



Closing the Loop: How Green HRM and Transformational Leadership Drive Employee Circular Economy Behaviors in the Textile Industry

Dr. Mina Kharal

Assistant professor, Faisalabad Business School, mina@ntu.edu.pk, Orcid id:0000-0002-2529-8275

Syed Hussain Mustafa Gillani

Department of Management Sciences, Kohsar University, Murree.

Muhammad Sabir

Msc Project Management, University of Northampton

Dr. Asghar Kamal*

Assistant Professor, Department of Business Administration, Sarhad University, Peshawar-
asghar.ba@suit.edu.pk

Abstract

The textile industry is globally recognized as a significant contributor to environmental degradation, necessitating an urgent shift from linear production to a Circular Economy (CE). While Green Human Resource Management (GHRM) is known to foster general pro-environmental behaviors, its specific role in driving "circular" behaviors—such as reusing, repairing, and resource looping—remains underexplored. Drawing on the Ability-Motivation-Opportunity (AMO) theory, this study investigates the impact of GHRM bundles on Employee Circular Economy Behaviors (ECEB), mediated by Green Psychological Climate and moderated by Green Transformational Leadership. Data was collected using a time-lagged design from 475 employees across leading textile manufacturing firms. Structural Equation Modeling (SEM) was employed to test the hypothesized relationships. The findings reveal that GHRM significantly enhances ECEB by fostering a supportive Green Psychological Climate. Furthermore, Green Transformational Leadership acts as a crucial boundary condition, strengthening the impact of HR practices on the psychological climate and subsequent circular behaviors. This study offers novel theoretical contributions by distinguishing "circularity" from generic "greening" and provides actionable insights for textile managers to unlock human capital for closing the resource loop.

Keywords: Green HRM, Circular Economy, Textile Industry, Green Transformational Leadership, Green Psychological Climate, AMO Theory.

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Corresponding Authors*:

Dr. Asghar Kamal*

Introduction

The growing environmental degradation and the violation of planetary limits have also aggravated the situation, forcing the globe to reconsider current economic models. The conventional linear system of take-make-dispose has become unsustainable for the environment, leading to a paradigm shift toward maintaining the Circular Economy (CE), which has become a foundation of sustainable development in the twenty-first century (Geissdoerfer et al., 2017; Kirchherr et al., 2023). The CE focuses on the fundamental economic growth from resource consumption, rather than on other traditional forms of sustainability that focus on increasing efficiency or reducing harm, and aims to close material loops through reuse, repair, refurbishment, and recycling (the 4 Rs model). Despite a substantial amount of scholarly interest dedicated to the technological and operational aspects of this concept, the human aspect of the process of cycling has not been explored as substantially as the other two aspects, namely, eco-design, reverse logistics, and closed-loop supply chains (Ghisellini et al., 2016; Korhonen et al., 2018). Recent studies indicate that the shift to a circular economy does not just represent a technical issue, but, most importantly, a behavioural one. Circular business models rely on employees who can demonstrate competencies, motivation, and autonomy to make circular principles work in daily practice (Singh & Singh, 2019). Therefore, understanding the human aspect of the circular economy is a challenging yet uncharted area of investigation.

Such an urgency to make the transition is higher in the textile and apparel sector, which is often seen as one of the most polluting industries in the world. Meanwhile, the industry contributes around 10 percent of the world's carbon emissions and 20 percent of the world's wastewater, and the estimated amount of textiles needlessly disposed of in the landfill or burned each year is more than 85 percent (Ellen MacArthur Foundation, 2022). Fast fashion has only fueled the acceptance of linearized production and consumption processes that have led to the establishment of a now-culture of disposability, which, naturally, clashes with the core ideals of circularity. In reaction, policymakers, consumers, and international bodies have increased their demands for systemic change, including the European Union Strategy on Sustainable and Circular Textiles. Nevertheless, for textile companies, especially those engaged in cost-sensitive, production-focused, high-stress settings, becoming circular involves moving beyond technological modifications or suppliers. It demands a radical change in organizational thinking and in employee behavior. Workers on the factory floor are the key gatekeepers of material movement; their daily choices on waste segregation, machine support, material recycling, and process innovations all determine whether circular strategies are successful. Although this is the core role, organizational behavior studies in the textile industry have mainly focused on productivity and safety compliance and have not provided much information on the behavioral precursors of circular-economy practices (Mishra et al., 2021).

To address the lack in bridging the aspect of the implementation of the circular strategies and its implementation at an employee level, scholars and practitioners have given more attention to Green Human Resource Management (GHRM). The organization of human resource practices in a systematic manner that is aligned with the environmental objectives of the organization, such as recruitment, training, performance appraisal and rewards is what is known as GHRM (Renwick et al., 2013). According to the Resource-Based View (RBV), GHRM is believed to create an intangible resource, which is valuable, rare, and hard to duplicate, as a so-called green workforce (Tang et al., 2018). It is also empirically proven that GHRM has a positive effect on the pro-environmental behavior of employees (PEB) (Dumont et al., 2017; Pham et al., 2019). One of the main weaknesses of this literature is the conceptual confusion between general green behaviors and those specific to the circular economy. Most research measures outcomes through low-

order processes such as energy savings or paper cuts (Norton et al., 2015). These actions, though leading to greater efficiency in the environment, are not enough to attract the more cognitively challenging and technologically embodied actions needed to achieve circularity, such as product life extension, material looping, and waste valorization. Consequently, little has been done to estimate the degree to which GHRM advances the Employee Circular Economy Behaviors (ECEB), a theoretically differentiated but practically entailed construct.

Besides direct impacts how GHRM shapes its workers and their behavior are not well-known. Employees are not affected by HR practices in isolation; they are manifested by the perception of the organizational environment by the employees. The Social Information Processing Theory is based on the assumption that individuals interpret cues in the environment to make inferences on what conduct is approved, justified and rewarded in the organization (Salancik and Pfeffer, 1978). The current perspective has been the mediating role of Green Psychological Climate or rather the conception of how the employees view the organizational determination towards lasting presence within the environmental context. GHRM practices can also be used as an indicator to show that environmental responsibility is never just a figurehead as opposed to a symbolic activity (Chaudhary, 2020). Such impressions could provide a psychological space where the employees would feel motivated and safe enough to conduct circular experiments to suggest new applications of the textile wastes or recycle process to extend the life cycles of materials. In spite of the fact that earlier research has worked on exploring the relationship between GHRM and the green psychological climate, the results have never empirically examined how far it motivates the circular actions, especially regarding the resource-constrained trade of produce due to the necessity of resource.

The impact of the direct supervisors can be substantial on the response of employees even with the presence of formal HR systems and supportive psychological climate. According to trickle down approach, leaders are the main interpretive vehicle through which staff members translate policy by perceiving and acting in accordance with organizational policies (Mayer et al., 2009). Green Transformational Leadership (GTL) is a decisive boundary condition in this respect. Green transformational leaders articulate an urgent environmental vision, prompting employees to reconsider linear routines and serving as role models of environmental responsibility (Chen & Chang, 2013). The supervisor's attitude toward sustainability may either support or weaken organizational cues in the textile industry, where production objectives conflict with environmental ambitions. When GHRM practices are used, they may become less relevant when line managers compare speed and output to waste reduction. On the other hand, green transformational leaders can further enhance GHRM's success by validating the circles of conduct at the operational level. Irrespective of its conceptual appropriateness, little studies have explored the interactive impacts of HR systems and leadership styles in generating employee level circular impacts. The main aim of the research is to investigate human and organization practices through which Green Human Resource Management (GHRM) enables us to implement the Circular Economy on employee level in a textile industry.

Objectives:

This study seeks to achieve the following objectives:

1. To examine the direct effect of Green Human Resource Management on Employee Circular Economy Behaviors in the textile industry.
2. To investigate the influence of Green Human Resource Management on Green Psychological Climate
3. To analyze the effect of Green Psychological Climate on Employee Circular Economy Behaviors.

4. To test the mediating role of Green Psychological Climate in the relationship between Green Human Resource Management and Employee Circular Economy Behaviors.
5. To examine the moderating role of Green Transformational Leadership in the relationship between Green Psychological Climate and Employee Circular Economy Behaviors.

Despite the fact that the necessity to trigger a circle of change among the textile industry is gaining momentum, a number of gaps in the literature should be bridged. One, micro-level behavioural foundations of the circular economy are not developed yet since employees are typically viewed as passive participants as opposed to agents of the circular change. Second, there is limited knowledge on the relationship between GHRM and circular-specific behaviors, but not general pro-environmental behaviors. Third, with respect to psychological climate and leadership, formal HR systems are not highly appreciated to determine circular behaviours, particularly where textile manufacturing is involved in the context of developing economy (Amrutha and Geetha, 2020). Closing these gaps, this paper examines how GHRM may influence the behaviour of the employees in terms of the circular economy, depending on the psychological climate of greenness, and the boundary condition of a green transformational leader. In such a way, it responds to the calls to become more integrative and multilevel when studying sustainable HRM (Renwick et al., 2016). The fact that it focuses on the behavioral processes of the loop which must be bridged at the level of the employees can be added to the literature on strategic HRM, as well as the literature on cyclical economic research. It offers theoretically established and managerially valuable insight into how the textile industry would be redesigned to become a source of the well-being of the planet in as opposed to being a pollutant.

Literature Review

The modern world is shifting towards considering the material and ecological boundaries of the planet, a fact best embodied by the notion of planetary boundaries (Rockström et al., 2009; Steffen et al., 2015). These limits form the biophysical breaks, understanding which humanity is safe to conduct its activities beyond these levels, and in which case irreparable damage to the environment is likely to arise. Faster global warming, biodiversity decline, freshwater shortages, and chemical contamination are rediscovered together, revealing that the prevailing model of industrial development is intrinsically irreconcilable with environmental resilience. The fundamental origin of this crisis is what has been described as a linear approach to working with the economy commonly known as the take-make-waste paradigm, which has existed in the industrial production since the Industrial Revolution. The model presupposes that the amount of resources is infinite, the advantage of waste assimilation is infinite, which is empirically unrealistic (Sariatli, 2017). The making of value in a linear system commences with procurement of virgin resources, processing of products and disposal of the products. It is a unidirectional flow that makes it easier to tap into and drain natural resources and externalizes the environmental costs to the ecosystems and the new generations (Ellen MacArthur Foundation, 2013). As the world population and consumption rise, a greater number of materials flow resulting in more waste with a loss of material and economic value instead of value-retention. According to this logic the waste is seen not as a structural failure but as the evil necessary. This has resulted in sustainability initiatives into linear systems focusing primarily on negative externalities - through efficiency (e.g. pollution) - or adherence to regulators. Although they are required, the measures are not adequate to address the causes of the problem (Geissdoerfer et al., 2017).

Against this background, the Circular Economy (CE) has emerged as a different paradigm that raises doubts on the very nature of linearity. CE views waste as a design failure rather than an unavoidable by-product, and aims to eliminate it through restorative and regenerative systems

(Ghisellini et al., 2016). Inspired by natural ecosystems, CE works to ensure that the products of one process become the products of another without consuming finite resources or decoupling economic success from their consumption. This decoupling is technological and systemic and concerns product design, business models, organizational practices, and consumption patterns. The circular economy is a framework that advocates eco-efficiency - doing less harm - as opposed to traditional sustainability approaches (Braungart et al., 2007; Morsetto, 2020). The R- frameworks for hierarchical strategies for value retention are key to implementing CE. While the early discussions about sustainability revolved around the concept of the triple bottom line (Reduce, Reuse, Recycle), in recent CE literature there has been a broad expansion toward nine strategies with a focus on Refuse, Rethink, Reduce and Remanufacture, and less focus on recycling and energy recovery (Kirchherr et al., 2017; Potting et al., 2017). This list highlights one critical point: recycling is not the way out but the last resort, because in most cases it entails material and energy losses.

The CE has received much criticism, even though it is conceptually sound in its overall implementation. According to scholars, early CE studies were overly techno-centric, focusing on material science innovations, product redesign, and industrial symbiosis without considering the social and organizational aspects of transition (Korhonen et al., 2018). Circular strategies may remain theoretical but not practical, organizational routines, employee behaviors, and managerial mindsets may change. Singh and Singh (2019) also argue that failures in implementing the CE are not usually attributed to technological limitations but to behavioural resistance, capability gaps, and disparities in organisational incentives.

The Textile Industry Circular Transformation

The textile and apparel industry is one of the world's manufacturing sectors, as it is not only an environmental hot spot but also a strategic advantage that can be leveraged to advance a circular economy. Often called one of the most polluting industries globally, textiles can be seen as the dysfunctions of the linear model in their most radical iteration. The mushrooming growth of industry, driven by globalization and consumer demand for cheap fashion, has created unprecedented material throughput and waste. These pressures have been heightened by the emergence of the fast-fashion trend, which has involved shorter manufacturing times, shorter product lifespans, and shorter shelf lives, leading to dire environmental and social impacts (Fletcher, 2010).

According to empirical estimates, the textile industry accounts for around 10 per cent of all carbon emissions and almost 20 per cent of industrial wastewater pollution, mainly due to dyeing and finishing processes that use large amounts of water (UNEP, 2019). Besides, although most fibers can be recycled, less than 1 percent of textile fibers are recycled into new clothing, representing an enormous waste of stored energy, labor, and material value (Ellen MacArthur Foundation, 2017). The most popular end-of-life approaches are landfilling and incineration, especially in developing economies where waste infrastructure is poorly developed. The need to make the textile industry circular is therefore not a choice but a necessity. However, this change goes well beyond replacing virgin fibers with recycled ones or installing cleaner technologies. Circular clothes necessitate reorganization throughout the entire value chain, from design and sourcing to manufacturing, consumption, and post-use management. This change at the organizational level requires new working routines, cross-functional work, and, most importantly, employees at any level must comply with the behavioral requirements (Luedke-Freund et al., 2019).

For example, using recycled polyester requires rigid segregation of sulphurated material during production to avoid contamination and improve recyclability (Jia et al., 2020). Water in closed-

loop systems is critical and must be carefully controlled using available chemicals; the systems also require strict maintenance. The lifespan of the equipment depends on active repairs and prophylactic maintenance performed by workers on the shop floor. These tasks are very cognitively demanding, time-consuming work that does not fit traditional measures of productivity. The dilemma of increased labor in textiles, mainly in developing countries. The industry relies on a low-skilled labour force, high turnover, minimal or no training, and heavy production pressure, as workers face competition over costs and tight delivery deadlines (Taplin, 2014). Under these conditions, discretionary behaviour - behaviour that goes beyond job rules - is challenging to maintain. Perry and Wood (2019) state that environmental projects in the textile industry fail most of the time because they do not take workers' abilities and motivational systems into account. Circular strategies are successful in the textile industry when organisations develop employee competencies, motivation, and opportunities that align with the circular model's goals. This means that Human Resource Management (HRM) is at the heart of circular change, shifting from a support role to an enabler in sustainability.

Theoretical Underpinnings

This study combines three perspectives, namely, the Ability-Motivation-Opportunity (AMO) theory, the Social Information Processing (SIP) theory, and the Social Exchange Theory (SET) to explain the relationship between organizational practices and employee-level circular behaviors. These theories together offer a multilevel account combining structural conditions, cognitive interpretation, and relational reciprocity. One of the most powerful strategies in the HRM domain is the AMO framework, initially proposed by Appelbaum et al. (2000), which underlies research on Green Human Resource Management (GHRM). According to the framework, performance by individuals and, by extension, organizational performance, is a product of three interdependent elements: employees need the Ability to work, be motivated to work hard, and can utilize their skills in a favourable environment.

Applied to the framework of the circular economy, the AMO framework as a concept can provide an effective tool for understanding how circular initiatives performed or did not perform at the operational level. Circularity is also knowledge-intensive, and employees need to understand how materials move through the system, their environmental impacts, and how specific processes rely on others. Ability, hence, is generic and is nurtured through green recruitment, training towards specific roles, and lifelong learning (Renwick et al., 2013). While AMO defines the conditions that pertain to performance, SIP theory explains how employees perceive those conditions. Developed by Salancik and Pfeffer (1978), SIP theory argues that people form acceptable attitudes and behaviors through the social environment. Employees are not or merely rational, they rely on social cues, norms, and signals in their conceptualisation of the strategic direction of organisations. The organizations are good indicators of HR practices (Bowen, 2004). These are consistency, uniqueness, and agreement signals involved and have an impact on values and rewards perception among employees. In cases where coherent and visible GHRM practices are employed, the literature reveals that the concept of environmental responsibility is expressed in forms other than symbolic (Chaudhary, 2020). This can be further explained by the Social Exchange Theory, which brings out the relational and moral aspects. As explained in SET, there are norms of reciprocity in social relationships, such that when one party is favorably treated, an obligation to reciprocate arises for the other party (Blau, 1964). When organizational employees feel their employer invests in their growth, health, and interests, they also experience a sense of indebtedness and retaliate through their responsive attitudes and discretionary behaviors (Gould-Williams, 2007). This takes on special significance in circular economic settings, where numerous key activities are discretionary and proactive.

GHRM as a Strategic Enabler of Circular Economy

Green Human Resource Management (GHRM) represents an approach to strategic philosophy, which integrates the environmental concerns into its key HR policies and practices, including the recruitment, training, performance management, and reward system (Renwick et al., 2013). While we aim to end socio-economic imbalances, rather than serving as an external compliance requirement, GHRM incorporates environmental responsibility into the essence of the employment relationship itself, thereby influencing employees' skills, motives, and behavioral norms. This integration will become even more basic in a circular economy, where circular strategies are based not just on technological innovation, but also on predictable and anticipated employee behaviour to close, slow down, and narrow material loops (Geissdoerfer et al., 2017; Korhonen et al., 2018). It is possible to consider GHRM as a consistent system of enhancing the capacity of employees to perform circular activities through recruitment and training, encouraging them to specialize in circular activities through their appraisal and rewards, and providing a favorable environment in which the implementation of the circular behaviours can occur (Appelbaum et al., 2000; Bos-Nehles et al., 2013). In addition to this structural perspective, there is the Social Information Processing (SIP) theory of GHRM practices being relevant organizational cues. These signals suggest the relevance and validity of sustainability when determining the choice to be made by employees regarding what to do (Salancik and Pfeffer, 1978; Bowen and Ostroff, 2004). Social Exchange Theory (SET) further argues that when employees perceive GHRM as an investment in them as developing persons and persons of significance, they are more likely to act voluntarily in ways that enable organisational objectives, including those related to the environment (Blau, 1964; Paillé et al., 2014). GHRM is particularly important for aligning employee behaviour with the forces of circularity in industries like textiles, which typically face countercircular forces due to their operational short-term productivity mechanisms. By systematically introducing environmental cues into HR systems, organizations can reduce behavioral ambiguity, legitimate circular tasks, and establish a workplace environment that can sustain the implementation of a circular economy (Jackson et al., 2011).

Green Recruitment and Selection

GRS is included in the realization of a circular economy as it ensures new employees that their values, attitudes, and competencies associated with the environment are characterized by the minimum level of sustainability (Jabbour et al., 2010; Renwick et al., 2013). Regarding the view of person-organization fit, recruiting individuals with pro-environmental orientations minimizes the tendency to resist environmental practices and increases the likelihood that expectations linked to sustainability issues will be internalized rather than perceived as externally imposed (Opatha, 2013). SIP theory also indicates that the concept of green employer branding can be viewed as a signal of organizational priorities that are communicated in advance, prior to joining an organization (Bowen & Ostroff, 2004; Guerci et al., 2016). GRS can deliver multifaceted cost reductions in downstream circularity implementation in the textile industry, where procedural discipline (e.g., material separation, chemical treatment, and waste management) is a significant aspect of environmental responsibility, by selecting employees who are predisposed to compliance and environmental responsibility. Nevertheless, recruitment is not enough; additional HR practices must reinforce it. GRS, as a component of an integrated GHRM system, lays the foundation for an attitudinal framework on which circular competencies and behaviors may be built.

Green Training and Development

The architecture of green training and development (GTD) is an important mechanism that promotes the acquisition of technical and cognitive skills required for circular economic practices

in organizations. Circularity requires not only a good basic understanding of the environment but also role-specific knowledge of material flows, reverse logistics, product waste, lifecycle considerations, and process optimisation (Sarkis et al., 2010; Kirchherr et al., 2017). Within the AMO framework, GTD directly increases employees' capability and motivation by enhancing self-efficacy and the importance of circular workload (Appelbaum et al., 2000). Empirical studies all demonstrate a positive relationship between green training, employee environmental behavior, and organizational environmental performance (Teixeira et al., 2016; Saeed et al., 2019). Textile production is one of the sectors in which technical mistakes, such as mishandling chemicals or a polluted stream of waste, can render the concept of circularity entirely meaningless, which explains why the process requires strict, task-oriented training (Zibarras & Coan, 2015; Ellen MacArthur Foundation, 2017). In addition to the acquisition of skills, a signaling role of GTD is also present: a long-term investment in training sends the message about the organization's commitment to sustainability, which supports the attitude of employees that states that circular practices are important and are expected (Salancik & Pfeffer, 1978; Chaudhary, 2020).

Green Performance Management and Appraisal

Green performance management and appraisal (GPMA) synchronises employee actions with circular economy goals through a comprehensive official method for incorporating environmental-related criteria into assessment systems (Jackson et al., 2011). The impact of performance appraisal systems is powerful, as they define priorities and influence the allocation of effort; employees are more willing to concentrate on activities that are measured and assessed (Epstein & Roy, 2001). Without environmental measurements, employees will give sustainability a secondary place to productivity despite the presence of green policies at the organizational level. Therein, alignment is essential, since a variety of circular strategies, such as careful sorting, preventive maintenance, and reuse habits, require more time and care and may conflict with short-term output targets (Bocken et al., 2016). Organizations can legitimize circular activities by integrating indicators (e.g., waste recovery rates, reductions in contamination, extension of equipment life) into appraisal systems, thereby minimizing the risk of being perceived as risky to participate in these practices. In AMO terms, GPMA enhances motivation by connecting circular behaviors with formal performance deliverables and opportunities, thereby promoting managerial support for sustainability-related activities.

Green Rewards and Compensation

Circular economy green rewards and compensation (GRC) systems ensure the strengthening of objectives by adding the desired environmental behaviors to the system through the achievement of the desired results. Based on the expectancy theory, GRC increases the likelihood of self-fulfillment among employees whose perceptions of an evident link between performance, effort, and reward motivate them to work in circles (Vroom, 1964). Sustainability contributions are also represented through rewards, which indicate that they are recognized and valued within the organization (Bowen & Ostroff, 2004). It has been found that financial and non-financial incentives increased employees' commitment to environmental programs. Gain-sharing and recognition-based rewards can also play a specific role in cost-sensitive industries like textiles, where results tend to rely on coordination rather than individual actions and on alignment at the team level (Mishra, 2017; Korhonen et al., 2018). With proper design, GRC aligns employees' intrinsic commitment to work with their desire to work, particularly when it is embedded in training and appraisal systems that focus on quality and retention of long-term value, rather than short-term volume.

Employee Circular Economy Behaviors (ECEB)

Employee Circular Economy Behaviors (ECEB) are a special type of workplace behavior that lies beyond generic pro-environmental behavior. Whereas the traditional PEB measures concentrate on low-effort behaviors such as energy conservation or paper recycling (Bissing-Olson et al., 2013), ECEB is concentrated on behaviors enabling the implementation of circular strategies to retain value, reuse, repair, remanufacturing, and high-quality recycling (Kirchherr et al., 2017; Morsetto, 2020). These are operationally instantiated, mentally challenging, and in many cases entail trade-offs with short-run effectiveness. The measures related to ECEB in the textiles business include careful segregation of fabric waste, proactive maintenance to extend machinery lifespans, innovative reuse of by-products, and feedback to enhance product disassembly and recyclability (Bocken et al., 2016). Since such behaviors are skills, motivation, and organizational support, they are susceptible when the HR system and leaders are involved. GHRM offers a more theoretically specific outcome variable to provide insights into its influence on the implementation of a circular economy at the employee level.

The Mediating Role of Green Psychological Climate

Green Psychological Climate (GPC) is a set of shared beliefs among employees that the organization values, fosters, and rewards environmental sustainability (Norton et al., 2014). The SIP theory states that organizational practices provide behavioral cues to employees; therefore, GHRM indirectly influences behavior by creating more favorable perceptions of the climate but does not have direct control over behavior (Salancik & Pfeffer, 1978; Bowen & Ostroff, 2004). Consistent, visible, and credible GHRM practices lead to a solid GPC that demystifies expectations and clarifies the significance of sustainability. Research has shown that GPC moderates the relationship between GHRM and employee green behavior (Dumont et al., 2017; Pham et al., 2019; Zhou et al., 2018). It is particularly in circular space experience that this mediating action is relevant and of which the circular action can be discretionary work and procedure not necessarily linear. Circular behaviour is justified in such a strong green psychological climate that better emerges to a higher level of psychological safety and will encourage the employee to pursue circular behaviour despite pressure on production. On the basis of this, GPC would play an influential role in explaining the relationship between GHRM practices and ECEB.

Green Transformational Leadership as the Moderating Role

Though HR systems give formal systems and signals, its leadership affects the attitude and perception people have towards those signals and how they are applied in the working practices. Green Transformational Leadership (GTL) is an extrapolation of the transformational leadership theory into the field of environmental context. One may describe it as the modelling of green roles, inspirational motivation, intellectual stimulation, and personal thought of sustainability goals (Chen and Chang, 2013). Another important role of leaders in the aspects of interpretation is that they either facilitate or undermine HR messages in their acting and decision-making with respect to behavior. The trickle-down strategy means that people abide by the examples of their immediate bosses (Mayer et al., 2009). The empirical data suggests that GTL encourages green behavior of employees and elevates the effectiveness of GHRM through motivation, commitment and normative alignment (Mittal and Dhar, 2016; Singh et al., 2020). The latent textile industry supervisors approaching conflicting requirements between production goals and environmental safety can use the assistance of GTL on which to maintain the relevance of circular programs under the pressure of short-term demands. Based on this, GTL is theorised as a moderating variable that enhances the relation between the green psychological climate and employee actions on the circles of the economic system. Transformational green leadership reinforces green climate perceptions, thereby increasing employees' tendency to translate these

perceptions into long-term circular action. On the contrary, without GTL, a favourable green climate would not fully become behavioural, as other functional needs would crowd it out.

Research Framework

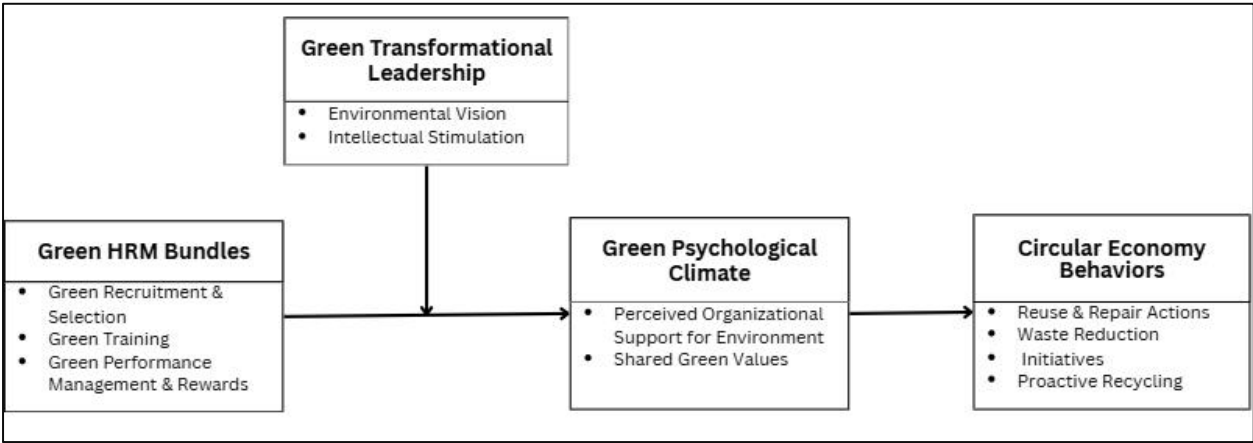


Figure 1: Research Framework

Methodology

The research design of this paper is a quantitative time-lagged survey to study how Green Human Resource Management (GHRM) is connected with Employee Circular Economy Behaviors (ECEB). To minimize the predictive in common method bias and increase the causal inference as prescribed by Podsakoff et al. (2003), a sample of 475 employees in three wave (T1, T2, and T3) separated by an interval of 3 weeks was employed in the data collection. GHRM practices with T1 being rated based on an adapted scale proposed by Tang et al., (2018), T2 with Green Psychological Climate being rated based on an adapted scale proposed by Norton et al., (2014) and T3 also providing self-reported rating of their circle economy behavior since Mishra et al. (2021) discusses. Structural Equation Modeling (SEM) was applied to the data in AMOS 24.0, and it relied on Ability-Motivation-Opportunity (AMO) framework (Appelbaum et al., 2000). It was also carried out in two steps (Anderson & Gerbing 1988). To begin with, reliability and validity of the measurement model were obtained using Confirmatory Factor Analysis (CFA). Two, previously postulated direct, mediating, and moderating structural, relationships were assessed.

Results

The sample characteristics have been broken down in Table 1 showing that sample is representative of the target population in the textile industry.

Table 1: Demographic Profile of Respondents (N=475)

Category	Characteristic	Frequency	Percentage (%)
Gender	Male	342	72.0
	Female	133	28.0
Age Group	18–25 years	85	17.9
	26–35 years	195	41.1
	36–45 years	140	29.5
	46 years and above	55	11.6
Education	High School / Diploma	120	25.3
	Bachelor's Degree	265	55.8
	Master's Degree or higher	90	18.9
Job Tenure	Less than 1 year	65	13.7
	1–5 years	210	44.2
	6–10 years	145	30.5

	More than 10 years	55	11.6
Department	Production / Operations	280	58.9
	Maintenance / Engineering	115	24.2
	Quality Control / EHS	80	16.8

Measurement Model Assessment

Prior to hypothesis testing, a Confirmatory Factor Analysis (CFA) was conducted using AMOS 24.0 to assess the reliability and validity of the measurement model. All standardized factor loadings exceeded the recommended threshold of 0.60 (Hair et al., 2010), ranging from 0.71 to 0.92, confirming strong item reliability. Internal consistency was supported as Cronbach's alpha and Composite Reliability (CR) values for all constructs were above 0.70. Convergent validity was established because the Average Variance Extracted (AVE) values exceeded the 0.50 criterion for all constructs.

Table 2. Reliability and Convergent Validity

Construct	Items	Factor Loadings (λ)	Cronbach's α	CR	AVE
Green HRM (GHRM)	6	0.74 – 0.88	0.91	0.92	0.65
Green Psychological Climate (GPC)	5	0.78 – 0.92	0.89	0.90	0.69
Green Transformational Leadership (GTL)	6	0.75 – 0.89	0.93	0.93	0.68
Employee Circular Economy Behaviors (ECEB)	7	0.71 – 0.86	0.88	0.89	0.58

All constructs demonstrate strong internal consistency and satisfactory convergent validity, indicating that the measurement model is reliable and suitable for subsequent structural analysis.

Discriminant Validity

The Fornell-Larcker criterion was used in determining the discriminant validity. Table 2 indicates that the square root of the AVE of each construct (diagonal values) exceeds the correlation of the construct with the other constructs, which proves that each construct is empirically different.

Table 3. Descriptive Statistics and Discriminant Validity (Fornell-Larcker Criterion)

Variable	Mean	SD	1	2	3	4
1. Green HRM	3.82	0.76	0.81			
2. Green Psychological Climate	3.65	0.82	0.45**	0.83		
3. Green Transformational Leadership	3.78	0.79	0.38**	0.51**	0.82	
4. Circular Economy Behaviors	3.54	0.85	0.41**	0.56**	0.49**	0.76

Diagonal values (bold) represent square roots of AVE. ** $p < 0.01$. The results confirm discriminant validity, indicating that the four constructs capture conceptually and statistically distinct phenomena.

Structural Model Assessment

Structural Equation Modeling (SEM) was employed to test the hypothesized relationships. The structural model demonstrated satisfactory fit, supporting the adequacy of the proposed model. GHRM significantly predicts Green Psychological Climate and directly influences Employee Circular Economy Behaviours. Green Psychological Climate also shows a strong positive relationship with ECEB, supporting the proposed direct effects.

Table 4. Structural Model Results (Direct Effects)

Hypothesis	Path	β	S.E.	t-value	p-value
H1	GHRM $\rightarrow$ Green Psychological Climate	0.48	0.058	8.24	<0.001

H2	Green Psychological Climate → ECEB	0.52	0.056	9.15	<0.001
H3	GHRM → ECEB	0.18	0.052	3.42	0.001

Mediation Analysis

Bootstrapping test with 5000 resamples was done to verify the mediating role of Green psychological climate. The indirect effect was also strong enough and there was no inclusion of zero within the confidence. The association between the GHRM and Employee Circular Economy Behaviors is partially mediated by Green Psychological Climate in both direct and indirect ways, that is, GHRM directly and indirectly controls the circular behavior via climate perceptions.

Table 4. Mediation Analysis (Bootstrapping Results)

Relationship	Effect Type	β	95% CI (Lower)	95% CI (Upper)	Result
GHRM → GPC → ECEB	Total Effect	0.43	0.35	0.52	Significant
	Direct Effect	0.18	0.09	0.28	Significant
	Indirect Effect	0.25	0.18	0.34	Significant

Moderation Analysis

The interaction approach was used to test the moderating role of the Green Transformational Leadership. The effect of interaction was positive and statistically significant. The significance of the interaction term shows that the positive relationship between Green Transformational Leadership and Green Psychological Climate and Employee Circular Economy Behaviors is reinforced. The mere slope analysis is used to ensure that this relationship is sturdier at high levels of GTL.

Table 5. Moderation Analysis Results

Path	β	S.E.	t-value	p-value
Green Psychological Climate → ECEB	0.45	0.054	8.33	<0.001
Green Transformational Leadership → ECEB	0.28	0.050	5.60	<0.001
GPC × GTL → ECEB	0.21	0.045	4.66	<0.001

As part of the effort to determine the robustness of the model and to respond to the need to raise the issue of common method bias, the literature reviewed hypothesized four-factor model was subjected to testing against alternative models. The four-factor hypothesis model is much better fit than others, which strongly supports the construct distinctiveness and dispels fears of common method bias.

Table 6. Model Fit Comparison

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
Hypothesized 4-Factor Model	428.00	200	2.14	0.96	0.95	0.048	0.042
3-Factor Model (GPC & GTL combined)	850.50	205	4.15	0.82	0.80	0.112	0.095
2-Factor Model (All independent combined)	1245.20	208	5.98	0.68	0.65	0.145	0.130
1-Factor Model (Harman's test)	2100.80	210	10.00	0.45	0.40	0.210	0.185

Discussion

The general concern of the researched was to demystify the process of translating Green Human Resource Management (GHRM) into Employee Circular Economy Behaviors (ECEB) within the context of textile industry- one of the industrial sectors to which structural elements of environmental injustice are rationally coupled to logics of linear production and in which a circularity heavily depends on the performances of the shop-floor (Ellen MacArthur Foundation, 2017). We have constructed a process model based on the Ability Motivation Opportunity (AMO)

model (Appelbaum et al., 2000) in which employees increase their circular performances because of the establishment of a Green Psychological climate (GPC) and which the Green Transformational Leadership (GTL) is a boundary condition that enhances the relationship between climate and behavior (Chen and Chang, 2013; Norton et al., 2014). The results are mostly related to the proposed relationships, which is a good argument in favor of the hypothesis that the deployment of the circular economy is not a totally technological or supply-chain problem, but a human and organizational one, based on time-lagged data regarding 475 textile employees (Hobson, 2016; Korhonen et al., 2018).

In line with the demand to shift away from techno-centric circular economy studies, the results provide empirical support for the view that employee-level behavior is a valuable channel through which circular strategies could be implemented in a production-intensive context (Singh & Singh, 2019). Besides, the model explains that circularity is shaped by HR systems, which produce administrative compliance or the psychosocial environment they generate (Bowen & Ostroff, 2004; Dumont et al., 2017). It is especially relevant to the textile business, where the pace of production, cost pressures, and routinised labour practices tend to prohibit discretionary sustainability practices (Taplin, 2014; Perry & Wood, 2019). These findings are discussed below in terms of the hypothesis and the study's position in the broader literature on GHRM, climate, leadership, and the circular economy.

The findings demonstrate that GHRM is a good predictor of employee circular economy behaviours, which proves the argument that HR bundles based on sustainability can change employee behaviour outside of the traditional job role. It is closely comparable to the reasoning of the AMO model that specifies that the performance can be achieved when employees possess the competence and skills, when they are willing and motivated to act, and when they have an opportunity to do so (Appelbaum et al., 2000; Bos-Nehles et al., 2013). Environmental needs may be integrated into recruitment, training, appraisal, and reward systems of the organizations, therefore, making them geared toward nourishing the circle shaped competencies that the employees demonstrate (i.e., recognizing scrap to be reused, servicing machines to extend their life, getting to look after precise separation of waste) and motivating the employees to act in a way which may initially appear tough, time consuming, and not compatible with the production requirements (Renwick et al., 2013; Jackson et al., 2011). The present discovery is based on the earlier GHRM literature and has concentrated on the association amidst GHRM and generic pro-environmental conduct (PEB), comprising energy savings, lessened paper and consumption and straightforward recycling amongst others (Dumont et al., 2017; Tang et al., 2018). Though these actions are efficient in terms of eco-friendliness, they are not absolutely complying with the demands of circularity. This research can contribute to the literature that HR systems can influence high-intensity and operation-oriented ways of giving contributions to the closing, slowing, and narrowing loops, e.g., proactive maintenance, contamination control and reuse of off-cuts in creative ways (Kirchherr et al., 2017; Bocken et al., 2016). This divergence is true to the textiles, where the sources of the failures of circularity tend to be operational failures on an employee level: inability to segregate properly to obtain higher re-use rates or inability to manage chemicals to avoid water pollution (Ellen MacArthur Foundation, 2017; Zibarras & Coan, 2015).

The direct relationship between these constructs is also significant, suggesting that formal green human resource management (GHRM) systems can establish a baseline for this circular behavior through structured expectations and compliance strategies. Nevertheless, a broader body of evidence suggests that a social-psychological context fostered by GHRM may be even more potent than the mere existence of policy. This interpretation strengthens the idea that human

resource practices are not to be seen as simple technical instruments but as expressive and communicative devices that shape employees' meaning-making processes and behaviour (Bowen & Ostroff, 2004; Chaudhary, 2020). Such signals can be particularly influential in production-intensive product areas such as textiles, where employees are forced to make a difficult choice between needs for speed and sustainability; such signals contribute to the design of circular behaviours that are highly valued or, conversely, symbolic in nature (Jackson et al., 2011; Taplin, 2014).

The result indicates that a green psychological climate is at the centre of the two factors, GHRM and commitment to corporate environmental behaviour by employees according to the Social Information Processing (SIP) theory (Salancik and Pfeffer, 1978). As postulated in SIP, employees attach meaning to organisational priorities depending on the salient cues within systems, routines, and social systems. In this research, GHRM practices are perceived as such cues, signalling the acceptability, anticipation, and reward of environmental sustainability as a practice. As a result, the psychological climate of a cultural group develops in which employees believe that the organisation supports and prioritizes sustainability (Bowen & Ostroff, 2004; Norton et al., 2014). This mechanism is particularly germane to the implementation of the circular economy, since many circular actions are discretionary and perceived as risky. An example would be extreme waste sorting or a line stop to prevent contamination of the mark, which can decrease productivity and expose employees to reproach in an environment where production output is a priority. One approach to such risk is to build normative and psychological legitimacy for circular activities, thus giving employees the freedom to voluntarily participate in circularity despite likely competition for short-term production speed.

Green psychological climate can be considered an opportunity pathway when interpreted through the AMO framework: creating a situation in which employees can put into practice what they have studied (ability) and what they are encouraged to do (motivation) (Appelbaum et al., 2000). In the presence of strong climate signals, employees feel that circular behaviors are encouraged and that participating in them is safe and rewarding. This resonates with the argument that to sustain high-pressure manufacturing settings, it takes more than building skills; it takes an enabling climate that minimizes ambiguity and offers psychological protection for the move toward sustainability-consistent non-conformity to well-established linear patterns (Rayner & Morgan, 2018; Korhonen et al., 2018). Most importantly, the mediating result also suggests that circular transformation cannot be achieved when organizations implement superficial green HR efforts without developing consistent climate cues. Defensive against symbols, the occasional training, or ad hoc rewards can fail to provide a standard corpuscular view of complex circular-inclination behaviours. This supports the perspective that circularity is a systemic organizational change process that does not comprise isolated initiatives (Geissdoerfer et al., 2017; Hobson, 2016). In this way, the research supports the thesis that GHRM should be implemented as a consistent and valid set of activities when organizations want to establish a climate that consistently translates into circularity on the shop floor (Renwick et al., 2013; Bowen & Ostroff, 2004).

This study contributions is that Green Transformational Leadership is a strong moderator of the relationship between Green Psychological Climate and ECEB. This confirms the hypothesis that although organizational systems (GHRM) and shared perceptions (GPC) for sustainability constitute the structural and cognitive basis of such sustainability, the immediate linkage between the shared perception and actual behavior is played by a proximal conversion mechanism, which is played by the immediate supervisor (Chen & Chang, 2013; Mayer et al., 2009). The positive effect of a green psychological climate on circular behaviors will be

significantly more substantial when employees assess a high degree of GTL. This finding is consistent with the trickle-down view, which holds that leaders convey and strategize organizational priorities through role modeling, strengthening, and interpreting daily (Mayer et al., 2009). In factory-like environments, such as the textiles industry, where bosses are mainly judged by efficiency and quotas, workers will receive conflicting messages: the organization can implement sustainability systems, but bosses will be focused on speed. Green transformational leaders prevent this dilemma by making circular objectives meaningful and legitimate, promoting problem-solving, and rewarding employees who invest time and energy in circular work (Bass & Riggio, 2006; Chen & Chang, 2013).

The findings also imply a synergy effect: GTL not only amplifies the effect of climate but also enhances the translation of climate into behavior. Green climate can give permission and normative backing, but leadership activation, in terms of inspiration and intellectual stimulation, and day-to-day reinforcement. This aligns with the findings that transformational leaders make employees more willing to act outside established role-related expectations, specifically when the behavior demands persistence and creativity (Mittal & Dhar, 2016; Singh et al., 2020). In textile processes, this kind of leadership could be key to motivating workers to develop reuse ideas for off-cuts, waste hotspots, and preventive maintenance, thereby extending product lifespans. On the contrary, the results suggest that, despite a facilitating green climate, low GTL does not necessarily lead to circular action. As a result, employees might be reluctant to adopt circular behaviors due to immediate supervisory pressure, the absence of role models, or fear that circular behaviors will be penalized as inefficient. This supports the concept that circular transformation is implemented at the micro level: line supervisors are either able to spur or suppress circular behaviors, and, thus, in this context, the development of leaders is a pivotal part of the circular implementation strategy in the textile industry (Perry & Wood, 2019; Taplin, 2014).

Theoretical Implications

This paper contributes to the emerging literature on the microfoundations of the Circular Economy (CE) by placing analytical focus on human capital rather than technological systems. Theoretically, we add value by differentiating between Employee Circular Economy Behaviors (ECEB), including material looping, repair, and creative reuse, as a construct distinct from generic pro-environmental behaviors. We attest to the fact that circularity is not just an operational demand when we validate the AMO framework for this scenario, but also a behavioral outcome of specific HR actions based on certain interventions. Also, the current study sheds light on the black box of sustainable HRM by confirming Green Psychological Climate, the primary cognitive mechanism underlying the impact of HR systems on behavior, thereby bridging the gap between Social Information Processing (SIP) theory and sustainable operations management. Lastly, by identifying Green Transformational Leadership as a critical boundary condition, we offer empirical data on the trickle-down effect in high-pressure manufacturing settings, thereby narrowing our view of how leadership styles relate to organizational climate to either enhance or reduce the circle effects.

Practical Implications

This study can also provide practical solutions for operationalizing sustainability for practitioners in the textile industry, especially those in export-led manufacturing. To start with, managers should not rely on hollow, symbolic green policies, but develop specific GHRM packages that explicitly build circadian competencies; hiring should include the ability to be flexible and resourceful, and training should include skills in waste valorization and machine life. Second, the results show the inseparable nature of line managers. The organizations need to invest in

leadership development programs that equip supervisors with the abilities in Green Transformational Leadership so that they can view waste reduction as a value-driving part of production rather than a delay to production pace. Third, to foster a conducive Green Psychological Climate, management should align performance appraisal with circular goals. If workers are punished for slowing down the line to separate trash, circular programs will not work.

Conclusion

In the face of increasing pressure on the textile industry to abandon the linear model of the production cycle, that is, the take-make-waste model, to adopt a regenerative cyclical model, this paper highlights that technology is not enough to achieve this seal-the-resource-loop. Our time-lagged study of 475 employees in the textile industry revealed that Green Human Resource Management (GHRM) is a key driver of Employee Circular Economy Behaviors (ECEB). This, though, is not a mechanical relationship; instead, it is mediated through the process of establishing a supportive Green Psychological Climate and is greatly enhanced by Green Transformational Leadership.

The results indicate that the way towards circularity is highly anthropocentric. Once HR systems equip organizations with the necessary capacity and incentives, and leaders create an opportunity-oriented environment that supports and encourages environmental care, then employees will be the driving force of circularity, extending product lifecycles and recovering value from waste. In conclusion, this study finds that to make the textile industry truly sustainable, it should not regard its workforce as an expense to be reduced, but rather as its most critical renewable resource in favor of a circular economy.

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