



ACTION ORIENTED PERSONALITY TRAITS AND SUSTAINABLE CAREER CHOICES AMONG GENERATION Z: A TRAIT FACTOR THEORY PERSPECTIVE ON CIRCULAR ECONOMY IMPLEMENTATION BEHAVIOR IN EMERGING ECONOMY

Khawar Razzaq

Hailey College Banking and Finance, University of the Punjab, Lahore, Pakistan.

Email: khawar_1983@hotmail.com

Dr. Ahmed Muneeb Mehta

Hailey College of Banking & Finance, University of the Punjab, Lahore, Pakistan.

Email: principal@puhcbf.edu.pk

Dr. Waqas Baig

Hailey College Banking and Finance, University of the Punjab, Lahore, Pakistan.

Email: waqasbaig33@puhcbf.edu.pk

Abstract

The accelerated global shift from conventional business models to circular business models (CBMs) has garnered increasing scholarly attention. This transition underscores the necessity of examining the behavioral drivers and personality traits that influence individuals' readiness to adopt and implement circular practices. In particular, traits such as innovativeness and entrepreneurial intentions, alongside mechanisms that enhance willingness to engage in circular business models, are emerging as critical determinants of circular economy (CE) implementation behavior. While much of the existing literature has focused on advanced economies, there remains limited understanding of these behavioral dynamics within the context of emerging economies, where systemic, cultural, and institutional challenges present unique barriers and opportunities. This study situates itself within the context of Pakistan, the world's fifth most populous country, faces acute ecological and socio-economic challenges but holds immense potential in its large Generation Z population, with HEI students representing a vital pool of future entrepreneurs. Yet, their role in advancing circular entrepreneurship through traits, intentions, and willingness to participate in CBMs remains largely underexplored. Grounded in trait-factor theory, this study investigates the influence of innovativeness on CE implementation behavior among Gen Z university students in Punjab, Pakistan—the country's most populous province and its hub for industrial, agricultural, and educational activities. The study conceptualizes entrepreneurial intentions as a mediating mechanism that channels individual innovativeness into CE-oriented behavior, while also recognizing that such intentions require reinforcement through a strong willingness to participate in CBMs to translate into actual implementation. By exploring these interlinkages, the study contributes to a deeper understanding of the behavioral underpinnings of CE adoption in Pakistan and provides insights into how HEIs, policymakers, and practitioners can mobilize youth-driven entrepreneurship to accelerate the country's transition toward a circular and sustainable economy. This study advances theoretical understanding by integrating trait-factor theory with circular economy implementation behavior, offering a novel lens to examine how individual traits and intentions shape sustainability transitions. Beyond theoretical contributions, the study provides practical insights for policymakers, the education sector, and NGOs to design interventions that foster circular entrepreneurship, develop a sustainability-oriented workforce, and strengthen ecosystem protection in emerging economies. Specifically, within the context of Pakistan, the findings aim to inspire the adoption of circularity principles and reinforce efforts to address pressing challenges of environmental



degradation, youth unemployment, and economic instability, thereby supporting the country's transition toward a resilient and sustainable future.

Keywords: *Innovativeness, Circular Economy Implementation Behavior, Entrepreneurial Intentions, Willingness to participate in Circular Business Models, and Trait-Factor Theory.*

1. Introduction

The circular economy has emerged as transformative paradigm essential for optimizing resource use, minimizing waste and extending product lifecycle, thereby contributing directly to the achievement of the Sustainable Development Goals (SDGs) of United Nation, particularly SDG 12 on responsible consumption and production, and SDG 13 on climate action (Gautam et al., 2025; Wayne & Frechtling, 2025). By emphasizing resource efficiency, product longevity, and waste reduction through circular business models (CBMs), the CE aims to decouple economic development from environmental degradation and resource depletion (Chabowski et al., 2025). Governments, industries, and academia are progressively championing circular economy initiatives as a crucial instrument to mitigate climate change, resource scarcity, and the mounting accumulation of waste (Gomes, 2025; Breusova, 2024). Despite global progress, CE adoption in emerging economies remains slow due to structural challenges such as inadequate financial resources, limited public awareness, and weak technological infrastructure (Gyimah et al., 2025; Jindal, 2025). In contrast to circular business models, the linear business model follows a “take–make–dispose” pattern in which natural resources are extracted, transformed into products, and ultimately discarded as waste (Panza & Peron, 2025). By comparison, the circular economy seeks to close the gap between the manufacturing cycle and the ecological system by extending product lifecycles and reintegrating materials into production processes. This is achieved through strategies such as reprocessing waste, composting biodegradable materials, remanufacturing, recovering, and reusing resources (Frishammar et al., 2025).

Extant literature highlights the benefits of adopting circular business practices to enable the transition from conventional production and consumption models toward more sustainable and responsible approaches (Chabowski et al., 2025; Mazzucchelli et al., 2022; Marrucci et al., 2022). Despite these advantages, the implementation of circular economy (CE) practices remains slow, particularly in emerging economies such as Pakistan, where limited evidence exists regarding their initiation, planning, and execution. This gap underscores the urgent need to develop localized policies and strategies that bridge the divide between policy formulation and practical application. Globally, more than 75 countries have adopted national CE strategies, reflecting the growing momentum of circular economy initiatives; however, Pakistan is not among them and lags behind many developing nations (Rasheed et al., 2024). Compared with other emerging economies—such as Brazil, China, and India—where CE has gradually been incorporated into industrial policy frameworks, Pakistan’s efforts remain at a pilot stage, reflecting a significant delay relative to other Asian economies (Uwuigbe et al., 2025; Ahmed et al., 2023; Ali et al., 2022). Nevertheless, Pakistan provides a compelling case for research on CE transition, given its high unemployment rate, large youth population, escalating environmental degradation and pollution, chronic waste management challenges, and pervasive inefficiencies in resource utilization. Recent initiatives, including *Clean Green Pakistan*, the ban on single-use plastic bags, energy-efficiency programs, and early-stage CE policies, indicate a positive trajectory (Khan & Flanagan, 2025; Awais et al., 2024; Nisar et al., 2022). However, full-scale implementation remains hindered by structural and



resource constraints, lack of awareness, financial limitations, weak enforcement mechanisms, a shortage of skilled entrepreneurs, and limited grassroots adoption of CE-oriented business practices (Akhtar et al., 2022; Ali et al., 2022). As an emerging economy, Pakistan faces severe ecological degradation and unsustainable consumption patterns, making the transition to a circular economy not merely an option but a strategic necessity (Hassan et al., 2023; Ali et al., 2022; Agyemang et al., 2019).

Pakistan ranks as the fifth most populous country in the world, with rapid urbanization, rising energy consumption, expanding industrial and urban footprints, and growing carbon emissions, all of which are straining its environmental carrying capacity (Ahmad et al., 2022). The country produces over 48 million metric tons of solid waste annually, of which only 60% is collected and a mere 10% is formally recycled. Such systemic inefficiencies exacerbate pollution and environmental degradation while simultaneously leading to the loss of valuable materials and economic opportunities (Ahmad, 2025). In addition, Pakistan is listed among the top ten countries most vulnerable to climate change (Yousaf et al., 2025). At the same time, Pakistan faces pressing socio-economic challenges, particularly in relation to its youth. Nearly 63% of the population is under 30 years of age, representing one of the world's largest proportions of Generation Z (Lodhi, 2024). This demographic holds considerable potential for driving sustainable transitions through entrepreneurship, innovation, and circular economy practices. However, despite the possibility of developing skills such as innovativeness, adaptability, and opportunity recognition through education and training, these capabilities remain largely untapped for sustainability purposes. Youth unemployment remains critically high, with more than 31% of educated young people unemployed (Ahsan & Khan, 2023). Moreover, almost 70% of startups fail within their first two years, primarily due to premature scaling, weak financial resilience, limited sustainable innovation, insufficient entrepreneurial capacity, and poor market adaptation (Raiz, 2024). Harnessing the entrepreneurial traits and sustainable career aspirations of the youth toward circular economy adoption is therefore not simply a developmental opportunity, but an urgent necessity for addressing Pakistan's dual crises of environmental degradation and economic instability. In particular, Punjab Province—home to a significant share of the population and serving as the country's hub for the textile, education, industrial, and agricultural sectors—holds a pivotal role in facilitating the transition to a circular economy and advancing the broader agenda of sustainable development. The paradigm shift from a traditional to a circular economy (CE) presents significant challenges, requiring multi-actor collaboration and systemic interventions across the economic ecosystem. Circular models not only reduce environmental footprints but also generate considerable economic benefits (Barón Dorado et al., 2022). CE implementation can occur at different levels: the national or macro level through policies and institutional frameworks, the industry and firm or meso level, and the individual or micro level. While the urgency of CE adoption is universally recognized, existing studies have largely concentrated on macro-level frameworks such as policies and institutional structures (Cafforio et al., 2025; Ahmadov et al., 2025). However, limited attention has been directed toward the micro level, where attitudinal and behavioral factors—particularly among young, educated citizens—play a decisive role in shaping sustainable development outcomes and circular behavior (Munonye, 2025; Appiah et al., 2023). Within this context, university students emerge as privileged actors in CE transitions. As potential entrepreneurs and future leaders, they are strategically positioned to advance sustainable



development (Lopes et al., 2025). Generation Z in particular represents an untapped reservoir of human capital, capable of driving CE adoption through entrepreneurial innovation, sustainable start-ups, and creativity-driven ventures. Yet, despite their potential, the readiness of higher education institution (HEI) students for CE-focused entrepreneurship remains underexploited. As change agents, innovators, and future leaders, their values, behaviors, and entrepreneurial choices will ultimately determine the degree to which CE practices are adopted in the future marketplace (de las Mercedes Anderson-Seminario & Alvarez-Risco, 2023).

Individual-level traits such as innovativeness and entrepreneurial intentions are critical precursors to CE implementation behavior. Innovativeness reflects an individual's tendency to generate, introduce, and adopt novel ideas, processes, products, and solutions (Al-Romeedy 2025, Wu et al., 2024). Prior research has linked innovativeness with pro-environmental behaviors (Meng et al., 2023; Huang et al., 2021; Cai et al., 2021), yet its direct influence on CE implementation behavior remains largely underexplored. Similarly, entrepreneurial intentions have been examined in relation to startup creation, sustainability-oriented business behavior, and ecological practices (Fonrouge, 2024; Wahyono et al., 2024). However, the mediating role of entrepreneurial intentions in linking innovativeness with CE implementation behavior has not been sufficiently investigated. (Slomski et al., 2024). Importantly, entrepreneurial intentions alone are insufficient to ensure actual CE implementation behavior. For intentions to translate into tangible entrepreneurial practices, they must be reinforced by an individual's willingness to participate in circular business models. Willingness captures the readiness of individuals to actively engage in initiatives that prioritize resource efficiency, environmental restoration, and product-service longevity (Gomes, 2025). When entrepreneurial intentions are strong but willingness to adopt the fundamental rationality of circularity is absent, behavior often fails to align with CE principles (Nuringsih & Nuryasman, 2022; Suchek et al., 2022). This suggests that willingness functions as a moderating mechanism, yet its role in shaping the relationship between entrepreneurial intentions and CE implementation behavior remains under-researched. Thus, examining how innovativeness influence circular economy implementation behavior of the students of HEI in Punjab Pakistan is need of the hour.

Against this backdrop, the present study aims to examine how innovativeness influences CE implementation behavior among university students in Punjab, Pakistan, through the mediation of entrepreneurial intentions and the moderation of willingness to participate in circular business models. Specifically, the study addresses the following research questions: (1) Does innovativeness influence CE implementation behavior among university students? (2) Do entrepreneurial intentions mediate the relationship between innovativeness and CE implementation behavior? (3) Does willingness to participate in circular business models moderate the relationship between entrepreneurial intentions and CE implementation behavior?

Grounded in trait-factor theory, this study posits that innovativeness—an individual personality trait—acts as a precursor of entrepreneurial intentions, which in turn shape behavior toward adopting circular business models. However, this pathway is strengthened when individuals exhibit a strong willingness to participate in circular models. By testing this framework, the study extends trait-factor theory to the domain of circularity and entrepreneurship. The contribution of this research is threefold. First, it enriches the literature on circular entrepreneurship, CE, and sustainable development by investigating the interrelationships among

innovativeness, entrepreneurial intentions, willingness to participate, and CE implementation behavior—areas that remain underexplored. Second, it demonstrates the critical role of university students' personality traits and circular economy implementation behaviors in shaping future trajectories of circular entrepreneurship, thereby emphasizing the untapped potential of Generation Z in Pakistan. Third, it provides actionable insights for policymakers, practitioners, and educators: higher education curricula must intentionally foster innovativeness, entrepreneurial intentions, and willingness to participate in CE models. Such interventions will not only enhance students' readiness to engage in circular entrepreneurship but also accelerate Pakistan's transition toward a circular, resilient, and ecologically sustainable future.

2. Theory and Hypothesis Development

2.1 Theory

Parsons developed an approach related with talent-matching that was transformed into career theory named as trait-factor theory (Parsons, 1909). The primary proposition of the theory is that an idyllic career of an individual relies on matching personal traits with job factor such as aligning personality, values, abilities, and skills of an individual with work and job environment. When the match is better, the level of individual success and satisfaction is higher. The theory is extensively applied in counseling of career for helping the individual to understand values, abilities, and behavior to find best opportunity for career. The theory recommends that career decisions are formulated by the individuals on the basis of their precise insight of their personal traits including their capabilities, interests, and aptitudes. Undeniably, knowledge about the job market is significant factor shaping the willingness of the individual to make career related decisions. The theory elucidate that how individuals who are innovative select their career where they perceive good compatibility (Goldsmith & Foxall, 2003). The research study is grounded on the Trait-factor theory developed by (Parsons, 1909) the study claims that innovativeness is a personality trait of individuals inclining them towards identifying opportunities, creativeness, and experimentation. The theory states that the behaviors of individuals related with career arise when the traits of individual is aligned with their pertinent professional or social demands. In the context of present study, the students of university who are representing a crucial segment of potential entrepreneurs interpret their innovativeness into their entrepreneurial intentions when they have a perception that entrepreneurship is harmonious with their values and abilities. Such intentions acts as a perceptive mechanism transforming the traits into sustainability based actions, particularly circular economy implementation behavior. Furthermore, the theory also stresses the role of situational and attitudinal factors such as willingness to participate in circular business models as a conditional process that augment the link of trait and behavior.

2.2 Hypothesis Development

2.2.1 Innovativeness and Circular Economy Implementation Behavior

Innovativeness provides the essential cultural and cognitive foundations for challenging the conventional linear economy paradigm and embracing new business models that prioritize resource efficiency, product durability, and waste minimization (Avunduk, 2023). Individuals and organizations that value innovativeness are more likely to explore unconventional approaches to product design, adopt eco-friendly materials, and invest in practices such as recycling and reuse (Zhang et al., 2025). Moreover, innovativeness fosters risk-taking and experimentation, enabling individuals to test alternative solutions and develop creative responses to sustainability challenges



(Delgado-Verde & Franco-Curiel, 2025). As an action-oriented personality trait, innovativeness reflects openness, curiosity, and the ability to generate and apply novel ideas, processes, business models, and technologies (Branca et al., 2025). Such characteristics are particularly relevant for advancing circular economy (CE) practices, which emphasize reprocessing, remanufacturing, product-life extension, and resource recovery. Implementing CE practices demands not only technical capabilities but also a mindset that embraces change, complexity, and forward-thinking (Chenavaz & Dimitrov, 2024). Innovativeness supports this mindset by promoting proactive learning, responsiveness to environmental pressures, and receptiveness to eco-innovation (Šimelytė, 2025). Individuals with traits like innovativeness are therefore more inclined to support sustainability-oriented initiatives, pursue eco-innovation, and exhibit behaviors consistent with CE principles (Appiah et al., 2023). Empirical studies further reinforce this perspective, showing that innovativeness is a key driver of circularity in businesses and is required at both strategic and operational levels to enable a successful transition to circular models (Perotti et al., 2025; Hojnik et al., 2024; Osei-Tutu et al., 2024; Ali et al., 2024). From the lens of trait-factor theory, students with strong innovative tendencies align well with the growing societal demand for circular business models, positioning them as likely participants in CE implementation behavior. Drawing on the above arguments, the following hypothesis is proposed:

H1: Innovativeness significantly influences circular economy implementation behavior of the students.

2.2.2 Mediation of Entrepreneurial Intentions

According to Schlaegel et al., (2021) Innovativeness is widely recognized as the generation and introduction of novel ideas, concepts, goods and services, processes, and approaches that drive significant improvements across economic and social domains. It plays a central role in fostering economic growth, improving quality of life, and addressing societal challenges. Within entrepreneurship, innovativeness functions as a critical tool for leveraging change, enabling individuals to adapt and compete in dynamic environments. Ugwueze et al. (2022), Argued that innovativeness plays a central role in fostering economic growth, improving quality of life, and addressing societal challenges. Within entrepreneurship, innovativeness functions as a critical tool for leveraging change, enabling individuals to adapt and compete in dynamic environments. Among students, innovativeness has been identified as a dominant trait of entrepreneurial behavior, fostering creativity, risk-taking, and experimentation (Ike et al., 2025). Innovativeness in the field of entrepreneurship is defined as investigation and adoption of creativity for generating unique models, goods and services, procedures, technologies, and techniques (Al-Romeedy 2025, Wu et al., 2024). It reflects the capacity to explore and apply creative ideas in the design of unique models, products, services, and technologies (Al-Romeedy, 2025; Wu et al., 2024), while also equipping students with the ability to test unconventional concepts and bring innovative goods and services to market (Gazi et al., 2025). Prior research has shown that innovativeness contributes to multiple entrepreneurial outcomes, including entrepreneurial intentions, willingness, and role-model behaviors Abdelwahed & Ramish, (2025). Innovative students are more likely to demonstrate determination and persistence in entrepreneurial engagements, whereas low levels of innovativeness are associated with self-doubt, fear of failure, and reluctance to engage in entrepreneurial activities (Pan et al., 2022; Alves & Yang, 2022). This evidence suggests that innovativeness serves as a critical antecedent to entrepreneurial intentions. Along with this, the



results of research conducted by Ihou & Mansingh, (2025) highlighted that innovativeness influences entrepreneurial intentions of the individuals which is demonstrated by them through innumerable traits including actions, behaviors, attentiveness, usage of technology in order to enhance strategy of the business. A context which is described by extreme rivalry and numerous hindrances faced in competition, instigating strategies of open innovativeness that works as a means of differentiation (Poulova et al., 2024). Moreover, when innovative approaches are embraced it is helpful for the advancement and enhancement of the commercial efforts of the social enterprises. From the point of view of Chaudhary & Biswas, (2024) in entrepreneurial endeavors in students possessing innovativeness expedite the foundation of new methodologies and add pointedly to reaching significant accomplishments. In the entrepreneurship actions the demand for innovation is up surging progressively. The findings of research by Lone & Baba, (2024) stated that startup business ventures which holds a weighty percentage primarily experienced failure and the reason of their failure was that they lack innovativeness. Previous studies showed that different positive and significant outcomes are influenced by innovativeness such as entrepreneurial intention (Thuc, 2024), manifestation of entrepreneurial role models (Alam, 2025) and entrepreneurial willingness (Martins et al., 2023). The results of the studies determines that when an individual is strongly inclined towards innovativeness it results in greater level of inclination of the individual be it a student to expend considerable attention and exhibit determination when taking part in entrepreneurial engagements. Contrary to this, when the students pays less attention to innovativeness their tendency to show self-doubt is higher (Ike et al., 2025) and their concerns to experience setbacks and failures are increased (Pan et al., 2022), and their willingness to engage in entrepreneurial actions and activities also reduced (Alves & Yang, 2022).

Entrepreneurial intentions as a crucial motivational and psychological element gained significant attention of the researcher and scholarly interest in the recent times because of its critical part to drive innovative and conservational behavior (Wahyono et al., 2024). Since entrepreneurial intentions are considered to be deliberate commitment or plan of a student to engage in entrepreneurial actions that are influenced by their aspiration to recognize and exploit unique prospects (Blanco-Mesa et al., 2024). The research study of Fonrouge, (2024) concluded that when the entrepreneurial intentions of the individual is aligned with sustainability objectives, it leads towards circularity behavior as the individual is persuaded to creation of projects and business models that focus on incorporation of reducing wastage, systems based on closed-loop, and usage of resources in an effective way. According to Slomski et al., (2024), when the entrepreneurial intentions of the students are strong, they challenge the outdated procedures and processes of doing business with new and innovative business model so that the business can promote conservational and circular practices for remanufacturing, repairing and reusing, redesigning, and ecofriendly startups and ventures. Entrepreneurial attitude and intentions are foundational for circular economy implementation behavior requiring shift in paradigm from linear to circular models (Minh & Cuong, 2025).

Although innovativeness is an important driver of CE practices, its impact on CE implementation behavior is not always direct. Empirical evidence suggests that innovativeness primarily shapes entrepreneurial intentions (Ike et al., 2025; Chaudhary & Biswas, 2024) which in turn influence ecological and sustainability behaviors (Paiva et al., 2024; Yasir et al., 2023). Likewise the research study Al-Mamary, (2025) For instance, individuals with high levels of

innovativeness combined with strong entrepreneurial intentions are more likely to engage in green entrepreneurship and launch sustainability-oriented ventures (Park et al., 2025). This implies that entrepreneurial intentions act as a mediating mechanism, channeling the innovative predispositions of students into tangible circular behaviors such as initiating green ventures, developing eco-friendly products, or promoting reprocessing and recycling campaigns. From the perspective of trait-factor theory, students' career behaviors emerge from the interaction of personal traits, social opportunities, and individual intentions. Accordingly, innovativeness as a personal trait stimulates entrepreneurial intentions, which then translate into CE implementation behavior. Based on this reasoning, the following hypotheses are proposed:

H2: Innovativeness significantly influence entrepreneurial intentions of the students.

H3: Entrepreneurial intentions significantly influence circular economy implementation behavior of the students.

H4: Entrepreneurial intentions mediates the influence of innovativeness on circular economy implementation behavior of the students.

2.2.3 Moderation of Willingness to participate in the Circular Business Model

Willingness to participate in circular business models (CBMs) reflects an individual's inclination, openness, and readiness to support ventures based on principles of regeneration, reprocessing, recycling, reuse, and remanufacturing (Borrello et al., 2020). This willingness plays a pivotal role in determining whether individuals are prepared to shift from conventional linear behaviors to circular practices, as it is closely tied to their prioritization of sustainability and their readiness to engage in CE-driven ventures (Gomes, 2025). While entrepreneurial intentions capture the motivational drive of students to initiate a business (Kariv et al., 2025), willingness to participate in CBMs reflects a more specific attitudinal and behavioral orientation toward sustainable and circular practices (Grilló-Méndez et al., 2025). Students with strong entrepreneurial intentions are more likely to adopt circular practices when their willingness to embrace circularity is high. Conversely, even when intentions are strong, a lack of willingness may lead them to pursue conventional, linear business models due to limited exposure or awareness of circular opportunities (Suchek et al., 2022). Students with strong entrepreneurial intentions are not able to pursue circular business model and they prefer traditional, conventional, and linear ideas of starting their own business because of their lack of exposure to circularity. In this sense, willingness functions as a catalyst that amplifies the effect of entrepreneurial intentions on CE implementation behavior. Previous research supports this view, showing that ecological commitment and circular orientations strengthen the translation of sustainable intentions into actual entrepreneurial practices Jabbour et al., (2019). Although entrepreneurial intentions are widely acknowledged as a critical driver of circular and sustainability-oriented behaviors (Nuringsih & Nuryasman, 2022), they do not automatically translate into CE implementation. Thus, willingness to participate in CBMs emerges as a boundary condition that ensures intentions are converted into circular actions. Grounded in trait-factor theory, willingness to engage in CBMs complements students' personality traits and entrepreneurial intentions by reflecting attitudinal openness to sustainability. It thereby moderates the relationship between entrepreneurial intentions and CE implementation behavior. Based on these arguments, the following hypothesis is proposed:

H5: Willingness to participate in the circular business model moderates the entrepreneurial intentions on circular economy implementation behavior of the students.

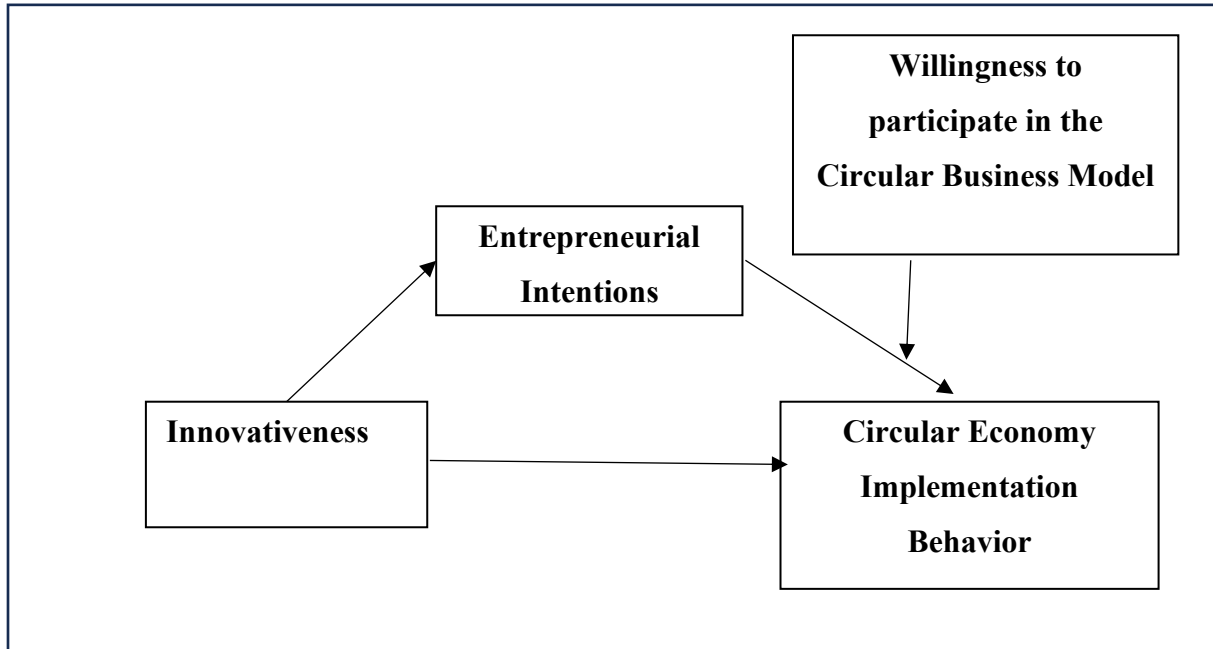


Figure 1: Research Model

3. Methodology

3.1 Research Design, Population, and Sample

The present study aimed to investigate the influence of innovativeness on circular economy (CE) implementation behavior among students in Higher Education Institutions (HEIs), with entrepreneurial intentions as a mediating mechanism. In addition, the study examined the moderating role of willingness to participate in circular business models in the relationship between entrepreneurial intentions and CE implementation behavior. A quantitative research methodology with a cross-sectional design was employed, adopting a deductive approach. Data were collected through a self-administered survey questionnaire distributed among Generation Z students enrolled in HEIs across Punjab, Pakistan. As Pakistan ranks fifth among the world's most populous countries, and Punjab is its most densely populated province, the region provides a relevant and significant context for exploring youth-driven transitions toward circular entrepreneurship (Ahmad et al., 2022). Specifically, the Province of Punjab holding a larger portion of population and known as an economic and educational hub as it hosts a substantial number of HEIs and home for top-tier degree awarding institutes. According to the report of Higher Education Commission, (2022) largest number of degree awarding institutes are in Punjab and also Punjab has higher number of enrollment of students in HEIs. Students are selected due to their understanding of the entrepreneurial processes and procedures (Batool et al., 2023; Fuller et al., 2018) and also because of their primary role as future innovators, entrepreneurs, and champions of sustainability. The study employed a stratified random sampling technique. In the first stage, two strata were created, comprising public and private HEIs in Punjab. Lists of enrolled students were obtained from the respective institutions, and universities with proportionally higher student



enrollments were selected from both strata. Consequently, 8 public universities and 15 private universities were included in the sample frame. In the second stage, students were randomly selected from these universities. A total of 600 questionnaires were distributed to potential participants between March 2025 and August 2025. Of these, 330 were returned fully completed and were deemed usable for the final analysis, representing a valid response rate of 55%. To reduce common method bias, the participants of study were already informed about the research objectives and it was ensured that their responses will be kept anonymous and also confidential (Podsakoff et al., 2003). The participants participated in the survey voluntarily and they were not given any incentive to be the part of research.

3.2 Measures

In order to measure innovativeness, the scale adopted by Mueller and Thomas, (2001) was used in the study consisting of eight items. For measuring entrepreneurial intentions, the scale used by Liñán et al., (2011) was used in the study having six items. To measure willingness to participate in circular business models the scale was adapted from Hao et al. (2020) comprising of six items. Circular economy implementation behavior scale was used which was revised by Appiah et al. (2023) but originally developed by Kusi-Sarpong et al. (2021). Appiah et al. (2023) measured the behavior in the organizational setting and in the present study the scale was adapted for assessing the same behavior among the students who have entrepreneurial intentions. The scale was adapted by replacing “our company” with “my company will” for gauging the behavior of the future entrepreneurs. Previous studies also demonstrated the use of instrument used in the organizational context in educational or entrepreneurial or vice versa (Kabir et al., 2023; Martin-Navarro et al., 2021; Gorostiaga et al., 2019; Satar & Natasha, 2019).

4. Analysis and Results

4.1 Demographics Analysis

The demographic information of the respondents indicates a diverse mix in terms of gender, age, education, specialization, and family business involvement. Out of the total sample of 330 participants, a significant majority were male, comprising 254 individuals (77%), while females accounted for 76 respondents (23%). Regarding age distribution, the largest group fell within the 41–50 years range, representing 107 respondents (32.4%). This was followed by 89 respondents (27%) aged between 31–40 years, and 77 respondents (23.3%) aged 20–30 years. The smallest proportion, 57 respondents (17.3%), were in the 51–60 years age group.

In terms of educational qualifications, most participants (209, or 63.3%) had completed their graduation, while the remaining 121 respondents (36.7%) had an education level below graduation. Examining their field of specialization, the same proportion—63.3%—were from business-related disciplines, whereas 36.7% had a non-business background. When asked about involvement in a family business, 154 respondents (46.7%) confirmed having such a background, while the majority, 176 respondents (53.3%), reported no connection to a family-owned business. This demographic profile provides useful insights into the composition of the study sample, reflecting diversity in professional background, education, and entrepreneurial exposure.

Table 4.1: Demographical Analysis

Demographics	Categories	N	%
Gender	Male	254	77.0



	Female	76	23.0
	Total	330	100.0
	20-30year	77	23.3
Age	31-40 year	89	27.0
	41-50 year	107	32.4
	51-60 year	57	17.3
	Total	330	100.0
Education	Graduation	209	63.3
	Under Graduation	121	36.7
	Total	330	100.0
	Business	209	63.3
Specialization	Non- business	121	36.7
	Total	330	100.0
Family Business	Yes	154	46.7
	No	176	53.3
	Total	330	100.0

4.2 Data Normality test

The descriptive statistics present an overview of the central tendency, variability, and distribution pattern for each variable in the study. The mean score for Innovativeness is 3.5848 with a standard deviation of 0.57529, indicating that responses were moderately clustered around the mean. The negative skewness value (-0.481) suggests that slightly more respondents rated innovativeness higher than the average. The kurtosis value (-0.552) shows a relatively flatter distribution compared to a normal curve. For Entrepreneurial Intention, the mean is 3.5758 and the standard deviation is 0.58942, reflecting moderate variation among responses. A skewness of -0.551 indicates a tendency towards higher ratings, while the positive kurtosis value (0.168) suggests a distribution slightly more peaked than normal.

The Willingness to participate in the Circular Business Model has a mean of 3.4859 and a standard deviation of 0.78031, representing the highest variability among the variables. The skewness (-0.723) indicates more responses leaning towards higher values, while kurtosis (-0.147) shows a nearly flat distribution. Lastly, Circular Economy Implementation Behavior has a mean of 3.5715, with a standard deviation of 0.62671. Its skewness (-0.790) reflects a stronger tendency towards higher ratings, and the kurtosis (0.299) indicates a slightly peaked distribution (Table 4.2)

Table 4.2: Skewness and Kurtosis

Variable	Mean	St. Deviation	Skewness	Kurtosis
Innovativeness	3.5848	.57529	-.481	-.552
Entrepreneurial Intention	3.5758	.58942	-.551	.168

Willingness to participate in the Circular Business Model	3.4859	.78031	-.723	-.147
Circular Economy Implementation Behavior	3.5715	.62671	-.790	.299

4.3 Reliability and Validity

The table 4.3 provides the reliability and validity statistics for the study variables. Innovativeness shows a Cronbach’s Alpha of 0.912 across 8 items, indicating excellent internal consistency. Its Average Variance Extracted (AVE) is 0.700, confirming strong convergent validity. Entrepreneurial Intention has a Cronbach’s Alpha of 0.837 with 6 items, reflecting good reliability, and an AVE of 0.650, which meets the acceptable threshold for validity. Willingness to Participate in the Circular Business Model records a Cronbach’s Alpha of 0.879 with 6 items, also indicating high reliability, and an AVE of 0.651, suggesting adequate convergent validity. Circular Economy Implementation Behavior has the lowest Cronbach’s Alpha value of 0.722 across 5 items, which still falls within the acceptable range for research, while its AVE is 0.510, meeting the minimum criterion for convergent validity. Overall, the statistics confirm that all constructs are both reliable and valid for analysis.

Table 4.3: Reliability and Validity

Variable	Cronbach Alpha	Items	AVE
Innovativeness	0.912	08	.700
Entrepreneurial Intention	0.837	06	.650
Willingness to participate in the Circular Business Model	0.879	06	.651
Circular Economy Implementation Behavior	0.722	05	.510

Table 4.4 Hetero Trait Mono Trait Method

Items	INN	EI	WTP	CEIB
Innovativeness	.790**			
Entrepreneurial Intention	.770**	.750**		
Willingness to participate in the Circular Business Model	.651**	.589**	.670**	
Circular Economy Implementation Behavior	.432**	.522**	.262**	.570**

The table 4.4 presents the correlation coefficients between the four study variables: Innovativeness (INN), Entrepreneurial Intention (EI), Willingness to Participate in the Circular Business Model (WTP), and Circular Economy Implementation Behavior (CEIB). Innovativeness shows a strong positive correlation with Entrepreneurial Intention ($r = 0.770, p < 0.01$) and a similarly strong relationship with Willingness to Participate in the Circular Business Model ($r = 0.651, p < 0.01$). Its correlation with Circular Economy Implementation Behavior is moderate ($r = 0.432, p < 0.01$). Entrepreneurial Intention also correlates positively with WTP ($r = 0.589, p < 0.01$) and shows a moderate correlation with CEIB ($r = 0.522, p < 0.01$). WTP has a moderate positive correlation with CEIB ($r = 0.262, p < 0.01$), which is the lowest among the reported values. Overall, all relationships are statistically significant at the 1% level, indicating that higher levels



of innovativeness, entrepreneurial intention, and willingness to participate are generally associated with greater circular economy implementation behavior.

4.4 Correlation

The diagonal values represent the correlation of each variable with itself, which is always 1. The off-diagonal values show the strength and direction of relationships between variables. Innovativeness is strongly and positively correlated with Entrepreneurial Intention ($r = 0.770, p < 0.01$) and moderately correlated with WTP ($r = 0.651, p < 0.01$). Its relationship with CEIB is weaker but still significant ($r = 0.432, p < 0.01$). Entrepreneurial Intention has a moderate positive correlation with WTP ($r = 0.589, p < 0.01$) and with CEIB ($r = 0.522, p < 0.01$). WTP shows the weakest correlation with CEIB ($r = 0.262, p < 0.01$), though the relationship remains significant. Overall, the results indicate that all variables are positively and significantly related, suggesting that higher innovativeness, entrepreneurial intention, and willingness to engage in circular models are associated with better circular economy implementation behavior.

Table 4.5: Correlation

Items	INN	EI	WTP	CEIB
Innovativeness	1			
Entrepreneurial Intention	.770**	1		
Willingness to participate in the Circular Business Model	.651**	.589**	1	
Circular Economy Implementation Behavior	.432**	.522**	.262**	1

4.5 Mediation Analysis

Model: 4

Y: CEIB

X: INN

M: EI

Sample

Size: 330

Outcome Variable

EI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.7697	.5925	.1420	476.8873	1.0000	328.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
Constant	.7486	.1311	5.7094	.0000	.4907	1.0065
INN	.7886	.0361	21.8377	.0000	.7176	.8597

Outcome variable

CEIB

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5245	.2751	.2865	62.0341	2.0000	327.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
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Constant	1.5144	.1953	7.7558	.0000	1.1303	1.8985
INN	.0789	.0804	.9823	.3267	-.0791	.2370
EI	.4962	.0784	6.3267	.0000	.3419	.6504

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
.0789	.0804	.9823	.3267	-.0791	.2370

Indirect effect(s) of X on Y

Effect	BootSE	BootLLCI	BootULCI
EI	.3913	.0572	.2785 .5068

Level of confidence for all confidence intervals in output: 95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals: 5000

This analysis used Model 4 of Hayes' PROCESS macro to test a simple mediation model where Innovativeness (INN) is the independent variable, Entrepreneurial Intention (EI) is the mediator, and Circular Economy Implementation Behavior (CEIB) is the dependent variable.

First stage (X → M)

The regression model predicting EI from INN shows a strong relationship ($R = 0.7697$, $R^2 = 0.5925$), meaning that about 59% of the variance in EI is explained by INN. The coefficient for INN ($B = 0.7886$, $p < 0.001$) indicates that higher innovativeness significantly increases entrepreneurial intention.

Second stage (X, M → Y)

When predicting CEIB from both INN and EI, the model explains 27.51% of the variance ($R = 0.5245$, $p < 0.001$). EI has a significant positive effect on CEIB ($B = 0.4962$, $p < 0.001$), while INN's direct effect is not significant ($B = 0.0789$, $p = 0.3267$).

Direct and Indirect effects

The direct effect of INN on CEIB is small and not significant. The indirect effect via EI is significant ($B = 0.3913$, 95% CI [0.2785, 0.5068]), confirming full mediation. This means innovativeness influences CEIB primarily through its effect on entrepreneurial intention rather than directly.

4.6 Moderation

Model: 1

Y: CEIB

X: EI

W: WTP

Sample

CEIB

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5255	.2762	.2869	41.4572	3.0000	326.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
Constant	1.4827	.7273	2.0387	.0423	.0520	2.9134
EI	.6391	.2091	6.0561	.0024	.2277	1.0505
WTP	.0107	.2285	.0470	.0026	.4603	.4388



Int_1 .0125 .0621 .0013 .0006 .1346 .1096

Product terms key

Int_1 : EI x WTP

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0001	.0405	1.0000	326.0000	.0006

Level of confidence for all confidence intervals in output: 95.0000

This analysis applies Model 1 of Hayes' PROCESS macro to examine whether Willingness to participate in the Circular Business Model (WTP) moderates the relationship between Entrepreneurial Intention (EI) and Circular Economy Implementation Behavior (CEIB).

Model Summary

The model explains 27.62% of the variance in CEIB ($R = 0.5255$, $R^2 = 0.2762$, $F = 41.4572$, $p < 0.001$), showing that the predictors collectively have a significant effect.

Main Effects

- EI → CEIB: The coefficient ($B = 0.6391$, $p = 0.0024$, 95% CI [0.2277, 1.0505]) indicates a significant positive relationship—higher entrepreneurial intention is linked to higher CEIB.
- WTP → CEIB: The coefficient ($B = 0.0107$, $p = 0.0026$) suggests a small but statistically significant main effect of willingness to participate on CEIB.
- Interaction (EI × WTP): The interaction term ($B = 0.0125$, $p = 0.0006$) is statistically significant, meaning WTP moderates the effect of EI on CEIB.

Interpretation of Moderation

The significant interaction shows that the strength of the relationship between entrepreneurial intention and CEIB changes depending on the level of willingness to participate. Specifically, higher WTP amplifies the positive influence of EI on CEIB.

5. Discussion and Conclusion

The transition from individual intention to actual behavior is widely acknowledged as a complex and challenging process, particularly in the domains of entrepreneurial initiatives based on circular business models and circular economy implementations. This study aims to understand the relationship between innovativeness and circular economy implementation behavior through entrepreneurial intentions, with the perspective of trait-factor theory. Furthermore, the study examines the moderating role of willingness to adopt circular implementation behavior in strengthening the influence of entrepreneurial intentions on circular economy implementation behavior. This research highlights how innovativeness not only fosters entrepreneurial intentions among students of HEIs but also facilitates the translation of those intentions into actual circular economy practices at entry level. The findings shows that the influence of innovativeness on students' circular economy implementation behavior is both significant and positive (H1 supported). Innovativeness is identified as a critical psychosocial trait that drives individuals toward conservation-oriented and sustainable transformation. In line with trait-factor theory, innovativeness reflects a behavioral orientation that fosters experimentation, motivates individuals to adopt novel business models, and aligns with the growing demand for circular practices. Students with higher innovativeness are more likely to embrace new approaches to business, design creative and sustainable models, and engage in practices such as waste reduction, reuse,



recycling, and resource efficiency (Gazi et al., 2025). These findings are consistent with prior studies identifying innovativeness as a key antecedent of sustainable behavior (Meng et al., 2023; Huang et al., 2021; Cai et al., 2021) and a driver of circularity (Appiah et al., 2023). Extant literature further shows that innovativeness is essential for the transition from linear to circular business models at both operational and strategic levels (Perotti et al., 2025; Hojnik et al., 2024; Osei-Tutu et al., 2024; Ali et al., 2024). Within the context of Punjab, Pakistan—where sustainability remains an emerging discourse—innovative students may view circularity as an opportunity to address economic and environmental challenges. Such a perspective positioned them to demonstrate proactive behavior in implementing circular economy practices.

The results of this study highlight that entrepreneurial intentions mediate the influence of innovativeness on students' circular economy implementation behavior (H2, H3, and H4 supported). This suggests that intentions constitute critical rational stage through which awareness is translated into concrete behavior and action. Consistent with previous research, the study shows that entrepreneurs' intentions to establish new ventures are strongly dependent on their degree of trait innovativeness (Ihou & Mansingh, 2025; Thuc, 2024; Poulouva et al., 2024). Conversely, individuals with low innovativeness, face greater risks of entrepreneurial failures, and demonstrate weaker readiness to engage in entrepreneurship (Pan et al., 2022; Alves & Yang, 2022). These findings reaffirm trait-factor theory, which posits that sustainable career choice behavior—such as circular economy implementation—emerge from the fit between personality traits and entrepreneurial intentions. Prior studies support this view, that students with high levels of innovativeness are more inclined toward entrepreneurial endeavors and willing to take risks (Ike et al., 2025; Chaudhary & Biswas, 2024). Entrepreneurial intentions therefore serve as a crucial motivational and psychological mechanism that channels innovative dispositions into entrepreneurial and sustainability-oriented behaviors (Wahyono et al., 2024). When aligned with sustainability objectives, entrepreneurial intentions foster the adoption of circular entrepreneurial practices (Fonrouge, 2024), including remanufacturing, refurbishing, recycling, restructuring, and the creation of sustainable business ventures (Blanco-Mesa et al., 2024; Slomski et al., 2024). Consistent with the prior research findings, entrepreneurial intentions provide the pathway through which innovativeness is translated into implementation of circular economy behavior, bridging the gap between personal traits and practical implementation. (Ike et al., 2025; Lopes et al., 2025; Chaudhary & Biswas, 2024; de las Mercedes Anderson-Seminario & Alvarez-Risco, 2023).

This study further highlighted that willingness to participate in circular business models strengthen the relationship between entrepreneurial intentions and circular economy implementation behavior (H5 supported). This aligns with trait-factor theory, which emphasize the role of personal inclinations in strengthening the link between traits and behaviors. Specifically, the impact of entrepreneurial intentions on circular economy implementation behavior becomes stronger when students exhibit higher willingness to engage in circular business models. This supports prior evidences that the intention-behavior relationship alone may be insufficient to induce favorable outcomes; instead, it is reinforced by individual values, sustainability awareness, and willingness to participate in circular business models (Basu, 2024; Ndofirepi, 2022; Prabowo et al., 2022). Similarly, entrepreneurial intentions alone may not fully predict circular entrepreneurial behavior without educational support and readiness to act (Shenmiao & Bin Kamruddin, 2024). Thus willingness to participate in circular business models act as a behavioral

catalyst, reflecting both readiness and commitment to transform students' intentions into entrepreneurial action. This moderating mechanism contributes in understanding that how students can be positioned as future entrepreneurs who actively advance circularity and sustainable development.

5.1 Practical Implications

This study provides several practical implications. First, it emphasizes the importance of integrating circularity and sustainability concepts into entrepreneurship curricula. Higher education institutions (HEIs) in Punjab, Pakistan, and beyond can design interdisciplinary modules that incorporate eco-innovation, logical reasoning, cognitive analysis, and sustainable business modeling, thereby preparing students with the intent and skills to implement circular business practices in real-world settings. The findings also offer valuable insights for the Higher Education Commission of Pakistan, particularly in Punjab, to create and strengthen an ecosystem that supports circular entrepreneurship by funding ventures, start-up projects, and incubation centers. Specifically, programs that stimulate readiness and willingness can help convert sustainability awareness into action. At the institutional level, HEIs can play a proactive role through developing sustainable campus societies, innovation laboratories, and zero-waste projects, which are likely to encourage circular economy implementation behavior. The study underscores that project-based learning, where students design solutions to real-life challenges is especially effective for entrepreneurial intentions into practice. Industry partners can further strengthen this process by offering trainings applied exposure, and practice-oriented opportunities that enhance innovation capabilities and sustainable outlook among students. Moreover, identifying students with high innovativeness and entrepreneurial intentions allows institutions to allocate resources strategically, directing mentoring and funding toward those most likely to succeed in circular ventures. Collectively, these strategies can cultivate a new generation of entrepreneurs equipped to advance social, environmental, and economic transformation through circularity.

5.3 Theoretical Implications

This study extends the circular entrepreneurship literature by integrating behavioral elements at the individual level, particularly entrepreneurial intentions and innovativeness, as critical drivers of circular economy implementation behavior. While prior studies have predominantly explored circularity through policy-oriented and institutional-level frameworks (Cafforio et al., 2025; Ahmadov et al., 2025), this study introduces an individual-level lens showing how students' innovativeness and entrepreneurial intentions shape their inclination to adopt circular economy business models in their future entrepreneurial endeavors. Drawing on trait-factor theory, the study emphasizes that innovativeness and entrepreneurial intentions are closely associated to sustainable behavior, thereby bridging the gap between two domains often treated separately—circularity and entrepreneurship. The study also emphasizes that sustainability and entrepreneurship education must be integrated to foster sustainable entrepreneurial intentions and behaviors among students (Shenmiao & Bin Kamruddin, 2024). Empirical evidences from this study supports the view that innovativeness is a vital antecedent of circular behavior, as it channels individual traits into environmentally motivated efforts (Ike et al., 2025; Lopes et al., 2025; Chaudhary & Biswas, 2024; de las Mercedes Anderson-Seminario & Alvarez-Risco, 2023). Furthermore, this study advances theoretical understanding by examining the moderating role of willingness to participate in circular business models in the intention–behavior relationship, thus,



challenging the conventional viewpoint that intentions alone are sufficient to drive behavior. IT aligns with the growing body literature of suggesting that conditional factors—such as individual values, sustainability awareness, willingness, institutional or environmental support, and educational readiness—are essential in shaping behavioral outcomes (Basu, 2024; Ndofirepi, 2022; Prabowo et al., 2022). Finally, by focusing on higher education students in Punjab, Pakistan, the study addresses a notable gap in circular economy research in developing economies, offering culturally relevant insights and extending the applicability of circular economy models across the study addresses a notable gap in the literature by investigating behavioral aspects of the circular economy in an emerging country context. Research on circular behavior in developing economies such as Pakistan remains limited; hence, the present study enriches the discourse by focusing on higher education students in Punjab, Pakistan. By doing so, it not only provides culturally relevant insights but also extends the generalizability of circular economy models and their implementation behavior across diverse contexts.

5.4 Research Limitations and Future Directions

Despite offering several theoretical and practical contributions, this study is not without limitations, which open promising avenues for future research. First, the study was conducted exclusively within Punjab, the largest province of Pakistan, thereby constraining the generalizability of its findings. Future research could broaden the scope by incorporating other provinces, diverse regions, or cross-country contexts, which would enhance the external validity of the results and enable meaningful comparative insights. Second, the reliance on a cross-sectional design poses the risk of common method bias and restricts the capacity to establish causal relationships. To address these concerns, future studies are encouraged to adopt longitudinal or experimental designs, which would allow stronger causal inferences and an in depth understanding of temporal dynamics. Third, this research employed a purely quantitative approach, which, effective for testing relationships, limited exploration of the underlying mechanisms shaping participants' attitudes and behaviors. Future studies could incorporate qualitative or mixed methods to yield richer and more contextualized insights. Lastly, the use of self-reported data may have introduced social desirability bias. Incorporating multiple data sources, behavioral measures, or longitudinal tracking would enhance robustness and validity.

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