quality development and strengthen structures and plans. The fourth driver, top management support (D7), describes that environment-friendly activities, such as worker development, eco teams, and awareness-raising initiatives, are promoted by top management. A strong message of environmentalism may be sent from the top down when management rewards employees for environmentally conscious actions. It encourages businesses to adopt and sustain environmentally responsible policies. Organizational environment activities may be supported by adequate human resources, which can be provided by top management. (Farooq, Yusliza, Muhammad, Omar, et al., 2022). The fifth driver, work-life balance (D6), includes that for Green HRM, work-life balance activities help workers achieve self-satisfaction and perform more on their job. They also have a sense of belonging to the company and prefer to be more productive because happier employees are more motivated.

First of the top five barriers identified in the study are difficulty and complexity in green technology adoption (B1) describes that green technology needs several practices for adoption as it is challenging to implement green practices to encourage this one of the methods is globalization, the sampling of effective international organizations, the collection of technical information and the background for technology acceptance. The second barrier is the lack of organizational support (B2) for Green HRM implementation. If there is a lack of administrative support in an organization, nobody would easily understand the importance of green HRM implementation. Specifically, business-level environmental policies focus on organizational support and perceive environmental problems as benefits or risks. The third barrier, employee resistance (B3), illustrates the value of a successful organizational communication platform as implementing a green environment and green behavior is adequately communicated and passed on to the workers. The fourth barrier, a lack of culture (B4), indicates that green human resource management practices are not integrated into the firm's cultural values. Cultural ideas guide workers' activities. Employee retention and motivation are more likely to be greater in company cultures that value employee engagement than in those that do not. An organizational culture that is open to exploring new ideas and persisting with them over the long haul is a significant factor in the success of any organization's efforts to innovate and adapt. It is easier for workers to behave suitably when they have the same attitudes, beliefs, and values as their employer (Farooq, Yusliza, Muhammad, Omar, et al., 2022). The fifth barrier, knowledge of individuals (B5), influences the management of green human resources. This suggests that if the staff is mindful of the impact of being green on the environment, being more environmentally sustainable, and consuming energy more efficiently, it would be much easier for them to adopt green human resource management activities. Initiatives that educate individuals on the importance of protecting the environment are essential because employees who care about the environment are more likely to act ecologically (Farooq et al., 2021; Rubel, Kee, Rimi, & Yusoff, 2017).

The barriers could be overcome by implementing the drivers of Green HRM identified in this study. Green HRM's success includes understanding the green effects of the activities, supply chain, distribution procedures, product standardization, etc. In order to incorporate green management, improvements in working practices and employee actions are essential. Top management attitudes and activities are crucial for productivity in implementing Green HRM strategies that encourage human resources to address environmental challenges and lead to green innovation. The knowledge barriers could be eliminated through the work-life balance drivers if an organization should communicate and give proper knowledge about the environmental policies and objectives to their employees to understand their company's green innovation efforts better. If the organization stimulates growth and innovation through Green HRM practices, it will increase sustainable growth, enhance productivity, promote growth, and eliminate the lack of organizational support barriers. Green HRM can explore different kinds of potential advantages. Organizations should consider Green HRM activities' consistency and benefit to enhance green infrastructure and implementing facilities. Using maximum use of resources and reducing the waste driver will eliminate the lack of cultural barriers. There is a need to continue and spend setting up quality software infrastructure to maintain their strategic resources and create an environmental conservation organizational culture to meet environmental objectives better.

5.1 Theoretical Implications

The current study has several theoretical contributions. Firstly, this study expands the literature on the theory of CAPS. This theory includes essential psychological factors that affect a person's behavior within a single dynamic structure, and also it provides a more comprehensive framework for the behavior and attitude of people. Therefore, this theoretical perspective can be beneficial for the field of GHRM. It explains how green human resource management helps organizations transform their employees' motivational, cognitive, and affective factors into ecological and environmentally-safe actions (S. Chen et al., 2021). Prior studies have applied this theory to explore the impact of human resource management practices on employees. However, there is still minimal literature on green human resource management. Hence, the current study is filling such a gap by making a significant theoretical contribution to how organizations can promote the green behavior of a person in the workplace. It contributes to the literature by being one of the studies trying to validate a comprehensive understanding of drivers and barriers of Green HRM practices in the textile industry of Pakistan.

Previously many studies examined the factors of this study separately. This study is the first which gathers these factors in one conceptual framework. While several quantitative types of research investigating Green HRM acceptance had been performed earlier, their results were not systematic. Maini and Kaur (2019), Fayyazi, Shahbazmoradi, Afshar, and Shahbazmoradi (2015), and Ghazilla et al. (2015) observed those who demonstrated the past drivers and barriers of Green HRM implementation in different industries by using other methods. This research further builds on their work. The established factors were focused on in the literature review, and there were only a few relevant factors. A specific FDM and FAHP method has been developed to research the relationships between identified drivers and Green HRM implementation barriers for the textile industry. This research has added to awareness by using a mixed methodology, which seeks to explain the key factors contributing to implementation in the industry. This research adds value for the Green HRM domain by validating the Green HRM implementation concept and can be seen as a first step to understanding these relations. As per the findings of this study, work-life balance (D6) can bring a positive change to employees, the organization, and the environment.

According to the study of V. Muster and U. J. G. J. o. H. R. M. Schrader (2011), green work-life balance policies help enhance eco-friendly behavior in private and working life, ultimately increasing environmental protection possibilities. These policies not only protect the environment but also give benefits to the employees that motivate employees to take voluntary action to enhance the scope for the protection of the environment. Hence, Riordan, Gatewood, and Bill (1997) and Maignan, Ferrell, and Hult (1999) talked about corporate responsibility in general terms, and they stated that these interventions help increase the positive impact on the work satisfaction, commitment, and motivation of the employees. Furthermore, it brightens the company image (D10) and gives the feeling of pride in their organization and employer (Lea & Webley, 1997). This behavior will eventually lift green labor relations and employee involvement (D5).

5.2 Practical and Managerial implications

In today's world, environmental issues are the biggest concern for the sustainable implementation of green HRM; from the recent past decade, Pakistan has been experiencing severe environment-related issues, such as natural disasters, desertification, air pollution, noise pollution, soil erosion, and climate change (Waqas et al., 2021). Textile is one of those industries that are worsening the effect of these issues by directly influencing the natural environment and the health of humans and animals. According to the study by Hayat, Hussain, and Lohano (2020), the textile industry released a considerable amount of solid and water waste. Water waste includes Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), and Biological Oxygen Demand (BOD). These pollutants directly affect human health and cause various diseases. Therefore, implementing GHRM policies and practices is essential for the textile industry, accompanied by the environmentally oriented behavior of employees. Organizations should adopt Green HRM practices depending on the suitability of the situation. The top management can work out a plan for Green HRM implementation, which will enhance the organization's sustainability performance. Organizations must provide indicators of green performance and a comprehensive plan for the system of appraisals and performance management (S. Chen et al., 2021). It can improve environmentally-friendly activities that would increase productivity and sustainability.

According to the study by Sobaih, Hasanein, and Elshaer (2020), managers have to emphasize more on the practices of green HRM and should invest more in supporting practices, particularly on green ability, because it has a significant influence on green innovation of product or service along with the ecological performance of the organization. The practices of green human resource management also enable policymakers to solve the workplace's environmental-related concerns by taking the employees' expertise and skills as an advantage. The government can also improve the drivers and reduce the barriers to environmentally friendly practices for the textile sector, increasing export and generating economic growth. Environmental awareness building is vital to ensure maximum support for green practices contributing to eco-friendly workplace behavior. The findings of this study give guiding principles to policymakers with the practices of GHRM in those textile companies which support green actions. The training sessions will help build up environmental knowledge and awareness because when employees have environmental abilities, they are more likely to show environmentally-oriented behavior (Shoaib, Abbas, Yousaf, Zámečník, Ahmed, Saqib, et al., 2021). Senior management can emphasize the lower-level attributes on the list proposed in the study. The managers need to understand the value of Green HRM. This will inspire green employee conduct, promote employee involvement in sustainability initiatives, and make organizational resources available to their employees to grow Green HRM implementation within the organization. A current study by Singh, Del Giudice, Chierici,

Graziano, and Change (2020) concluded that the manager's green ability is a critical resource that increases the environment's performance and green innovation. Also, managers must apply GHRM practices to achieve environmental performance and green innovation. Managers must develop the green corporate culture that is the core component of Green HRM to implement the organizational development structures that meet the organization's culture and long-term priorities. The practices of GHRM, like green training and green recruitment (M. Pinzone, M. Guerci, E. Lettieri, & D. J. J. o. C. P. Huisingh, 2019) and green rewards, help achieve and improve environmental performance. Also, it develops green employees, enhances employees' daily behavior, and eventually improves the green work culture. Green culture leads to developing a healthy and safe workplace that will safeguard employees' well-being and wellness (Amrutha & Geetha, 2020). Umar, Khan, Yusliza, Ali, and Yu (2021) found that using digital technologies aids in implementing GSCM practices by providing adequate and timely information, improving decision-making capabilities, and connecting suppliers and customers, which contribute to better economic and environmental performance. More efficient information management might be another benefit of using cutting-edge technology to promote greener practices (Umar, Khan, Muhammad Zia-ul-haq, Yusliza, & Farooq, 2021). As a result, it will be necessary for researchers in the future to examine both the rate of digital technology adoption and the effect that technology has on other environmentally friendly behaviors.

6. Conclusion

This study identifies the drivers and barriers to Green HRM implementation in the textile industry of Pakistan. In this study, a list of drivers and barriers was assembled from a systematic literature analysis. A survey was carried out in the Fuzzy Delphi Method and Fuzzy AHP, which included submitting questionnaires to a group of experts, mainly in the textile industry. Firstly, the fuzzy Delphi method survey weighs the critical drivers and critical Green HRM barriers. Afterward, a fuzzy AHP survey is used to compare the questionnaires' pairwise comparison to measure the degree of value for drivers and barriers. This analyzes factors, enablers, and barriers to implementing Green HRM in the textile industry based on industry experts' opinions. The study identifies the five most influential drivers that can improve the organization's image, maximize the use of resources, reduce waste, stimulate growth and innovation, and increase top management support and work-life balance. This research also shows the five critical barriers to implementing Green HRM: difficulty and complexity in green technology adoption, lack of organizational support, employee resistance, lack of culture, and individual knowledge. This study implies that organizations must implement Green HRM by maintaining the environment and developing sustainability policies, with a strong interest in green initiatives. Green HRM societies, which possess green culture and innovation, also play a part in Green HRM implementation.

6.1 Future Research and Limitations

This research opens a way of identifying the Green HRM implementing drivers and barriers in Pakistan's textile industry. A study with a representative sample of the whole sector should be further explored to obtain more findings. For example, validating and expanding the Green HRM implementation practices with organizations in various sectors is possible. Fuzzy TOPSIS may also be carried out in future research, especially comparing small and large companies' drivers and barriers of Green HRM. The method should expand our awareness of the Green HRM implementation by organizations in emerging research approaches. Future research in this context would examine green staff development, economic consideration, and green intellectual capital

affect the quantitative implementation of Green HRM. Also, given that an organization's overall objective is sustainable development, Green HRM practices supporting global sustainable best practices may help future studies. A broader survey and a methodological approach can be used in future studies to gain empirical evidence of its significance. Considering the different drivers and barriers to Green HRM implementation in the petrochemicals, automobile, and hospital sectors, as the green management model of human capital in the textile industry and other sectors, the correlation between Green HRM and the productivity index will be suggested for future researchers. Since the Circular Economy (CE) is becoming more critical in green supply chain management, future research should also investigate its implementation. Even still, several obstacles make actual CSC deployment difficult; this is a topic that needs more investigation. Since human activities are a significant cause of environmental problems, pro-environmental behavior (PEB) may be deemed important for the future, and future research may choose to conduct a longitudinal, qualitative study to show a more in-depth understanding of the employees' pro-environmental behavior, as stated by H. Chen, Chen, Huang, Long, and Li (2017). Employees that take part in ecologically friendly behaviors will get social approval might be explored in future research (Foster et al., 2022). In the future, researchers may investigate whether a company's value can grow due to its greener practices improving environmental performance (Farooq, Yusliza, Muhammad, & Saputra, 2022).

Declarations

All authors declare that they do not have any conflict of interest. It is declared that animal or human testing is neither applicable nor relevant to this study.

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