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Aims and scope

IGEE Proceedings is an international, multidisciplinary, scholarly, peer-reviewed, and open-access journal that aims to publish original research, review, and perspective papers across all fields relevant to achieving the 17 United Nations Sustainable Development Goals (SDGs). We aim to foster a holistic and integrated approach to sustainable development research by bringing together various disciplines and fields. *IGEE Proceedings* intends to help researchers, policymakers, practitioners, and the general public understand how to ensure the well-being of current and future generations by addressing complex social, environmental, and technological problems that pose sustainability challenges, which cannot be tackled in isolation.

We welcome submissions from researchers worldwide, with an emphasis on promoting diversity, equity, and inclusion. *IGEE Proceedings* values research that helps develop a better conceptual base for understanding sustainability and the social responsibility of organizations/institutions across borders. We encourage authors to explore innovative approaches and practical solutions that advance sustainable development in various contexts, including local, regional, national, and global levels. Our ultimate goal is to contribute to sustainable development by disseminating high-quality research that informs policymaking, decision-making, and public awareness.

We are open to accepting papers related to the SDGs, and we encourage authors to address issues related to various aspects of the SDG Framework, including, but not limited to, sustainable development, climate change, energy, food systems, water, biodiversity, health, education, poverty, inequality, and peace.

IGEE Proceedings accepts papers that have been previously published (within one to two years), as long as they are revised and refined according to our aim and scope. We publish articles electronically in English throughout the year and compile them three times a year for electronic and print publication.

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Perspective

Time for Action: Emerging Technology & Global Solidarity

Arturo Condo*

EARTH University & University Global Coalition (UGC)

No person, no institution, no country can advance the global agenda alone.

Secretary General Guterres reminded us last year in the UN's Sustainable Development Goals Report:

"Despite… important gains, conflicts, climate chaos, geopolitical tensions, and economic shocks continue to obstruct progress at the pace and scale needed to meet the 2030 targets. This year's Sustainable Development Goals Report finds that only 35% of SDG targets are on track or making moderate progress. Nearly half are moving too slowly, and, alarmingly, 18% are in reserve. We face a global development emergency." (UN DESA, 2025)

It is because of this development stagnation that gatherings such as GEEF and global networks such as the University Global Coalition (UGC) and the United Nations Academic Impact (UNAI), among others, are more important today than ever.

The University Global Coalition emerged in 2019 from the recognition that universities must contribute meaningfully to the SDGs and move beyond isolated efforts to coordinated and collaborative transformation. UGC brings together a network of 191 global Higher Education Institutions across all regions. The coalition was created with support from the Rockefeller Foundation, a group of university presidents from Europe, Asia, Africa, and North and South America, and UNITAR. The consensus among the founding partners was that "universities not only have the opportunity, but also an obligation, to do whatever is in their power to educate and inspire students to play an active role in addressing the most pressing issues confronting our world today, produce new ideas that can lead to new solutions, and collaborate with other organizations to create awareness, support, and even lead local and global efforts." (University Global Coalition, 2019)

Similarly, UNAI is "an initiative that engages institutions of higher education with the United Nations in supporting and

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The Global Engagement & Empowerment Forum on Sustainable Development (GEEF) 2026, hosted by Yonsei University, was successfully held over two days from March 12 to 13, 2026. Addressing global challenges such as climate change, inequality, and humanitarian crises requires stronger international cooperation and collective action than ever before. GEEF 2026 serves as a global platform that moves beyond dialogue toward real action and measurable impact. As part of this year's keynote, President Arturo Condo, President of EARTH University, reflected on the urgent need for collective action to achieve the Sustainable Development Goals (SDGs).

contributing to the realization of the Organization's purposes and principles, including the promotion and protection of human rights, access to education, sustainability and conflict resolution" (United Nations Academic Impact, n.d.).Through its network of over 1,800 institutions in over 150 countries, UNAI functions as a global network that connects knowledge with the priorities of humanity.

These university networks were not created for visibility. They were created to align with humanity's needs, encourage a shared purpose, and execute global collective action.

These platforms remind us that while each university is unique, our responsibility is shared.

Universities occupy a singular position in society:

- We generate knowledge.
- We convene diverse voices.
- We engage with communities.
- And most importantly, we educate the leaders of tomorrow and today.
- We need to create a greater space for youth leadership in our world.

Because of this responsibility, we have something very few institutions have:

The capacity not only to respond to the future, but to shape it.

Together, our impact can be even greater. But to do so, we must begin with introspection, not a superficial alignment with the SDGs or a list of existing initiatives, but a deeper institutional question to guide our work:

What does humanity need from us?

Too often, our planning begins with: "What do we want to do? What research would we like to pursue? What does the market demand from our students and us?"

These are valid questions; however, they are not sufficient on their own. If universities are to be true agents of change, then every university must define, at the level of its mission, its strategy, and its incentives: How its core purpose serves humanity and advances local communities and the global agenda.

This kind of introspection is transformative.

Because when an institution places humanity's needs at the center of its decision-making, silos disappear, communities become partners, not beneficiaries, and Faculty and students find a shared sense of purpose. Alignment with humanity's needs becomes part of the culture and identity of a university.

According to UNESCO, in 2025, the number of students in higher education institutions reached a record high of 264 million worldwide, an increase of 25 million since 2020 (UNESCO, 2025).

It's within our responsibility as Higher Education Institutions to prepare these students as leaders, but leadership does not emerge automatically from theoretical excellence or critical thinking.

In order for university education to be truly transformational in preparing young leaders to address the most pressing challenges of our times, we must ask ourselves important questions:

1. What in the design of our programs truly prepares our students to lead?
2. Are we cultivating ethics and a sense of responsibility in our students? If not, how could we?
3. Are we giving them a systemic understanding of global challenges? If not, how should we?
4. Are we providing them with real hands-on experiences that require them to work across disciplines, cultures, and communities? If not, how might we?

Leadership is not about knowing; leadership is about acting, it is about mobilizing others, it is about creating change in complex environments.

In order to prepare and empower change agents who can advance the SDGs, leadership development must be intentional, experiential, and deeply connected to real-world challenges. This is one of the most powerful contributions universities can make to the global agenda.

And yet, even the most committed university cannot achieve this alone. Global challenges are interconnected and systemic. Therefore, our responses must be interconnected and integrate a systems approach as well.

Partnership is not an option. It is a necessity.

For partnerships to generate real impact, we must move beyond traditional models, exchanges, and memoranda of understanding. The world and its youth need action-oriented collaboration.

We need collaboration that allows us to design programs together, conduct joint research aligned with the SDGs, create shared learning experiences for our students, and co-develop solutions with communities and international organizations.

This is the spirit that gave birth to initiatives such as the SDG-focused consortia within the UGC, and the joint leadership of global platforms like the UNAI SDG Hubs, where university partners collaborate to create meaningful and impact-

ful initiatives for the advancement of sustainable development through discussion from different regional perspectives and professional backgrounds.

These experiences have shown us something important: deep collaboration takes time, it requires trust, and it requires a shared vision. When it happens, the impact is exponential. In a world facing urgent and complex challenges, exponential impact is exactly what we need.

Each university must undertake its own process of reflection and transformation unique to its own context and circumstances, defining how its mission, academic programs, and incentives align with humanity's needs.

All of us must work together, more intentionally, more creatively, and more boldly than ever before. The SDGs will not be achieved through isolated excellence; they will be achieved through a connected global purpose. Let this Global Engagement and Empowerment Forum be more than a space for dialogue. Let it be a moment of commitment.

A commitment to place humanity's agenda at the heart of our institutions, to intentionally prepare the next generation of ethical and action-oriented leaders, to dismantle the barriers that prevent deep collaboration, and to build coalitions that match the scale of the challenges we face.

This commitment will ensure that universities go beyond simply contributing to sustainable development and become one of the most powerful forces driving it.

The future of the SDGs will not be written in declarations alone; it will be written in our strategies, in our classrooms, in our partnerships, and in the lives of the students we graduate.

Through the University Global Coalition, we are attempting to lead by example, to 'walk the talk' by advancing deep, action-oriented collaboration models that can help define that shared future.

As part of this, we are honored to be partnering with President Yoon and his team at Yonsei University as Vice Chairs of UGC, and we look forward to engaging in many new UGC collaborations with institutions in the coming months and years.

Let us move forward together, not as individual institutions, but as a global community of purpose.

About EARTH University:

EARTH is a global university based in Costa Rica that prepares and empowers young leaders to ethically and sustainably transform food systems, protect and enhance the livelihoods of food producers, and regenerate the planet. Its unique program offers students the opportunity to learn about agricultural sciences, food systems, ethical entrepreneurship, and social and environmental challenges through experiential student-centered learning, and by living together with peers from all over the world. For more information, please see: www.earth.ac.cr. *EARTH University President Arturo Condo is honored to serve as current Chair of University Global Coalition and Co-Chair of the SDG2 Hub of United Nations Academic Impact.*

About University Global Coalition:

Since 2020, EARTH is a co-founding member of the University Global Coalition (UGC), a global platform of universities and other higher education organizations committed to working together and in partnership with the United Nations (through UNITAR), SDSN, and other relevant organizations, in support of the Sustainable Development Goals both locally and globally through our education, research, and service missions. For more information please see: https://universityglobalcoalition.org/.

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Perspective

Inclusive Technologies and the Reconfiguration of Care

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Care in the Age of 'Intelligent' Systems

Across aging societies, health and care systems are under growing pressure. Some governments have positioned technology as both a solution and a necessity to tackle labor shortages, rising health and care costs, and demographic shifts. AI-driven monitoring systems, care robots, and digital assistants are increasingly framed as tools that can help sustain care infrastructures at scale.

Yet care is not merely a logistical or technical problem. It is relational, emotional, and embedded in social and cultural contexts. The integration of so-called intelligent systems into care therefore raises deeper questions—not only about efficiency and capability, but about responsibility, dignity of the person being cared for, and the meaning of care itself.

The Performance of Technological Futures

A significant tension lies in the gap between how care technologies are presented and how they function in practice. In robotics laboratories, technologies are often demonstrated under carefully controlled conditions. Laboratories are optimized to ensure smooth operation: obstacles are removed, lighting is calibrated, and systems are continuously monitored.

These demonstrations create illusions of autonomous and reliable machines. However, they often rely on hidden layers of human intervention—engineers adjusting systems in real time or partially controlling outcomes. What appears as seamless automation is frequently a coordinated performance (De Togni, 2024).

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When these staged demonstrations are taken as evidence of real-world readiness, they shape expectations in ways that obscure the limitations of current technologies. Outside controlled environments, care settings—homes, hospitals, and assisted living facilities—are far more complex and unpredictable. They involve not only physical variability but also interpersonal dynamics and emotional labor that resist standardization.

Care Beyond Efficiency

The persistence of optimistic narratives around care technologies reflects broader political and economic dynamics. Technological promises attract investment, justify policy priorities, and reinforce national ambitions for innovation and competitiveness. In some contexts, care technologies are framed not only as practical tools but as symbols of progress and future readiness (De Togni, 2026).

At the same time, alternative approaches to care—such as improving working conditions for caregivers or strengthening social support systems—receive comparatively less attention. Care is reframed as a problem of efficiency, coordination, and data management, rather than one of labor, structural inequalities, or social responsibility.

This reframing risks overlooking the fundamental nature of care. Care involves empathy, trust, responsibility, and human connection. While technologies may assist with certain tasks, they cannot replace the relational and ethical dimensions that define care practices (De Togni, 2025).

The Datafication of Aging and Care

The design of care technologies is also shaped by underlying assumptions about aging. Older adults are frequently represented as passive, dependent, or technologically resistant. These assumptions are embedded in datasets, design processes, and implementation strategies.

As care becomes increasingly mediated by digital systems, it is often reduced to measurable indicators: dashboards, alerts, and monitoring tools. Individuals are translated into data points—signals of risk, decline, or deviation. This process of datafication simplifies complex lived experiences into quantifiable variables, obscuring the broader contexts in which care takes place.

The limitations of this approach become evident in practice. For instance, fall detection systems—widely promoted as safety solutions—are often trained on datasets that do not accurately reflect different bodies and real care environments. The resulting systems may produce frequent false alarms, leading users and caregivers to mistrust and ultimately ignore them. In such cases, technology does not adapt to human needs; instead, people either have to adapt their practices to accommodate the technology or see the device as an obstacle to the provision of care.

Beyond Technosolutionism

These patterns reflect a broader tendency toward technosolutionism—the belief that complex social problems can be addressed primarily through technological innovation. While care systems undeniably face structural challenges, reducing these challenges to technical issues risks ignoring their social, political, and ethical dimensions.

Care is shaped by institutional arrangements, labor conditions, cultural norms, and power relations. Technological interventions developed without attention to these factors may reproduce existing inequalities or introduce new forms of exclusion.

Toward Inclusive and Responsible Innovation

A more inclusive approach to care technologies requires rethinking how innovation is defined and practiced. Meaningful engagement with care workers, caregivers, and care recipients must occur early in the design process, rather than as a symbolic or late-stage exercise.

Such engagement also requires acknowledging that different stakeholders have distinct—and sometimes conflicting—needs. Rather than seeking simple consensus, inclusive design must create space for negotiation, recognize power imbalances, and value diverse forms of expertise, including lived experience (De Togni et al., 2026).

Equally important is the recognition of limits. Not all problems demand technological solutions, and not all technological possibilities are ideal for certain contexts and actors. Responsible innovation includes the capacity to question, redirect, or even halt development when necessary.

Reimagining Care Futures

Alternative models of care technology suggest that more

inclusive futures are possible. When technologies are co-designed with users and embedded meaningfully in social contexts, they can support autonomy, participation, and connection. In some cases, they enable individuals who might otherwise be excluded—such as those with severe physical disabilities—to engage, if they wish to do so, in work and community life activities in new ways.

These examples point toward a different understanding of innovation: one that prioritizes enrichment over optimization, and relationships over efficiency.

Conclusion

The integration of AI and robotics into care systems presents both opportunities and risks. While technologies may help address certain challenges, they cannot alone sustain or resolve emerging needs in strained health and care systems.

The critical question is not simply whether technology can improve care, but how care itself is being reshaped in the process. Who defines the problems to be solved? Whose voices are included and whose are excluded in the process? And what values are embedded in the systems being built?

The future of care will depend not only on technological advancement, but on the choices societies make about how to tackle structural inequalities and foster collective responsibility for care. In this sense, care is not just a site of innovation—it is a site of negotiation about the kind of future we collectively want to create.

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Perspective

The Social Resource Bank: A University-Based Model for Sustainable Community Engagement

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Introduction

Universities possess a diverse range of resources, including knowledge, time, facilities, and professional expertise across multiple disciplines. However, these resources often remain fragmented and underutilized due to the absence of effective coordination mechanisms. As a result, even abundant resources fail to generate meaningful social value unless they are systematically connected and mobilized. In response to this challenge, this paper introduces the Social Resource Bank (SRB) model developed at Yonsei University—a structured platform designed to store, connect, and activate the resources of university communities for broader social benefit.

Yonsei University was ranked 11th globally and 1st in South Korea in the 2024 Times Higher Education (THE) Impact Rankings, reflecting the growing recognition that universities are not only institutions for education and research, but also key actors with substantial social responsibilities. Within this context, the SRB is proposed as a practical and scalable model for operationalizing such responsibilities through structured and measurable social engagement.

The Social Resource Bank, abbreviated “SRB,” is a system for storing and connecting social resources. Just as a conventional bank allows people to deposit and withdraw money, the SRB is a platform through which time, professional expertise, and services are registered and made available for public use. Students, faculty, and staff register

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the resources they are able to contribute. The bank then provides information about communities that can benefit from those resources, and the institution supports the resulting activities. Through this process, university members can enhance their own civic consciousness while contributing to a more sustainable society (Figure 1).

The premise of the SRB is that the same individual can generate significantly different levels of social impact depending on how their expertise is matched with contextual needs. A dental professional, for example, may contribute to a session like this one, which is valuable, but their greatest social impact is likely realized in clinical settings where their specific expertise meets a direct patient need. Therefore, the effectiveness of social resources depends not only on their availability but also on their strategic allocation to areas of greatest need. The SRB provides the structure to make that placement possible, extending beyond one-off acts of service to create a system capable of generating lasting social impact. The basic unit of the SRB is time, operationalized through a time-credit system. Contributing two hours of service, for example, generates two-time credits. However, the value of a contribution is not determined solely by the number of hours provided; it is shaped by the expertise behind those hours and the level of social demand being addressed. A contribution of specialized knowledge to a community facing acute need carries a different weight than the same number of hours in a lower-demand context (Figure 2).

The system operates through three stages:

1. Stage 1 (Time Registration): Community members register their available time and areas of expertise on the platform, building a continuously updated inventory of social resources.

2. Stage 2 (Expertise Matching): The platform connects registered resources with identified community needs — linking what the university has with what society requires.

3. Stage 3 (Social Impact Assessment): Rather than simply recording volunteer hours, the system evaluates the actual social impact generated. This transforms participation data into evidence, and evidence into a basis for sustained institutional commitment.

Similar models have been implemented internationally. In the United Kingdom, the Time Bank network uses time as a form of currency within local communities (Bird & Boyle, 2014). Even during the COVID-19 pandemic, when face-to-face interaction was severely constrained, the network facilitated over 80,000 hours of voluntary activity. In the United States, the Partnering Care program operates services including a Ride Partners program; helping patients travel to and from medical appointments and personal care assistance programs that enable neighbors to support one another with household tasks (Wacker & Roberto, 2018). These cases demonstrate that time-based resource exchange systems work in practice, at scale (Figure 3).

In 2024, Yonsei University's Leadership Center conducted

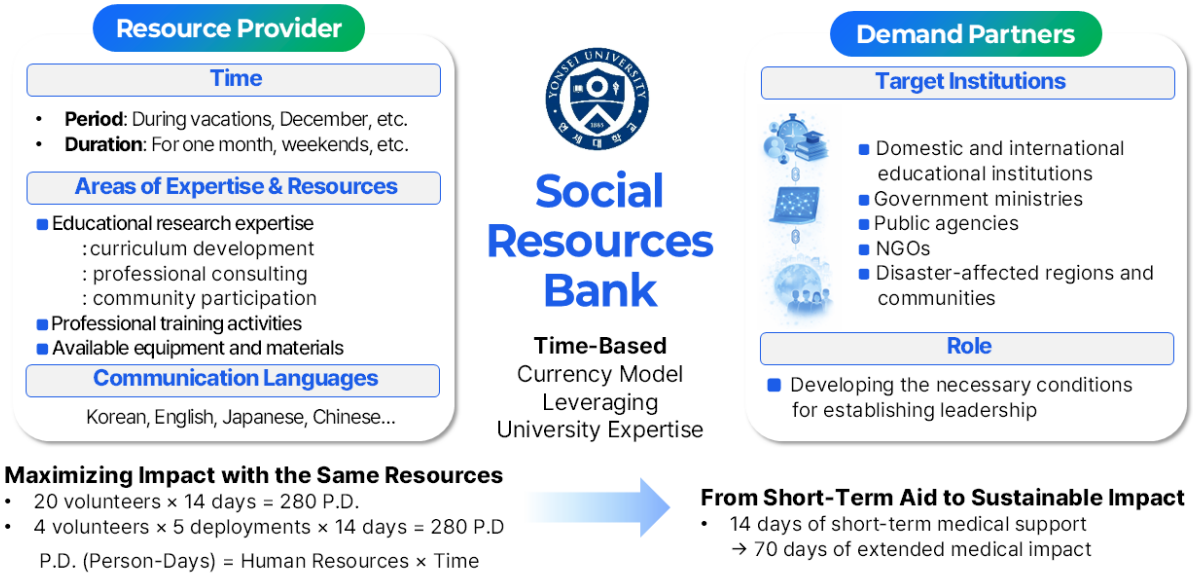

Figure 1. The Social Resource Bank.

a cross-sectional survey to assess the feasibility of implementing the Social Resource Bank (SRB) model. Approximately 200 faculty and staff members across diverse age groups and professional roles participated, reflecting broad institutional interest in the initiative. Data was collected through an online questionnaire that explored motivations, barriers to participation, and willingness to engage in social resource activities, and the responses were summarized using descriptive analysis.

When asked why they would want to engage in social resource activities, respondents identified three main motivations: first, intrinsic motivation and personal fulfillment—namely, the sense of meaning derived from participation; second, a desire to support specific groups in need, such as elderly populations or patients with rare diseases; and third, a perception that such activities are part of their organizational role as members of the university community (Figure 4).

The most significant barrier to participation was the lack of

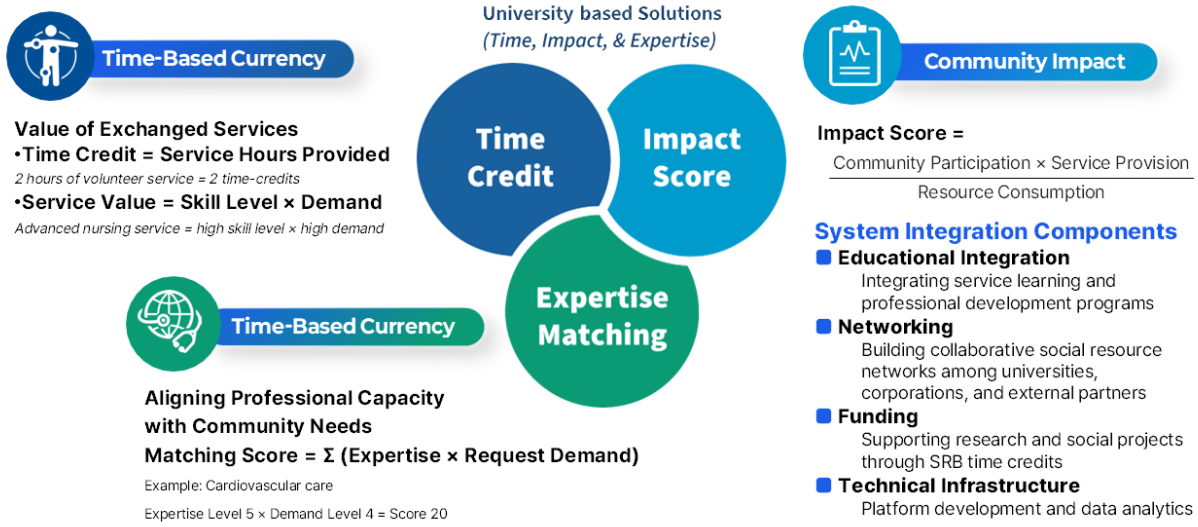

Figure 2. A Three-stage Operational Mode.

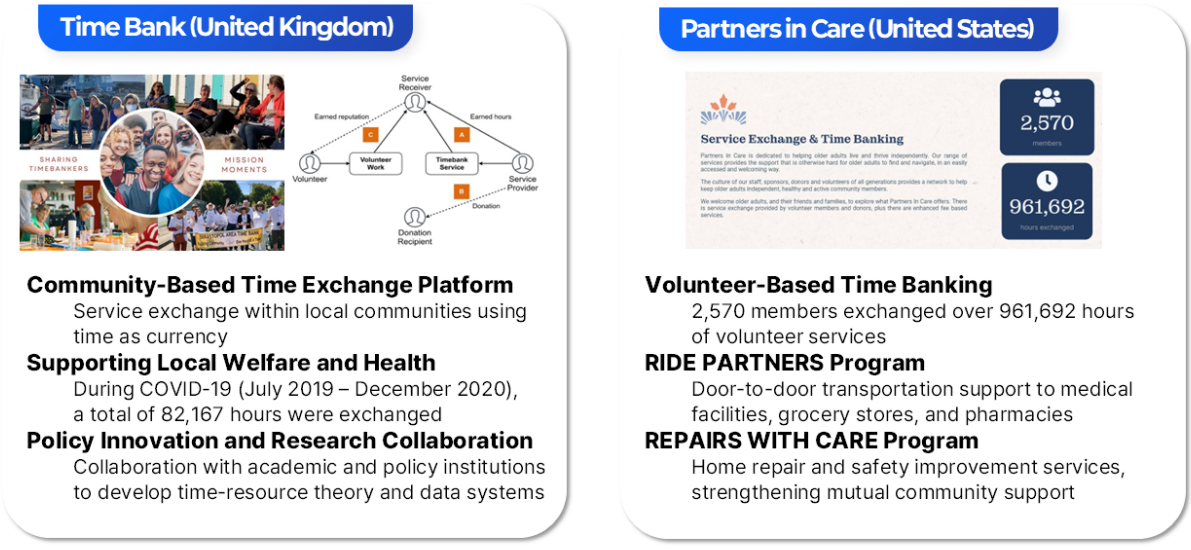

Figure 3. International Time-Banking Models.

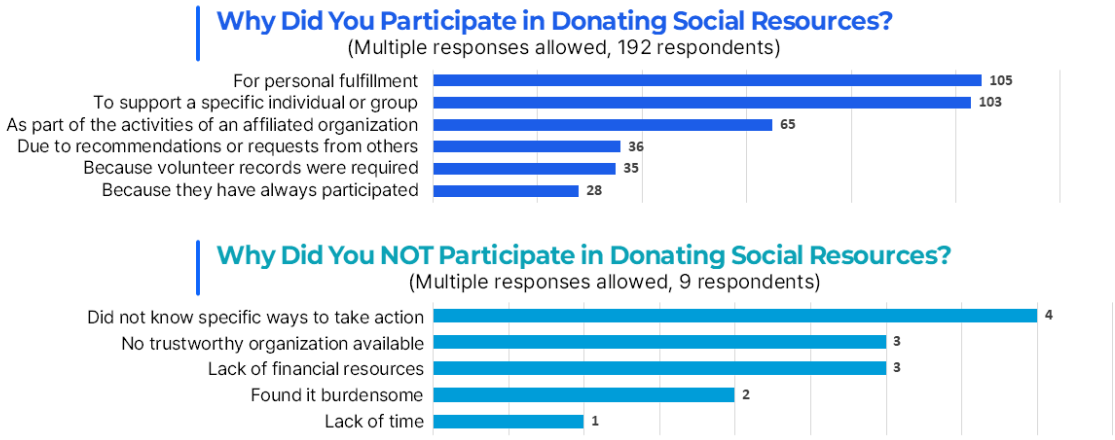

Figure 4. Survey Results: Primary Motivations for Social Resource Participation (N ≈ 200).

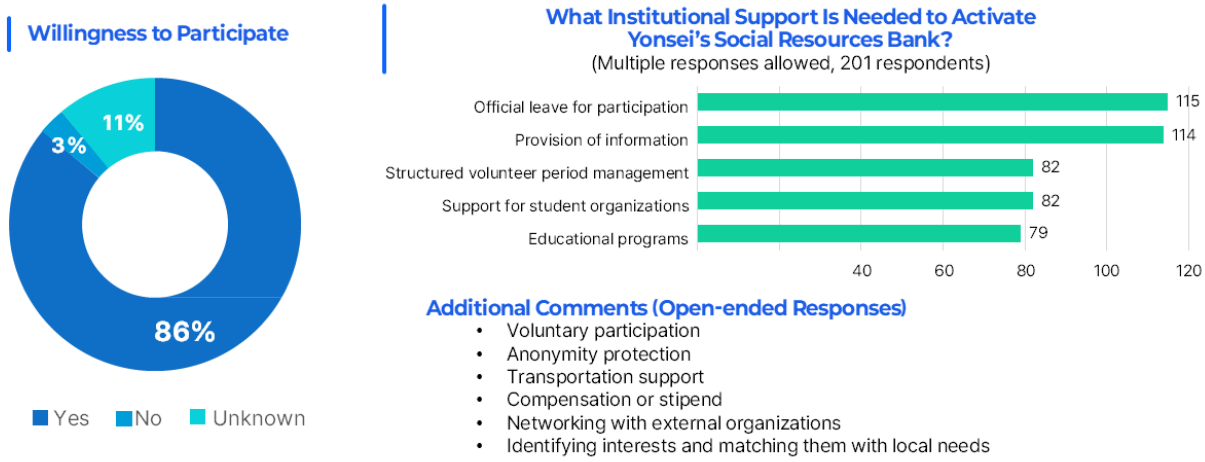

Figure 5. Willingness to Participate if SRB System is Implemented (N ≈ 200).

awareness regarding how to engage with social resource activities. Contrary to what might be expected, the most commonly cited reason for not participating was simply not knowing how. This suggests that the primary barrier is not a lack of willingness, but rather a lack of accessible and structured systems. The absence of a clear, accessible platform is what prevents people who are already motivated from acting on that motivation (Figure 5). When asked whether they would participate if such a system were in place, a total of 86% of respondents indicated a willingness to participate if such a system were implemented. In terms of institutional conditions that would support participation, respondents prioritized: official leave time designated for social resource activities rather than requiring the use of personal leave, access to adequate information, and a systematic operational structure.

Respondents rated the importance of universities playing a significant role in social resource contribution at 4.5 out of 5. They rated the personal importance of contributing to social resources at 4.29 out of 5. However, when asked to evaluate the university's current performance in this area, the rating dropped to 3.46 out of 5. Many members of the university community believe that social resource contribution matters both institutionally and personally, but feel that the university's current systems are not yet adequate to support it. This gap points directly to the need for a structured platform such as the SRB (Figure 6).

Volunteering is often framed as an act of sacrifice. But re-

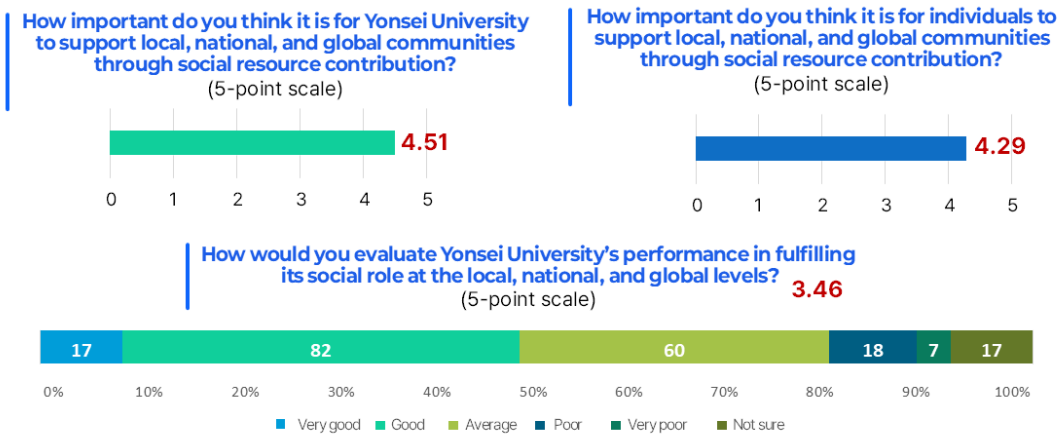

Figure 6. Survey Results: Importance Ratings and Perceived Performance Gap in Social Resource Contribution.

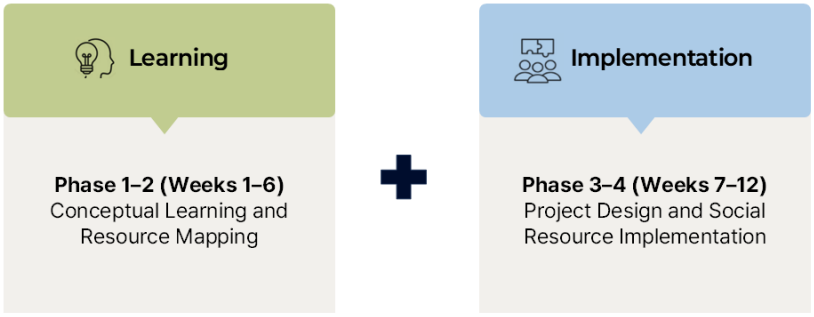

Figure 7. Proposed SRB Ambassador Program design framework.

search suggests a more nuanced picture. While prosocial behavior is genuinely motivated by care for others, it also yields real personal benefits and acknowledging this does not diminish its value. Andreoni proposed the concept of *impure altruism*, which challenged purely altruistic models of giving by highlighting the role of internal satisfaction: what he called the "warm glow" of giving. He argued that public provision of goods does not fully replace private giving, because the personal reward of the act itself cannot be substituted (Andreoni, 1990).

Neuroscientific and health research has found that helping others releases endorphins, reduces cortisol, and activates the same neural reward circuits as monetary compensation i.e. a phenomenon sometimes called the "helper's high." Studies have also found that the brain activity triggered by acts of giving resembles that associated with the pleasure of eating, and that anonymous giving may yield even greater reward than recognized giving. Stress levels decrease, and activity in the anterior insula and amygdala is reduced. These findings reframe volunteering not as sacrifice, but as a genuine source of personal benefit.

Research on social exchange raises an important practical question: can purely one-directional contribution i.e. giving without receiving, be sustained over time? The SRB addresses this directly through its credit exchange system, in which participants who contribute their time and expertise may also access the contributions of others. Sustainable engagement requires a sense of fair exchange, not just the expectation of ongoing selfless giving. Prior research on time banking and social resource platforms points to three recurring structural problems: a lack of trustworthy organizational infrastructure, a disconnection between generations, and insufficient understanding of how to actually implement participation. These gaps persist even when good platforms exist, because having a platform is not the same as having a community that knows how to use it. The SRB is designed with these lessons in mind. A broader challenge underlies all of this. Across the 17 Sustainable Development Goals, AI and

existing technologies have already identified solutions to the majority of the problems we face. The barrier is not knowledge or capability, but coordinated action. The same is true at the university level: the resources exist, the willingness exists, but without structures that translate intention into action, the potential goes unrealized. This is precisely the gap the SRB is designed to close. If the primary barrier to participation is a lack of awareness about how to engage, then education has a critical role to play. Awareness transformation which shifts how people understand their own role as social actors requires deliberate, structured programming. This is the premise behind the SRB's activation framework.

A program to activate university participants in the SRB is proposed in four phases (Figure 7):

1. **Phase 1 — Recruitment.** Outreach to potential participants across all university roles, making clear that a wide range of resources qualify for contribution.
2. **Phase 2 — Awareness and Problem Identification.** Participants engage with the rationale for the SRB, examine why existing platforms have not always achieved their potential, and identify specific social problems to which their own resources could be connected.
3. **Phase 3 — Program Design.** Participants collaboratively design contribution activities suited to their resources and the identified needs, developing ownership and building a practical link between personal expertise and social demand.
4. **Phase 4 — Implementation.** Participants carry out their designed activities and become ambassadors who can draw others into the system.

The benefits of the SRB operate at three levels. At the individual level, participants develop civic identity, apply their expertise in new contexts, and access the personal benefits of prosocial behavior. At the university level, the SRB provides a mechanism for operationalizing social responsibility and strengthening community relationships. At the societal level, the SRB reduces social isolation, builds community networks, and expands access to specialized knowledge, particularly for populations currently underserved by existing systems.

Conclusion

The Social Resource Bank offers a structural response to a persistent gap between intention and action in university community engagement. Universities are repositories of knowledge, expertise, time, and infrastructure i.e. resources that carry enormous potential social value. But resources must be structured, connected to where they are needed, and measured in their impact before that potential can be realized as sustained social benefit. The 2024 survey at Yonsei University makes clear that the conditions for a successful SRB are already present: 86% of respondents indicated willingness to participate if a system existed, and institutional attitudes toward social contribution were consistently high. The aspiration is there. What is needed is the structure. Built on the principles of Structure, Matching, and Measurement, the SRB draws on a tradition as old as Korean *poomasi* ("품앗이") i.e. the communal sharing of labor according to mutual need and applies it to the contemporary university context, where the resource being shared is professional knowledge. The SRB represents a modern, knowledge-based *poomasi*: a way for universities to work with society, not simply alongside it.

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Perspective

Strengthening CBRN Preparedness through Military Medical Capabilities and Multisectoral Collaboration

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Introduction

CBRN is an acronym for Chemical, Biological, Radiological, and Nuclear, referring to hazardous agents and materials capable of causing serious harm to humans, animals, plants, the environment, and the economy through intentional misuse, accidental release, terrorism, or warfare. These hazards include toxic chemical substances, pathogenic microorganisms such as bacteria and viruses, radioactive materials, and the effects of nuclear incidents or weapons.

The international community, national governments, and local authorities must establish comprehensive preparedness and response systems for CBRN threats by: 1) maintaining integrated surveillance and prevention systems; 2) conducting tactical response operations during incidents; 3) activating Whole-of-Government and Whole-of-Society integrated crisis management mechanisms during large-scale or complex emergencies; and 4) ultimately strengthening systemic resilience to ensure the continuity of critical local, national, and international functions.

Surveillance and Coordination System (UN & WHO Framework)

The United Nations Security Council has identified CBRN terrorism and proliferation as major threats to international peace and security through Resolutions 1373 (2001), 1540 (2004), and 2325 (2016) (UNODC, 2016). These resolutions call upon Member States to strengthen national non-proliferation systems, improve counter-terrorism capacity, secure

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The Global Engagement & Empowerment Forum on Sustainable Development (GEEF) 2026, hosted by Yonsei University, was successfully held over two days from March 12 to 13, 2026. Addressing global challenges such as climate change, inequality, and humanitarian crises requires stronger international cooperation and collective action than ever before. GEEF 2026 serves as a global platform that moves beyond dialogue toward real action and measurable impact. As part of this year's program, a featured session on "Disaster Preparedness, Response & Global Health Cooperation" examined how individuals can prepare for disasters through military medical capabilities and multisectoral collaboration. The following is a translated transcript of the session.

hazardous materials, and reinforce coordinated preparedness and response mechanisms against CBRN incidents. In addition, the United Nations Global Counter-Terrorism Strategy emphasizes preventing the misuse of biotechnology, strengthening border and customs controls, combating illicit trafficking of hazardous materials, and promoting international cooperation (UNGA, 2006).

International governance mechanisms for CBRN security currently rely on the Chemical Weapons Convention (CWC), the Biological Weapons Convention (BWC), and the Nuclear Non-Proliferation Treaty (NPT). While the Organization for the Prohibition of Chemical Weapons (OPCW) and the International Atomic Energy Agency (IAEA) provide implementation and monitoring mechanisms for chemical and nuclear threats, respectively, the Biological Weapons Convention still lacks a formal verification and monitoring organization. This governance gap remains a significant challenge for global biological security preparedness.

Recent global events have demonstrated that CBRN risks are becoming increasingly complex, interconnected, and globally significant. Examples include chemical attacks in Syria, the VX assassination of Kim Jong-nam, Novichok poisonings involving Russian opposition figures, the 2001 anthrax attacks, the COVID-19 pandemic, the Fukushima Daiichi nuclear disaster, and ongoing nuclear tensions involving North Korea and Iran (Figure 1). These incidents collectively highlight the urgent need for integrated preparedness systems combining military medical capabilities, public health systems, intelligence, emergency management, and international cooperation.

The World Health Organization (WHO) provides practical implementation tools to support national preparedness and response capacities for CBRN and other public health emergencies. The International Health Regulations (IHR 2005), which are legally binding for all Member States, define 15 core capacities including those related to chemical events and radiation emergencies. Complementing the IHR, the Joint External Evaluation (JEE) tool assesses national capacities across prevention, detection, and response functions, while also addressing points of entry, chemical events, and radiation emergencies.

Yoon et al. (2025) analyzed health security implementation strategies to assess countries' capabilities and capacities to prepare for and respond to CBRN threats and infectious disease outbreaks. Their findings suggest that countries should prioritize strengthening surveillance capacity and improving immunization performance indicators as foundational elements of national health security.

Military Medical Capabilities

Military medical systems provide rapid, organized, and scalable capabilities essential for responding to CBRN emergencies and other complex crises. During the COVID-19 pandemic, the Republic of Korea (ROK) Armed Forces Medical Command (AFMC) demonstrated a notable example of military medical support by transferring approximately 300 patients from the Armed Forces Daegu Hospital to another military medical facility and subsequently converting the hospital to receive and manage severe civilian COVID-19 patients (Konrad-Adenauer-Stiftung e., 2022).

Effective CBRN preparation and response requires coordinated action among government sectors by integrating defense, health, security, and emergency management systems. For example, chemical accidents are supported by the Ministry of Environment's Chemical Accident Response Information System (CARIS), and infectious disease accidents utilize the KDCA's national infectious disease monitoring and information system. Nuclear and radioactive accidents are supported by the Nuclear Safety Commission's National Radiation Emergency Medical Network. These mechanisms demonstrate the importance of integrating military, public

Biological	Chemical	Radiological / Nuclear	Conflict-related Nuclear Risk	Geopolitical Nuclear Risk
• COVID-19 Pandemic (2020-) • Anthrax mailing (2001)	• Syria Chemical Weapons Attacks (2013–2018)	• Fukushima Nuclear Disaster (2011)	• Ukraine War – Nuclear Plant Risks	• Iran–USA Nuclear Tensions

Figure 1. CBRN Risks (example).

health, and emergency management capabilities into an integrated national response framework.

CBRN threats are evolving rapidly in the context of geopolitical instability, technological advancement, climate change, and increasing global interdependence. Chemical accidents, biological pandemics, radiological disasters, and nuclear crises demonstrate that modern CBRN risks are no longer isolated events, but interconnected threats capable of simultaneously disrupting healthcare systems, economies, governance, military readiness, critical infrastructure, and societal stability. Strengthening preparedness against these threats therefore requires integrated approaches combining military medical capabilities, public health systems, multisectoral coordination, and international cooperation. Tactical preparedness must encompass prevention, surveillance, rapid detection, emergency response, medical countermeasures, risk communication, recovery governance, and long-term resilience planning.

Military medical systems provide unique operational advantages including rapid deployment capability, organized command structures, field medical operations, decontamination systems, logistics support, and surge healthcare capacity during national emergencies. However, military capacity alone is insufficient to manage large-scale CBRN disasters (United Nations Medical Support Section & Department of Peacekeeping Operations, 2024). Effective preparedness requires continuous collaboration between civilian and military sectors before crises occur.

Conclusion

Preparedness must begin during peacetime. Regular joint simulation exercises, integrated surveillance systems, interoperable communication platforms, shared stockpiling strategies, coordinated emergency operation centers, and collaborative education and training programs are essential for building trust and operational readiness between civilian and military sectors.

Whole-of-Government and Whole-of-Society approaches should become central pillars of national CBRN preparedness strategies. Future global health security efforts should prioritize integrated bio-surveillance systems, AI-supported early warning mechanisms, strategic stockpiling systems, One Health collaboration, and strengthened military-civilian medical partnerships.

Ultimately, strengthening CBRN preparedness requires a balanced combination of international governance, national public health capacity, military medical readiness, and societal resilience. Reinforcing cooperation under frameworks such as the IHR, CWC, BWC, and NPT will remain essential for reducing CBRN risks and enhancing both national and global resilience in an increasingly uncertain security environment.

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Article

The Role of Transnational Advocacy Networks in United Nations Human Rights Council Resolutions†

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This study examines how civil society participation in target and voting states shapes voting behavior in the UN Human Rights Council (UNHRC). Drawing on Transnational Advocacy Network theory, it argues that civil society organizations (CSOs) in target states transmit information on human rights abuses to the international level, while CSOs in voting states translate this information into domestic political pressure. Using data on target-state CSO complaints submitted to the UN Special Procedures (UNSP) and measures of voter-state civil society participation from V-Dem (2025), the study analyzes UNHRC voting outcomes from 2009 to 2022 using a binary logistic regression. The results show that a higher number of CSO complaints against a target state increases the likelihood of affirmative votes, and this effect is significantly stronger when voting states have more active civil societies. These findings provide empirical evidence that transnational advocacy networks operate within the UNHRC, showing that civil society influence originating in target states is transmitted into international decision-making processes and becomes more effective when supported by active civil society in voting states.

Keywords United Nations Human Rights Council (UNHRC), Transnational Advocacy Networks (TANs), Civil Society Organization (CSO), International Organizations (IOs)

1. Introduction

Under what conditions do member states of the UN Human Rights Council (UNHRC) increase their support for human rights resolutions? This paper answers this question by focusing on target states' civil society and voting states' domestic political environment.

In today's global landscape, civil society organizations

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(CSOs) often act as agenda-setters. They use information to draw the attention of international organizations (IOs) to crises that were previously ignored. The digital age has expanded this capacity. Information on human rights abuses can now spread globally at high speed (Hall et al 2020). The persecution of the Rohingya in Myanmar illustrates this dynamic. Local activists used social media to broadcast atrocities to the world. This surge of information, carried through transnational networks, helped move the issue onto the UNHRC agenda. It shows how CSOs can supply the informational "raw material" for international action.

At the same time, domestic civil society action faces a paradox. Many CSOs operate under systematic constraints. The European Union Agency for Fundamental Rights (FRA) documents that civic space is under constant threat. A 2020 report finds that CSOs across Europe repeatedly face "complex registration procedures, unstable funding, direct or indirect political pressure from public authorities, and online attacks". These limits imply that strong domestic activism alone may not translate into international support for human rights norms. It may even be ineffective or counterproductive when isolated from broader leverage (Tarrow, 2005).

Given these constraints, this study examines how civil society participation in target and voting states shapes voting behavior in the UNHRC. Pressure from CSOs in the target state must be matched by a receptive and active civil society in voting states. Together, these forces can generate stronger domestic pressure for supportive votes. This argument draws on the literature on Transnational Advocacy Networks (TANs), which explains how activists and CSOs coordinate across borders to influence state behavior.

By integrating this framework with a quantitative analysis of UN Special Procedure (UNSP) CSO complaints and resolution voting, this paper examines how transnational advocacy influences UNHRC decision-making. The empirical results show that when CSO complaints from the target state increase, the likelihood of a positive vote in favor of resolution also rises. Moreover, this effect becomes significantly stronger when the voting state has an active civil society at home.

This study offers broader implications for research on UN politics and transnational advocacy. By statistically linking civil society activity in both target and voting states to measurable shifts in state positions, the study extends the classic TANs/boomerang framework and shows that a central part of the mechanism operates through voter states, where governments ultimately decide whether to support scrutiny. It also clarifies multi-level governance as a connected chain in which information and pressure travel from target-state CSOs through international institutions and into the domestic politics of voting states, reappearing as institutional pressure within the UNHRC. At the same time, these findings imply shared responsibility across actors: CSOs should continue to document and transmit credible information; pro-rights actors in voting states should translate that information into domestic accountability pressure; and international institutions should keep channels open to diverse civil society participation so that the human rights regime remains responsive rather than symbolic.

In this paper, the term CSO is employed in place of NGO, encompassing charities, community groups, religious organizations, and other non-state actors engaged in transnational advocacy. This terminology provides a more comprehensive basis for examining how diverse civil society networks influence state behavior within the UNHRC, particularly in light of the diversity of submitters in UNSP complaints. This approach is consistent with Steinert and Smidt (2025), who likewise adopt an expansive definition of CSOs to account for the wide range of actors engaged in the UNSP complaint process.

2. Materials and Methods

Theory

The human rights literature has been broadly divided into two strands. One of them is optimistic perspective forming the theoretical foundation of the this study. This strand emphasizes the positive role of international and transnational networks in facilitating the diffusion of human rights norms and enabling international advocacy (Risse, Ropp, and Sikkink 1999). On the same context, Keck and Sikkink (1998) argued the significance of TANs, defined as cross-border coalitions of NGOs, activists, and professional organizations that mobilize around shared values and human rights norms.

This perspective helps interpret the pattern shown in Figure 1, which indicates that periods of stronger civil society presence are associated with higher levels of support for human rights resolutions. This pattern reflects the boomerang effect, a core mechanism through which TANs translate civil society pressure into state behavior within international institutions.

It presents the boomerang effect, highlighting how interna-

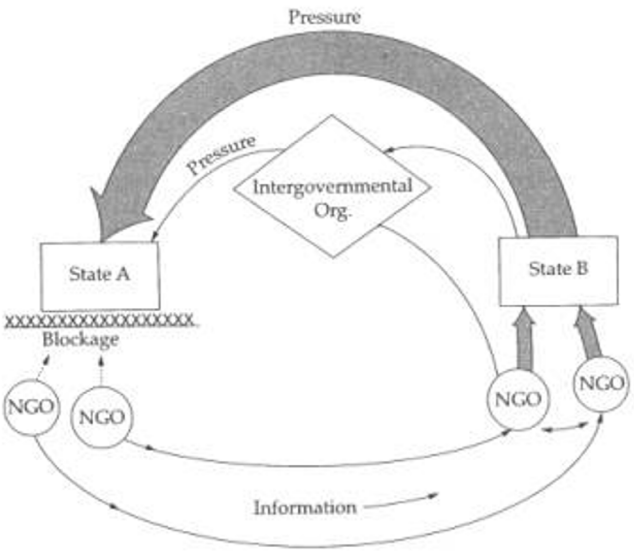

Figure 1. Stages of Transnational Advocacy Networks (Kick & Sikkink 2018).

tional organizations are strategically leveraged within transnational advocacy networks. Unlike the original formulation, this revised figure makes explicit the mediating role of intergovernmental organizations in converting transnational information flows into political pressure.

In this model, NGOs operating in State A face domestic blockage, which prevents them from directly influencing their own government. As a result, these NGOs redirect their advocacy outward by transmitting information on alleged human rights violations through institutionalized reporting channels, such as individual communications to the UNSP. These mechanisms allow localized claims to be formally documented and circulated within the UN human rights system. Civil society actors and NGOs in State B, benefiting from greater political access and responsiveness, can then use this information to mobilize their own governments within the UNHRC.

Through deliberation, agenda-setting, and voting processes at the UNHRC, information initially produced by NGOs in State A is transformed into collective political pressure. Member states such as State B may raise concerns during interactive dialogues, support country-specific resolutions, or reference UNSP communications as authoritative sources of concern. In this process, international organizations function not merely as neutral forums but as amplifiers that aggregate information, confer legitimacy, and translate civil society reports into reputational and diplomatic costs.

Pressure is subsequently exerted back onto State A through multiple channels, including public scrutiny in UNHRC sessions, repeated references to UNSP communications, and the prospect of adverse resolutions or follow-up monitoring. In this sense, transnational advocacy does not bypass international organizations but instead strategically relies on institutional mechanisms within the UN human rights regime as leverage points, enabling civil society actors to overcome domestic political constraints and influence state behavior indirectly.

Building on this mechanism, this study argues that the effectiveness of transnational advocacy varies systematically with the configuration of civil society in both target and voter states. Specifically, while civil society activity in the target state generates information through channels such as UNSP complaints, the extent to which this information translates into political pressure depends on the level of civil society participation in voter states. *Here is the posited hypothesis.*

H1. The higher the number of CSO complaints filed against a target country, the more likely UNHRC member states are to vote Yes on the resolution.

Target state civil society plays a crucial role in amplifying international information domestically, mobilizing governments within the UNHRC, and shaping states' voting behavior on human rights resolutions. The complaints filed by CSOs against target states activate civil society networks within voting states, reconstructing the very environment in which policymaking occurs.

In the short-term process, civic groups and engaged publics translate global human rights norms into domestic pressure, imposing relational and reputational costs on policymakers and raising the political costs of opposing human rights initiatives. At the same time, supporting international resolutions becomes a marker of normative legitimacy, prompting reputation-sensitive policymakers to align with pro-human-rights positions; these domestic pressures are then transmitted through the foreign policy apparatus to Geneva missions, ultimately shaping diplomatic voting behavior.

In the long-term process, sustained civic engagement stimulates domestic debate on human rights issues, with TANs and domestic civil society playing critical roles as states move through the five stages of Risse, Ropp, and Sikkink's (1999) spiral model—repression, denial, tactical concessions, prescriptive status, and rule-consistent behavior. In the early stages, TANs expose violations and mobilize international attention, pushing governments from denial to-

ward tactical concessions, while domestic civil society becomes increasingly empowered to hold governments accountable, forming a feedback loop in which international commitments provide leverage for domestic actors who in turn demand consistent implementation.

As a result of this bottom-up process, states with vibrant civil societies and strong TAN linkages undergo an identity shift toward supporting human rights resolutions, leading to the second hypothesis as follows.

H2. As civil society participation in the voter state increases, the positive effect of target-state CSO complaints on the likelihood of a Yes vote becomes stronger.

Materials

The dependent variable is state voting behavior on UNHRC resolutions. It draws on data originally compiled by Kim (2025), covering 97 countries and 1,407 country-specific resolutions debated in the UN Human Rights Council from 2009 to 2022. The unit of analysis is a resolution–voting state dyad, capturing how each UNHRC member state voted on a given resolution over time. In the original dataset, voting outcomes were coded on an ordinal scale: 1 (No), 2 (Abstain), 3 (Yes), and 4 (No Vote). The "No Vote" category reflects procedural absences, temporary suspensions, or technical non-participation. These cases were excluded because they are driven by administrative circumstances rather than substantive political positions. Keeping them would blur the policy preferences expressed through active voting.

The first independent variable, CSO complaints, captures the number of human rights complaints filed by CSOs in each country through the UNSP mechanism[1]. These complaints indicate the extent to which domestic civil society actors channel local grievances into international human rights processes. It is necessary to clarify, however, that these complaints are not necessarily filed directly by CSOs toward the Target State. Nevertheless, this study analyzes this variable by treating the complaints as explicitly targeting the target state. The rationale for this is twofold: First, in the majority of cases, the underlying grievances originate from human rights violations within the target state itself. Second, even when complaints are filed from abroad, they are typically made by small diaspora or exiled civil society groups originating from the target country, which still serve the function of channeling domestic grievances into international processes. For the purposes of this study, the analysis focuses on thematic mandates.

A second independent variable measures the domestic civil society environment within voting states. Drawing on V-Dem (2025)'s Civil Society Participation index, this variable captures the extent to which citizens and organizations in voting countries participate in public life and are able to mobilize collectively. In this study, CSOs include, but are not limited to, interest groups, labor unions, spiritual organizations engaged in civic or political activities, social movements, professional associations, charities, and other non-governmental organizations. The index combines information on whether major CSOs are routinely consulted by policymakers, how widespread citizen involvement in voluntary associations is, the degree to which women are able to participate in civil society on equal terms, and whether candidate nomination within parties is decentralized or takes place through party primaries. Taken together, these components reflect the density, inclusiveness, and political relevance of associational life in each country.

The control variables in this study are constructed as follows. To account for regional bloc dynamics, a regional alignment dummy variable is included, coded 1 when the voting state and the target state belong to the same UNHRC regional group. To capture the political and institutional environment of the voting state, three additional controls are incorporated: the Human Rights Index from V-Dem, a binary democracy variable recoded from the Liberal Democracy Index, and the UNGA Ideal Point Distance drawn from Voeten (2009), which measures ideological divergence in foreign policy preferences between the voting and target states. Finally, log-transformed GDP per capita is included to control for economic capacity and overall development level.

[1]Information on complaints submitted to the UN Special Procedures is publicly accessible through the OHCHR Special Procedures Communications Database (OHCHR, November 24, 2025). As of November 2025, the Special Procedures mechanism comprises 46 thematic mandates and 13 country mandates (OHCHR, November 19, 2025). Mandate holders perform several core functions: drawing attention to alleged human rights violations, issuing communications to governments and other relevant actors, and producing reports on such violations (OHCHR, November 19, 2025; OHCHR, December 1, 2025).

Methods

To empirically analyze how transnational civil society engagement shapes states' positions on UN human rights resolutions, this study employs a quantitative research approach focusing on the voting behavior of member states in the UNHRC. The main analysis uses a binary logistic regression (logit) model to test the core hypotheses. The dependent variable is recoded into a binary indicator distinguishing "Yes (1)" from "No and Abstain (0)". This recoding reflects the substantive distinction between states that actively support a resolution and those that withhold support, either by opposing or abstaining.

This study recodes the original dependent variable into a binary measure: values of 1 and 2 (no and abstain) are collapsed into 0, while the value of 3 (yes) is retained as 1. This recoding reflects the logic of consensus-based decision-making prevalent in UN settings, where most states adopt resolutions without active opposition, a practice that does not necessarily indicate genuine endorsement. Consequently, the symbolic significance of *no* and *abstain* votes becomes comparatively more meaningful as indicators of deliberate dissent.

In the specification above, the dependent variable is modeled as the probability of a supportive vote. All covariates are lagged by one year to ensure proper temporal ordering and reduce simultaneity concerns, such that most variables enter the model. Standard errors are clustered at the voter level to accommodate within-voter serial correlation and cross-resolution dependence, thereby producing more reliable inference.

Year fixed effects control for period-specific political shocks that commonly affect all UNHRC member states, such as changes in the international political environment. Resolution fixed effects absorb unobserved, time-invariant characteristics inherent to individual resolutions, including issue salience and drafting patterns, while target-state fixed effects control for persistent features of target states that systematically shape voting behavior.

As a result, resolutions that receive unanimous support or opposition across member states are automatically excluded in statistical identification once resolution fixed effects are included. Accordingly, the analysis focuses on contested resolutions, where variation in voting behavior allows the influence of civil society to be meaningfully evaluated.

3. Results

This study examines how civil society influences member states' voting behavior on UNHRC resolutions. Model 1 is estimated using a logit specification, while Model 2 introduces an interaction term to test the conditional effect of domestic civil participation. Table 1 reports the results for Hypotheses 1 and 2. Overall, the findings provide strong support for both hypotheses.

First, CSO complaints regarding human rights violations in target states exhibit a positive and statistically significant effect across both models. In Model 1, an increase in CSO complaints is associated with a higher likelihood that UNHRC member states vote in favor of the corresponding human rights resolution. This result remains robust in Model 2 after accounting for domestic civil participation in the voting state. Substantively, this finding suggests that civil society reporting increases the international visibility of human rights abuses and facilitates agenda-setting within the UNHRC, thereby mobilizing support for collective action.

Second, Model 2 shows that the interaction between CSO complaints and the level of civil participation in the voting state is positive and highly significant, lending strong support to Hypothesis 2. While the coefficient for civil participation alone is negative, the positive interaction term indicates that CSO complaints become more influential as civil participation in the voting country increases. In other words, where domestic civil society is more active and participatory, governments are more responsive to information and pressure

Table 1. Results for Hypotheses 1 and 2

VARIABLES	(1) Model 1	(2) Model 2
CSO complaints(target)	0.245*** (0.0438)	0.208*** (0.0459)
Civil participation (voter)		-1.417*** (0.825)
Interaction		0.105*** (0.0324)
Same region	-0.368 (0.232)	-0.396*** (0.230)
Human rights score (voter)	2.337*** (0.598)	1.888*** (0.762)
UNGA distance	2.001*** (0.118)	2.011*** (0.116)
Democracy (voter)	0.0306 (0.310)	-0.0315 (0.325)
GDP per capita(logged)	0.505*** (0.0817)	0.546*** (0.0912)
Constant	-5.498*** (0.863)	-5.034*** (0.906)
Year FE	YES	YES
Voter FE	YES	YES
Resolution FE	YES	YES
Observations	7,943	7,943

Robust standard errors in parentheses.
***p<0.1, **p<0.05, *p<0.01.

generated by transnational civil society networks. This pattern is consistent with the logic of TANs, whereby local claims originating in target states travel through international civil society channels and are reinforced by civic engagement within voting states, ultimately shaping state behavior inside the UNHRC.

Finally, economic capacity also matters. Higher GDP per capita is positively associated with supportive voting behavior, implying that wealthier states may face lower political or material costs when endorsing human rights scrutiny. In contrast, democracy status in the voting state does not show a statistically significant independent effect, suggesting that civil society channels play a more direct role in shaping voting outcomes.

Taken together, the results highlight the central role of civil society in international human rights politics. Civil society influences UNHRC decision-makisng not only directly, through the documentation of human rights abuses, but also indirectly, through cross-border linkages that amplify pressure when domestic civic engagement in voting states is high. These findings underscore the importance of transnational civil society networks in sustaining and enforcing human rights norms within international institutions.

Figure 2 shows that the influence of target-state CSO complaints depends strongly on the level of civic engagement in the voting state. When civic participation in the voting state is low, additional CSO complaints have little to no effect on support for human rights resolutions, with marginal effects close to zero. As civic participation strengthens, the effect of CSO complaints becomes clearly positive and statistically significant. In voter states with strong civic engagement, each additional CSO complaint raises the probability of a supportive vote by roughly 1 to 1.3 percentage points. At moderate levels of participation, the increase is about 0.5 percentage points, while at high and very high participation levels, the effect grows to approximately 0.9 and 1.3 percentage points.

Turning to the predicted probabilities in Figure 3, we can more directly observe how the impact of CSO complaints on voting behavior differs by the level of civic engagement in voter states. When there are no CSO complaints, the probability of a Yes vote is about 64 percent, but as complaints increase to 35, this probability declines to approximately 58 percent. By contrast, under conditions of high civic participation, with 20 complaints, the predicted probability of a Yes vote increases to approximately 66 percent, and with 35 complaints, it rises further to nearly 74 percent.

Substantively, this implies that CSO complaints translate into more Yes votes only when voter states possess strong domestic civic participation. In highly participatory contexts, moving from no complaints to sustained civil society pressure corresponds to an increase of nearly 18 percentage points in the probability of a Yes vote, whereas in low-participation states, the same increase in complaints is associated with a 6-percentage-point decline in Yes votes. This suggests that policy-makers in participatory contexts internalize civic pressure into their foreign policy, otherwise, without free civic engagement, the likelihood of voting in favor of human rights resolutions tends to decline.

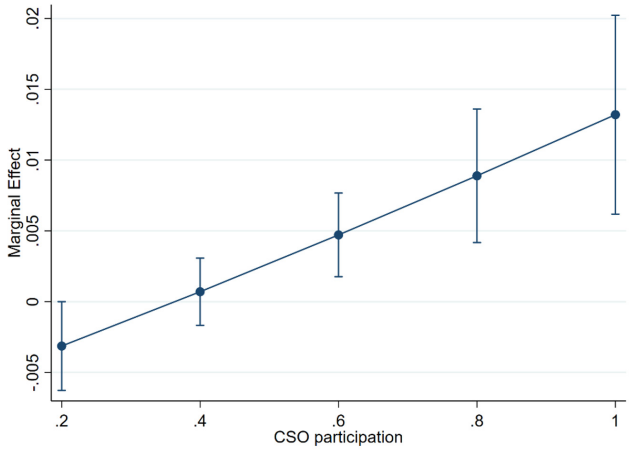

Figure 2. Marginal Effects.

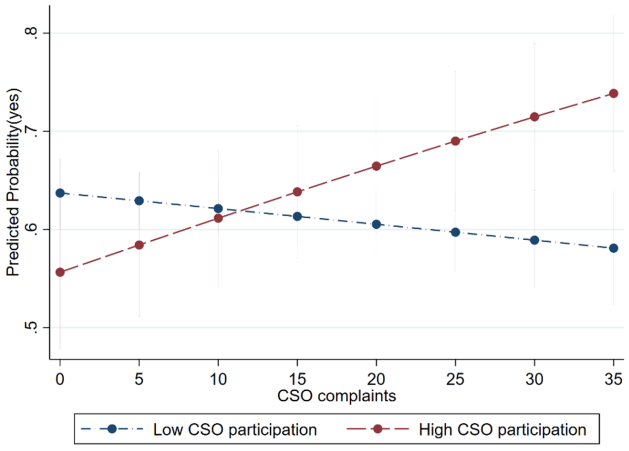

Figure 3. Predicted Probabilities of Resolutions.

4. Discussion and Conclusions

This study empirically analyzes how civil society strategically influences voting behavior on UNHRC resolutions. By using a Binary Logit model, this research finds that civil society activities in the target state positively influence the likelihood of supportive votes at the UNHRC. The interaction model further demonstrates that as CSO complaints increase and simultaneously, when the voting state exhibits higher levels of domestic civic engagement, the probability of casting a supportive vote rises substantially. These findings provide systematic empirical evidence that TANs operate effectively within the HRC context, shaping states' decisions through cross-border civil society pressure.

This study offers three main implications. First, this study provides statistical evidence that transnational advocacy dynamics shape UNHRC resolution voting. It extends the classic TAN/boomerang framework (Keck & Sikkink, 1998) by showing that the mechanism does not stop at the target state: it also runs through voter states, where governments decide whether to support or resist scrutiny. Because civil society influence is observable inside the HRC, protecting the human rights regime requires sustained and active international engagement by civil society actors of both target and voter countries.

Second, the findings demonstrate that political contestation in the human rights regime can be shaped, and even reinforced, through the interaction strategies employed by civil society actors. Issues that fail to achieve consensus in UNHRC are, by definition, politically sensitive for member states. It is therefore notable that civil society influence operates across this threshold, suggesting that non-state actors retain meaningful leverage even on contentious agenda items. This is more significant given that such influence can often be traced to localized grievances initially brought to the UNSP complaints.

Third, the findings clarify multi-level governance as a connected sequence: pressure travels from target-state CSOs through international institutions into voter-state domestic politics, and returns as institutional pressure within the UNHRC. This shows that civil society-driven information and mobilization can generate cooperation and conflict beyond state interests alone. Sustaining this multi-level governance also requires effort from global citizens, whose attention and participation help keep institutions responsive.

However, the study has three key limitations. First, UNHRC voting data raises a selection concern: most resolutions pass by consensus, and recorded votes typically occur only on politically contested items; moreover, fixed-effects models mechanically exclude resolutions with little or no within-resolution variation (including near-unanimous outcomes). As a result, the analysis may not fully reflect the Council's broader voting practice. Second, the study focuses on international voting outcomes and does not trace whether resolutions generate subsequent improvements within target states, leaving the final stage of the boomerang effect untested. Third, the analysis does not examine governments' strategic responses to external pressure, including whether international scrutiny prompts stronger restrictions on domestic CSOs that could dampen advocacy efforts.

Future research should proceed in three directions: first, it should address the selection problem in UNHRC recorded votes with appropriate statistical approaches that model which resolutions reach a vote; second, it should trace whether and how resolutions produce positive changes within target states after adoption; and third, it should test how domestic civil society repression conditions (or counteracts) these effects, including whether repression dampens advocacy or triggers adaptive strategies and backlash dynamics.

Taken together, these results show that international human rights politics are shaped not only by states but also by the networks that connect civil society across borders. Transnational advocacy can transform local struggles into international concerns that governments must address. Even as illiberal pressures persist, cooperation among civil society actors continues to open space for accountability and human rights protection. The future of the human rights regime will depend on their ability to keep mobilizing, adapting, and sustaining influence within international institutions.

[1]Information on complaints submitted to the UN Special Procedures is publicly accessible through the OHCHR Special Procedures Communications Database (OHCHR, November 24, 2025). As of November 2025, the Special Procedures mechanism comprises 46 thematic mandates and 13 country mandates (OHCHR, November 19, 2025). Mandate holders perform several core functions: drawing attention to alleged human rights violations, issuing communications to governments and other relevant actors, and producing reports on such violations (OHCHR, November 19, 2025; OHCHR, December 1, 2025).

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Article

Narrowing the Attitude-Behavior Gap: EcoStep, a Mobile Application for Plastic Reduction Using Visualization, Gamification, and Personalization†

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Plastic pollution, especially microplastics, has emerged as a serious environmental problem. However, the attitude-behavior gap, in which high awareness does not translate into action, has been noted as a barrier to sustainable consumption, and a regulation-centered approach alone appears to have difficulty driving voluntary individual behavior change. In response, this study developed EcoStep, a mobile application combining visualization, gamification, and personalization to help convert awareness into action, and examined its effects on practice frequency and response efficacy. Using a mixed methods design, the 20-day study drew on usage logs from 29 app users, end-of-study survey responses from 14 of them, and in-depth face-to-face interviews with 5 participants. A retrospective pre-post survey on a 5-point scale measured severity awareness, practice frequency, response efficacy, feature ratings, and intention to use. Plastic reduction was calculated through conservative conversion to prevent overestimation, and the quantitative data were analyzed using descriptive statistics. The 29 participants recorded a total plastic reduction of 7 kg. Practice frequency rose from an average of 2.29 to 3.71, narrowing the attitude-behavior gap from 1.57 to 0.14, and response efficacy from 2.86 to 3.64. Ratings of the main features were generally positive, and about 80% of participants indicated an intention to continue using and recommend the app. These results suggest that concrete, measurable feedback and motivational elements can help narrow the attitude-behavior gap, and that digital interventions can complement regulation-centered policy to support voluntary pro-environmental behavior. This study also relates to Sustainable Development Goals (SDGs) 12, 13, and 14.

Keywords Attitude-behavior gap, Pro-environmental behavior, Gamification, Mobile application, Sustainable Development Goals

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1. Introduction

Plastic has greatly increased the convenience of modern society, but at the same time it acts as a factor causing serious environmental pollution. In particular, microplastics, which are 5 mm or smaller, are difficult to identify with the naked eye, so it appears that the general public has difficulty fully recognizing their existence and severity. According to an international collaborative study led by the 5 Gyres Institute, an estimated 171 trillion microplastic particles, weighing about 2.3 million tons, are present in the world's oceans (Eriksen et al., 2023). The rate of increase in microplastics has also been reported to be accelerating since 2005 (Eriksen et al., 2023). These microplastics are presumed to be transferred through the food chain to higher-level predators and ultimately into the human body. In fact, microplastics have been reported in the blood of 17 of 22 adults (about 77%) (Leslie et al., 2022). In addition, the possibility has been raised that plants absorb airborne microplastics and provide a pathway for them to reach the human body (Li et al., 2025).

The international community has recognized the severity of the problem and has responded with various policies (United Nations, 2022). However, because these approaches focus mainly on regulation and prohibition, they appear to have limitations in eliciting voluntary and sustained behavior change at the individual level. Prior research points out that even when awareness of environmental problems is high, it does not immediately translate into action, a phenomenon known as the attitude-behavior gap, which acts as a major barrier to sustainable consumption (Wintschnig, 2021). Meanwhile, it has also been reported that pro-environmental behavior can be promoted when the environmental consequences of one's own behavior are presented visibly (Luo et al., 2022). These findings suggest the possibility that visible feedback may contribute to narrowing the attitude-behavior gap.

Building on this concern, this study aims to develop a mobile application that helps young adults take action to reduce plastic use in daily life, and to examine its effects. To convert awareness into action, the application adopted three design principles. First, visualization that presents reduction outcomes visibly was intended to let users immediately confirm the results of their actions. Second, gamification elements were intended to provide ongoing motivation to participate. Third, personalized challenges were intended to increase the likelihood of taking action. The conceptual structure of this approach is presented in Figure 1.

The aims of this study relate to the Sustainable Development Goals (SDGs), specifically Responsible Consumption and Production (SDG 12), Climate Action (SDG 13), and Life Below Water (SDG 14). In particular, the study aligns with Target 14.1 of SDG 14, which aims to prevent and reduce marine pollution of all kinds (United Nations, 2025).

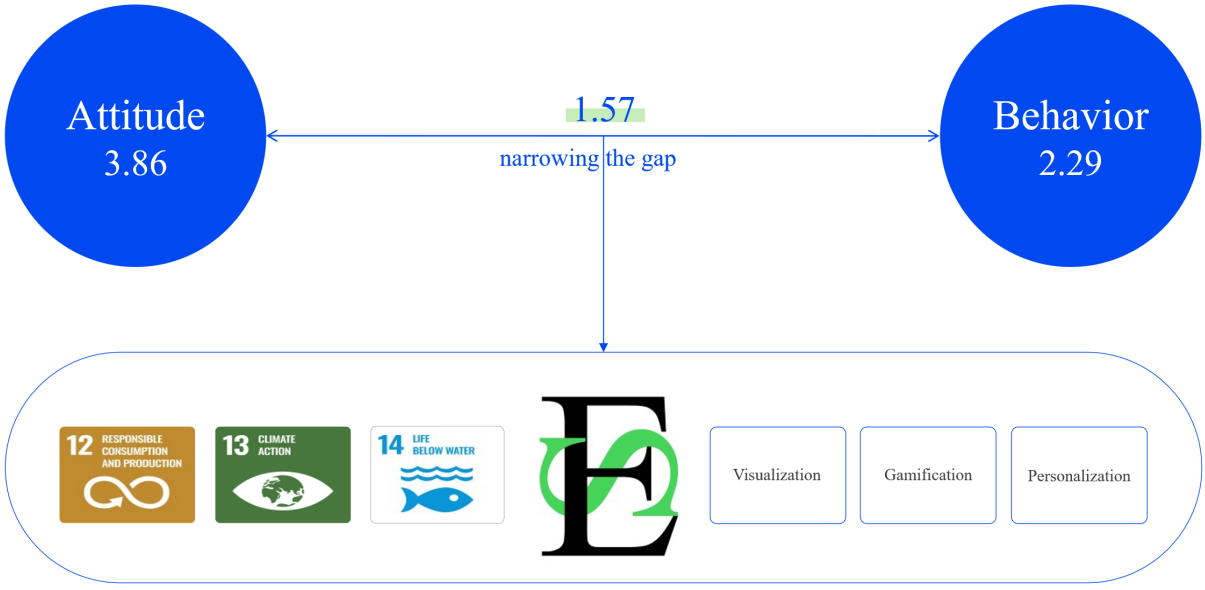

Figure 1. Conceptual Framework of EcoStep: the attitude-behavior gap, the three design principles for narrowing it (visualization, gamification, and personalization), and the related Sustainable Development Goals (SDGs 12, 13, and 14).

Accordingly, this study sought to test the following hypotheses. First, use of the application is expected to increase the practice frequency of environment-related activities and, as a result, to reduce the gap between awareness and action (H1). Second, use of the application is expected to increase response efficacy, that is, the belief that one's own pro-environmental behavior can contribute to solving the problem (H2). In addition, the gamification and visualization elements are expected to contribute to users' motivation to act. The validity of these expectations was examined using both quantitative and qualitative data. Specific results are presented in the following sections.

2. Materials and Methods

Materials

EcoStep, the application used in this study, was developed over about five months (August to December 2025) based on an initial prototype built in June 2025. After internal testing and preliminary validation from October to December 2025, it was officially released on the iOS and Android platforms in December.

The application used React (19.2.1) and Vite (7.2.4) for the frontend and Tailwind CSS (3.4.17) for styling, and it used Supabase (supabase-js 2.57.4) for the database and authentication (Google, Kakao, and Apple OAuth). The iOS and Android builds were configured with Capacitor (7.4.3). The Anthropic Claude API (Anthropic SDK 0.60.0, claude-3-haiku-20240307 model) was used for the chatbot, for providing environmental information, and for estimating the weight of unregistered items. The Naver Maps API (v3) was used for location-based store guidance, and the Kakao JavaScript SDK was used for KakaoTalk sharing.

Guided by the goal of converting awareness into action, the application mapped the three design principles of visualization, gamification, and personalization onto its features (Figure 2).

First, the visualization principle was implemented through a virtual ocean aquarium and a water-quality system on the

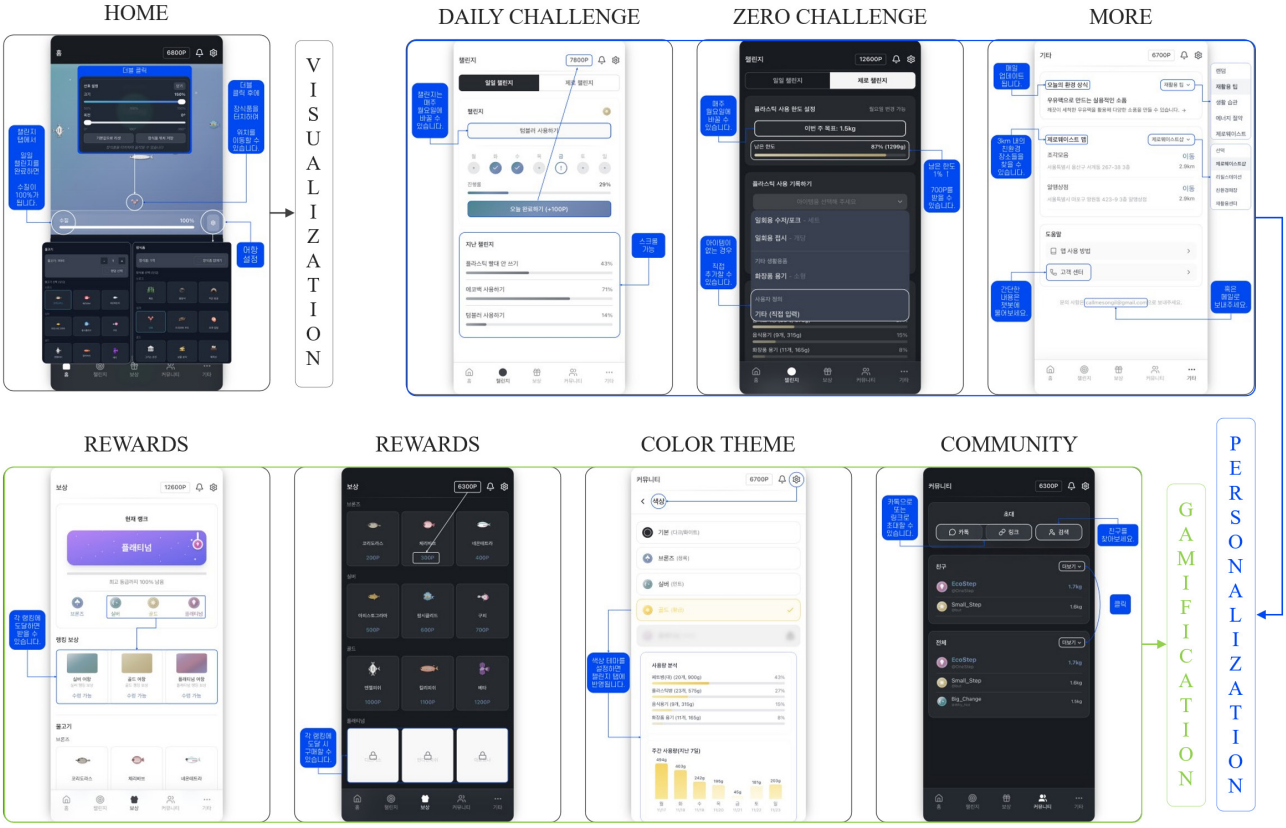

Figure 2. Screenshots of the EcoStep Application, Organized by Tab According to the Three Design Principles (visualization, gamification, and personalization).

home screen. If a user does not complete challenges, the aquarium gradually becomes murky, and when challenges are completed, the water quality recovers and becomes clear. This allows users to indirectly observe the impact of their actions on the marine environment. In addition, the cumulative amount reduced is presented as statistics, along with concrete figures such as "○○g saved."

Second, the gamification principle was implemented through points, a reward system, rankings, and community features. Each time users record a reduction, they earn points and can collect rewards (12 types of fish, 4 ranks, 12 decorations, and 4 backgrounds). In addition, through rankings and community features (inviting friends and sharing reduction amounts), users experience that taking action is not a solitary activity.

Third, the personalization principle was implemented through customized challenges and location-based guidance. In the Daily Challenge, users directly select the items they will act on, and in the Zero Challenge, users set their own plastic-use limits and record them so that they can view their usage habits as a graph. In addition, through the Zero-Waste Map, information on eco-friendly stores within a 3 km radius of the user's location (20 stores in Seoul) was provided through integration with Naver Maps.

The amount of plastic reduced was calculated conservatively to ensure measurement integrity. When a user recorded a reduced item, it was converted into weight according to a predefined per-item weight conversion table (Table 1). Items not registered in the conversion table were estimated using the Claude API. The conversion values were set low to prevent overestimation.

Table 1. Per-item Weight Conversion Table

Category	Item	Converted Weight (g, per unit)
Beverage	Plastic bottle	15
Beverage	Disposable cup	10
Beverage	PET bottle (large)	45
Beverage	Straw	1
Bag	Plastic bag (small)	3
Bag	Plastic bag (large)	7
Food	Food container	35
Food	Disposable spoon/fork	3
Food	Disposable plate	8
Other	Cosmetics container	15

These are the reference values used to convert the reduced items recorded by users into weight per unit (g). They were set conservatively to prevent overestimation. The weight of items not registered in the conversion table was estimated using the Claude API.

Methods

Participants. Study participants were recruited on a voluntary basis. Data were collected from application usage logs (29 participants), an end-of-study survey (14 participants), and in-depth interviews (5 participants). Both the survey and the interviews were conducted with subsets of the 29 people who used the app. The survey was conducted by email using Google Forms. All participants took part voluntarily and consented by responding to the survey and participating in the interviews. Demographic information was obtained only for the 14 survey respondents, not for the 29 participants with usage logs. Because participants were recruited voluntarily, it is possible that the sample included a relatively large number of users who are interested in environmental issues. This limitation is discussed in Section 4.

Measures. Data were collected through three channels. First, the cumulative amount of plastic reduced, converted according to the per-item weight conversion table (Table 1), was collected from the application usage logs. Second, on a 5-point scale (1 to 5), the survey measured severity awareness of the plastic problem, the practice frequency of environment-related activities (e.g., using a reusable cup or tumbler, using a reusable shopping bag, and separating recyclables), response efficacy related to pro-environmental behavior, the reasons that hindered practice, feature-by-feature ratings, and intention to continue using and to recommend the app. Explicit anchors were provided for the 1 and 5 points of each item (for example, for practice frequency, 1 = "never" and 5 = "every day"). Third, face-to-face semi-structured in-depth interviews were conducted with 5 participants to collect feedback on which features helped with behavior change and which aspects needed improvement. When presenting qualitative data, responses from open-ended survey items and from the in-depth interviews (5 participants) were distinguished by source.

Study model. This study adopted a mixed methods approach that combines quantitative investigation and qualitative analysis. The study proceeded in the following order: defining the problem through a literature review and data analysis, then completing and stabilizing the core features based on the prototype, then conducting a user study with the completed application (January 3 to January 23, 2026,

over 20 days), and finally performing quantitative and qualitative analysis. The survey was administered once, at the end of the study. The pre-use state was measured through a retrospective pre-post design, in which participants reported on their earlier state from memory. The limitations of this design (such as the possibility of recall bias) are discussed in Section 4. The conceptual structure of the study approach is presented in Figure 1.

Analysis. The quantitative data were analyzed with descriptive statistics (means, percentages, and the percentage of responses rating 4 or higher) using Microsoft Excel. The attitude-behavior gap was defined as the severity awareness score minus the practice frequency score. Means are reported to two decimal places, but differences and gaps were calculated using the pre-rounding means. The qualitative data were summarized thematically.

3. Results

The survey respondents were 14 of the 29 app users. Their age distribution was 10 in their 20s and 30s (71.4%) and 4 in their 40s and 50s (28.6%), and all 14 reported that they had no prior experience using environment-related apps other than this application. In what follows, the amount of plastic reduced is reported for all 29 participants whose usage logs were aggregated, while survey-based indicators are reported for the 14 respondents.

Analysis of the application usage logs showed that the total amount of plastic reduced recorded by the 29 participants over 20 days (January 3 to January 23, 2026) was observed to be 7 kg (rounded down). This value is an observed value calculated according to the predefined conservative weight conversion table.

Before using the app, participants' severity awareness of the plastic problem averaged 3.86 (on a 5-point scale), a relatively high level. In contrast, the practice frequency of environment-related activities averaged only 2.29, so a gap of 1.57 points was observed between severity awareness and action. After using the app, practice frequency increased to an average of 3.71. As a result, the attitude-behavior gap narrowed to 0.14 points (Table 2). In addition, the number of participants practicing environment-related activities at least three times a week (rating 4 or higher) increased from 1 (7.1%) before using the app to 7 (50.0%) after using it. These results are consistent with the hypothesis (H1) that app use would increase practice frequency and narrow the attitude-behavior gap.

The background to the low level of practice before app use is partly reflected in the responses about reasons for hindered practice. Of the 14 participants, 11 responded to the item asking why they had not practiced environment-related activities (multiple responses allowed). "Not knowing the effect" was the most common, cited by 11 (100%), followed by "not knowing what to do" by 6 (54.5%), "finding it bothersome" by 6 (54.5%), "a sense of doing it alone" by 5 (45.5%), and other by 1 (9.1%).

Response efficacy, the belief that pro-environmental behavior can contribute to solving the problem, rose from an average of 2.86 before app use to 3.64 after app use (Table 2). The number of participants rating 4 or higher increased from 2 (14.3%) to 10 (71.4%). These results are consistent with the hypothesis (H2) that app use would increase response efficacy.

The feature-by-feature ratings and intention to use are presented in Table 3. The motivational effect of the challenge format averaged 4.00 (85.7% rating 4 or higher, 12 people), game elements such as points, rewards, and rankings averaged 4.00 (71.4%, 10 people), and the provision of concrete

Table 2. Changes in Key Indicators before and after Using EcoStep

Indicator	Before Using App	After Using App	Change
Severity awareness	3.86	-	-
Practice frequency	2.29	3.71	1.43
Attitude-behavior gap	1.57	0.14	−1.43
Response efficacy	2.86	3.64	0.79

Values reported by the 14 survey respondents (N = 14). All indicators were measured on a 5-point scale (1 to 5). The pre-use values were reported retrospectively at the end of the study. Severity awareness refers to awareness of the severity of the plastic problem. Practice frequency refers to the degree of practice of environment-related activities (using a reusable cup or tumbler, using a reusable shopping bag, separating recyclables, etc.). Response efficacy refers to the belief that one's own pro-environmental behavior can contribute to solving the plastic problem. The attitude-behavior gap is the severity awareness score minus the practice frequency score. Severity awareness was measured only once, before app use, so no post-use value (-) is reported. Changes and gaps were calculated using pre-rounding means, so they may differ somewhat from calculations based on the rounded values shown in the table.

Table 3. Application Feature Ratings and Intention to Use

Item	Average	Percentage Rating 4 or Higher
Challenge-based motivation	4.00	85.7% (12 people)
Game elements (points, rewards, rankings)	4.00	71.4% (10 people)
Providing specific figures (“○○g saved”)	3.93	78.6% (11 people)
Intention to continue using	3.93	78.6% (11 people)
Intention to recommend	4.07	78.6% (11 people)

Ratings by the 14 survey respondents (N = 14). All items were measured on a 5-point scale. The feature-rating items were anchored at 1 = strongly disagree to 5 = strongly agree, and intention to continue using at 1 = not at all to 5 = very much. “Percentage rating 4 or higher” is the percentage of participants who responded with a 4 or a 5. The number in parentheses is the corresponding count.

figures such as "○○g saved" averaged 3.93 (78.6%, 11 people). The intention to continue using in the future averaged 3.93 (78.6%, 11 people) and the intention to recommend averaged 4.07 (78.6%, 11 people), so even after short-term use, about 80% of participants showed an intention to continue using and to recommend the app.

Responses related to behavior change were also found in the in-depth interviews. One participant said, "It was a topic I had only vaguely thought about, but using the app made it easy to take part through concrete action." Another participant noted that the app helped them act by reminding them of practices they had only thought about and quickly forgotten. These responses suggest the possibility that visible feedback and concrete guidance for action may have contributed to connecting awareness to action. Suggestions for improving and expanding features are discussed together in Section 4.

4. Discussion and Conclusions

This study began from the view that individuals' action on environmental problems is constrained not so much by a lack of awareness as by the absence of concrete methods for action, sustained motivation, and visible feedback on the effects of their behavior. This phenomenon, in which action does not follow even when awareness is high, has been discussed in prior research as the attitude-behavior gap (Wintschnig, 2021).

The findings of this study were in line with this view. Participants' severity awareness of the plastic problem was relatively high at an average of 3.86, but the practice frequency of environment-related activities averaged only 2.29, confirming an attitude-behavior gap of 1.57 points. In addition, "not knowing the effect" was the most frequently cited reason for hindered practice, which suggests that the absence of feedback for confirming the effects of behavior was a major obstacle. In other words, what was lacking appears to have been not awareness but the methods, motivation, and feedback that support action.

EcoStep was designed to address these deficiencies. Through visualization, it presents the results of behavior visibly. Through gamification, it provides motivation to participate. Through personalization, it makes methods for action concrete. After app use, practice frequency rose to an average of 3.71 and the attitude-behavior gap narrowed to 0.14 points. Response efficacy also rose. These changes are consistent with hypotheses H1 and H2. They are also in line with prior research showing that visible feedback can promote pro-environmental behavior (Luo et al., 2022). However, this study’s design does not allow us to determine whether the change in efficacy mediated the change in practice, so it is difficult to conclude that efficacy is a mediator of behavior change.

These results suggest that scalable digital interventions that complement policy centered on regulation and prohibition can play some role in encouraging voluntary behavior change at the individual level. The practicality and scalability of this approach are supported by two findings: the challenge, game elements, and provision of concrete figures were all rated relatively highly in the feature-by-feature evaluation, and about 80% of participants showed an intention to continue using and to recommend the app even after short-term use.

Based on the observed values of this study, the magnitude of the reduction effect can be estimated. Linearly extrapolating the 20-day per-person reduction to an annual basis yields an expected reduction of about 4.41 kg per person per year (equivalent to approximately 294 plastic bottles of 500 ml, based on 15 g per bottle). With a user base of 100, this could lead to a reduction of about 441 kg per year, and with 1,000 users, about 4,410 kg per year. However, because these figures are a linear extrapolation based on the as-

sumption that participants continue to use the app at the same level as during the 20 days, the actual long-term effect needs to be verified through follow-up research.

This study has the following limitations. First, because the study used a single group without a control group and relied on retrospective reporting of the pre-use state, the possibility of recall bias is difficult to rule out. Second, because the data collection period was short, at 20 days, it was not possible to confirm whether the observed behavior change is sustained as a habit. Third, because participants were recruited voluntarily, the sample may have included a relatively large number of users interested in environmental issues, which limits the generalization of the results to the general public. Fourth, because a research team of two carried out app development, data collection, and analysis together, there were limitations in collecting large-scale data and conducting in-depth analysis. Fifth, because the reduction amounts are based on users' self-reports, there is a possibility of measurement error. However, conservative weight conversion was applied to reduce the possibility of overestimation.

Considering these limitations, future research should verify whether the behavior is sustained as a habit through pre-post measurement that includes a control group and through longitudinal observation, and should expand the size and age range of the sample. In addition, we plan to improve the app through links with public institutions and recycling facilities, multilingual support, and the expansion of challenges into areas beyond plastic.

In sum, this study suggests that abstract awareness of environmental problems alone is unlikely to translate into action, but that the attitude-behavior gap can be narrowed when concrete and measurable feedback and motivational elements are provided. In a short-term user study using EcoStep, practice frequency and response efficacy rose in directions consistent with the hypotheses. These results show that digital interventions can serve as a complementary tool for supporting pro-environmental behavior change at the individual level. However, given the constraints of a short-term, single-group, and voluntary sample, the results of this study are preliminary. Confirmation through long-term and controlled follow-up research is needed.

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Article

Exploring the Moderating Role of Curiosity in the Relationship Between Ethical Awareness and Consumer Behaviors†

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Despite the increasing interest in ethical consumption, the intention–behavior gap (I-B gap), where consumers' ethical intentions do not translate into actual behavior, remains a significant challenge. This study aimed to explore the role of curiosity in overcoming this gap. In Study 1, an online survey was conducted with 400 Korean university students to examine whether trait curiosity moderates the relationship between ethical consumption intention and prioritization. In Study 2, an experimental approach with 300 participants was used to investigate whether information gap and ambiguity techniques induce situational curiosity. Results from the first study revealed that although the hypothesized moderating effect of trait curiosity was not supported, exploratory analyses indicated that it independently predicted prioritization, and Stress Tolerance exhibited a negative moderating effect. In the subsequent experiment, while the ambiguity manipulation did not work as intended, exploratory observations suggested that curiosity may increase as information is perceived to be sufficient, showing a pattern contrary to the existing information gap theory. These exploratory findings suggest that transparent provision of information is more effective in eliciting curiosity in the context of ethical consumption.

Keywords I-B gap, Curiosity, Ethical consumption, Social innovation Enterprise, SDGs

1. Introduction

Today, social innovation enterprises such as non-profit startups and social ventures aiming for social innovation are rapidly increasing worldwide. As of 2024, over 10 million social innovation enterprises are active globally, generating more than 2 trillion dollars in annual revenue and creating over 200 million jobs (Schwab Foundation for Social Entre-

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preneurship, 2024). In South Korea, since the introduction of the social enterprise certification system in 2007, the number of certified enterprises has surged from 55 to approximately 3,700 in 2024. Notably, disability-friendly companies that focus on employing people with disabilities, providing social services, and donating profits have shown remarkable growth. These companies play a key role in supporting the independence and social participation of people with disabilities. At the same time, ethical values of companies have emerged as an important criterion in consumers' purchasing decisions, spreading interest in 'ethical consumption' and increasing public attention toward social innovation enterprises. For example, the social venture 'Donggubat,' which produces eco-friendly soap by employing people with developmental disabilities, employed 54 out of 116 total staff as of 2024 and achieved approximately 14 billion KRW in sales in 2023, demonstrating clear success.

However, mere interest or exposure to ethical issues does not directly translate into purchasing, investing, or sponsoring behaviors. Active consumer participation is essential to securing the sustainability of social innovation enterprises. Therefore, identifying the psychological factors that operate in the process of converting 'interest' into 'action' is an important task. Especially, to establish a stable growth foundation for disability-friendly companies, it is necessary to identify decisive mediating and moderating variables that convert people's perceptions into actual consumer behavior. Through this, companies can design more effective marketing and communication strategies and further spread social momentum supporting people with disabilities.

Intention–Behavior Gap

As mentioned in the introduction, positive interest in social innovation enterprises does not necessarily lead directly to actual consumer behavior. In the literature on ethical consumption, this phenomenon—where consumers' good intentions do not result in actual purchases—is explained as the 'Intention–Behavior Gap (I-B gap)' (Carrington, Neville, & Whitwell, 2014). For instance, a survey by Futerra Sustainability Communications (2005) found that 89% of UK consumers expressed deep concern about ethical issues, but only 3% actually purchased ethical products. Similarly, a study on Korean consumers' awareness and practice of sustainability revealed that while 82.2% of respondents agreed that environmentally sustainable consumption is necessary, only 25.5% made efforts to purchase eco-friendly products (Lee, 2020, as cited in Kim et al., 2022). This shows that consumers' ethical intentions did not translate into actual purchasing behavior.

Carrington et al. (2014) summarized that this discrepancy is moderated by four key factors. The first is 'prioritizing ethical concerns.' Since consumers cannot focus on all ethical issues simultaneously amid busy daily lives, they distinguish their ethical concerns into primary and secondary priorities. Ethical issues that become a consumer's primary concern resonate deeply with their core values, prompting active information seeking and integration of the issue into their identity and lifestyle. The second factor is 'Plans and habits,' which helps avoid impulsive purchases or other temptations in stores and breaks existing unethical consumption habits to form new ethical habits. Repeated execution of such plans gradually establishes habits, making ethical consumption occur naturally without much effort. The third factor is 'Commitment and Sacrifice.' To establish ethical consumption as a long-term daily routine, consumers often need to accept sacrifices such as paying higher costs or tolerating reduced convenience and quality. Such high levels of commitment and sacrifice manifest only for major ethical concerns closely linked to the consumer's self-identity and values. The last factor is 'behavioral modes,' which refers to how the previous three factors (prioritization, plans and habits, commitment and sacrifice) concretely manifest in actual purchasing environments.

Casais and Faria (2022) empirically tested Carrington's model through a survey-based study. The results showed that 'plans and habis' significantly mediated the relationship between ethical intention and behavior, while 'commitment and sacrifice' played a moderating role that strengthened this relationship. This suggests that cognitive prioritization and structured planning are essential for consumers' ethical intentions to translate into behavior.

While existing literature has succeeded in identifying structural factors and pathways to reduce the I-B gap, it still lacks explanation of the psychological drivers that trigger the connection between key factors to the next stage. In other words, fundamental questions remain about how consumers select a particular ethical issue as their 'primary concern' among numerous social issues and what motivates them to voluntarily seek information about unfamiliar social innovation enterprise products. For ethical attitudes to convert into active behavior, an internal motivation to recognize and fill

cognitive gaps is essential. Accordingly, this study aims to identify the psychological drivers that elevate ethical issues to personal primary concerns and trigger information seeking behavior as a starting point to overcome the I-B gap.

Curiosity

The psychological driver this study seeks to identify must play a key role in the ethical consumption implementation process proposed by Carrington et al. (2014). They suggested that even if consumers recognize ethical issues, the first step toward behavioral change is securing prioritization of ethical concerns among various personal interests. This prioritization should lead to related information seeking, behavior planning, and habit formation through repeated practice to result in actual ethical consumption behavior. Therefore, the psychological driver of interest in this study should promote prioritization of ethical concerns and possess characteristics that connect to subsequent behavioral implementation.

Considering these requirements, curiosity is a suitable candidate. Curiosity is a motivation that broadens understanding of the environment and others and drives exploration of new information. In social contexts, it enhances openness, receptivity, and empathy, leading to positive interactions (Kashdan et al., 2011). Curiosity also makes individuals aware of information gaps between what they know and do not know, prompting active information seeking behavior to close these gaps. These characteristics can lead individuals to pay more attention to social and ethical issues and recognize specific ethical issues as important considerations among competing interests. Furthermore, curiosity-driven information seeking can lead to knowledge acquisition related to ethical consumption, behavior planning, and sustained practice, aligning theoretically with the behavioral pathway proposed by Carrington et al. (2014).

Previous studies have shown that curiosity promotes prosocial behavior. Kashdan et al. (2013) found that highly curious individuals tend to exhibit non-defensive, non-critical, and inclusive attitudes toward others. Jahantab et al. (2024) reported that explicit social curiosity—direct ways of seeking information about others, such as asking questions—can enhance prosociality like organizational citizenship behavior through social acceptance. Therefore, curiosity may play a positive moderating role in the relationship between ethical awareness and consumption behavior and is expected to contribute to prioritizing specific ethical issues as primary concerns among various social issues.

Accordingly, this study has two purposes. First, it aims to verify whether curiosity acts as a moderating variable in the relationship between ethical issue awareness and ethical consumption behavior. Specifically, it explores whether trait curiosity, as a stable personal characteristic, promotes prioritization of ethical concerns and how this prioritization influences the process of translating awareness into behavior. Second, it examines the effectiveness of situational curiosity-inducing techniques used in advertisements for products from disability-friendly companies. By verifying how various curiosity-inducing treatments enhance consumers' situational curiosity and whether increasing the number of treatments amplifies the effect, this study seeks to provide foundational data for marketing strategy development for disability-friendly enterprises.

Directions for Achieving the Sustainable Development Goals (SDGs)

This study aligns with the Sustainable Development Goals (SDGs). Theoretically, by proposing curiosity as a moderating variable between problem awareness and consumption behavior, it expands existing ethical consumption behavior models and offers a new paradigm in consumer behavior research. Practically, it enhances actionable applicability by providing concrete guidelines for disability-friendly social innovation enterprises to utilize curiosity-based marketing strategies. Furthermore, at the policy level, it suggests strategies to incorporate curiosity into public institutions and local governments' disability support policies and campaigns to increase citizen participation and acceptance. Ultimately, this promotes the spread of ethical consumption, contributing to the independence of people with disabilities and the creation of an inclusive social environment. These effects specifically contribute to achieving SDG 8 (Decent Work and Economic Growth), SDG 10 (Reduced Inequalities), and SDG 12 (Responsible Consumption and Production), playing a crucial role in strengthening overall social sustainability and inclusiveness.

2. Study 1

In Study 1, we analyze the impact of individuals' internal cognitive processes on consumer behavior by integrating the psychological factor of 'curiosity' and the cognitive stage

of 'prioritization' into the model of the intention–behavior pathway in consumption scenes proposed by Casais and Faria (2022). In particular, we explore how curiosity influences Prioritizing ethical concerns, which serves as the starting point of the pathway leading to ethical consumption. The research hypothesis and model are as follows (Figure 1).

H1. Trait curiosity will exert a positive moderating effect between intention and prioritization in the I-B Gap model.

Method

1) Participants

Referring to the prior study (Casais & Faria, 2022), which was based on 346 adults with experience in ethical consumption, this study conducted an online survey targeting a total of 400 Korean university students aged 19 or older. The final participants consisted of 199 males and 201 females, with an average age of 22.41 years (M = 22.41, SD = 2.15). Participants were recruited through Dataspring, a professional survey company, and before participating, they reviewed and consented to the explanation of the study's purpose and procedures. Upon completing the survey, participants were compensated with 400 points equivalent to 400 KRW in cash.

Table 1. Status of Respondents' Interest in Ethical Issues (Multiple Responses Allowed)

Interest area	Frequent	Percentage (%)
Environment	254	63.50
Labor/Human Rights	170	42.50
Animal Welfare	130	32.50
Local Community	105	26.25
Fair Trade	91	22.75
Disability Inclusion	55	13.75
Etc.	5	1.25

2) Materials and Procedure

The questionnaire consisted of 2 items asking about demographic characteristics (age and gender), 20 items related to ethical consumption reconstructed by translating and adapting the measurement tools from the prior study (Casais & Faria, 2022) into Korean, and 24 items measuring trait curiosity. Trait curiosity was measured using Five-Dimensional Curiosity Scale-Revised(5DCR) developed by Kashdan et al. (2020). Except for demographic questions and some items identifying key ethical issues, all variables were measured on a 7-point Likert scale. To prevent missing data due to skipped responses, the online system was configured so that participants had to answer all questions before submitting and completing the survey.

Results

1) Awareness of Ethical Issues and Status of Consumer Behavior

Before the main analysis, to identify which ethical issues the participants were mainly interested in, the frequency of responses regarding areas of interest was examined (see Table 1). Multiple responses were allowed for this item. Respondents showed the highest interest in 'environmental' is-

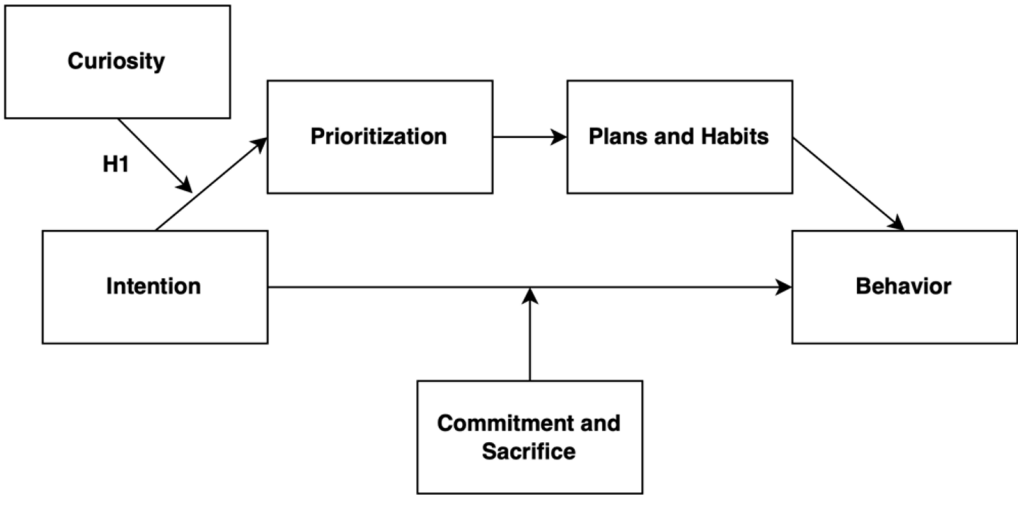

Figure 1. Research Model.

sues (63.50%, 254 participants). This was followed by 'labor/human rights' issues at 42.50% (170 participants), 'animal welfare' (32.50%, 130 participants), 'local community' (26.25%, 105 participants), 'fair trade' (22.75%, 91 participants), and 'disability inclusion' (13.75%, 55 participants).

A paired t-test was conducted to verify whether this interest actually translates into consumer behavior, i.e., whether the I-B gap underlying this study exists in the sample. The analysis showed that the mean of ethical consumption intention was 4.28 (SD = 1.24), whereas the mean of actual ethical consumption behavior was 3.63 (SD = 1.34). The mean difference between the two variables was statistically significant (t (399) = 12.06, p < .001), with ethical consumption intention being significantly higher than behavior. These results empirically demonstrate that the Korean university student sample experiences a clear I-B gap, showing high interest in various ethical values such as environment and human rights but failing to translate this into immediate action. Therefore, there is a need to explore specific mechanisms that intervene in the process of converting intention into behavior beyond simply increasing intention.

2) Replication

To replicate and verify the moderated sequential mediation model presented in prior research (Casais & Faria, 2022), the analysis was conducted in two stages. First, to confirm whether the mediation paths proposed in the prior study could be replicated in a sample of Korean university students, the variable of prioritization of ethical concerns was additionally included, and a sequential mediation analysis was performed. Before including the variables of commitment and sacrifice, the basic sequential mediation model was tested, and the cognitive mechanism from the prior study was significantly supported in this study as well (see Table 2). An indirect effect (B = 0.056) was found where ethical consumption intention sequentially influenced prioritization and planning stages, leading to behavior, and the 95% bootstrap confidence interval [0.029, 0.089] did not include zero, indicating statistical significance.

Next, the moderated mediation model was analyzed by adding the moderating effects of commitment and sacrifice on the direct path between intention and behavior. The analysis showed that the interaction terms between intention and commitment and sacrifice on behavior were not statistically significant (see Table 3; B = 0.027, p = .264, 95% CI [-0.021, 0.076]). Examining the conditional direct effects at different levels of the moderators revealed that regardless of the levels of commitment and sacrifice (low, average, high), the positive effect of intention on behavior was significant, but differences in effect size were not statistically supported. Unlike the prior study, the moderating effects of commitment and sacrifice were not replicated in this data.

3) Hypothesis Testing

To test the hypothesis that trait curiosity would moderate the relationship be-tween ethical consumption intention and prioritization, a moderated sequential mediation model analysis was conducted. The interaction term between intention and curiosity did not have a significant effect on prioritization (B = -0.003, p = .961). To verify differences in conditional indirect effects according to levels of curiosity, the Index of Moderated Mediation was examined, and its 95% confidence

Table 2. Results of Mediation and Sequential Mediation Effects Testing.

Indirect Paths	*B*	*SE*	*p*	95% Boot CI
Intention → Prioritizing ethical concerns → Behavior	0.115	0.033	< .001	[0.054, 0.184]
Intention → Plans and Habits → Behavior	0.063	0.022	.005	[0.028, 0.120]
Intention → Prioritizing ethical concerns → Plans and Habits → Behavior	0.056	0.015	< .001	[0.029, 0.089]

Table 3. Results of Moderating Effects of Commitment and Sacrifice and Conditional Direct Effects Testing

Paths and Condition	*B*	*SE*	*p*	95% Boot CI
Moderating Effects				
Intention x Commitment and Sacrifice → Behavior	0.027	0.024	.264	[-0.021, 0.076]
Conditional Direct Effects				
Low Commitment and Sacrifice (-1 SD)	0.401	0.060	< .001	[0.278, 0.514]
Mean Commitment and Sacrifice (M)	0.438	0.062	< .001	[0.314, 0.559]
High Commitment and Sacrifice (+1 SD)	0.475	0.079	< .001	[0.324, 0.633]

interval included zero, indicating no statistical significance (*Index* = 0.000, 95% CI [-0.018, 0.015]). Additionally, simple slope analysis showed that intention predicted prioritization similarly in both low curiosity (B = 0.366, p < .001) and high curiosity groups (B = 0.362, p < .001). In summary, the moderating and moderated mediation effects of trait curiosity were not supported in this study, leading to the rejection of Hypothesis 1. However, trait curiosity independently had a significant positive effect on prioritization (B = 0.151, p = .045), indicating that individuals with higher levels of curiosity tend to explore and prioritize ethical issues themselves, regardless of the level of ethical consumption intention.

4) Post-hoc Analysis

In the previous analysis, the total score of the 5DCR scale was used to test the moderating effect of trait curiosity. However, in exploratory analysis, individual sub-factors were entered as independent moderators instead. This multidimensional analytical approach is supported by two reasons. First, theoretically, the 5DCR proposed by Kashdan et al. (2020) conceptualizes curiosity not as a single dimension but as a structure composed of five independent and heterogeneous dimensions, including motivation, emotion, and behavioral styles. Therefore, treating sub-dimensions as a single variable by integration may overlook detailed characteristics of curiosity. Second, statistically, if the directions of effects of each sub-factor on the dependent variable differ, summing them into a single total score may cancel out effects and distort the actual causal relationships between variables. Indeed, the post-hoc analysis results showed that among the 5DCR sub-factors, 'Joyous Exploration (JE)' and 'Stress Tolerance (ST)' exhibited effects in opposite directions on the path from ethical consumption intention to prioritization, supporting the validity of detailed sub-factor analysis (see Table 4).

Based on this, sub-factor analyses were conducted. In the model with JE as the moderator, the interaction term between intention and JE on prioritization was not statistically significant (B = 0.057, p = .105), and the 95% bootstrap confidence interval of the Index of Moderated Mediation (IMM) included zero, indicating no support for moderated mediation (*Index* = 0.008, 95% CI [0.000, 0.023]). Although not statistically significant, simple slope analysis showed a tendency for ethical consumption intention to predict prioritization more strongly in the high JE group (B = 0.412) than in the low JE group (B = 0.294). In the model with ST as the moderator, the interaction term between intention and ST had a significant negative effect on prioritization (B = -0.083, p = .034, 95% CI [-0.166, -0.009]). The Index of Moderated Mediation was significant as its 95% bootstrap confidence interval did not include zero (*Index* = -0.012, 95% CI [-0.030, -0.002]). Simple slope analysis also confirmed that the positive effect of intention on prioritization was relatively weaker when ST was high (B = 0.291, 95% CI [0.166, 0.407]) compared to when ST was low (B = 0.469, 95% CI [0.371, 0.578]). This result is contrary to the hypothesis that trait curiosity would exert a positive moderating effect between intention and prioritization.

Table 4. Comparison of Moderating Effects and Moderated Mediation Effects of 5DCR Sub-factors (JE, ST)

Paths and Condition	*B*	*SE*	*p*	95% Boot CI
Joyous Exploration (JE) Moderation Model				
Intention → JE → Prioritizing ethical concerns	0.057	0.035	.105	[-0.007, 0.134]
Index of Moderated Mediation (IMM)	0.008	0.006	.155	[0.000, 0.023]
Stress Tolerance (ST) Moderation Model				
Intention → ST → Prioritizing ethical concerns	-0.083	0.039	.034	[-0.166, -0.009]
Index of Moderated Mediation (IMM)	-0.012	0.007	.086	[-0.030, -0.002]
Conditional Direct Effects of the ST Model				
Low Stress Tolerance (-1 *SD*)	0.469	0.053	< .001	[0.371, 0.578]
Mean Stress Tolerance (M)	0.380	0.040	< .001	[0.299, 0.456]
High Stress Tolerance (+1 *SD*)	0.291	0.063	< .001	[0.166, 0.407]
Conditional Indirect Effects of the ST Model				
Low Stress Tolerance (-1 *SD*)	0.067	0.019	.001	[0.034, 0.108]
Mean Stress Tolerance (M)	0.054	0.015	< .001	[0.028, 0.087]
High Stress Tolerance (+1 *SD*)	0.041	0.013	.002	[0.020, 0.073]

The Index of Moderated Mediation (IMM) for the indirect effect through Stress Tolerance (ST) is considered statistically significant as its bootstrapped 95% confidence interval does not contain zero.

Discussion

Study 1 aimed to verify the role of cognitive mechanisms—prioritization and planning—in the process by which ethical consumption intentions translate into actual behavior, and to explore the influence of trait curiosity on this process. The results confirmed that the model from prior research, in which intention sequentially leads to prioritization, then planning, and finally behavior, also holds true for a sample of Korean university students. This reaffirms that, in the domain of ethical consumption, overcoming the intention–behavior gap requires placing specific ethical issues as primary concerns and establishing practical plans for action.

On the other hand, the moderating effects of commitment and sacrifice, which were significant in previous studies, were not supported in this research. This difference can be interpreted as stemming from sample characteristics between the two studies. The prior study recruited participants from an online community specialized in ethical issues and included only respondents who demonstrated both purchase intentions and actual purchase behaviors for ethical reasons. This sampling method targeted a group with already high involvement and commitment to ethical consumption, within which sufficient variability in the spirit of sacrifice existed, possibly allowing the detection of significant moderating effects.

In contrast, this study collected data from Korean university students without preconditions regarding ethical consumption experience or involvement, to examine whether the prior model could be replicated in a general sample. In such a general sample with diverse prior experience and involvement in ethical consumption, the overall level of the spirit of sacrifice may have been low or its variability limited, which could explain the lack of statistically significant moderating effects. Therefore, the results do not imply that the spirit of sacrifice has no effect per se, but rather suggest that the sample did not meet the sufficient level of ethical consumption experience and involvement necessary for the moderating effect to manifest. Future research should consider segmenting samples based on ethical consumption involvement.

The core hypothesis regarding the moderating effect of trait curiosity was rejected. However, a significant finding was that trait curiosity had a direct positive effect on prioritization, independent of intention. This suggests that curiosity functions not as a moderator amplifying existing consumption intentions, but as an in-dependent antecedent that draws attention to ethical issues themselves. Strzelecki et al. (2024), through a systematic literature review, reported that in consumer contexts, curiosity acts as a motivational force directly inducing behaviors such as information seeking, exploratory shopping, and diversity pursuit, and plays an independent role in sustainable consumption by interacting with consumers' environmental awareness to guide ethical consumption choices. In other words, even individuals with low initial ethical consumption intentions may have sufficient potential, if their trait curiosity is high, to seek new information about ethical issues and prioritize these issues as important in their lives.

An exploratory analysis separating the sub-factors of the 5DCR clearly demonstrated the limitations of treating curiosity as a unidimensional construct and supported the need for a multidimensional approach. Notably, among the sub-factors, Stress Tolerance showed a negative moderating effect by weakening the path from intention to prioritization, contrary to the hypothesis. This unexpected result can be alternatively interpreted by considering that ethical issues inevitably cause psychological discomfort or cognitive dissonance—a form of 'stress'—to individuals. Individuals scoring high on the Stress Tolerance exhibit curiosity-based on a belief in their ability to cope with anxiety and uncertainty. Those with high scores in this dimension tend to have the greatest psychological flexibility and pain tolerance and are least likely to avoid or respond maladaptively to stressful situations. Paradoxically, this may reduce the pressure to immediately resolve cognitive dissonance. According to the Need for Cognitive Closure theory, lower tolerance for uncertainty and ambiguity strengthens motivation to quickly reach a definite answer (Kruglanski, 2013; Zuo et al., 2025). Therefore, individuals with low Stress Tolerance are strongly motivated to promptly prioritize ethical issues in their lives to quickly alleviate psychological discomfort caused by these issues, whereas those with high Stress Tolerance can endure such discomfort longer and thus may feel less urgency to prioritize these issues immediately.

In conclusion, stimulating the Joyous Exploration tendency, which is the curiosity facet to be explored in the ethical consumption context, may facilitate progression to the next stage. However, a high level of Stress Tolerance—the ability to endure ambiguity and tension—may conversely delay behavioral change.

3. Study 2

In Study 2, an experiment is designed to directly address disability-friendly companies, which are the core ethical concern of this research. Loewenstein(1994) stated that trait curiosity, a stable personal disposition, and state curiosity, which varies depending on the situation, show a positive relationship. Based on this, Daume and Hüttl-Maack (2020) developed curiosity-inducing advertising stimuli and conducted an experiment, finding that advertisements using information gap techniques and ambiguity techniques elicited high levels of curiosity. This study aims to verify whether applying this strategy to disability-friendly companies, that is, in the context of ethical consumption, also significantly increases consumers' levels of curiosity. The research hypothesis is as follows.

H2. The information gap technique and the ambiguity technique will enhance situational curiosity.

Method

1) Participants

Study 2 was conducted as an online experiment with a total of 300 Korean male and female university students aged 19 and above who did not participate in Study 1. The final participants consisted of 145 males and 155 females, with an average age of 22.52 years (*SD* = 2.53). The sample size for this study was calculated based on the prior study by Daume and Hüttl-Maack (2020), which served as the foundation for the research design. That prior study categorized curiosity-inducing situations into information gap, ambiguity, novelty, and control groups, assigning 70 participants to each group for a total of 280 participants. In the present study, the novelty condition, which did not show significant effects in the prior study, was excluded, and an 'information gap and ambiguity mixed condition' was added, resulting in a total of four groups to be compared. Accordingly, the basic assumption was 70 participants per group as in the prior study, and considering possible data loss due to dropouts, the final sample size was set at 75 participants per group, totaling 300 participants. Participants were randomly assigned to one of the four experimental conditions, resulting in an equal distribution of 75 participants each in the information gap condition, ambiguity condition, information gap and ambiguity mixed condition, and control condition. All participants were recruited through Dataspring, a professional survey company, and participated in the experiment after reading and agreeing to the explanation of the study's purpose and procedures. Upon completing the survey, participants were compensated with 200 points equivalent to 200 KRW in cash.

2) Materials and Procedure

Due to copyright constraints, the original visual stimuli used in this study are not reproduced here. The stimuli consisted of four variations of a mock advertisement for a solid shampoo bar produced by a real social enterprise. All four conditions featured the identical background and a central image of the shampoo bar. The advertising stimuli in Study 2 consisted of four types: information gap, ambiguity, a mixture of information gap and ambiguity, and a control condition. To ensure that the manipulation intentions for each condition did not overlap, drafts were repeatedly reviewed and expressions were adjusted. Furthermore, the visual elements—such as the placement of phrases, the size of emphasized text, and the position of supplementary explanations—were carefully standardized across conditions.

Participants in the information gap condition read advertisements with no product description and a catchphrase containing blanks (e.g., "Through this shampoo bar, [____] is created"). Participants in the ambiguity condition read advertisements that included product descriptions along with catchphrases unrelated to the product (e.g., "This is not a soap"). In the information gap and ambiguity mixed condition, advertisements were presented that included unrelated catchphrases without product descriptions. Participants in the control condition read advertisements with clearly presented product descriptions.

Afterward, participants in the four groups were given a brief questionnaire based on prior research, consisting of five items in total: three items to verify whether appropriate situational curiosity was induced, and two items to check the manipulation of conditions (measuring the degree of information provided and the degree of confusion).

Results

1) Manipulation Check

To verify whether the presented stimuli were intentionally manipulated, responses to the condition manipulation check items were examined. The degree of information provided was measured by a single item to check the information gap

manipulation, and the degree of confusion was measured by a single item to check the ambiguity manipulation.

First, to verify the information gap manipulation, an ANOVA was conducted on the information provision scores. The information gap condition (M = 3.23) and the mixed condition (M = 3.01) were significantly lower than the control group (M = 5.09, p < .001), confirming that the information gap manipulation was successfully implemented.

On the other hand, to verify the ambiguity manipulation, confusion scores were analyzed. The ambiguity condition (M = 3.36) did not show a statistically significant difference from the control group (M = 2.77, p = .136), indicating that the ambiguity manipulation failed.

Notably, in the information gap condition, confusion (M = 4.47) was significantly higher compared to the control group, revealing an unintended effect where the absence of information caused cognitive confusion beyond mere curiosity. It was difficult to conclude that the ambiguity condition increased confusion. Therefore, hypothesis testing based on comparisons between conditions was deemed invalid.

Accordingly, this study conducted an additional exploratory analysis focusing on how participants actually perceived the stimuli, rather than relying on comparisons between conditions.

2) Regression Analysis Model Using Perceived Variables

As a result of conducting regression analysis using the perceived level of information provision and the perceived confusion variables, it was found that when consumers felt that the information in the advertisement was insufficient or ambiguous, curiosity was not aroused. Rather, the more the advertisement was perceived to provide sufficient information, the more situational curiosity about the product significantly increased (B = 0.257, SE = .052, t (297) = 4.963, p < .001; Figure 3 and Table 5). This result contradicts the existing Information Gap Theory (Loewenstein, 1994), which

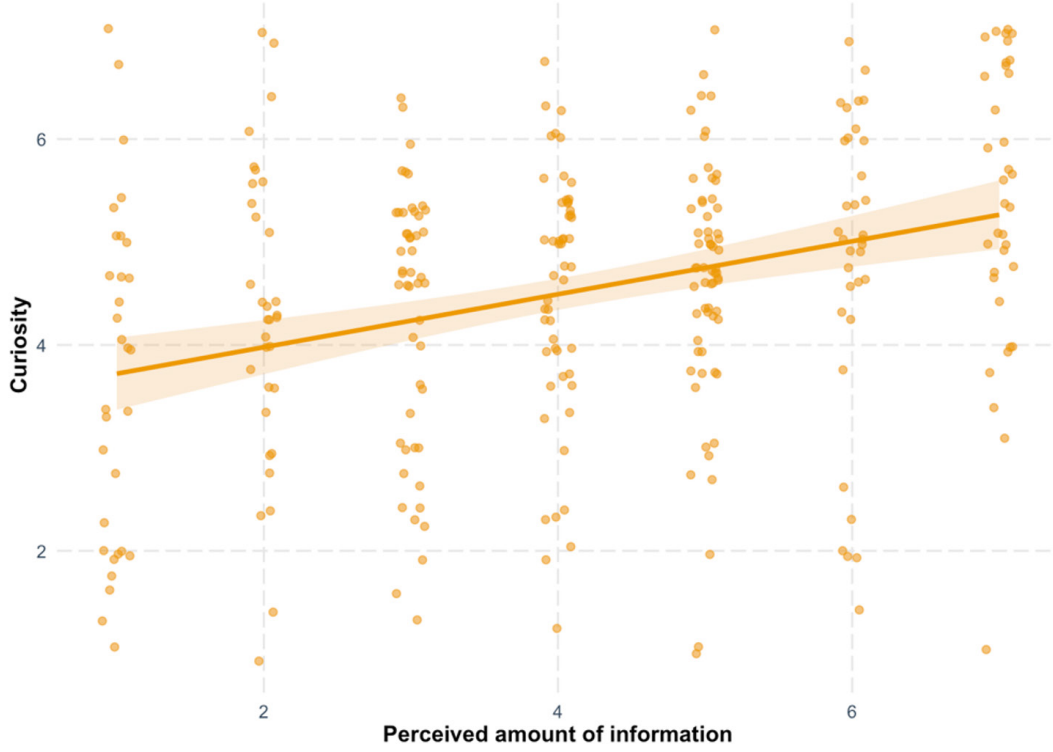

Figure 3. Graph showing the effect of the perceived level of information provision on curiosity.

Table 5. The Effect of Perceived Information Provision and Confusion Levels on Situational Curiosity

Predictor	B	*SE*	*β*	*t*	*p*
Perceived Level of Information Provision	0.257	0.052	0.332	4.963	< .001
Perceived Level of Confusion	0.059	0.051	0.077	1.156	0.249

suggests that the absence of information stimulates curiosity. This difference can be interpreted as being due to the ethical consumption context of this study's subject, which is products from disability-friendly companies. In the case of products that advocate social values, consumers tend to verify the sincerity of the company, so techniques that hide information may rather risk lowering trust. In conclusion, in the marketing context of products with ethical and social values, rather than artificially creating information gaps, providing transparent and rich information about the product's characteristics and the company's values can more effectively elicit consumers' genuine interest and curiosity. The interaction effect between JE and ST is illustrated in Figure 2.

Discussion

Study 2 aimed to verify whether information gaps and ambiguity techniques could induce consumers' situational curiosity within the specific ethical consumption context of disability-friendly companies. However, prior to the main experiment, manipulation checks showed that the information gap condition was perceived as significantly lacking information compared to the control condition, indicating successful manipulation. In contrast, the ambiguity condition failed to independently induce significant confusion, resulting in manipulation failure. Notably, the information gap condition caused unintended effects, such as significantly higher cognitive confusion compared to the control group, beyond merely stimulating curiosity. Due to the failure of the ambiguity manipulation and limitations in controlling conditions, this study shifted from the originally planned hypothesis testing via mean comparisons between conditions to an exploratory analysis focusing on how respondents actually perceived the stimuli. Regression analysis using perceived information provision level and confusion variables revealed that when consumers felt the information in the advertisement was insufficient or ambiguous, curiosity was not induced. Conversely, the more consumers perceived the advertisement as providing sufficient information, the more situational curiosity toward the product significantly increased (B = 0.257, p < .001).

The manipulation failure and experimental design limitations in this study offer important methodological suggestions for future research. First, since the stimulus phrases and visual elements did not clearly induce the intended manipulations, subsequent studies should rigorously verify the validity of stimulus manipulations through preliminary pilot tests and strictly control wording and design elements to prevent overlap or interference between conditions. Second, this experiment only conducted post-measurements after stimulus presentation, lacking direct baseline comparisons of participants' situational curiosity levels before and after exposure. Future research should incorporate pre-post measurement designs to clearly verify stimulus effects based on change scores.

The exploratory finding that 'curiosity tends to increase as information sufficiency increases' contrasts with the traditional information gap theory (Loewenstein, 1994) and prior research (Daume & Hüttl-Maack, 2020), which argue that information deficiency promotes curiosity. This discrepancy

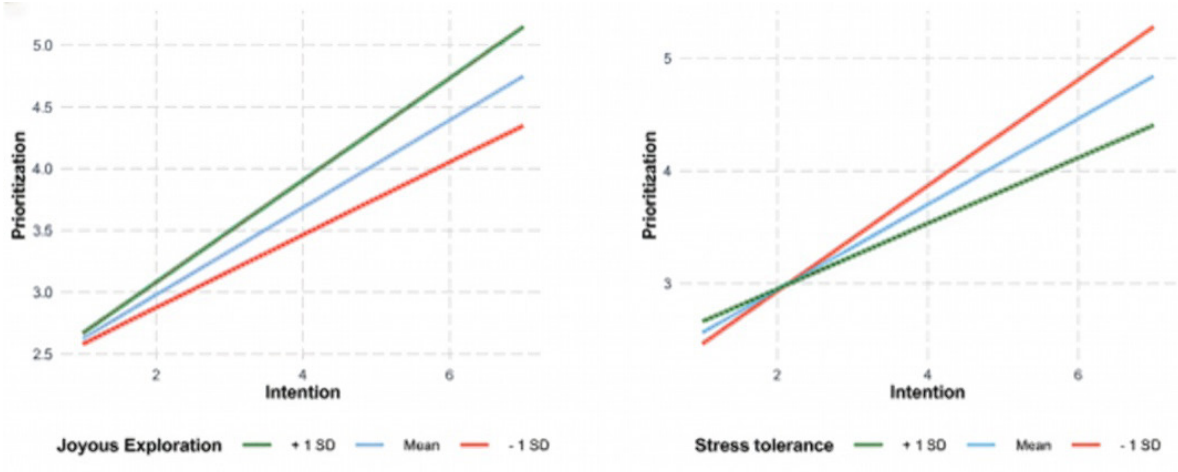

Figure 2. Graph Showing the Interaction Effects of Joyous Exploration and Stress Tolerance among 5DCR Sub-Factors.

can be explained in two contexts. First, the specificity of the ethical consumption context, where the experimental stimulus modeled a socially value-driven company (disability-friendly company). In general commercial marketing, information gaps may simply trigger interest or playful curiosity, but in ethical consumption, consumers have strong motivation to verify the company's social mission and authenticity. According to Orazi and Chan (2020), ambiguous environmental claims activate consumer skepticism and reduce corporate trust, whereas providing concrete and sufficient information significantly enhances positive consumer responses. Therefore, in ethical consumption contexts, artificially hiding or obscuring information may be perceived as opacity or lack of information rather than intrigue, risking trust erosion. In other words, for ethical products, 'information sufficiency and transparency,' rather than 'information deficiency,' may be the key factors eliciting genuine interest and curiosity.

Another explanation is the possible influence of Korea's cultural context on stimulus interpretation and curiosity responses. East Asian consumers tend to have a stronger holistic thinking style (Choi et al., 2007), which may lead them to perceive ambiguous or information-omitted advertisements as more difficult to interpret and cognitively fatiguing (Chung et al., 2015). Additionally, domestic research (Kim, 2019) supports that in the Korean consumer context, providing explicit and sufficient information more effectively promotes curiosity and subsequent behavioral intentions. Therefore, future research should measure cultural thinking styles and perceived advertisement interpretive difficulty to conduct cross-cultural comparisons.

In summary, although Study 2 faced constraints in hypothesis testing via planned condition comparisons due to manipulation failure, the exploratory analysis based on participants' actual perceptions yielded meaningful practical implications. In marketing communications for products with ethical and social values, rather than applying general curiosity-inducing techniques that control information, storytelling strategies that transparently and richly provide product characteristics and the company's benevolent values are much more effective in enhancing consumer curiosity and engagement.

4. General Discussion

This research was conducted to reconfirm existing pathways explaining the intention–behavior gap in ethical consumption within a sample of Korean university students and to verify the role curiosity plays in this process. Study 1 successfully replicated significant antecedent pathways including prioritization, planning, and habit formation. Although the moderating effect of trait curiosity was not supported, curiosity independently predicted prioritization and an interaction effect was found in the sub-factor Stress Tolerance, suggesting that curiosity may influence antecedent processes rather than directly strengthening the intention–behavior link. In Study 2, the effects of information gap and ambiguity manipulations were tested; the information gap manipulation succeeded, but the ambiguity manipulation failed, limiting condition comparisons. Consequently, an exploratory analysis was conducted, which observed that perceived information sufficiency increased curiosity. This suggests that in the Korean and ethical consumption contexts, 'clear information provision' rather than 'information deficiency' may better connect to subsequent behavior.

This study provides important implications by examining how curiosity operates in ethical consumption contexts. Particularly, given the repeatedly reported intention–behavior gap where ethical awareness does not translate into actual consumption behavior, this research explored the psychological factor of curiosity linking ethical awareness and ethical consumption behavior. This is meaningful in that it adds psychological variables potentially operating in the transition process, even when existing explanatory pathways for ethical consumption exist. It also focuses on how individual traits, specifically trait curiosity, function in consumption situations. The approach assumes that ethical consumption is not solely determined by situational stimuli or information exposure but that individuals' dispositional traits can influence prioritization of ethical concerns and subsequent processes. In Study 1, although total trait curiosity scores did not moderate the intention–prioritization relationship, they significantly predicted prioritization independently of intention. This suggests that curiosity may act more as a dispositional predictor encouraging individuals to regard ethical issues as important and seek information, rather than as a moderator directly strengthening the intention–behavior connection. Furthermore, this study highlights the need to consider curiosity at the sub-factor level rather than as a single construct. Additional analyses found a moderating effect in the Stress Tolerance sub-factor on the intention–prioritization relationship. Individuals high in Stress Tolerance exhibit curiosity-based on confidence in coping with anxiety and uncertainty. Conversely, those scoring low may avoid stress or respond mal-

adaptively. This implies that high Stress Tolerance in ambiguous or tense situations may even delay behavioral change.

Practically, this study is distinctive in applying and directly testing curiosity-inducing techniques in the promotional strategies of social innovation enterprises. Existing curiosity marketing discussions have mainly focused on general companies and products, with relatively limited systematic verification in social innovation enterprise products. In this context, this study presents a novel approach by combining curiosity techniques with communication for social innovation enterprise products. Notably, Study 2's results indicate that the general assumption 'information gap marketing increases curiosity' may not hold in ethical consumption contexts. Although manipulation failure limited hypothesis testing based on condition comparisons, exploratory analysis showed that perceived information sufficiency increased curiosity. This suggests that consumers of social innovation enterprise products require clear evidence of 'why the product is ethical' and 'how it contributes,' implying that providing sufficient and concrete information may better promote curiosity and subsequent behavioral intentions than mere information deficiency. Therefore, marketing strategies for social innovation enterprises may be better suited to providing credible evidence and detailed information while encouraging further exploration, rather than aiming for information gaps per se.

Additionally, Study 2's findings suggest possible cultural differences in ethical consumption contexts. The tendency for curiosity to increase with perceived information sufficiency may reflect that Western-centric assumptions that 'information gaps increase curiosity' do not uniformly apply to Korean consumers. Considering East Asian holistic thinking styles, insufficient or ambiguous cues may increase interpretive burden and weaken curiosity. Thus, in the Korean context, providing clear information followed by encouraging additional exploration may be more effective, and future research should incorporate cultural variables.

This research newly explores the function of curiosity in ethical consumption contexts and presents both the applicability and limitations of curiosity-inducing strategies targeting social enterprise products. By considering individual trait variables in consumption situations, it provides a basis for more precisely explaining ethical consumption behavior. It also suggests that curiosity-inducing strategies centered on information gaps may operate differently in ethical consumption situations, emphasizing the need for strategy design that reflects product characteristics and ethical context in future research and practical applications.

From a sustainability perspective, this study offers substantial potential for extension in future research. First, based on the core variables and their relationships with curiosity identified here, interventions (message composition methods, information presentation strategies, storytelling, etc.) that help consumers maintain ethical issues as "major concerns" over time can be compared and verified. Second, it is necessary to explore conditions that increase repurchase rates directly linked to corporate sustainability beyond one-time purchases. For example, further research can investigate which information provision methods and experience designs are effective in forming repeated purchases after the initial purchase, and how planning and habit formation processes lead to repurchase behavior. Third, by expanding the context of this study—disability-friendly companies—to other social issue areas such as environment, fair trade, and community, it is possible to compare whether the same mechanisms operate and propose more generalized strategies applicable across ethical enterprises.

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