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## **RESEARCH ARTICLE**

#### Business Strategy and the Environment

# Exploring the efficacy of ecolabels as a marketing strategy: Insights from the emerging bioplastic packaging market

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#### Abstract

The packaging industry's significant role in plastic production and environmental pollution underscores the need for more sustainable alternatives. Bioplastics emerge as a promising solution, yet consumer understanding of this innovative material often lags, particularly in emerging markets. This study thus aims to explore effective marketing strategies for communicating bioplastic packaging to shape consumer adoption and disposal practices in such markets. Through a case study approach, we examine the role of ecolabels as a marketing tool across key sectors of the bioplastic packaging supply chain. Drawing upon the signalling theory, we identify key characteristics of effective signals, including costly signalling, visibility, clarity, fitness, consistency and credibility, which should be integrated into a broader context of ecolabels design in order to encourage consumer adoption and responsible disposal. Our study also identifies instances where noises from the environment may have little impact and where communication gaps hinder feedback loops between consumers and producers.

KEYWORDS bioplastic packaging, ecolabel, emerging market, marketing strategy

# 1 | INTRODUCTION

The packaging industry plays a significant role in plastic production accounting for about 31% of the 460 million tonnes global plastics used for packaging in 2019 (OECD, 2022). This packaging includes items like beverage bottles, food wraps, carrier bags and takeaway containers, many of which are used once and then discarded (Eunomia, 2023). Most of these packaging materials are made from petroleum-based plastics, which do not break down easily and contribute to long-lasting pollution. About two thirds of all plastic ever produced ends up polluting the environment (Costa et al., 2020).

Encompassing plastics that are either biobased, biodegradable or have both properties (European Bioplastics, 2016), bioplastics have emerged as a potential solution to the above problems. Biobased plastics use renewable resources as feedstocks, reducing reliance on finite fossil resources and sometimes emitting fewer carbon emissions than traditional plastics (Acquavia et al., 2021). Biodegradable plastics offer alternative waste management options, such as composting, as environmentally responsible alternatives to recycling (Di Bartolo et al., 2021).

Despite the potential ecological benefits of bioplastics (Costa et al., 2023), consumers often feel uncertain about these materials (Herrmann et al., 2022), and their awareness often lags behind (Dilkes-Hoffman et al., 2019). Confusion arises among consumers regarding the terminology used in messages or labels promoting bioplastics (Boesen et al., 2019; Fletcher, 2022), leading to improper disposal of bioplastic waste in recycling bins and contaminating recycling

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streams (Kakadellis et al., 2021). This contamination can degrade the quality of recycled plastics and damage recycling machinery (Alaerts et al., 2018).

However, research suggests that consumer willingness to use bioplastics can be enhanced through information provision (Uehara et al., 2023). In this instance, product packaging should encourage better communication of a proper disposal method, aiming to motivate responsible behaviours from consumers (Ottoni et al., 2018). Message framing and the chosen communication medium also influence public engagement and behaviour towards disposable plastics (Skoric et al., 2022). This indicates that effective communication with consumers regarding the adoption and post-consumption treatment of bioplastics is crucial due to the diverse characteristics of bioplastic materials (Findrik & Meixner, 2023). Addressing these communication challenges is essential to effectively integrating bioplastics into consumers' daily lives and promoting sustainable waste management systems.

While research on bioplastics consumers primarily focusses on developed nations with established industries (Weinrich & Herbes, 2023), understanding consumer behaviour in emerging markets is crucial (Findrik & Meixner, 2023). In these regions, insights into consumer preferences and decisions in such contexts hold significant relevance and potential implications for market development strategies (Boz et al., 2020).

One such emerging market is Indonesia, where the bioplastic sector is in its nascent stages (Soesanto et al., 2016). Despite government efforts to accelerate the transition to a sustainable bioindustry, challenges persist, including limited domestic production (Alam, 2023), reliance on imported technology (Martínez-Burgos et al., 2022; Wij, 2013) and production capacity remaining underutilised due to low market demand (Hidavat, 2017). However, government initiatives. such as the Grand Strategy of Agricultural Development 2015-2045, aim to promote the bioindustry. Regulations incentivise the integration of degradable products into luxury packaging and support the growth of the bioplastic industry with a targeted growth rate of 5% (Garrido et al., 2021; Jayabuana, 2017).

Indonesia struggles with significant waste management problems due to its vast population and high waste production (Andriani & Atmaja, 2019). A notable challenge lies in the mismanagement of organic waste, particularly from households and market sectors (Paduloh et al., 2022). This situation could exacerbate existing waste problems if biodegradable plastics are not properly sorted, collected and composted, potentially contributing to litter issues similar to conventional plastics (Di Bartolo et al., 2021).

Acknowledging the pivotal role of clear communication in guiding consumer choices, there is a pressing need for a study to assist businesses in crafting messages that align with consumer concerns (Fletcher et al., 2021; Weinrich & Herbes, 2023). This highlights the importance of exploring effective marketing strategies for conveying information about bioplastic packaging (BP) to consumers. Consequently, we have devised two primary research questions for our study:

Research Question 1. How does the communication mechanism through ecolabels shape consumer adoption and encourage appropriate disposal practices of bioplastics?

Research Question 2. How effective is the use of ecolabels as a marketing strategy?

Our study employed a case study approach (Yin, 2017) with a focus on utilising ecolabels as a primary means of communication with consumers. Ecolabels were chosen for their potential to succinctly convey information while influencing consumer decision-making (Yokessa & Marette, 2019). Thus, ecolabels are increasingly utilised by companies across various sectors (Czarnezki et al., 2014), providing a visible, standardised communication and reliable indication to consumers regarding the environmental attributes of products (Taufique et al., 2019; Wurster & Ladu, 2020). However, research scrutinising their mechanisms and elements is notably lacking.

The empirical investigation was conducted in Indonesia, encompassing analysis across various sectors including production. consumption, waste management and academia. The idea was to assess the efficacy of ecolabels as instruments for achieving both environmental and business objectives, hence the need for a comprehensive understanding of the interplay among these diverse constructs.

Acknowledging the gaps highlighted by previous research regarding the lack of integrated coordination within the BP supply chain (Fletcher et al., 2021; Tjahjono et al., 2021), we purposefully seek insights from multiple perspectives. By addressing these gaps, our study makes a significant academic contribution through the theoretical framework based on empirical data from ecolabelling practices. It also extends the application of signalling theory to the context of sustainable packaging. On a practical level, the study provides actionable recommendations for the bioplastic industry on crafting an effective environmental labelling strategy targeted at end-consumers.

#### LITERATURE REVIEW 2

Ecolabels are marks placed on product packaging or in e-catalogues to indicate that a product meets specific environmental performance criteria, which could help consumers identify environmentally preferable options (EPA, 2023). Although ecolabelling is a multidimensional topic, most discussions on ecolabelling are in the areas of market dynamics (including consumer behaviour and economics modelling), environmental policy and social environmental awareness, with ecolabelling as an organisational strategy only being addressed to a limited extent in the literature (Meis-Harris et al., 2021; Prieto-Sandoval et al., 2016). The significance of these labels lies in their official certification, which is conferred by either national government agencies or third-party institutions (Prieto-Sandoval et al., 2016). Companies across industries have adopted environmental labelling schemes, using them as strategic tools to legitimise their practices, differentiate from competitors and cater to environmentally conscious consumers (Kawansson, 2018; Pedersen & Neergaard, 2006).

Ecolabels address the issue of asymmetric information with consumers regarding the authenticity of their environmental claims (Mason, 2006). Moreover, firms have recognised the potential of ecolabels as strategic tools to target a broad spectrum of consumer preferences and values, including those motivated by genuine altruism for the environment, seeking personal satisfaction, self-interest when green attributes align with other desirable qualities like health benefits and taste or positional effects indicating high income status as purchasers (Yokessa & Marette, 2019). Ecolabels empower companies, particularly those within competitive sectors, with the opportunity to transcend prevailing consumer brand loyalty (Testa et al., 2015).

Specific industries have harnessed the potential of ecolabels to achieve various business and marketing strategic objectives. For instance, in the tourism sector, firms are employing ecolabels as a means to enhance their public perception, projecting an environmentally responsible image (Aragon-Correa et al., 2015). In fisheries, ecolabels are not only symbols of sustainable fishing but also instrumental in corporate social responsibility, allowing firms to demonstrate commitment to ethical practices and environmental conservation (Leadbitter & Benguerel, 2014). In the real estate market, companies view ecolabels as a means to enhance the value of properties through eco-friendly improvements, believing they indicate a positive bottomline impact (Christensen et al., 2022). In the fashion industry, ecolabelling emerges as a valuable strategy to communicate environmental commitment. However, the efforts required to comply with and maintain ecolabel standards may prompt companies to re-evaluate their strategies over time (Jørgensen & Jensen, 2012).

The strategic use of ecolabels extends to marketing strategies, where their disclosure in advertisements emerges as a potent

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marketing communication strategy, particularly in the case of electronic products, effectively shaping consumer attitudes towards environmental advertising and increasing their purchase intention (Chang et al., 2019). In the food sector, ecolabel serves as a signal that enhances consumers' perceptions of product quality, mitigates information asymmetry, fosters trust in the agri-food market and elicits strong emotions among certain consumer segments (Schena et al., 2023). There is also evidence that ecolabels exert significant influence on consumer willingness to pay premiums for certain commodities across various markets, notably observed in the United States and multiple Western and Northern European countries (Yokessa & Marette, 2019).

However, while ecolabels offer strategic marketing opportunities, research examining the mechanism of ecolabels for consumer responses regarding packaging, particularly bioplastic materials and their post-consumption treatment, remains limited (Allison et al., 2022). Additionally, research identifying the crucial characteristics of ecolabels that make them effective communication strategies for companies is not extensive (D'Souza et al., 2021; Prieto-Sandoval et al., 2016). These knowledge gaps present a critical need for further investigation to inform more effective implementation of ecolabels in marketing strategies.

# 3 | THEORETICAL UNDERPINNING

A theoretical framework can help organise ideas and streamline the development of a suitable tool for data collection and analysis (Furber, 2010). A framework offers a systematic model for managing and mapping data, which is invaluable for dealing with large data sets



and achieving a thorough understanding of the observed phenomenon (Ravitch & Carl, 2019).

Addressing the information asymmetry between BP producers and consumers is a well-known barrier in the industry (D'Adamo et al., 2020; Fletcher et al., 2021). While the extant literature in the bioplastics domain (e.g., Allison et al., 2021; Taño et al., 2021) suggested several conceptual frameworks for future research, they did not comprehensively address the need to close the loop and reduce this information gap. Consequently, we have selected the framework introduced by Baskoro et al. (2024), as it provides a robust conceptual basis for bridging this divide by enabling bioplastic packaging producers (signallers) to effectively communicate the environmental benefits and sustainable attributes of their products to consumers. This framework (see Figure 1) offers a holistic approach to understanding

TABLE 1 Signalling theory constructs.

Elements	Constructs	Description
Signaller	Integrity	The genuine underlying quality related to the signal being sent
	Proficiency	The capability to create effective communication with the consumer
Environment	Distortion	The reduction of signal quality or signal effect because of noise that could be introduced by the signalling environment itself, by another receiver or by another signaller
Signal	Cost	The transaction cost incurred when implementing a signal
	Visibility	The observability of a signal to be noticed by the receiver
	Clarity	The extent to which the signal is clear and easily comprehensible to the receiver
	Fit	The extent of correlation between the signal and the unobservable attribute
	Consistency	The degree of coherence between multiple signals sent from one signaller
	Credibility	The degree to which the signaller is truthful, and the signal conforms to signal quality
Receiver	Attention	The degree to which receivers monitor the signalling environment to look for the signal
	Interpretation	The process of the receiver converting signals into perceived meaning
Feedback	Intention to adopt	The willingness to use a product regularly
	Intention to properly dispose of	The willingness to discard the product's waste in accordance with the suggested methods

Source: Baskoro et al. (2024), Connelly et al. (2011) and Kharouf et al. (2020).

how a communication medium can convey information about the unobservable quality of bioplastic packaging, thereby reducing information asymmetry and facilitating informed decision-making by consumers.

The framework comprises five essential signalling elements: signaller, environment, signal, receiver and feedback. Each of these elements consists of several constructs. Explanations regarding these elements and constructs are shown in Table 1.

#### **RESEARCH METHOD** 4

#### Data collection 4.1

In this study, we employed a case study approach, focusing on the BP supply chain in Indonesia as the focal case. The goal was to gain insights into the perception of ecolabels and their influence on consumer intentions regarding adoption and proper disposal. This approach was chosen to facilitate the thorough collection and analysis of pertinent data, aligning with the case study method (Yin, 2017).

As several authors have highlighted a lack of harmonious coordination among actors in the BP supply chain (Fletcher et al., 2021; Tjahjono et al., 2021), this study consequently engaged diverse stakeholders. The goal was to foster a comprehensive understanding and alignment of perspectives among these stakeholders. The actors within this chain can be classified into four clusters, namely, production, consumption, waste management and cross-sectoral (Tjahjono et al., 2021). Embracing this classification, the academic sector was specifically chosen from the cross-sectoral cluster to obtain a more comprehensive perspective on the BP supply chain.

Data collection was conducted through multiple sessions of interviews involving 22 informants who represented 20 entities (company, organisation, community, university, etc.) carried out between November 2022 and July 2023, resulting in 37 semistructured interviews. These entities, meticulously selected to ensure saturation of information, spanned various sectors within the BP supply chain, encompassing production, consumption, waste management and academia, as shown in Table 2.

The informants were first purposefully selected, primarily using LinkedIn, a professional networking platform. Those who responded positively to interview invitations were provided with research details, privacy notices and consent forms via email. Purposive sampling aims to create a sample that can be presumed to be representative of the population being researched (Battaglia, 2008). The selection criteria for participants included individuals aged 18 years or older, with a minimum of 3 years' experience in relevant sectors, namely, production, consumption, waste management and academia. Participants were required to have an affiliation with entities such as companies, organisations or universities that were based in Indonesia.

We targeted informants who are involved in management, at least at the middle-management level or above, due to their active involvement in strategic decision-making, making them valuable sources of insights (Linder & Sax, 2020). For the academic sector, we

Sector

Production

Consumption

Waste

management

Academic

#### TABLE 2 Informants profile.

nts profile.				
Organisation	Role	Years of experience	Entity code	Informant code
Packaging industry federation	Executive director	38	P1	PD11
Packaging professional association	Chairman	26	P2	PD21
Bioplastics converter company	Director	17	P3	PD31
	Vice director	3		PD32
Bioplastics manufacturer company	Government and public relations manager	12	P4	PD41
	Marketing specialist	6		PD42
Packaging company	CEO	12	P5	PD51
Student representative council	Chief	3	C1	CS11
Student association for profession	Chief	3	C2	CS21
Consumer protection NGO	Programme director	5	C3	CS31
Environmental movement community	Field event organiser	3	C4	CS41
National consumer protection agency	Commissioner	18	C5	CS51
Waste collector community	Head coordinator	5	W1	WM11
Community composting management	Director	14	W2	WM21
Composting service company	CEO	6	W3	WM31
Local council composting unit	Unit coordinator	10	W4	WM41
National solid waste association	Chairperson of the board of trustees	41	W5	WM51
University	Agribusiness lecturer	9	A1	AD11
University	Information design lecturer	9	A2	AD21
Polytechnic	Packaging design lecturer	24	A3	AD31
University	Food packaging technology lecturer	9	A4	AD41
National research agency	Policy researcher	8	45	AD51

chose participants with teaching or research experience in packaging-related topics. This criterion ensures the inclusion of individuals with deep knowledge and expertise in the academic discourse on packaging materials and consumer communication (Akhter, 2022). Subsequently, a snowball approach was adopted to solicit referrals from these participants, aiming to engage other potential informants with whom the researchers had no prior contact (Parker et al., 2019).

Based on the initial framework, the interview guide posed questions about the following: (1) company capabilities; (2) surrounding environment influences; (3) ecolabel components and consumer perceptions; and (4) consumer responses. The interviews were conducted remotely using Zoom or Teams video conferencing platforms. Online interviews were chosen to improve accessibility for participants by eliminating potential impediments like travel, thereby increasing the likelihood that prospective participants would consent to take part (Cole, 2017). Furthermore, the social situation at the time of data collection was still characterised by people being cautious about the spread of the COVID-19 virus through physical interaction. Each

interview lasted an average of 40 to 60 min. To ensure clarity, any unclear responses were followed up with additional questions through a secure text messaging application. Supplementary data were gathered from ministry documents about ecolabelling, the official websites or social media of the companies or organisations.

#### 4.2 Data analysis

For the analysis phase, a template analysis approach was adopted. Template analysis is a qualitative data analysis method designed to facilitate the examination of textual data. Template analysis was chosen for this study due to its systematic applicability across various data sources, facilitating structured comparisons (King & Brooks, 2017). The process starts with a template consisting of initial coding categories derived from the theory, the literature review and interview questions. The template is then modified, expanded and refined based on emerging patterns from the actual data (see Table 3).

## TABLE 3 Example of template analysis process.

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Туре	Code	Category	Theme
Initial codes	Honesty	Company integrity	Company capability
	Integrity		
	Communication proficiency	Company proficiency	
	Technical proficiency		
	Campaign competency		
	Networking capability		
	Financial competency		
	Visual appeal	Ecolabel visibility	Ecolabel element
	Colour		
	Legibility		
	Size		
	Placement		
	Contrast		
	Comprehensible	Ecolabel clarity	
	Simplicity		
Expanded codes	Price	Price-related	Packaging price
	Discount		
	Affordability	Affordability	
	Organic waste facility	Waste management infrastructure	Waste infrastructure accessibility
	Segregated waste facility		
	Home composting facility		
	Waste transportation		
	Waste dealer	Waste collection and handling	
	Compostable waste collector		

To bolster the comprehensiveness of the categorisation procedure regarding factors that affect consumer responses, keywords from the interviews were classified into ecolabel and nonecolabel-related factors. This categorisation process was consulted with a linguistics expert who is unfamiliar with the project. The suggestions provided were accommodated to refine the categorisation.

Furthermore, to maintain the robustness of the results, a thorough examination was conducted to assess the quality of the categories within the dimensional framework. This assessment was accomplished using multiple correspondence analysis (MCA), a statistical technique for analysing categorical data. MCA is particularly suitable for binary data, as it facilitates the examination of interrelationships among multiple categorical constructs (Kamalja & Khangar, 2017).

In this study, MCA employed binary stakeholder responses (1 for mentioned and 0 for not mentioned) to assess construct importance and quality within the framework. The analysis results measured association strengths between constructs, guiding the interpretation of their interrelationships. Quality measures indicated construct robustness and influence, with higher values signifying greater significance.

# 5 | RESULTS

This section delineates factors reflecting majority consensus among stakeholders based on the initial framework. The last subsection examines factors lacking agreement across sectors, highlighting the nuanced variations in stakeholder perspectives on this phenomenon.

# 5.1 | Companies' integrity and proficiency

Companies must demonstrate *integrity* when promoting ecolabelling to consumers. Firms should genuinely believe in "the importance of ecolabels for the good of the Earth, which will then have value in the eyes of consumers" (AD31). Firms ought to refrain from devising misleading self-proclaimed ecolabels, lest they be "caught" by their competitors (PD51), considering the substantial "people power on social media" (CS41). Furthermore, there are consumers who are willing to evaluate "if there is no consistency between the company's behaviour, company culture, and the messages sent, presented, and communicated, there's an indication of dishonesty" (AD11). The interviews also reveal that firms' *proficiency* in comprehending the unique traits of biodegradable plastics significantly enhances the ecolabel message's effectiveness. This competence hinges on producers' need for a clear understanding of relevant certification standards and the ability to obtain, interpret and apply them, including the capability to "access and then learn about environmentally friendly regulations" (AD11). Moreover, firms must possess technical skills, such as assessing "biodegradability levels" or "ecotoxicity" (PD41). Additionally, companies should excel at crafting clear, precise language that educates people and promotes ecolabel importance, as CS51 advises using straightforward, understandable messages without complex terminology.

# 5.2 | Influence from the environment

Recycling campaigns for plastic waste are considered insufficient and ineffective, with some perceiving that they do not meet recycling rate expectations, described as "not even reaching 10% of the total plastic waste" (PD41). Moreover, in Indonesia, recycling companies do not typically handle flexible plastics, leading to significant disparities between the recycling of rigid and flexible plastic packaging, including flexible bioplastics, which are the most prevalent type.

However, most stakeholders, particularly in the production and consumption sectors, are unconcerned about the potential contradictory message (distortion) between recycling campaigns and ecolabels for compostable plastics. One producer reassured that "there won't be an issue since those flexible plastic bags [bioplastics and conventional] aren't collected" (P31).

Stakeholders also reject the notion that there could be significant distortion for ecolabels in the online environment. Ecolabels for bioplastic-packaged goods are expected to be displayed regardless of the sales medium, as they serve as selling points, according to PD21. As also asserted by PD41, "If it can't be seen too clearly on the product photo, it will certainly be described through narratives in the product explanation." The absence of ecolabels might only arise in a particular case when "the distribution chain has become somewhat lengthy" (AD31), thereby curtailing the brand owner's authority to govern the presented content, and when the reseller and customers "aren't overly concerned about such matters" (AD21), as in the case of facial tissue products, for example.

# 5.3 | Ecolabel cost, visibility, clarity, appropriateness and consistency

Stakeholders unanimously concurred that investing in enhancing ecolabel effectiveness for bioplastics is necessary, despite the *cost*. This is due to the recognition that current ecolabels lack sufficient information on material composition or disposal guidance. These costs need to fund extensive consumer education to increase public awareness and comprehension of bioplastics. As underscored by P31, consumers require dedicated education for this and, as AD31 further accentuates, "do not leave the label alone but also assist it with other educational media." Furthermore, although obtaining certification is costly, it is crucial for building consumer confidence in ecolabels. As highlighted by PD51, to engender trust, ecolabels "need to have certification issued by the relevant agencies." Stakeholders mentioned that third-party verification can be effectively showcased by displaying the names of known certification schemes, certification bodies, certification numbers or traceable QR codes, which effectively reinforces consumer trust in ecolabel claims.

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To effectively capture consumers' attention, all stakeholders agree that ecolabels on packaging must possess prominent *visibility*. As AD21 stated, it should be visibly eye-catching and use graphic design principles. Several stakeholders also suggest that the more conspicuous the labels are, the less they blend into the background, prompting cue-driven focus and curiosity. As AD31 reiterated, whether "colour contrast, size contrast, shape contrast, or whatever" kind of contrast. Subsequently, salient visual positioning is advised by placing labels in primary sightlines on the packaging.

All informants concur that the *clarity* of ecolabel content reduces misinterpretation and aids comprehension. The message should be simple, easy to understand and capable of reducing consumers' cognitive load. PD51 described, "within a few seconds they had to get the point," while AD31 advised making the messages "short but sufficiently explanatory. Images, icons, [and] symbols will strengthen the explanation."

Numerous stakeholders suggest that the text or images used in ecolabels must be carefully selected to *fit* the representation of the desired concept, such as biodegradability or compostability. The synergy between word choice and visual elements within ecolabels holds significance in effectively communicating those concepts, thus avoiding confusion. For instance, many informants echoed that the colour green is synonymous with environmentally friendly qualities. PD41 suggests using "symbols that people already understand or that have a common consensus."

Consistent ecolabel appearance aids swift recognition and comprehension, fostering interpretation through visual cues. Unfamiliar consumers might find this *consistency* intriguing, potentially prompting them to "educate themselves and search for information about the label" (AD51). For others, "by looking at the ecolabels that they already recognise, consumers will know that the product is in accordance with the environmental values they support, without the need to look for other additional information" (AD11).

# 5.4 | Consumers' attention, interpretation and trust

Consumers who pay *attention* to clear ecolabel instructions may properly dispose of bioplastic waste via organic waste facilities. Seeing such labels "builds the understanding [...] the packaging can be composted" (AD41). As for waste sorting practices, ecolabels play an essential part in guiding consumers. AD31 adds, "If consumers already have the understanding and awareness for it, labels will greatly assist."

Thus, accurate ecolabel *interpretation* aligns consumer actions with sustainability goals.

Most of the stakeholders also agreed that credible ecolabels can cultivate consumer *trust*, driving purchasing decisions and daily usage. When consumers trust ecolabels, they are more likely to repurchase and encourage consistent adoption. As CS51 elaborates, "If the consumer already believes in the ecolabel, then trust is established here. Trust generally affects purchasing. They make a purchase, and later they'll repurchase."

# 5.5 | Other influencing factors

The informants have voiced that encouraging consumers to adopt BP and responsible disposal goes beyond relying solely on an ecolabel. All stakeholders agree that additional supportive factors are required. The *price* holds a substantial influence on consumers' decisions to use BP. Generally, BP material costs are "three to four times higher than conventional plastic" (PD31). Many Indonesians prioritise affordability due to limited disposable income. Additionally, PD21 reveals that the Indonesian market has one of the highest levels of price sensitivity in Southeast Asia, meaning slight price variations greatly impact product choice.

Consumers with positive *environmental attitudes* tend to consistently favour eco-friendly options and actively engage with ecolabels, particularly "for certain people who have very good [environmental] awareness" (CS31). These individuals are more conscious of their environmental footprint and prefer to align their consumption choices with their ecological values, promoting responsible waste disposal. WM21 underlines that this environmental consciousness "must be owned by the consumer."

Waste sorting habits contribute to environmentally responsible BP waste disposal. Developing these habits takes time but is achievable with community support. WM21 recounts, "It took us from 2008 to 2018 before the community developed a new habit of disposing of their organic waste in the composter bin." Accessible organic waste infrastructure significantly impacts proper waste disposal. While organic waste processing facilities exist in certain limited areas, most organic waste still ends up in landfills, with rates remaining "above 90% throughout Indonesia" (WM51). Although one producer mentioned consumers possibly having personal home composting bins, most remain uncertain about bioplastic disposal due to inadequate local infrastructure information. PD11 added, "this is what makes the ambiguity [...] because the infrastructure has not been established yet." Furthermore, well-functioning waste transportation is also crucial to sustaining consumer sorting efforts. As AD31 relays, "Some have sorted it out, but when the refuse collectors put it in their carts, it's mixed again," which frustrates consumers and leads to the discontinuation of sorting.

## 5.6 | Consumers' adoption and disposal

Stakeholders show diverse approaches to comprehend consumer responses, specifically consumer adoption. Beyond sales reports,

understanding consumer reactions to BP is extracted from "reviews from consumers on e-commerce websites and social media" (AD11). Well-established firms are capable of conducting "consumer intelligence" (PD11) or "market research" (C41). For instance, PD41 tracks growing interest from plastic converters in biodegradable resin as an indicator of consumer adoption. Additionally, participation in industry associations and attending seminars also provides valuable market trend insights (PD21).

Consumer feedback would shape future producer communications. Initially, producers might need to allocate substantial resources for marketing and consumer education. However, as expected by AD51, "when public demand rises, perhaps reaching a certain critical mass, companies don't need huge efforts, just an ecolabel will suffice."

Regarding proper disposal, one producer believes that their "communication is still one way" (PD31). Despite some producers engaging in sporadic composting and partnerships with waste processors, these efforts are suspected to be brand image-boosting exercises. Producers are not monitoring the proper disposal of bioplastics into organic waste streams. WM51 describes that producers "just create one or two plots. But in their advertisements, it's presented impressively." Manufacturers justify this, citing high costs, "distant from the end consumer" in the context of supply chain position (P41) and also a lack of authority to manage this issue (AD11) due to the absence of an integrated waste management system (PD11). Thus, manufacturers believe that they are relieved of the responsibility for consumer waste of their own products. However, WM31, a composting service, contests the cost issue as a convenient excuse and stresses the potential for collaboration with existing composters. The lack of producer evidence on product end-fate renders doubts about the biodegradability or compostability claims (PD11).

## 5.7 | Divergent perspectives among stakeholders

Consumer adoption of BP is influenced by various factors, with differing views on BP durability and market availability across stakeholder sectors. Production sector stakeholders show little concern about BP strength, while others express performance concerns, for instance, WM21 noted, "the weakness of it is when we carry wet items," although these concerns remain marginal.

Next, the availability of BP mainly concerns the consumption sector rather than production or academia stakeholders. This scarcity hinders widespread adoption; as CS31 notes, "the society doesn't consider it. It could be because there are no options (of BP)."

Perspectives on proper disposal also diverge. The consumption sector favours regulatory interventions, with CS21 stating, "to ensure adherence, there should be regulations." However, waste processors emphasise incentives, given the lack of an organic waste compost market. WM51 notes, "The market for compost is non-existent here. Nobody seems to be trying to create one."

Furthermore, producers highlight the bond between waste's monetary value and proper post-consumer disposal, noting how plastic

biodegradable plastics, which differs from the situation in Indonesia, where flexible biodegradable plastics are more prevalent (Soesanto et al., 2016). Next, for products with BP sold in the online environment, brand owners or official distributors are expected to show or provide ecolabelling information because it is a promising selling point, instead of not displaying it. Our results challenge the observations of Allison et al. (2021), which suggest a lack of packaging information when shopping online for BP products. In the context of Indonesia, this does occur, but only in minority cases, such as products with lengthy distribution chains where marketing control is no longer in the hands of the brand owner and the environmental aspect of the packaging is not a selling point for the product such as facial tissue. Henceforth, it can be deduced that concerns regarding potential distortions from the environment will exert a negligible impact on the ecolabel signal strength. 6.3 Signal Obtaining official certification comes with costs for companies. However, bioplastics certification offers quality assurance, curbs misleading marketing efforts, addresses pressing concerns (Jayakumar et al., 2023) and makes ecolabels more trustworthy to consumers. This additional cost of the ecolabel is, however, believed to enhance the recipient's attentiveness and understanding and simultaneously nurture a tangible feeling of confidence.

Expanding on costly signalling, highlighting the necessity of consumer education, becomes important in ensuring the effectiveness of ecolabels by fostering public awareness and comprehension of their significance. However, there is a reluctance within the supply chain to shoulder the responsibility and implementation of such a costly education effort, resulting in ongoing confusion among consumers about ecolabels. Indeed, Boesen et al. (2019) suggest the necessity of developing educational campaigns to enhance awareness, which can subsequently impact consumer preferences and purchasing decisions.

When an ecolabel stands out in product packaging through prominent positioning, contrasting colours or larger text, it draws the consumer's gaze and attention (Rihn et al., 2019). The more conspicuous the label, the more it becomes noticeable, prompting focus. Enhanced *visibility* boosts accessibility amid competing information (Taufique et al., 2014). Enhancing the visual prominence of the sustainability signal will effectively extend an invitation to the recipient, encouraging them to actively engage with the content it conveys (Song et al., 2019). When ecolabel content is clear and free from ambiguity or convoluted phrasing, it minimises potential misinterpretation. This *clarity* illuminates meaning for consumers, reducing the cognitive burden and facilitating effortless comprehension (Taufique et al., 2014). Clear communication avoids conflicting or confusing messages, enabling recipients to easily grasp the intended meaning (Ottoni et al., 2018).

Furthermore, there is a need for ecolabels to be thoughtfully designed to precisely *fit* concepts like biodegradability or

bottles are quickly collected by rubbish scavengers due to their value and established routes for resale. As PD21 recounts, "when it's triggered by being business-oriented, it will surely work." CS31 concurs, "they focus on categorising waste based on economic viability as a parameter."

# 6 | DISCUSSION

## 6.1 | Signaller

Integrity plays a pivotal role in creating a strong signal. Deception carries a significant risk in the current interconnected world where consumers are intricately linked through social media. The disparity between ecolabel claims and actual circumstances could harm the producer's reputation and erode trust in their future communications (Vaverková et al., 2014). Consumers value a company's commitment and try to assess its veracity through the congruence between claims and actions, both within the organisation's operation and in the larger societal context (Jung & Seock, 2016). In tandem with this, the higher signaller's proficiency in understanding the complexities of biodegradable plastics and accurately communicating them could strengthen the signal. Production stakeholders must identify and access relevant standards to ensure their bioplastic materials meet certification requirements and undergo the process thoroughly (Fletcher et al., 2021). In addition, they should be proficient in crafting informative communication that adeptly elucidates the ecolabels they hold for consumers (Gaffey et al., 2021). These actions collectively enhance the signal being transmitted.

**Proposition 1.** Higher signal integrity and proficiency will improve the signal strength.

# 6.2 | Environment

The ongoing plastic waste recycling campaign is regarded as having yet to attain a level of efficacy that resonates throughout society. Although the prevalent type of biodegradable plastic packaging marketed in Indonesia is flexible plastic, flexible plastic recycling is not common in Indonesia due to the lack of economic feasibility, and it is often burned or dumped (Alexander & Putri, 2022). Consequently, upon the introduction of bioplastics and the provision of proper disposal guidance through ecolabels, it is perceived that the recycling campaign will be less likely to create information distortions about how to properly dispose of bioplastics waste. Our results diverge from the work of Taufik et al. (2020), which indicated that the plastic recycling campaign is associated with the proper waste disposal for biodegradable plastics. This variance can be attributed to the fact that their research was conducted in Germany, where recycling campaigns and supporting infrastructure are well-established (Žmak & Hartmann, 2017). Consequently, consumers are highly accustomed to recycling plastic waste. Additionally, they experimented on rigid

compostability, aligning words and visuals for a seamless connection. Proper word choice and visuals are vital for fittingly communicating these attributes as misalignment might lead to confusion or, even worse, accusations of greenwashing (de Freitas Netto et al., 2020). Meticulous alignment of language and imagery within ecolabels is key to accurately conveying these attributes to consumers (Song et al., 2019). *Consistency* in ecolabel appearance is deemed crucial by all stakeholders. There is even hope that the ecolabels are also consistently used on the bins showing what should be discarded. Uniformity in ecolabel design enables swift recognition and seamless comprehension (Kirschstein et al., 2022). Maintaining a coherent, consistent ecolabel style can enhance recipient interpretation through common visual and textual cues.

Consumers consider third-party validation of claims regarding biodegradability or compostability to be essential in cultivating trust. The showcasing of certification numbers or traceable codes, which facilitate validation, may reinforce confidence. Consequently, when ecolabels exhibit external validation, consumers are more inclined to perceive the sustainability messaging as credible and authentic (Riskos et al., 2021). This emphasises the significance of the *credibility* construct in fostering consumer confidence.

**Proposition 2a.** Higher signal cost will improve the receiver's attention, interpretation and trust.

**Proposition 2b.** Higher signal visibility will improve the receiver's attention.

**Proposition 2c.** Higher signal clarity, fit and consistency will improve the receiver's interpretation.

**Proposition 2d.** Higher signal credibility will improve the receiver's trust.

# 6.4 | Receiver

Engaged consumers who pay *attention* to and have a correct *interpretation* of the meaning of ecolabels are perceived to exhibit a tendency to prioritise the integration of BP into their daily routines, as opposed to opting for conventional plastic alternatives (Cheng et al., 2021). Consumers believed that purchasing eco-friendly packaged products would promote sustainability and benefit the planet (Scott & Vigar-Ellis, 2014). Moving to the post-consumption phase, attentive consumers guided by the unambiguous disposal instructions provided by the labels may help them ensure the responsible route of bioplastic packaging waste, utilising the organic waste facility. When consumers notice and process ecolabel information accurately, their usage and waste sorting actions can align with expected sustainability goals (Chao, 2022).

Stakeholders recognise that consumer *trust* in ecolabel has a crucial role in shaping their consumption habits. When consumers have faith in ecolabels, they are more likely to choose, prioritise and incorporate them into their daily routines. This highlights the importance of consumer confidence in driving sustainable choices (D'Souza et al., 2021). In turn, a credible ecolabel alleviates consumer scepticism, paving the way for consistent adoption. This fostered trust reinforces consumer confidence, leading to increased intention of purchasing activity (Chang et al., 2019), thus sustained pattern of repeated purchases (Kyoi et al., 2022).

**Proposition 3a.** Higher receiver's attention and interpretation will improve the consumer's intention to adopt and properly dispose of the packaging waste.

**Proposition 3b.** Higher receiver's trust will improve the consumer's intention to adopt bioplastic packaging.

## 6.5 | Other factors

The consideration of *price* holds substantial weight in consumers' choices concerning the purchase and adoption of bioplastic packaging (Filho et al., 2022). The contrast between the affordability of conventional plastic and the relatively higher cost of bioplastic poses challenges in garnering widespread acceptance. As confirmed by stakeholders, a significant portion of the Indonesian population faces constrained disposable income, prompting this demographic to prioritise affordability over sustainability considerations. Considering this, the price of bioplastic packaging has an inverse relationship with the consumer's desire to use it (Soesanto et al., 2016).

Consumers who engage with ecolabels and consciously select consumption options that are perceived as ecologically beneficial are often the ones who have awareness of and care for the environment (Chekima et al., 2016). We refer this to as *pro-environmental attitude*, an individual's inclination to engage in actions that safeguard the environment and promote sustainable development (Shen et al., 2024). This pro-environmental attitude includes having a positive environmental worldview, concern and commitment (Gutierrez et al., 2020). Furthermore, a positive environmental attitude is also evident in the post-consumption phase, as it is a prerequisite for motivating consumers to dispose of plastic waste responsibly (Jia et al., 2023), particularly by directing it to organic waste streams.

When individuals develop a regular *waste sorting habit* as part of their daily routines, it enhances the likelihood of integrating sustainable disposal practices (Ofstad et al., 2017). The communal disposal behaviour practices may also exert an influence. However, the paramount factor comes from the availability of accessible organic *waste infrastructure* (Allison et al., 2021), including personal-owned composting bins or integrated waste disposal systems for organic waste collection and treatment. If consumers feel they have easy access to an organic waste facility due to the available infrastructure, they believe they can dispose of plastic waste effectively.

**Proposition 4a.** Higher packaging price will decrease the consumer intention to adopt bioplastic packaging.

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**TABLE 4** Summary of analysis of stakeholders.

Proposition 4b. Higher pro-environmental attitude will improve the consumer intention to adopt and properly dispose of the bioplastic packaging.

Proposition 4c. Higher sorting waste habit and accessibility to organic waste management infrastructure will improve the consumer intention to properly dispose of the bioplastic packaging.

#### 6.6 Feedback

Within the production sector, actors can glean insights about consumer adoption towards bioplastic packaging through mechanisms such as sales reports, online reviews and social media sentiments. Larger corporations have the capacity to harness consumer intelligence and market research or become members of industry associations, which helps them recognise evolving consumer preferences and perceptions for environmentally friendly products (Breckon et al., 2019; Kanwal et al., 2017). The reception or rejection of these offerings by consumers plays a direct role in honing the intrinsic attributes of the signaller, which in turn informs the calibration of their future communication signals (Connelly et al., 2011).

Unfortunately, consumer responses regarding the proper disposal of bioplastic packaging are not diligently monitored by producers. Stakeholders concur on this matter. Despite sporadic and minimal efforts, collaboration with waste management entities lacks a systematic approach. This deficiency is primarily attributed to legal ambiguities in the extended producer responsibility governance, leading to the weak enforcement of integrated waste management (EKONID, 2022; Maskun et al., 2023). Consequently, manufacturers remain unaware of whether their packaging waste has been appropriately processed as intended. From this standpoint, it can be inferred that consumer disposal behaviour responses are unlikely to significantly impact actors within the production sector.

Our findings deviate from what Connelly et al. (2011) proposed. It appears that, in the context of the proper disposal of BP, there has been a lack of concerted efforts by the signaller to actively engage with receiver feedback. This phenomenon can be primarily attributed to the absence of well-established waste management systems for organic waste in various regions (Fletcher et al., 2021). Consequently, producers may encounter challenges in acquiring comprehensive data pertaining to consumer feedback concerning the responsible disposal of BP.

Proposition 5. Better consumer adoption will improve the signaller characteristic.

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#### 6.7 **Refined conceptual framework**

Utilising MCA (see Table 4), we observe that signal proficiency, cost, visibility, clarity, consumer's pro-environmental attitude and waste infrastructure attain the highest quality ratings, each scoring 1, highlighting their paramount importance in the framework. Signal consistency, credibility, consumer adoption and packaging price are rated as the second highest dimensions, with slightly lower quality in the ecolabel's marketing strategy framework compared with integrity and fit, both scoring 0.81. This suggests that while these four constructs hold significance for most stakeholders, signaller integrity and signal fit are perceived as marginally higher in quality. Additionally, the dimension relating to consumer disposal treatment ranks as the least prioritised, with a quality value of 0.0602. This implies that, for BP producers, the significance of understanding how they handle the end of life of BP products is considered negligible within their existing nractices

From the propositions described previously, it is beneficial to create a diagram that represents a comprehensive conceptual framework to provide a clear understanding of the relationship between the factors affecting the adoption of bioplastic packaging (see Figure 2). In order to make ecolabels effective marketing tools, marketing strategies should be grounded in an understanding of how various constructs and elements interact with each other (Antonenko, 2015; Lindgreen et al., 2021). These interactions are outlined through propositions, forming the basis for refining the conceptual framework (Ravitch & Riggan, 2016). The enhanced conceptual framework offers a structured approach for devising strategies to leverage ecolabels in influencing consumer behaviour towards the adoption of BP and its responsible waste disposal, thereby aligning with both business and environmental objectives. This conceptual framework will act as a refinement of the theoretical framework proposed previously for business strategy in the BP industry.

Compared with the previous study, this novel framework offers several important improvements. First, it elucidates the interrelationships between various constructs with heightened clarity, resolving the ambiguity present in the prior model. Second, it introduces novel prominent constructs within the receiver element, namely, consumer trust, and additional factors influencing consumer feedback, such as packaging price, pro-environmental attitude, habitual practice and organic waste infrastructure. Third, it reveals that environmental distortion lacks significant influence on the signal, causing it to be omitted from the framework. Furthermore, while it is ideal for the signaller to capture receiver feedback, empirical evidence unveils a missing connection from the consumer's disposal behaviour, thus inhibiting its direct influence on the signaller. These findings not only enhance the precision of the theoretical model but also contribute to a more nuanced understanding of the intricate dynamics within the context of BP communication for marketing strategy.

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FIGURE 2 The refined conceptual framework.

# 7 | CONCLUSIONS

Using BP as a case, this study delineates the communication mechanism employing ecolabels and substantiates that ecolabel could serve as a marketing strategy for producers to achieve business and environmental goals, provided they carefully consider the relationships among different elements and constructs within the framework provided. Further, we emphasise that, within the context of emerging markets, ecolabels can serve as an effective marketing strategy for BP, given that producers take into account consumer concerns regarding pricing, distribute their products in regions with established organic waste infrastructure and target eco-conscious consumers who segregate waste.

In a theoretical context, this study expands Connelly et al.'s (2011) signalling theory into sustainable packaging literature, emphasising the critical attributes an effective signal should possess—costly signalling, visibility, clarity, fitness, consistency and credibility. Moreover, *consumer trust* is identified as a significant construct within the consumer's internal self. Additionally, within the landscape of emerging markets, fossil-based plastic recycling campaigns are not considered to be significant noise that weakens the signal strength.

In practice, our study serves as guidance for industry stakeholders and ecolabel institutions, aiding in the creation of robust communication signals through a thoughtful consideration of the identified signal constructs. Due to the vital role of costly signalling in strengthening ecolabels signal, supply chain stakeholders must take responsibility for educating consumers about BP ecolabels. Furthermore, producers are suggested to be aware of consumers' concerns about price, strategically allocate marketing resources to areas or closed-loop systems with organic waste infrastructure and target consumer segments with high pro-environmental attitudes and waste segregation practices.

# 7.1 | Theoretical implications

Through empirical data, this study improves the preceding theoretical framework in the context of material packaging communication, employing the signalling theory (Baskoro et al., 2024). The framework highlights the role of signaller integrity and proficiency in crafting a robust signal, encompassing constructs such as cost, visibility, clarity, consistency and credibility.

Subsequently, this study reveals that signal costs can include both direct implementation costs, such as acquiring certification, and indirect expenses, such as consumer education initiatives. These costs deter disingenuous signallers, reinforcing signalling theory's premise of costly signalling.

Additionally, within the receiver, alongside attention and interpretation, trust emerges as a significant new construct that could influence consumer decisions. Heightened attention, understanding and trust positively impact consumers' willingness to adopt and responsibly dispose of BP.

Therefore, this study extends the signalling theory by Connelly et al. (2011), by identifying trust as an essential construct that should exist in the receiver of the message. Simultaneously, it also acknowledges instances where environmental distortions may not significantly impact the strength of the message signal, given its inherent weakness.

Moreover, this study demonstrates that receiver feedback does not always exert full influence over the signaller. A missing connection in the communication pathway from feedback to the signaller can hinder its influence and may further exacerbate information asymmetry from the receiver to the signaller. In parallel, additional factors have also demonstrated significant importance in supporting the desired influence of the signal on feedback.

Finally, identifying and comparing differing perspectives among stakeholders in the supply chain contribute to a more holistic view of the phenomenon. As a result, the refined framework distils the substantiated linkages between the constructs, illuminating the communication dynamics that drive BP adoption and waste disposal. By accentuating significant validated pathways while pruning unsupported associations, the framework brings into sharper focus the key forces at play (Ravitch & Riggan, 2016). The framework's establishment of proposed connections lays the mechanism by which strategic messaging and design choices shape consumer intentions, facilitating understanding of how to effectively channel ecolabel communication into sustainable behaviours.

#### 7.2 **Practical implications**

On a practical level, this research offers guidance to industry and ecolabel institutions on crafting robust communication signals by considering the six identified constructs of signals. Furthermore, the influence of online sales platforms on ecolabel messages is deemed nondisruptive, and plastic recycling campaigns are proven to be insignificant nuisance (Alexander & Putri, 2022). Therefore, producers need not harbour excessive concerns regarding the potential adverse environmental distortion associated with the promotion of ecolabels within these mediums.

Given the importance of costly signalling in bolstering ecolabel signal strength, stakeholders within the supply chain must define their roles and contributions in educating consumers about the ecolabels featured on BP, aiming to improve understanding of the environmental benefits and responsible bioplastic disposal procedures.

Subsequently, to foster consumer trust, producers are advised to obtain and prominently display well-known third-party certifications on ecolabels. Moreover, due to the barrier posed by price in consumer adoption, producers have the option to enhance the product's value for the given price or explore strategies such as cross-subsidy or leveraging economies of scale to make bioplastics more affordable (Filho et al., 2022), given the underutilised production capacity existing within the industry (Hidayat, 2017).

Companies are also advised to strategically allocate marketing resources and distribution efforts to locales or closed-loop systems where organic waste management systems are readily available (Fletcher et al., 2021). Considering the limited composting facilities in emerging markets, producers should make efforts to search for and build connections with local organic waste processors to demonstrate and verify the compostability of their plastic packaging, instilling confidence among waste processors. Subsequently, targeting consumer segments characterised by high pro-environmental attitudes (Husted et al., 2014) and accustomed to waste segregation practices is recommended (Fan et al., 2019).

Furthermore, the study accentuates the importance of the feedback loop between consumers and producers (Ganglmair-Wooliscroft & Wooliscroft, 2022), particularly regarding the purchase and disposal of bioplastic packaging. However, a reliable communication channel regarding the post-consumption fate of these materials remains absent. This information gap leaves manufacturers unaware of the effectiveness of communicated biodegradable or compostable claims, potentially subjecting them to accusations of deceptive practices (Goel et al., 2021).

Consequently, policymakers are urged to enhance the clarity of extended producer responsibility frameworks, mandating producers' involvement in the end-of-life product phase to ensure proper collection and disposal of BP waste (Springle et al., 2022). Enforcing this measure would facilitate the receipt of consumer feedback, enabling subsequent refined signals from producers to accurately communicate the material's attributes and post-consumption treatment (Baskoro et al., 2024). These practical recommendations can help address the challenges and opportunities facing the BP industry in the emerging market.

#### 7.3 Limitations and future research

Our study was carried out in Indonesia, a country where the campaigns promoting the recycling of fossil-based plastics have shown limited effectiveness in influencing public behaviour. Therefore, it is of considerable interest to conduct further investigations in a country or region where fossil-based plastic recycling is already deeply ingrained in societal practices. Such research could provide additional insights into the factors that contribute to the success of ecolabel as a marketing strategy.

While our study adeptly uncovers the intricate relationship between ecolabels and consumers, a thorough investigation into how ecolabel visual design triggers consumer attention, interpretation and trust has yet to be extensively studied. This paves the way for upcoming studies to undertake a nuanced examination of the visual communication attributes of ecolabels and their effects on these internal individual processes. Also, delving further into comprehending how the visual language of consumers communicates concepts linked to the bioplastic material attributes also presents an intriguing avenue for exploration.

Moreover, although this qualitative study aptly extracted rich information and proposed a refined theoretical framework, the inherent limitations of a qualitative approach hinder generalisability and

external validity for broader application to other marketing cases. Given this context, it is recommended that future research adopt a quantitative trajectory. This involves careful sample selection with a substantial sample size, allowing for the potential validation of correlations among signal elements, thereby facilitating the unravelling of communication mechanisms to comprehend a broader phenomenon.

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### APPENDIX A: INTERVIEW GUIDE

### Profile

- What role do you hold within your organisation? How long have you been working in this field?
- What are the goals of your organisation and how extensive is your organisation's scope?

### Signaller to signal

- What capabilities should producers possess to effectively use ecolabels?
- What capabilities should producers have to create compelling messages through ecolabels?

• What elements are essential for producers to establish credible messages through ecolabels?

Environment to signal

- When selling products online, is ecolabel information easily accessible to potential consumers?
- Will plastic waste recycling campaigns potentially disrupt the message conveyed by bioplastic ecolabels?

### Signal to receiver

- (There are three labels, and for each label shown, this question is asked) If this label is on plastic packaging, can consumers easily determine the type of packaging material and how to dispose of it?
- What are the features of ecolabels that capture consumers' attention?
- What are the features of ecolabels that are easily understandable to consumers?
- What are the features of ecolabels that consumers find trustworthy?
- Will labels on packaging assist consumers in sorting waste properly?

#### Receiver to feedback

- If consumers trust the messages conveyed by ecolabels, what are the expected outcomes?
- How can consumers be encouraged to adopt bioplastic packaging for daily use and dispose of bioplastic packaging waste in organic waste bins?

### Feedback to signaller

- Can producers determine if consumers are starting to favour bioplastics?
- Can producers determine if consumers are correctly disposing of bioplastic packaging waste through organic waste bins or composting?

### Other questions

- Is it possible to convey an effective message that (1) this plastic packaging material is compostable and (2) the plastic waste should be composted through a single label?
- Have you heard of "industrial composting" in Indonesia?

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## APPENDIX B: ANOVA RESULTS

	ANOVA				
Source	SS	df	Ms	F	Prob > F
Between groups	3.4	3	1.13333333	0.69	0.5731
Within groups	26.4	16	1.65		
Total	29.8		19 1.56842105		