

WHEN INFORMATIONAL POLICIES BECOME RETAIL ASSETS: HOW VOLUNTARY FRONT-OF-PACK NUTRITION LABELS BUILD TRUST AND LOYALTY IN RETAIL

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Abstract

In voluntary labeling regimes, standardized Front-of-Pack Nutritional Labels (FOPL) can become embedded in retailer-controlled branding and loyalty infrastructures, generating relational value beyond their informational intent. This research examines how Front-of-Pack Nutritional Labels (FOPL) shape retailer-oriented outcomes through relational mechanisms operating at different stages of the retailer–consumer relationship. Across five experiments in voluntary labeling markets, we trace the evolution of FOPL from trust-creating cues to scheme-dependent trust reinforcement among non-enrolled consumers, to the institutionalization of trust through loyalty program enrollment. Study 1 shows that, in the absence of brand cues, FOPLs increase Brand Trust, which mediates their effect on Retail Brand Loyalty. Study 2 demonstrates that in branded private-label retail contexts with baseline retailer trust, relational effects become scheme-dependent: Nutri-Score reinforces trust and loyalty intentions among non-enrolled consumers, whereas NutrInform Battery does not. Study 3 models enrollment as an institutional mechanism linking trust to durable loyalty, showing that only Nutri-Score activates the full trust–enrollment–loyalty sequence. Study 4 tests explicit retailer commitment to consumer health as a boundary test for this mechanism. Study 5 reveals a retailer advantage: when a retailer proactively claims ownership of the FOPL, it generates an incremental, yet small, significant direct effect on retail brand loyalty, thus internalizing public policy as a private relational asset. Collectively, the findings show how informational policy tools can evolve into relational assets within retailer-controlled loyalty systems in voluntary regulatory settings.

Keywords

Retail Brand Loyalty; Brand Trust; Private Labels; Loyalty Program Enrollment; Retail Branding Strategy; Front-of-Pack Nutritional Labels, Voluntary Labeling.

1. Introduction

Front-of-Pack Nutritional labels (FOPL) were introduced as informational policy instruments intended to improve consumers' nutritional understanding and to steer choices through simplified disclosure rather than command-and-control regulation (Ikonen et al., 2020). In several European countries, however, adoption remains voluntary, leaving retailers and manufacturers with discretion over whether and how to display FOPL at the point of choice (Dubois et al., 2021; Julia et al., 2018). This discretion is not trivial. Yet despite extensive research on FOPL effects on consumer understanding and healthier choices, we still lack a theoretical backing of how voluntary adoption interacts with retailer-controlled infrastructures—private labels and loyalty programs—to generate relational value at the retailer level. This omission is consequential because it leaves unexplained how informational policy tools become embedded within private governance structures and appropriated as relational assets. When disclosure is optional, the presence of a standardized scheme constitutes an observable strategic decision whose effects may extend beyond product-level information. Beyond this, the *source* to which the disclosure is attributed (retailer vs. institutional actor) may further shape how consumers interpret voluntary adoption—although such endorsement framing may become redundant once a credible standardized label is already present. In voluntary regimes, standardized informational tools become partially appropriable by retailers: although originating from public policy, their adoption is discretionary and therefore attributable to the retailer's governance choices. This discretionary adoption may shift the perceived responsibility for the signal from the institution to the retailer, enabling retailers to capture relational value from a standardized public policy tool.

Building on this premise, we argue that, in voluntary environments, FOPL can operate not only as decision aids but also as relational signals shaping retailer-oriented outcomes—most notably retail brand trust, loyalty intentions, and consumers' willingness to enter retailer-controlled relationship systems (Morgan & Hunt, 1994; Garbarino & Johnson, 1999; Dick & Basu, 1994). This argument is particularly consequential in grocery retailing, where competition and customer retention increasingly revolve around two retailer-controlled architectures: private labels, as retailer-owned brand portfolios, and loyalty programs, as institutional mechanisms for retaining and monetizing customer relationships (Ailawadi & Keller, 2004; Chen et al., 2021; Dorotic et al., 2012). Prior research documents that private labels strengthen retailer differentiation and retail brand loyalty, while loyalty programs help convert repeat purchase into more durable commitment through rewards, personalization, and switching frictions (Ailawadi et al., 2008; Choi & Coughlan, 2006; Bolton et al., 2004; Liu, 2007; Bombajj & Dekimpe, 2020). Yet this literature largely treats policy-driven disclosures as exogenous constraints or purely informational

inputs, leaving open key questions that are central in voluntary labeling markets (Ikonen et al., 2020; Roberto et al., 2021):

- *how does a retailer's discretionary adoption of standardized nutrition disclosure translate into trust and relationship development at the retailer level?*
- *what happens when a standardized informational policy tool is embedded into retailer-owned brand and loyalty architectures — especially when adoption is voluntary?*

To theorize this process, we integrate three streams that are rarely connected explicitly. First, drawing on signaling theory, we conceptualize voluntary FOPL as a disclosure choice that can signal disclosure, accountability, and willingness to subject the retailer's private-label offer to externally defined evaluative standards (Spence, 1973; Kirmani & Rao, 2000; Darnall et al., 2018). Importantly, the relevant uncertainty is not limited to product attributes but includes the retailer's credibility in managing and communicating product quality: voluntary adoption can serve as a credible cue via adherence to a standardized disclosure scheme (Kirmani & Rao, 2000; Darnall et al., 2018; Mogyoros, 2023). Second, building on relationship marketing and trust-based loyalty formation, we treat trust as the pivotal relational belief that reduces perceived risk and enables progression from initial reliance to loyalty (Morgan & Hunt, 1994; Garbarino & Johnson, 1999; Kim et al., 2009; Gefen et al., 2003). Third, building on research on loyalty infrastructures, we view enrollment as an institutional threshold through which retailers formalize relationships and stabilize loyalty by reshaping future choice environments (Bolton et al., 2004; Dorotic et al., 2012; Chen et al., 2021; Bombaij & Dekimpe, 2020). Together, these lenses imply that, in voluntary regimes, FOPL can evolve from informational cues into retail relationship assets (Morgan & Hunt, 1994; Spence, 1973). Only by integrating signaling theory, trust-based relationship development, and loyalty infrastructures can we explain how informational policy tools become relational assets in voluntary retail environments. This integration is essential because none of these perspectives alone can account for the relational appropriation of informational policy tools. By connecting these perspectives, the framework explains how a public informational device becomes a privately appropriated relational asset: signaling theory explains diagnosticity but not institutionalization; trust theory explains relational beliefs but not their conversion into structural commitment; loyalty infrastructures explain institutional commitment but not its informational antecedents. This integrated view is necessary to understand how voluntary FOPL adoption reshapes retailer–consumer relationships.

A second unresolved issue concerns label design. FOPL schemes differ in informational architecture and interpretive demands (Ikonen et al., 2020; Newman et al., 2016). Summary, evaluative labels (e.g., Nutri-Score) compress nutritional information into a single graded judgment that is immediately

comparable across products (Egnell et al., 2020; Talati et al., 2017a; Ikonen et al., 2020). Nutrient-specific labels (e.g., NutrInform Battery) provide disaggregated numerical information without a synthetic evaluation and require more consumer processing to translate information into judgment (He et al., 2023; Newman et al., 2016). Extant FOPL research has largely examined these differences in terms of consumer understanding and healthier choices; comparatively less is known about whether—and when—these formats differentially activate relational responses such as trust and willingness to enter retailer relationship systems (Ikonen et al., 2020; Mazzù et al., 2022). If voluntary FOPL operate partly as relational signals, the “signal clarity” and cognitive accessibility of the format should matter for whether the disclosure is interpreted as reassuring and diagnostic of capacity to reduce informational ambiguity at the retailer level (Kirmani & Rao, 2000; Schwarz, 2004; Newman et al., 2016).

We therefore propose a staged relational framework in which FOPL shift function across phases of the retailer–consumer relationship (Harmeling et al., 2015; Morgan & Hunt, 1994). At early stages, when brand equity is absent and uncertainty is high, any standardized FOPL can serve as a substitute credibility cue that facilitates trust formation (Darke et al., 2016; Garbarino & Johnson, 1999). At intermediate stages, when baseline retailer trust exists but consumers are not formally enrolled, FOPL are more likely to play a confirmatory role—reinforcing trust only if the scheme provides clear, low-ambiguity reassurance (Garbarino & Johnson, 1999; Talati et al., 2017a; Ikonen et al., 2020). At more advanced stages, trust can be converted into durable loyalty through institutionalization, where consumers cross a behavioral threshold by enrolling in the retailer’s loyalty program; here, the central question becomes whether FOPL can facilitate this transition by lowering perceived relational risk and legitimizing entry into the retailer ecosystem (Bolton et al., 2004; Dorotic et al., 2012; Chen et al., 2021; Liu, 2007).

We test these ideas across five experiments conducted in European Union markets characterized by voluntary FOPL adoption. Study 1 isolates the trust-creation mechanism in a fictitious private-label context where brand equity is absent. Study 2 examines trust reinforcement in a branded private-label context among non-enrolled consumers, where baseline retailer trust is present and scheme differences should become consequential. Study 3 models enrollment as the institutional mechanism linking trust to durable loyalty and tests whether labeling schemes differentially activate a trust–enrollment–retail brand loyalty pathway. Study 4 provides a boundary test by assessing whether an explicit retailer health-commitment message adds incremental relational value once a standardized label is present. Study 5 then examines an endorsement-source boundary mechanism, holding Nutri-Score constant on a private-label product and varying whether the label is framed as promoted by the Ministry of Health or by the retailer.

This research contributes to theory in three ways. First, we reconceptualize voluntary Front-of-Pack Nutritional Labels (FOPL) as appropriable relational signals within retailer-controlled brand architectures (Ikonen et al., 2020; Roberto et al., 2021; Ailawadi & Keller, 2004). While prior work treats FOPL as

informational devices, we show that voluntary adoption allows retailers to internalize the relational value of standardized policy tools, effectively transforming public informational instruments into private trust assets. Second, we develop and empirically validate a staged relational mechanism that explains how informational cues evolve from heuristic trust signals (when brand equity is absent), to scheme-dependent trust reinforcement (when baseline trust exists), to institutional triggers of loyalty program enrollment (Spence, 1973; Kirmani & Rao, 2000; Morgan & Hunt, 1994; Garbarino & Johnson, 1999). This mechanism clarifies when and why informational policies acquire relational meaning in retailer-consumer relationships and can become trust-based retail assets. Third, we advance research on loyalty infrastructures by identifying enrollment as the institutional threshold through which trust becomes structural commitment. We show that only summary labels (e.g., Nutri-Score) activate the full trust to enrollment to loyalty sequence, demonstrating that informational architectures condition the institutionalization of trust within retailer ecosystems (Bolton et al., 2004; Dorotic et al., 2012; Chen et al., 2021; Bombajj & Dekimpe, 2020). Finally, by documenting boundary conditions where retailer-authored commitments and endorsement framing add limited incremental value once a credible standardized label is present, the studies delineate the limits of relational appropriation and clarify when informational policy tools become redundant relative to existing relational assets. Collectively, these contributions reposition voluntary FOPL as strategic levers within retailer-owned loyalty systems and illuminate how informational policy tools become endogenized into private governance structures in voluntary regulatory environments.

The remainder of the paper is structured as follows. We first develop the theoretical framework and derive hypotheses for each stage of the retailer–consumer relationship. We then present five experimental studies conducted in voluntary labeling markets, testing the proposed staged relational mechanism. We conclude with implications for theory, retail strategy, and public policy.

2. Theoretical Development

2.1 Trust-Based Retail Loyalty Formation

In retail contexts, trust constitutes a fundamental antecedent of commitment and, together with it, drives long-term customer loyalty through a sequential process that unfolds from cognitive beliefs to affective attachment, conative intentions, and ultimately loyalty (Morgan & Hunt, 1994; Garbarino & Johnson, 1999). Within this framework, trust operates across multiple temporal horizons: in the short term, it reduces perceived risk and facilitates initial transactions, while in the long term, it fosters satisfaction, habitual choice, and self-reinforcing loyalty dynamics (Kim et al., 2009).

As trust-based relationships mature, loyalty programs may transform such loyalty into structural commitment by introducing procedural, relational, and financial switching costs - such as accumulated rewards, personalized offers, and ecosystem familiarity (Hwang et al., 2019; Chen et al., 2021; Lin & Bowman, 2022; Meyer-Waarden et al., 2023). Importantly, the effectiveness of this mechanism is contingent upon trust: when trust is high, switching costs complement voluntary commitment and reinforce relational continuity (Dick & Basu, 1994).

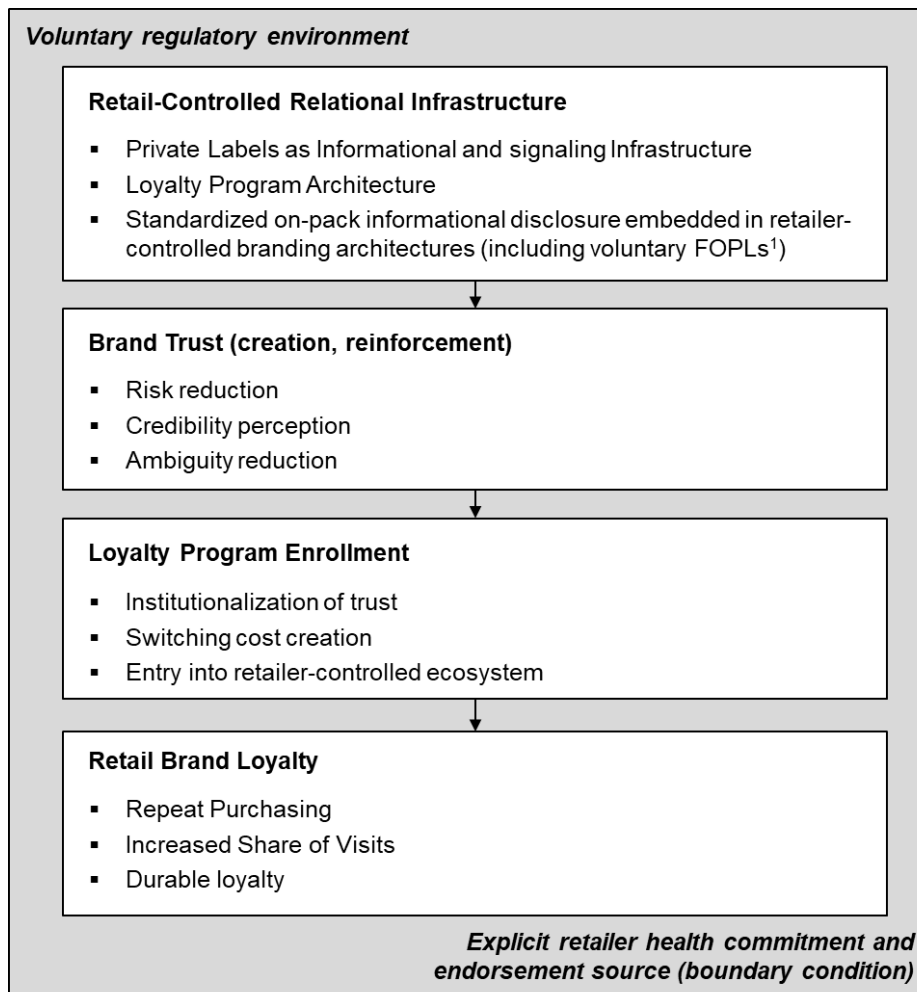
To strengthen customer trust and loyalty, retailers are increasingly relying on assortment strategies as a core value-creation lever to build trust by delivering multidimensional consumer utility, encompassing support for well-being and self-improvement (Lombart et al., 2025), protection of perceived purchasing power under economic uncertainty¹ through enhanced value-for-money perceptions (Dekimpe et al., 2023; Pham et al., 2025), and the enhancement of hedonic value via more engaging shopping experiences (Lee & Park 2024). Within this strategic architecture, private labels play a central role as retail brand extensions, enabling retailers to exercise direct control over assortment composition and product-level information, thus operationalizing trust signaling and translating multidimensional utility into strengthened customer trust and Retail Brand Loyalty (Ailawadi & Keller, 2004; Orth & Malkewitz, 2008; Kirmani & Rao, 2000).

Loyalty programs act as complementary, data-enabled relational levers that reinforce retailer-controlled value creation by mediating satisfaction, personalizing rewards, and supporting consumers along the decision journey (Steinhoff & Zondag, 2021). By increasing switching costs and providing economic and experiential benefits, they strengthen retailer–customer relationships and stimulate Retail Brand Loyalty through sustained repeat purchasing and higher share-of-visits (Yi & Jeon, 2003; Liu, 2007; Bombajj & Dekimpe, 2020; see Figure 1).

Figure 1. The Trust-Based Pathway from Voluntary Informational Disclosure to retail brand Loyalty

This figure illustrates how voluntary Front-of-Pack Nutritional Labels (FOPL), embedded in retailer-controlled infrastructures, foster Brand Trust, enable loyalty program enrollment, and ultimately generate Retail Brand Loyalty in voluntary regulatory environments.

¹ Financial Times (2026), Food and drink companies suffer as US shopper sentiment sinks. Accessed on February 2026 at <https://www.ft.com/content/6aea157a-4f6a-4dac-8b0e-9035e77485b7>



(1) Summary vs. Nutrient-Specific Labels

2.2. Front-of-Pack Nutritional Labels as Relational Signals in Voluntary Retail Environments

While the literature on retail loyalty has extensively documented the role of trust, assortments, private labels, and loyalty programs as relational drivers (Bolton et al., 2004; Verhoef et al., 2007), considerably less attention has been devoted to how standardized informational cues, originating outside the retailer’s strategic domain, interact with these mechanisms. Front-of-Pack Nutritional Labels represent a particularly relevant case in this respect. Although designed as policy instruments aimed at improving consumer understanding and supporting informed and healthier choices (Egnell et al., 2019; Mazzù et al. 2022), FOPL are increasingly embedded within retailer-controlled branding architectures, especially in regulatory environments where their adoption remains voluntary (Dubois et al., 2021).

In such contexts, FOPL cannot be conceptualized solely as cognitive inputs facilitating information processing. Rather, they may function as relational signals, conveying broader meanings related to disclosure, credibility (Mazzù et al., 2025), and alignment with public-interest norms (Spence, 1973; Kirmani & Rao, 2000). Importantly, unlike classic quality signaling, the relational signaling role of FOPL

does not concern unobservable product attributes, but the retailer's willingness to align with externally defined normative standards.

Because FOPL adoption is discretionary in voluntary regimes, their presence constitutes an observable disclosure choice. Packaging and labeling that incorporate third-party certified standards or recognized sustainability labels act as external signals of compliance, reducing information asymmetry and enhancing perceived credibility (Darnall et al., 2018; Mogyoros, 2023). In the context of private labels, retailers increasingly rely on such trust-building mechanisms to strengthen the credibility of their own brands (Gielens et al., 2021). Accordingly, private label packaging may signal alignment with external standards, reducing perceived ambiguity and reinforcing credibility. This signaling function is particularly salient when alternative credibility cues, such as established brand equity, retailer reputation, or prior relational history, are weak or absent (Darke et al., 2016).

In settings where regulatory compliance is voluntary, the adoption of Front-of-Pack Nutritional Labels results from a discretionary decision by either producers or retailers and is therefore directly observable by consumers. As a result, the presence of a FOPL does not merely convey nutritional information but also constitutes an observable disclosure choice, which can be interpreted as a signal of disclosure and accountability in voluntary settings (Roberto et al., 2021; Montecchi et al., 2024). Importantly, the signaling value of FOPL does not derive from informational accuracy, but from the retailer's voluntary exposure to external evaluation

2.2.1. Differentiation between Summary and Nutrient-Specific Front-of-Pack Nutritional Labels

Importantly, Front-of-Pack Nutritional Labels differ not only in their regulatory origin, but also in their informational architecture and interpretive demands. Prior research distinguishes between summary labels (e.g., Nutri-Score), which provide a synthetic and evaluative assessment of a product's overall nutritional quality, and nutrient-specific labels (e.g., NutrInform Battery), which offer detailed numerical information on individual nutrients without an explicit evaluative judgment (Newman et al., 2016; Mazzù et al., 2022).

Summary labels condense multidimensional nutritional information into a single, graded indicator, typically algorithmically derived and typically expressed per a standardized reference amount (e.g., 100 g), which facilitates comparability across products but may abstract from consumption patterns in quantity or frequency, thereby facilitating rapid interpretation and comparison across products (Chandon & Indaburu, 2026). By translating complex nutritional profiles into an immediately interpretable signal, these labels reduce cognitive effort and ambiguity and may therefore operate as directive cues that guide

judgments not only about product healthfulness but also about the credibility and benevolence of the actor providing the information (Dubois et al., 2021).

By contrast, nutrient-specific labels present disaggregated numerical information on individual nutrients, expressed per portion and relative to reference intakes, without providing an overall evaluative summary (Muzzioli et al., 2022). By reconstructing the contribution of each nutrient to daily requirements, they enable consumers to assemble balanced meals composed of differentiated foods (Penzavecchia et al., 2022). While this format enhances informational completeness and supports informed consumer choice, it places greater cognitive demands on consumers and requires active processing to translate numerical content into evaluative judgments (Newman et al., 2016; Ikonen et al., 2020). As a result, nutrient-specific labels, while effective in building long-term and deeper consumer knowledge and supporting individuals (Howlett et al., 2008; Mazzù et al., 2023) in monitoring the intake of specific nutrients, are less likely to function as immediate heuristic signals and may therefore be less effective in triggering relational responses such as trust, particularly in low-involvement or heuristic-driven decision contexts (Saleem et al., 2022).

In the no-label condition, consumers rely on existing brand cues or prior beliefs about the retailer. Within voluntary regulatory frameworks, the presence of any FOPL functions as an observable disclosure of choice and thus as a signal relative to no labeling. Thus, while any FOPL constitutes a voluntary disclosure signal, summary labels are more likely to function as low-ambiguity relational cues in retailer-controlled environments. This distinction reflects a deeper psychological mechanism: summary labels reduce relational ambiguity by providing a single evaluative judgment, increasing signal clarity and diagnosticity. Nutrient-specific labels increase informational completeness but do not reduce relational ambiguity, limiting their effectiveness as relational signals in low-involvement contexts.

2.2.2. Trust Creation in the Absence of Brand Equity

At early stages of the retailer-consumer relationship, consumers face heightened uncertainty regarding product quality, retailer intentions, and informational credibility (Morgan & Hunt, 1994; Orth & Malkewitz, 2008). In such contexts, trust formation relies heavily on heuristic cues that reduce perceived risk and facilitate initial engagement (Kirmani & Rao, 2000; Schwarz, 2004). When applied to private label products lacking established brand associations, Front-of-Pack Nutritional Labels may serve as substitute trust cues, compensating for the absence of reputational capital by providing an externally validated signal of informational disclosure and accountability (Newman et al., 2016; Ikonen et al., 2020).

Accordingly, in contexts where brand equity and prior relational history are minimal, the presence of a Front-of-Pack Nutritional Label (irrespective of its specific format) should increase Brand Trust relative

to the absence of labeling. To note, in each study, Brand Trust refers to the focal brand displayed on the stimulus; in the experiments reported here, this coincides with the retailer's private-label brand (and thus captures part of the retail brand trust). This increase in trust is expected to foster Retail Brand Loyalty (Liu-Thompkins et al., 2022). Importantly, because the primary function of FOPL at this stage is to shape relational beliefs rather than directly stimulate behavioral intentions, their effect on loyalty should be fully mediated by trust (Morgan & Hunt, 1994; Garbarino & Johnson, 1999). Consequently, in the absence of brand equity:

- H1a. The presence of any Front-of-Pack Nutritional Label Increases Brand Trust relative to no labeling.
- H1b. Brand Trust mediates the relationship between Front-of-Pack Nutritional Labels presence and Retail Brand Loyalty.

2.2.3. Trust Reinforcement under Institutionalized Retailer Brands

As the retailer–consumer relationship evolves, trust may become partially institutionalized through brand reputation and prior shopping experiences, even in the absence of formal enrollment in the retailer's loyalty program. Consumers who are not enrolled in the retailer's loyalty scheme thus occupy an intermediate relational position: they are familiar with the retailer and may hold baseline trust, yet they remain outside the retailer's formal relational infrastructure.

In this pre-institutional stage, informational cues are evaluated not primarily for their capacity to induce commitment, but for their ability to confirm and stabilize existing trust without requiring additional cognitive or relational investment (Gefen et al., 2003). Under voluntary regulatory regimes, where the adoption of Front-of-Pack Nutritional Labels is discretionary rather than mandated, the presence of a FOPL represents an intentional disclosure choice by the retailer. Front-of-Pack Nutritional Labels may therefore function as trust-reinforcement signals (Mazzù et al., 2022), but only insofar as they provide clear and unambiguous confirmation of the retailer's disclosure and reliability.

From this perspective, labeling schemes might differ in their suitability for reinforcing trust among non-enrolled consumers. Summary labels, by offering an explicit and standardized evaluative judgment, reduce residual uncertainty and provide immediate reassurance (Egnell et al., 2020), hence reinforcing shorter-term trust in contexts where disclosure remains voluntary and relational engagement is low-cost and reversible; such summary cues are both highly accessible and readily diagnostic, allowing consumers to form judgments without extensive cognitive elaboration (Feldman & Lynch, 1988). By contrast, nutrient-specific labels, while informationally comprehensive, require consumers to actively process

numerical information and derive evaluative meaning; such higher interpretive burden may limit their short-term effectiveness as trust-reinforcement devices among non-enrolled consumers.

Recent evidence suggests that cognitively demanding information cues are less effective in shaping trust judgments under conditions of low involvement (Meyer et al., 2016), which may limit the short-term trust-reinforcing role of nutrient-specific labels.

This higher interpretive burden may limit their short-term effectiveness as trust-reinforcement devices among non-enrolled consumers. At this stage, informational cues primarily serve as a confirmatory rather than diagnostic function, stabilizing existing trust without requiring additional cognitive effort or relational commitment. (Gefen et al., 2003; Talati et al., 2017a).

Accordingly, in branded private label contexts involving non-enrolled consumers, and characterized by voluntary FOPL adoption, the trust-based effects of Front-of-Pack Nutritional Labels are expected to become scheme-dependent. Formally, consumers who are not enrolled in the retailer's loyalty program in contexts with baseline retailer trust:

- H2a. The effect of Front-of-Pack Nutritional Labels on Brand Trust depends on the labeling scheme.
- H2b. Summary labels increase Brand Trust and indirectly enhance Retail Brand Loyalty more than Nutrient-Specific labels.

2.2.4. Institutionalization of Trust through Loyalty Program Enrollment

While non-enrolled consumers may exhibit trust and repeat purchase behaviors, durable retail brand loyalty typically requires institutional commitment. Loyalty programs represent the primary mechanism through which retailers formalize relationships, transform trust into structural dependence, and reshape future choice environments through rewards, personalization, and switching costs (Bolton et al., 2004; Dorotic et al., 2012; Liu, 2007; Bombajj & Dekimpe, 2020).

Importantly, the present framework focuses again on non-enrolled consumers, conceptualizing enrollment not as a background condition but as a behavioral threshold that marks the transition from relational openness to institutional participation. At this stage, the key theoretical question is whether informational cues such as Front-of-Pack Nutritional Labels can facilitate the shift from trust-based relational beliefs to entry into the retailer's relational infrastructure. Enrollment represents a structural threshold: it marks the transition from relational openness to institutional participation, binding consumers to the retailer's ecosystem through data sharing, switching costs, and personalized benefits.

As such, enrollment is the mechanism through which trust becomes institutionalized and translated into structural commitment.

In voluntary labeling environments, where FOPL adoption is discretionary, FOPLs are expected to influence loyalty only indirectly, through a serial process in which trust increases the willingness to enter the retailer's relational ecosystem, and enrollment subsequently stabilizes loyalty by altering future choice conditions. As in the previous stage, labeling schemes are expected to differ in their ability to activate this transition. Summary labels that provide clear and immediate evaluative reassurance may reduce perceived relational risk and lower the threshold for institutional commitment (Morgan et al., 1994; Garbarino & Johnson, 1999), whereas nutrient-specific formats that emphasize informational processing over reassurance and require longer-term assimilation may be less effective in triggering enrollment intentions among non-enrolled consumers. Specifically, among consumers who are not enrolled in the Retailer Loyalty program:

- H3a. Front-of-Pack labeling influences Enrollment in the Retail Brand Program indirectly through Brand Trust.
- H3b. Enrollment in the Retail Brand Program mediates the relationship between Brand Trust and Retail Brand Loyalty.
- H3c. Summary labels, but not Nutrient-Specific labels, activate the full trust–enrollment–Retail Brand Loyalty transition.

2.2.5. The Role of Retailer Commitment in Shaping the Relational Value of FOPL

While the previous sections examine how FOPLs acquire relational value across stages of the retailer–consumer relationship, their effectiveness may also depend on the institutional framing in which they are embedded. In voluntary regulatory environments, retailers often accompany standardized nutritional disclosures with explicit claims about their broader commitment to consumer health. Such framing may function as a higher-order cue that shapes how consumers interpret informational signals. Study 4 therefore tests whether the trust–enrollment–loyalty mechanism activated by Nutri-Score depends on the presence of an explicit retailer commitment to consumer health. Accordingly, we formulate the following hypothesis:

- H4. Explicit retailer health commitment does not independently amplify the trust–enrollment–loyalty mechanism activated by Nutri-Score.

2.2.6. Endorsement Source as a Boundary Condition in Voluntary Regimes

In voluntary labeling environments, standardized disclosures can be framed as either retailer-driven initiatives or institutionally endorsed cues. Attribution to an institutional actor could, in principle, increase perceived legitimacy and reduce perceived opportunism, thereby strengthening trust and facilitating entry into retailer-controlled relationship infrastructures. However, when a credible standardized FOPL is already present and clearly recognizable, endorsement framing may offer limited incremental diagnosticity beyond the disclosure itself. Accordingly, holding the labeling scheme constant:

- H5. Holding a credible standardized FOPL constant, endorsement source yields no reliable indirect effects via Trust and Enrollment, and any direct differences in Retail Brand Loyalty are context-dependent.

2.2.7. Summary of the Conceptual Framework

This framework conceptualizes Front-of-Pack Nutritional Labels as relational devices whose function evolves across stages of the retailer–consumer relationship. At early stages, FOPL operate as trust-creating signals relative to no labeling; at intermediate stages, their effectiveness becomes scheme-dependent and contingent on their capacity to provide clear, low-ambiguity reassurance (Talati et al., 2017a); at advanced stages, they facilitate the institutionalization of trust through retailer-controlled loyalty infrastructures. This staged perspective clarifies how informational policy tools may acquire strategic relevance for retailers in voluntary regulatory environments.

In mandatory regimes, FOPL may be less diagnostic of retailer discretion and therefore carry weaker signaling value as voluntary disclosure. By contrast, in voluntary environments, the presence versus absence of a FOPL remains an observable choice, which is central to the signaling logic developed here. This specifies when informational policies become relational assets, clarifying the strategic conditions under which standardized disclosures influence retailer–consumer relationships (Table 1).

Table 1 - Evolution of the Relational Function of Front-of-Pack Nutritional Labels

Stage	Relational context	Role of FOPL	Dominant mechanism	Expected outcome
Trust creation	No brand equity	Substitute trust cue	Credibility signaling	Brand Trust
Trust reinforcement	Baseline retailer trust	Confirmatory signal	Ambiguity reduction	Trust stabilization

Trust institutionalization	Loyalty infrastructure	Enrollment trigger	Risk reduction	Durable loyalty
Boundary test: Institutional framing	Explicit retailer health commitment	Contextual boundary condition	No incremental relational effect beyond standardized disclosure	Trust–institutionalization mechanism unchanged
Boundary test: Endorsement framing	Credible standardized FOPL already present (voluntary regime)	Attribution cue (retailer vs. institutional)	Incremental legitimacy vs. redundancy	No systematic mediated effect on TR/ENR/RBL beyond disclosure; any differences are small and not robust.

2.3. Overview of studies

This research comprises five experimental studies conducted in European markets with voluntary FOPLs (Appendix 1) and different levels of overweight and obesity (Appendix 2). Study 1 establishes a baseline test of how directive and non-directive FOPL influence retailer-oriented outcomes in the absence of established brand cues. Study 2 examines whether these effects persist in a branded private label context characterized by baseline retailer trust. Study 3 extends the framework by modeling loyalty program enrollment as an institutional mechanism linking trust to durable Retail Brand Loyalty. Study 4 tests whether retailer-authored health commitment adds incremental relational value once a credible standardized label is present. Finally, Study 5 tests an endorsement-source boundary condition in Greece by holding Nutri-Score constant on a private-label product and manipulating whether the label is framed as promoted by the Ministry of Health or by the retailer. A cross-national robustness test in Central–Eastern Europe replicates the internal trust–enrollment–loyalty structure under similar endorsement manipulations.

In all studies, we included initial screening questions and in-task attention checks. Participants who failed these checks were screened out of the survey and did not receive compensation (Table 2). Importantly, these “stages” are conceptual relationship states operationalized through experimental context (absence vs. presence of brand equity; non-enrollment in loyalty programs), rather than a longitudinal progression observed within the same consumers.

Table 2. Summary of studies

Theoretical Stage	Core Theoretical Mechanism	Hypotheses	Empirical Context	Study	Model Specification	Key Expected Outcome
Stage 1: Trust Creation	FOPL as <i>relational credibility signals</i> compensating for absence of brand equity	H1a–H1b	Fictitious private label; no retailer brand cues; voluntary FOPL environment	Study 1 (Poland)	Simple mediation (X - TR - RBL)	Presence of any FOPL (X1, X2) increases Brand Trust vs. no label (X0); effect on loyalty fully mediated by trust
Stage 2: Trust Reinforcement	Scheme-dependent trust reinforcement under baseline retailer trust	H2a–H2b	Real-market branded private label; baseline retailer trust; non-enrolled consumers	Study 2 (Spain)	Simple mediation (X - TR - RBL), scheme-specific effects	Summary label (Nutri-Score, X1) reinforces trust and loyalty; nutrient-specific label (NutriInform, X2) shows weaker or null indirect effects
Stage 3: Trust Institutionalization	Loyalty program enrollment as institutional mechanism converting	H3a–H3c	Strong retailer brand; developed loyalty ecosystem; fragmented	Study 3 (Italy)	Serial mediation (X -TR - ENR - RBL)	Only Nutri-Score activates full trust - enrollment - loyalty chain; no

	trust into durable loyalty		voluntary FOPL environment			direct effects of labeling on loyalty
Stage 4: Commitment Contingency	Retailer health commitment framing as boundary condition for trust–enrollment mechanism	H4	Strong retailer brand; explicit health commitment vs. no commitment; non-enrolled consumers	Study 4 (Portugal)	Serial mediation (Nutri-Score only)	Commitment message does not add incremental effects once Nutri-Score is present; internal TR/ENR - RBL structure remains
Stage 5: Endorsement Source Boundary Test	Attribution of a credible standardized disclosure (retailer vs. institutional) adds limited incremental diagnosticity once the Label is hold constant	H5	Voluntary FOPL regimes; non-enrolled consumers; retailer private label with Nutri-Score held constant	Study 5 (Greece)	Serial mediation (Policy endorsement - TR - ENR - RBL), Nutri-Score only	Endorsement framing shows no reliable indirect effects via TR/ENR; any differences in RBL change
Across stages	Evolution of FOPL from informational disclosure to retailer-controlled relational asset	—	Voluntary regulatory environments	Studies 1–5	Progressive model complexity	FOPL effects shift from generic trust creation to scheme-dependent strategic

						integration; boundary tests show limited incremental value of retailer- authored framing and endorsement attribution once a credible scheme is present
Appendix Study: Endorsement Source Boundary Test	Cross-national replication of endorsement- source boundary test with retailer/category change	H5	Voluntary FOPL regimes; non- enrolled consumers; retailer private label with Nutri- Score held constant	Appendix Study (CEE: Czech Republic, Hungary, Slovakia)	Serial mediation (Policy endorsement - TR - ENR - RBL), Nutri-Score only	Endorsement framing largely null; internal TR/ENR structure replicates

3. Study 1

Study 1 examines whether Front-of-Pack Nutritional Labels (FOPL) can generate retailer-oriented value by increasing Brand Trust and, ultimately, Retail Brand Loyalty in a voluntary labeling environment. The study is conducted in Poland, a major European market with no mandatory FOPL regulation, where retailers retain full discretion over labeling adoption.

Using a fictitious private-label cereal brand, the study isolates the informational and relational effects of FOPL from confounding influences such as brand equity, retailer reputation, or prior loyalty. This

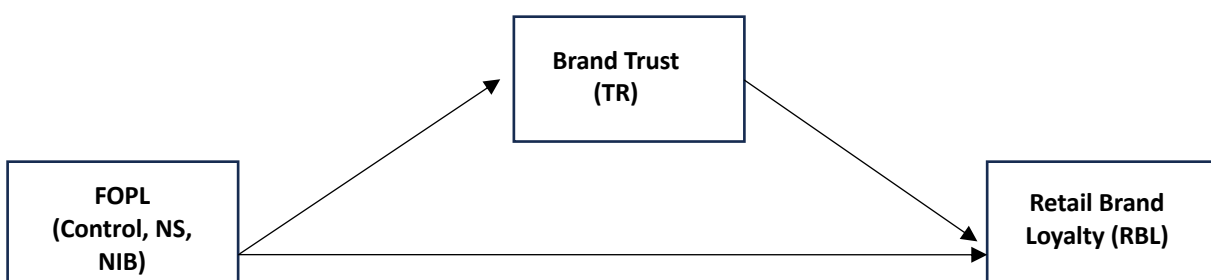
design enables a clean test of whether standardized nutritional labels function as trust-enhancing signals even in the absence of established brand cues.

Participants were exposed to one of three labeling conditions (no label, Nutri-Score, or NutrInform Battery) to assess whether (i) the presence of a FOPL (vs. no label) enhances retailer-relevant outcomes, and (ii) different labeling schemes vary in their ability to activate trust-based loyalty mechanisms (Figure 2). Study 1 thus provides the foundational test of the relational pathway through which policy-driven informational tools may become embedded within retailer-controlled branding architectures.

3.1. Data source, model specification and procedure

Study 1 uses a controlled experimental design to isolate the causal role of FOPL in generating Brand Trust within a retailer-controlled branding context. A pretest confirmed the neutrality of the fictitious brand stimuli (Appendix 3). The study recruited 158 Polish consumers via Prolific who met eligibility criteria of Polish fluency and responsibility for grocery shopping. Participants (socio-demo in Appendix 4) were randomly assigned to one of three labeling conditions applied to a fictitious private-label cereal package of a fictitious retailer brand (stimuli in Appendix 6): no label, Nutri-Score, or NutrInform Battery. Study 1 (and all subsequent studies) was conducted with informed consent and in accordance with applicable ethical guidelines. All materials and data are available from the authors upon request. Using a fictitious brand neutralizes pre-existing equity, reputation, and loyalty, allowing us to observe how informational cues alone shape trust and downstream retailer-oriented outcomes. We estimated a simple mediation model (PROCESS Model 4) with labeling condition as a multicategorical predictor, Brand Trust (TR) as the mediator, and Retail Brand Loyalty (RBL) as the outcome. Age, gender, and education were included as covariates. All constructs were measured using established multi-item seven-point Likert scales, which showed satisfactory reliability (Appendix 5).

Figure 2 – Study 1 Proposed Model



3.2. Results

Results indicate that Front-of-Pack Nutritional Labels Influence Retail Brand Loyalty (RBL) primarily through Brand Trust (TR).

Both Nutri-Score ($b = 0.555, p = .007, 95\% \text{ CI } [0.151, 0.959]$) and NutrInform Battery ($b = 0.590, p = .004, 95\% \text{ CI } [0.191, 0.989]$) significantly increase Brand Trust relative to no label, while sociodemographic covariates are non-significant ($ps > .34$). Brand Trust strongly predicts RBL ($b = 0.360, p < .001, 95\% \text{ CI } [0.213, 0.507]$).

Once trust is included, direct effects of labeling on RBL are weak: Nutri-Score is non-significant ($b = 0.093, p = .628$), and NutrInform Battery shows a negative direct effect ($b = -0.387, p = .044, 95\% \text{ CI } [-0.763, -0.010]$) that is fully offset by a positive indirect effect through trust.

Bootstrap analyses (5,000 resamples) confirm significant indirect effects for both schemes: Nutri-Score ($b = 0.200, \text{BootSE} = 0.088, 95\% \text{ CI } [0.041, 0.385]$) and NutrInform Battery ($b = 0.212, \text{BootSE} = 0.084, 95\% \text{ CI } [0.064, 0.394]$). The total effect of labeling on RBL is not significant ($p = .070$), consistent with full mediation.

Overall, FOPLs do not directly increase loyalty but operate through Brand Trust rather than exerting direct effects on loyalty.

3.3. Discussion

Study 1 shows that Front-of-Pack Nutritional Labels enhance Retail Brand Loyalty indirectly through increased Brand Trust rather than direct behavioral effects. In a fully retailer-controlled branding context, FOPLs act as relational signals that elevate perceived credibility and disclosure, strengthening loyalty even in the absence of established brand equity.

For retailers, this suggests that adopting FOPL can serve as a low-cost trust-building strategy for private labels in voluntary labeling environments. Their effectiveness lies in reshaping consumers' relational beliefs about the retailer, not in directly stimulating loyalty intentions.

From a policy perspective, the findings indicate that as FOPL evolve along the policy life cycle, their influence may increasingly reflect retailer incentives. Although designed to improve nutritional understanding, their dominant effect here is relational rather than informational. This creates potential tension in voluntary regimes, where informational policy tools may be leveraged as branding assets, underscoring the need to consider both consumer-facing and retailer-facing consequences when evaluating voluntary labeling systems.

Study 1 provides evidence that Front-of-Pack Nutritional Labels generate retailer-oriented value through a trust-based mechanism, even in the absence of brand equity. By isolating labeling effects in a fictitious private-label context, it identifies Brand Trust as the primary pathway through which informational cues translate into Retail Brand Loyalty.

However, the use of a fictitious brand limits ecological realism. In real retail settings, private labels are embedded within well-known retailer brands whose existing trust, reputation, and relational history may interact with labeling effects. This raises a key theoretical question:

does the trust-enhancing role of FOPL persist when baseline retailer trust is already present?

Study 2 addresses this issue by replicating the mechanism in a branded private-label context, using a Carrefour product in Spain. It moves from a context of trust creation to one of trust reinforcement, examining whether FOPLs continue to function as meaningful trust signals when baseline retailer trust is present and ecological validity is higher.

4. Study 2

Study 2 builds on Study 1 by testing whether the trust-based mechanism activated by Front-of-Pack Nutritional Labels persists in a branded private-label context, where baseline trust in the retailer is already present. The study is conducted in Spain, a major European market with high private-label penetration and voluntary FOPL adoption.

To examine trust reinforcement rather than trust creation, the study focuses on non-enrolled consumers, pre-selecting respondents who do not hold the retailer's loyalty card. This design captures relational dynamics at the threshold of institutional commitment, before enrollment introduces rewards, switching costs, and deeper relational lock-in.

4.1. Data source, model specification and procedure

The study was conducted in Spain, a large EU market characterized by voluntary front-of-pack labeling and high private-label penetration. The sample consisted of 155 Spanish consumers recruited via Prolific. Participants were required to reside in Spain, be fluent in the local language, be responsible for grocery

shopping, and not be enrolled in the retailer's loyalty program. Participants viewed a Private Label product featuring one of three labeling conditions: no FOPL, Nutri-Score, or NutrInform Battery. Unlike Study 1, the use of a real and well-known retailer brand enhances ecological validity and allows us to examine labeling effects in a context characterized by baseline retailer trust.

Hypotheses were tested using a simple mediation model (PROCESS Model 4), with labeling conditions specified as a multicategorical predictor, Brand Trust (TR) as the mediator, and Retail Brand Loyalty (RBL) as the outcome. Age, gender, education, and private-label usage (PLuse) were included as covariates.

4.2. Results

Results indicate a trust-based mechanism consistent with Study 1, but the effect is scheme-dependent. Nutri-Score produces a strong and significant increase in Brand Trust relative to no label ($b = 0.383$, $p < .05$, 95% CI [0.0461, 0.721]), whereas NutrInform Battery does not significantly affect Brand Trust ($b = 0.159$, $p = .375$). Private-label usage is also a strong positive predictor of trust ($b = 0.293$, $p < .001$), while sociodemographic covariates are non-significant.

Brand Trust strongly predicts Retail Brand Loyalty ($b = 0.314$, $p < .001$, 95% CI [0.148, 0.482]), even after accounting for private-label usage ($b = 0.365$, $p < .001$).

Labeling does not exert significant direct effects on RBL (Nutri-Score: $b = -0.138$, $p = .442$; NutrInform: $b = 0.016$, $p = .930$), and total effects are non-significant ($p = .899$), consistent with a mediation-dominated pattern.

Bootstrap analyses (5,000 resamples) show a significant indirect effect of Nutri-Score on RBL via Brand Trust ($b = 0.121$, BootSE = 0.071, 95% CI [0.011, 0.287]). The indirect effect of NutrInform Battery is smaller and not significant ($b = 0.050$, BootSE = 0.062, 95% CI [-0.059, 0.185]).

Overall, results indicate a selective mediation pattern: in a branded private-label context, only Nutri-Score reinforces trust and translates into higher loyalty intentions among non-enrolled consumers.

4.3. Discussion

Study 2 indicates that Front-of-Pack Nutritional Labels operate through a trust-based mechanism in branded private-label settings, but their effectiveness is scheme-dependent.

When baseline retailer trust is already present, FOPLs no longer act as generic credibility cues; instead, only certain schemes reinforce trust.

From a retailer perspective, Nutri-Score emerges as a trust-reinforcement and onboarding tool for non-enrolled consumers, whereas NutrInform Battery is less effective in activating relational responses, limiting its strategic value for customer acquisition.

Viewed together, Studies 1 and 2 show a consistent pattern: Front-of-Pack Nutritional Labels influence retailer-oriented outcomes primarily through Brand Trust, both in contexts of trust creation (fictitious private labels) and trust reinforcement (branded private labels). Study 2 further indicates that this mechanism is particularly relevant for non-enrolled consumers, positioning FOPL as onboarding devices at early stages of the retailer–consumer relationship.

However, trust and loyalty intentions alone do not capture how retailer–consumer relationships become durable. In contemporary retail settings, loyalty programs represent the institutional mechanism through which trust is converted into sustained loyalty.

Study 3 incorporates this institutional dimension by examining whether FOPLs indirectly foster Retail Brand Loyalty through a serial process in which Brand Trust increases Enrollment in the Retail Brand Program, which in turn strengthens loyalty. By introducing enrollment as an intermediate outcome, Study 3 captures a more advanced stage of retailer–consumer relationship formation.

5. Study 3

Study 3 examines whether Front-of-Pack Nutritional Labels contribute to retailer-controlled relational loyalty, extending the framework beyond trust formation and short-term intentions. The study is conducted in Italy, a voluntary and institutionally fragmented FOPL environment where Nutri-Score and NutrInform Battery coexist across retailers and manufacturers, offering a natural context to test labeling effects under strategic discretion.

The experiment focuses on Esselunga private-label biscuits, a setting characterized by strong retailer brand equity and a well-developed loyalty program infrastructure. To isolate early-stage relational mechanisms, participants were pre-selected among non–loyalty-card holders, allowing us to observe trust formation and enrollment intentions rather than already-institutionalized loyalty.

The study’s core contribution is to model Enrollment in the Retail Brand Program (ENR) as the structural mechanism through which Brand Trust translates into durable Retail Brand Loyalty. Accordingly, we test a serial mediation model in which FOPL influence loyalty through the Trust → Enrollment pathway (Figure 3), capturing the institutionalization stage of the retailer–consumer relationship.

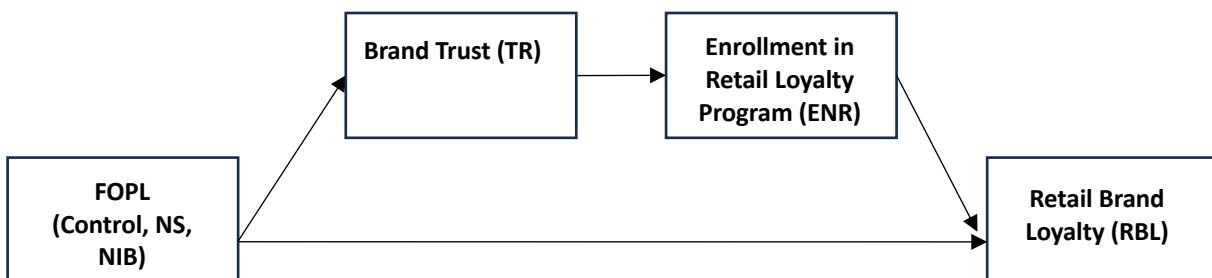
5.1. Data source, model specification and procedure

The study recruited 156 Italian consumers via Prolific who met eligibility criteria of residence in Italy, language fluency, and responsibility for household grocery shopping. Italy represents a voluntary FOPL environment characterized by retailer discretion over labeling choices.

Participants were randomly assigned to one of three conditions in which an Esselunga private-label biscuit was presented with no label (X0), Nutri-Score (X1), or NutrInform Battery (X2). Using a real retailer brand enhances ecological validity within a well-developed loyalty program infrastructure.

To test the proposed mechanism, we estimated a serial mediation model (PROCESS Model 6) with labeling condition as a multicategorical predictor, Brand Trust (TR) as the first mediator, Enrollment intentions (ENR) as the second mediator, and Retail Brand Loyalty (RBL) as the outcome. Age, gender, education, and private-label usage were included as covariates. All constructs were measured using validated multi-item seven-point Likert scales and showed satisfactory reliability.

Figure 3. Study 3 Proposed Model



5.2. Results

Results support a serially mediated process linking Front-of-Pack Nutritional Labels to Retail Brand Loyalty through Brand Trust and Enrollment intentions.

Nutri-Score significantly increases Brand Trust relative to no label ($b = 0.394$, $p = .041$, 95% CI [0.016, 0.773]), whereas NutrInform Battery shows no effect ($b = 0.025$, $p = .903$). Private-label usage also predicts higher trust ($b = 0.129$, $p = .008$).

Brand Trust, in turn, strongly predicts Enrollment intentions ($b = 0.403$, $p < .001$, 95% CI [0.189, 0.616]), while labeling has no direct effect on enrollment. Private-label usage ($b = 0.197$, $p = .003$) and gender are also significant predictors.

Retail Brand Loyalty is driven by both Enrollment ($b = 0.391, p < .001, 95\% \text{ CI } [0.286, 0.495]$) and Brand Trust ($b = 0.266, p < .001$), with no direct or total effects of labeling ($ps > .59$).

Bootstrap analyses (5,000 resamples) confirm a significant serial indirect effect of Nutri-Score on RBL through Trust-Enrollment ($b = 0.062, \text{BootSE} = 0.041, 95\% \text{ CI } [0.001, 0.157]$), and a marginal indirect effect through Trust alone ($b = 0.105, 95\% \text{ CI } [0.000, 0.261]$). No indirect effects emerge for NutrInform Battery. Overall, the results indicate that only Nutri-Score is associated with the full trust–enrollment–loyalty chain.

5.3. Discussion

Study 3 demonstrates that Front-of-Pack Nutritional Labels can support retailer-controlled loyalty strategies, but only when they successfully activate trust and translate it into institutional participation. Nutri-Score emerges as the only labeling scheme capable of triggering the full trust–enrollment–loyalty sequence, whereas NutrInform Battery fails to generate downstream relational effects. While enrollment intentions do not capture realized program participation, they represent the theoretically relevant threshold of institutional commitment among non-enrolled consumers

From a retailer perspective, these findings suggest that FOPL may function as entry points into relational infrastructures, facilitating enrollment into loyalty programs that structurally reinforce long-term loyalty. Importantly, labeling does not directly drive loyalty; its strategic value lies in enabling retailers to convert informational cues into institutional commitment.

From a policy perspective, the results draw attention to how labeling schemes may be differentially incorporated into retailer strategies. Labels that are most effective in fostering enrollment and loyalty may be favored by retailers, even when alternative schemes emphasize different informational or educational objectives. In voluntary regulatory environments, these dynamics highlight a potential misalignment between policy intentions and market outcomes, raising questions about how voluntary labeling schemes function once embedded within retailer-controlled relational infrastructures.

Robustness checks using alternative conditional process specifications confirm that the trust–enrollment–loyalty mechanism identified in the main analyses is stable across levels of private label usage and is not driven by consumers' baseline propensity toward private labels (see Online Appendix 1).

While Study 3 demonstrates that Nutri-Score can activate the full trust–enrollment–loyalty sequence, it remains unclear whether this mechanism operates independently of broader institutional framing. Retailers increasingly accompany informational disclosures with explicit claims about their commitment

to consumer health. Study 4 addresses this boundary condition by testing whether the relational effectiveness of Nutri-Score depends on the presence of an explicit retailer commitment.

6. Study 4

Study 4 examines whether the relational impact of Nutri-Score depends on the broader institutional framing provided by the retailer. In voluntary environments, retailers often accompany standardized disclosures with explicit claims about their commitment to providing value to consumers (see Online Appendix 3 and 4), including health-related values, which may in turn shape how such cues are interpreted.

Such framing could, in principle, shape how consumers interpret informational signals. Study 4 therefore tests whether the trust–enrollment–loyalty mechanism activated by Nutri-Score is contingent upon the presence of an explicit retailer commitment to consumer health.

6.1. Data source, model specification and procedure

Study 4 was conducted in Portugal, a voluntary FOPL environment, and focused exclusively on Nutri-Score. Participants ($n = 126$) were randomly assigned to one of two conditions: Nutri-Score only or Nutri-Score accompanied by a health-oriented retailer commitment message from Mercadona. As in Studies 2 and 3, only consumers not enrolled in the retailer’s loyalty program were eligible.

Participants evaluated a Mercadona private-label sliced bread product and then completed established measures of Brand Trust, Enrollment intentions, and Retail Brand Loyalty. Age, gender, education, and private-label usage were included as covariates. To assess whether retailer commitment shapes the trust–enrollment–loyalty mechanism once Nutri-Score is present, we estimated a serial mediation model (PROCESS Model 6; Hayes, 2022), with retailer commitment as the predictor, Brand Trust (M1) and Enrollment (M2) as sequential mediators, and Retail Brand Loyalty as the outcome. Indirect effects were tested using 5,000 bootstrap samples. All constructs were measured using the same validated multi-item seven-point Likert scales as in previous studies and exhibited satisfactory reliability.

6.2. Results

Restricting the analysis to Nutri-Score conditions, we tested whether an explicit retailer commitment message affects the trust–enrollment–loyalty sequence. A serial mediation model (PROCESS Model 6) showed that retailer commitment had no significant effect on Brand Trust ($b = 0.31$, $p = .079$),

Enrollment ($b = -0.34, p = .17$), or Retail Brand Loyalty ($b = 0.14, p = .28$). The indirect effects through Trust, Enrollment, or their serial combination were all non-significant (all 95% CIs include zero).

The internal relational structure was partially replicated: Brand Trust strongly predicted Retail Brand Loyalty ($b = 0.41, p < .001$), and Enrollment also predicted Retail Brand Loyalty ($b = 0.18, p < .001$). The association between Brand Trust and Enrollment was positive but not statistically significant at conventional levels ($b = 0.21, p = .094$). Private-label usage consistently emerged as a strong positive driver across the model.

6.3. Discussion

Study 4 provides a boundary test of whether explicit retailer commitment enhances the relational value of a standardized and institutionally credible FOPL. Results indicate that, once the FOPL is present, adding a health-oriented commitment message does not strengthen Brand Trust, Enrollment intentions, or Retail Brand Loyalty. The trust–enrollment–loyalty mechanism remains intact, but its activation is largely independent of additional retailer framing. These findings indicate that the relational meaning of standardized FOPL is sufficiently autonomous: the nutritional label conveys trust-relevant signals that do not require reinforcement through retailer self-claims. This clarifies the limited role of explicit commitment narratives as standalone relational devices.

More broadly, Study 4 delineates the limits of retailer commitment. When a credible standardized label is already in place, explicit health-oriented messaging neither substitutes for nor amplifies the relational signal conveyed by the label. This pattern reinforces the central argument of the paper: in voluntary labeling environments, relational value originates primarily from standardized informational disclosures, while retailer self-claims play a secondary and contingent role.

While Study 4 shows that retailer-authored health commitment does not amplify the Nutri-Score trust–enrollment–loyalty sequence, a related boundary question concerns attribution. In voluntary regimes, the same standardized disclosure can be framed as a retailer initiative or as institutionally endorsed. Study 5 holds Nutri-Score constant on a retailer’s private-label product and tests whether endorsement source (retailer vs. institutional) shifts Retail Brand Loyalty among non-enrolled consumers.

7. Study 5

Study 5 provides an attribution boundary test in a voluntary labeling market by examining whether endorsement framing (institutional vs. retailer) meaningfully changes the trust–enrollment–loyalty

process when a Summary Label is held constant. Conducted in Greece—a market characterized by high private-label penetration and voluntary FOPL adoption—the study assessed whether framing the Nutri-Score as endorsed by the Ministry of Health versus by the retailer alters the serial mediation pathway from trust to enrollment to Retail Brand Loyalty

7.1 Data, model, and procedure

A total of 110 Greek consumers not enrolled in AB Vassilopoulos' loyalty card program (screened out at the beginning of the survey) were randomly assigned to one of two framing conditions: institutional endorsement (Ministry of Health) vs. retailer endorsement (AB Vassilopoulos). The stimuli used a real-market retailer and a high-frequency commodity (Milk) to maximize ecological validity, thus capturing relationship dynamics at the threshold of loyalty-program participation. Participants completed measures of Brand Trust (TR), Enrollment Intentions (ENR), and Retail Brand Loyalty (RBL), along with covariates (PL use, age, education). The model was tested using PROCESS Model 6 with 5,000 bootstrap samples.

7.2 Results

Framing was associated with a positive direct effect on Retail Brand Loyalty in the full model ($b = .321$, $p = .046$), indicating higher loyalty when Nutri-Score was framed as a retailer initiative (AB Vassilopoulos = 1) rather than as endorsed by the Ministry of Health (0). However, the total effect was not statistically significant ($b = .233$, $p = .170$), consistent with a suppression-type pattern. Indirect effects were not statistically reliable (all bootstrap CIs include zero). The internal mechanism replicated the pattern observed in earlier studies: Brand Trust positively predicted Enrollment intentions, and both Trust and Enrollment were positively associated with Retail Brand Loyalty.

7.3. Discussion

Study 5 provides an endorsement-source boundary mechanism test for Nutri-Score in a voluntary FOPL environment. Holding the scheme and product constant, attributing the label to the Ministry of Health versus to the retailer does not materially alter Brand Trust, Enrollment intentions, or the indirect Trust–Enrollment–Loyalty pathway. A detectable difference appears as a direct shift in Retail Brand Loyalty, while mediated effects remain null.

Taken together with the cross-national robustness study in Central–Eastern Europe (Online Appendix 2), these findings suggest that once a credible standardized FOPL is present on a retailer private

label, the primary relational signal is the label itself rather than its specific public versus private endorsement framing. Endorsement source appears to play at most a secondary role, leaving the core trust–enrollment–loyalty structure largely unchanged across markets.

8. General discussion

Across five experiments conducted in Poland, Spain, Italy, Portugal, and Greece (replicated in Central–Eastern Europe in Czech Republic, Hungary, and Slovakia), the findings corroborate and refine the trust-based pathway articulated in prior work on retailer loyalty, which emphasizes sequential transitions from cognitive beliefs, to affective attachment, to conative intentions, and ultimately to behavioral loyalty (Morgan & Hunt, 1994; Garbarino & Johnson, 1999; Kim et al., 2009). In line with this tradition, the results demonstrate that standardized policy cues such as FOPL can be endogenized into retailer-controlled ecosystems, first as credibility signals, then as trust-reinforcing assurances, and finally as structural inputs into loyalty infrastructures. This staged evolution complements existing accounts of assortments, private labels, and loyalty programs as core levers of trust-based value creation (Ailawadi & Keller, 2004; Bolton et al., 2004; Verhoef et al., 2007; Steinhoff & Zondag, 2021), by showing that informational policy tools can be strategically recombined with these levers in voluntary regimes. More specifically, the studies collectively confirm the conceptual progression outlined in the framework: informational cues become relational signals, and relational signals become strategic assets embedded within retailer infrastructures. Front-of-Pack Nutritional Labels, originally designed as public-interest instruments to improve understanding and promote healthier choices (Egnell et al., 2019; Newman et al., 2016; Mazzù et al., 2022), can acquire retailer-specific relational functions when their adoption is discretionary and observable. Across relational stages, the results trace a consistent pattern—from trust creation in the absence of brand equity, to trust reinforcement under baseline retailer trust, to trust institutionalization via loyalty program enrollment, and finally to a boundary condition where explicit retailer health commitments do not further enhance relational outcomes once a credible FOPL is in place.

Also, the findings extend trust-based models of retail loyalty formation by explicitly integrating voluntary informational disclosure into the architecture of retailer-controlled value creation. Prior research has shown that assortments and private labels build trust by delivering multidimensional utility—support for well-being, perceived value for money, and hedonic experience—while loyalty programs convert this trust into structural commitment through switching costs and data-enabled personalization (Ailawadi & Keller, 2004; Dekimpe et al., 2023; Hwang et al., 2019; Steinhoff & Zondag, 2021). This research adds that voluntary FOPL can serve as an upstream trust-formation mechanism that feeds into these infrastructures, thereby specifying when and how informational policies become building blocks of

retailer loyalty ecosystems. A first contribution is to clarify the conditions under which standardized informational cues substitute for, complement, or become redundant with existing relational assets. In early stages, where brand equity and relational history are weak, the presence of any FOPL operates as a substitute trust cue: Study 1 shows that standardized FOPL increase Brand Trust, which fully mediates their effect on Retail Brand Loyalty, consistent with models in which trust is an essential mediator between perceived credibility and loyalty outcomes (Morgan & Hunt, 1994; Garbarino & Johnson, 1999). This aligns with research on external certifications and disclosure signals, which finds that third-party standards and voluntary disclosures reduce perceived risk and bolster credibility, particularly when alternative cues are scarce (Darnall et al., 2018; Mogyoros, 2023). At later stages, where loyalty infrastructures are already in place, explicit retailer self-claims add little incremental relational value over credible standardized disclosures, suggesting that informational cues can acquire an autonomous relational meaning that does not rely on retailer-authored narratives. Similarly, when Nutri-Score is already present, varying whether the label is framed as policy- versus retailer-promoted produces, at most, small direct shifts in loyalty and no systematic mediated effects, both in Greece and in the CEE robustness study, further underscoring the primacy of the standardized disclosure over its endorsement framing.

A second contribution is to link trust-based loyalty formation to the institutionalization of relationships via loyalty program enrollment. While prior work has established that loyalty programs transform attitudinal loyalty into structural dependence through economic, procedural, and relational switching costs (Bolton et al., 2004; Dorotic et al., 2012; Meyer-Waarden et al., 2023; Steinhoff & Zondag, 2021), the present research identifies voluntary FOPL as triggers that lower the threshold for entering such infrastructures. Study 3 shows that, in the Italian market, FOPL influence Retail Brand Loyalty through a serial process in which Brand Trust increases Enrollment in the loyalty program, and enrollment in turn stabilizes loyalty; notably, only Nutri-Score activates the full trust–enrollment–loyalty sequence. This extends loyalty program research by demonstrating how informational policy tools can be harnessed as relational “gateways” that encourage consumers to move from trust-based openness to institutionalized participation in retailer ecosystems.

Moreover, the research advances the emerging literature that conceptualizes FOPL as more than cognitive aids, highlighting their role as relational signals in voluntary regulatory environments. Existing work has documented that interpretive summary labels such as Nutri-Score improve the nutritional quality of shopping baskets and facilitate healthier choices, outperforming more complex, nutrient-specific formats in many contexts (Egnell et al., 2019; Dubois et al., 2021; Gassler et al., 2023; Yamim et al., 2025). Building on this evidence, the current studies show that, when adoption is discretionary, FOPL also signal retailer willingness to align with externally defined normative standards

and to submit to institutional scrutiny, thereby conveying disclosure, credibility, and public-interest alignment (Spence, 1973; Kirmani & Rao, 2000; Mazzù et al., 2025).

Study 2 demonstrates that, once retailer brands enjoy baseline trust, the relational impact of FOPL becomes scheme-dependent: Nutri-Score continues to reinforce trust and loyalty intentions among non-enrolled consumers, whereas NutrInform Battery does not. This pattern is consistent with research on processing fluency and cue diagnosticity, which suggests that simple, summary indicators yield stronger evaluative and trust responses under low involvement and heuristic processing conditions (Reber et al., 2004; Schwarz, 2004; Talati et al., 2017). The results therefore extend the cognitive literature on FOPL by linking informational architecture—summary versus nutrient-specific formats—to relational outcomes in retailer contexts: summary labels function as low-ambiguity, immediately interpretable relational cues, whereas nutrient-specific labels, while informationally rich, are less likely to generate short-term trust reinforcement in routine shopping scenarios. The staged perspective developed in the paper further refines the signaling account of FOPL in voluntary regimes. At the trust-creation stage, any voluntary FOPL differentiates the retailer from non-disclosing competitors and signals a baseline level of disclosure and accountability; at the reinforcement stage, the diagnosticity of that signal depends on the scheme's ability to reduce residual ambiguity without imposing cognitive burden; at the institutionalization stage, only sufficiently clear and credible schemes meaningfully lower perceived risk associated with entering loyalty infrastructures. Study 4 shows that once Nutri-Score is present as an institutionally credible label, adding explicit retailer health commitment does not strengthen trust, enrollment intentions, or loyalty, indicating that the relational meaning of a standardized FOPL can saturate the disclosure signal to a point where additional self-claims are redundant.

Finally, the research specifies important boundary conditions regarding the regulatory status of FOPL. In voluntary regimes, the presence versus absence of a FOPL constitutes an observable disclosure choice by producers or retailers, which consumers can interpret as a signal of voluntary disclosure; in mandatory regimes, by contrast, label presence becomes less diagnostic of retailer discretion and should therefore carry weaker relational signaling value (Roberto et al., 2021; Montecchi et al., 2024). The staged framework thus clarifies that the relational and strategic relevance of standardized disclosures is contingent on institutional context: informational tools become relational assets when retailers retain discretion over adoption and when consumers can attribute the disclosure to deliberate, norm-consistent choices.

8.1. Theoretical Contributions

By articulating how FOPLs traverse the stages from informational policy instruments to relational signals and, ultimately, to strategic assets within loyalty infrastructures, this research contributes to three bodies of literature. It enriches trust-based models of retail loyalty by integrating informational disclosure into the architecture of assortments, private labels, and loyalty programs; it extends the FOPL literature beyond health outcomes to encompass retailer–consumer relationship dynamics; and it refines signaling theory by demonstrating how the same standardized cue can perform different relational functions across relationship stages and regulatory regimes

8.2. Managerial implications

Voluntary FOPL adoption should be treated not as a compliance decision but as a strategic relational investment. Because voluntary disclosure shifts perceived ownership of the signal from the institution to the retailer, standardized labels become appropriable trust assets that can be embedded into private-label architectures and loyalty infrastructures. Retailers that adopt summary labels can therefore leverage a public informational tool to strengthen their own relational capital and accelerate the transition from trust to institutionalized loyalty.

The findings also imply that retailers can use voluntary FOPL adoption as a differentiation lever in markets where private labels and loyalty programs are central to competitive advantage. Summary labels, by reducing relational ambiguity, provide a low-cost mechanism to enhance perceived credibility and lower the threshold for loyalty program enrollment. Retailers should therefore integrate FOPL into their broader governance of customer relationships, aligning disclosure choices with loyalty program design, private-label positioning, and assortment strategies.

For policymakers, the results highlight an unintended consequence of voluntary regimes: standardized informational tools may transfer relational value from public policy to private retail ecosystems. When adoption is discretionary, retailers can appropriate the relational benefits of standardized labels, potentially widening competitive gaps between adopters and non-adopters. Policymakers should therefore consider how regulatory design influences the distribution of relational value across market actors.

Overall, the managerial and policy implications converge on a central insight: in voluntary environments, informational policy tools do not remain neutral. They become embedded in retailer-controlled architectures and acquire strategic significance. Retailers should therefore treat FOPL adoption as a relational governance choice, while policymakers should recognize that voluntary disclosure regimes shape not only consumer understanding but also the competitive dynamics of retail ecosystems.

8.3. Limitations and future research

This research relies on experimental designs and stated intentions, which allow for clean identification of mechanisms but may not fully reflect realized purchasing or long-term loyalty behavior. Future studies could validate the proposed trust–enrollment pathways using field data or natural experiments.

The empirical focus on private label products in breakfast-related categories supports internal validity but may limit the generalizability of the findings to other product types, involvement levels, or brand architectures. Extending the framework to additional categories and mixed-brand assortments would strengthen external validity.

Moreover, all studies are conducted in European markets with voluntary Front-of-Pack labeling, where retailers retain discretion over label adoption. As labeling becomes mandatory or more standardized, the strategic role of FOPL may change. Longitudinal research could examine how the documented mechanisms evolve across different stages of regulatory institutionalization.

The boundary tests on endorsement source rely on one single-country experiment in Greece and a relatively small Central-Eastern European robustness sample; although the pattern of limited incremental impact of endorsement framing is conceptually consistent across these contexts, replication with larger samples, additional retailers, and non-European markets would further strengthen the external validity of this boundary condition.

Finally, while the analysis centers on Brand Trust and Enrollment, other cognitive or evaluative processes may also contribute to retailer outcomes. Future research could integrate these mechanisms to further unpack how informational policy tools interact with retailer strategy.

Furthermore, future research could examine how the institutional framing of FOPL—whether perceived as policy-driven or retailer-initiated—conditions their relational effects.

8. Conclusions

This research demonstrates how policy-driven informational tools can acquire relational and strategic value when embedded within retailer-controlled infrastructures. Across five studies, Front-of-Pack Nutritional Labels evolve from credibility cues into relational signals and, ultimately, into components of retailer-managed loyalty infrastructures. Although designed as consumer information devices, standardized FOPLs generate trust, facilitate onboarding, and reinforce participation in retailer programs—not through deliberate strategic intent, but through the structural dynamics of voluntary policy environments. In aggregate, these findings underscore both the relational potential of

informational disclosures and the risk of misalignment between public policy objectives and the retailer incentives shaping contemporary retail ecosystems. At the same time, the endorsement-source results indicate that, once a credible standardized FOPL is in place, variations in whether the label is framed as policy- versus retailer-promoted have limited capacity to reshape the underlying trust–enrollment–loyalty pathway, highlighting the primacy of the disclosure itself over its attribution.

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Appendix 1 – EU countries (ranked by population) and FOPL status

Country	Population	FOPL suggested by Institutions	Mandatory FOPL (Yes/no)
Germany	84.075.075	Nutri-Score (2020)	Yes
France	66.650.804	Nutri-Score (2017)	Yes
Italy	58.934.177	NutrInform Battery (202X)	No
Spain	49.077.984	Nutri-Score (2018)	No
Poland	36.497495	None	No
Romania	18.908.650	Nutri-Score (2025)	Yes
Netherlands	18.346.819	Nutri-Score (2021)	Yes
Belgium	11.758.603	Nutri-Score (2019)	Yes
Sweden	10.656.633	Keyhole	Yes
Czech Republic	10.609.239	None	No
Portugal	10.411.834	None	No
Greece	9.938.844	None	No
Hungary	9.632.287	None	No
Austria	9.113.574	None	No
Bulgaria	6.714.560	None	No
Denmark	6.002.507	Keyhole	No
Finland	5.623.329	None	No
Slovakia	5.474.881	None	No
Ireland	5.308.039	None	No
Croatia	3.848.160	Healthy Living	No
Lithuania	2.830.144	Keyhole	No

Slovenia	2.117.072	Protective Food Symbol	No
Latvia	1.853.559	None	No
Cyprus	1.370.754	None	No
Estonia	1.344.232	None	No
Luxembourg	680.453	Nutri-Score (2020)	Yes
Malta	545.405	None	No

Source:

<https://www.worldometers.info/it/popolazione/paesi-ue-per-popolazione/> ;

https://www.eca.europa.eu/ECAPublications/SR-2024-23/SR-2024-23_IT.pdf ;

https://en.wikipedia.org/wiki/Nutri-Score?utm_source

Appendix 2 – Key obesity and overweight indicators of tested countries

	Poland	Spain	Italy	Portugal	Study 5 (Greece)
Population (Millions of inhabitants)	36.5	49.1	58.9	10.4	9.9
Overweight rate (%)	41.9%	39.8%	32.6%	37.20%	42.9%
Obesity rate (%)	13.9%	15.2%	10.4%	15,80%	12.0%

Source:

https://ec.europa.eu/eurostat/databrowser/view/DEMO_GIND_custom_7680622/bookmark/table?lang=en&bookmarkId=edacacb0-acad-4876-859f-9549d766826b&c=1696497719249 ;

<https://data.worldobesity.org/tables/prevalence-of-adult-overweight-obesity-2/> ;

https://ec.europa.eu/eurostat/databrowser/view/sdg_02_10/default/table?lang=en

Appendix 3 – Pre-test – Selection of suitable brand names for Study 1

A cereal package designed to closely resemble a real commercial product was used as an experimental stimulus, from which all brand-identifying elements were removed to prevent potential brand-related bias. FOPLs were digitally applied in a prominent and clearly visible position on the packaging, following established procedures in prior research (e.g., Talati et al., 2017b; Mazzù et al., 2024). Specifically, Nutri-Score was used as the directive labeling system, while NutrInform Battery served as the non-directive system.

A pretest conducted prior to the main study identified suitable brand names for national brands and private labels used in the experimental scenarios.

The pretest involved 86 participants recruited via Prolific, an international online panel widely recognized for its high recruitment standards, data reliability, and strong response rates in academic research.

Participants were informed that the study examined consumer reactions to different brand names displayed on packaging. Accordingly, an overall liking measure was collected to identify the most effective brand name for each experimental condition, with the questionnaire administered in Polish language to avoid foreign language bias (Circi et al 2021; Costa et al 2014).

The pre-test results indicated Zenya ($M = 4.48$; $SD = 1.24$) as the preferred name for the private label product. This procedure minimized potential perceptual biases among respondents, thereby enhancing the validity of the experimental manipulation. Consistent with this, a Pearson chi-square test revealed a statistically significant association between brand type and response type, $\chi^2(1, N = 84) = 8.60, p = .003$.

Appendix 4 – Sample sociodemographic composition for all studies

	Study 1 (Poland)	Study 2 (Spain)	Study 3 (Italy)	Study 4 (Portugal)	Study 5 (Greece)
Gender					
Male	63.3%	55.5%	58.3%	61.1%	57.3%
Female	34.8%	42.6%	38.5%	36.9%	42.7%

Non-binary	1.3%	1.9%	3.2%	1.6%	-
Prefer not to answer	0.6%	-	-	0.4%	-
Age					
18-24	25.9%	9%	15.4%	21.7%	9.1%
25-34	47.5%	41.9%	50%	53.7%	51.8%
35-44	21.5%	22.6%	21.8%	16.8%	17.3%
45-54	4.4%	21.3%	9.6%	6.6%	11.8%
55-64	0.6%	4.5%	3.2%	1.2%	7.3%
65+	-	-	-	-	2.7%
Education					
Less than high school degree	2.5%	0.6%	2.6%	0.4%	-
High school graduate (high school diploma or equivalent including GED)	14.6%	14.8%	14.1%	13.9%	13.6%
Some college but no degree	19%	14.2%	23.1%	11.1%	6.4%
Associate degree in college (2-year)	1.3%	2.6%	0.6%	4.1%	6.4%
Bachelor's degree in college (4-year)	22.2%	34.2%	40.4%	37.7%	56.4%

Master's degree	36.7%	25.2%	13.5%	29.1%	11.8%
Doctoral degree	1.3%	3.9%	3.8%	1.6%	3.6%
Professional degree (JD, MD)	2.5%	4.5%	1.9%	2%	1.8%

Appendix 5 – Constructs and reliability statistics for all studies

Construct		Cronbach's Alpha					Source of the scale
		Study 1 (Poland)	Study 2 (Spain)	Study 3 (Italy)	Study 4 (Portugal)	Study 5 (Greece)	
Perceived Product Healthiness		$\alpha: .924$	$\alpha: .892$	$\alpha: .903$	$\alpha: .869$	$\alpha: .757$	Mazzù et al. 2021
	I expect this product to be healthy						
	I would consider this product to be good for me						
	This product looks healthy						
Brand trust		$\alpha: .808$	$\alpha: .851$	$\alpha: .792$	$\alpha: .881$	$\alpha: .871$	Delgado-Ballester, E. 2004.

	This brand inspires trust in me						
	This brand's product are reliable						
Loyalty Program Enrolment Intent.		$\alpha: .974$	$\alpha: .965$	$\alpha: .940$	$\alpha: .964$	$\alpha: .960$	Yi & Jeon 2003.
	I would be willing to join this supermarket's loyalty program.						
	I intend to sign up for the loyalty program offered by this supermarket						
	If available, I would probably enroll in this supermarket's loyalty program.						
	I would consider becoming a member of						





	this supermarket's loyalty program.						
Retail Brand Loyalty		α : .785	α : .840	α : .764	α : .748	α : .749	Chaudhuri & Holbrook 2001
	I intend to continue shopping at this supermarket in the future						
	This supermarket would be my first choice for grocery shopping.						
	I am likely to keep buying groceries from this supermarket.						
	I would not easily switch to another supermarket.						
Commitment					α : .923		Becker-Olsen, Cudmore

							& Hill (2006)
	This company shows a strong commitment to promoting consumers' health.						
	Consumers' health appears to be a strategic priority for this company.						
	The message communicates a genuine (rather than merely symbolic) commitment to health.						
	This company seems to actively invest in improving the health						

	profile of its products.						
	The company appears to take responsibility for supporting healthier consumer choices.						

Appendix 6 – Stimuli used in Study 1, Study 2, Study 3, Study 4, and Study 5

	Study 1 (Poland)	Study 2 (Spain)	Study 3 (Italy)	Study 4 (Portugal)	Study 5 (Greece)
Private Label					
Control					
Nutri-Score					 (Greece)

					 (CEE)
NutrInform Battery					

Online Appendix 1 – Robustness checks, Study 3

As a robustness check, we estimated conditional process models (PROCESS Models 83 and 92) treating private label usage as a moderator of the trust and enrollment pathways. The core mediation results remain unchanged across model specifications, indicating that the effects of Front-of-Pack Nutritional Labels are not contingent on consumers' baseline private label proneness.

Across both models, Models 83 and 92 provide converging evidence that the effects of Front-of-Pack Nutritional Labels on Retail Brand Loyalty through Brand Trust and Enrollment are robust to consumers' private label usage. While private label usage is a strong predictor of relational outcomes in levels, it does not systematically alter the process through which Nutri-Score—and not NutrInform Battery—activates trust and facilitates enrollment-based loyalty.

These findings reinforce the interpretation that Front-of-Pack Nutritional Labels function primarily as relational and onboarding devices, particularly effective among consumers who are not already strongly predisposed toward private labels. At the same time, the absence of moderated mediation confirms that the main results are not driven by private label proneness, but reflect a stable trust- and institution-based mechanism.

Details of Robustness – Model 83

As a first robustness check, we estimated a moderated serial mediation model (PROCESS Model 83) in which private label usage (PLuse) moderates the effect of front-of-Pack labeling on Brand Trust, and consequently the indirect effects on Retail Brand Loyalty through Brand Trust and Enrollment. Results show that the overall interaction between labeling and PLuse is not statistically significant in predicting Brand Trust ($\Delta R^2 = .016$, $F(2,147) = 1.34$, $p = .266$). Consistently, the indices of moderated mediation are not significant for either the indirect path Label \rightarrow Brand Trust \rightarrow Retail Brand Loyalty or the serial path Label \rightarrow Brand Trust \rightarrow Enrollment \rightarrow Retail Brand Loyalty, for both Nutri-Score and NutrInform Battery (all bootstrap confidence intervals include zero).

Conditional indirect effects reveal a coherent but non-systematic pattern. For Nutri-Score, indirect effects through Brand Trust (and through the serial trust–enrollment chain) tend to be more pronounced at moderate levels of private label usage, while they attenuate at high levels of PLuse. However, these variations do not translate into statistically reliable moderated mediation. Overall, Model 83 indicates that the trust-based and loyalty mechanisms identified in the main analysis are not contingent on consumers' baseline propensity toward private labels.

Details of Robustness Check B – Model 92

To further assess the stability of the proposed mechanism, we estimated a more stringent conditional process model (PROCESS Model 92), allowing PLuse to moderate not only the labeling–trust

relationship but also the internal paths linking Brand Trust to Enrollment and Enrollment to Retail Brand Loyalty. Results provide no evidence of meaningful moderation along these paths. Neither the interaction between labeling and PLuse nor the interactions involving Brand Trust \times PLuse and Enrollment \times PLuse are statistically significant (all $ps > .17$).

The pattern of conditional indirect effects closely mirrors that observed in Model 83. For Nutri-Score, indirect effects via Brand Trust and the serial Brand Trust \rightarrow Enrollment pathway are again more visible at moderate levels of PLuse but attenuate at higher levels. For NutrInform Battery, indirect effects remain weak and statistically unreliable across all levels of PLuse. Importantly, even under this more flexible specification, the core serial mediation structure remains intact.

Online Appendix 2 – Robustness Check across Central–Eastern Europe (CEE) Markets

To further validate the serial mediation model of Study 5, an additional study was conducted across the voluntary, non-mandated regimes of Czech Republic, Hungary, and Slovakia (N=73) using a different product category (Porridge) and a multinational retailer (Tesco) and recruit non-enrolled grocery purchase-responsible consumers. While this study showed a “source redundancy” effect—where the impact on trust and loyalty remained stable regardless of whether the Ministry or the Retailer endorsed the label—the core serial mechanism (Brand Trust - Enrollment - Loyalty) was consistently confirmed (TR on ENR ($b = 0.455, p = .003$); both TR on RBL ($b = 0.237, p = .018$); ENR on RBL ($b = 0.194, p = .012$). The results suggest that, once a credible standardized FOPL is present, endorsement framing is largely redundant, while the trust–enrollment–loyalty structure remains robust. This reinforces the structural stability of the proposed model across diverse European markets and product categories.

Online Appendix 3 – Retailers’ commitment to main areas - Example

Country	Consumers’ Health	Products’ Quality and Health	Eco sustainability	Source (inserire il link della pagina web)
Auchan	To make our customers want to consume them more often, we are improving our sustainable shopping experience, in order to highlight, in our stores or online, fresh seasonal products that	For all our regions and countries, we give priority to the quality of the products, their unique tastes, and our partners’ know-how. Consumers have the opportunity to discover or rediscover traditional	“Auchan: Let's Cultivate the Good” sourcing channels promote more environment-friendly production methods, including socially responsible agriculture, careful water management and attention to animal welfare. They also give rise to investments aimed at reducing energy consumption	<u>Nos engagement pour un alimentation bonne, saine et locale Auchan Retail</u>

	do the body good.	dishes, or revisit them to let local products shine.	or encouraging the use of renewable energies, as well as ways to rethink waste management or redevelop areas of biodiversity. In the future, good food will need to be sustainable, with a limited impact on the climate.	
Ahold Delhaize	We make healthier food choices accessible, inspire a healthier lifestyle and address food insecurity in the communities we serve.	As the demand for healthier food grows, we help drive it, offering products and services with the right balance of price, convenience and quality. This creates growth for our business. To further support our communities, we donate food and aim to have it reach the	We partner with our value chain on nature and climate, reducing emissions and supporting a resilient food system.	aholddelhaize

		people who need it the most.		
Carrefour	<p>The Group's purpose is to offer its customers quality products, services, and food that are accessible to all, across all distribution channels.</p> <p>Thanks to the skills of our employees, a responsible and multicultural approach, our roots in the regions and our ability to adapt to production and consumption patterns, our ambition is to be a leader in the food</p>	<p>The Group has various levers at its disposal to guarantee consumer health and product quality. The Group relies on an action plan with three main areas of focus:</p> <ul style="list-style-type: none"> committing to food quality and safety; making quality accessible at a fair price; becoming collective players in the food transition. 	<p>Scopes 1 and 2 emissions are mainly related to energy use and refrigerant fluids in stores. Scope 3 emissions primarily come from the following sources :</p> <p>72% from the products and packaging sold in stores, 12% from the use of sold fuels, 5% from upstream transportation of products and packaging, and 5% from the use of non-food products sold.</p>	<p><u>CSR Commitment Carrefour Group</u></p>

	transition for all.			
COOP	Specific sections of the website are designed to support and engage consumers, promoting events that help them discover the beauty of Italy and its gastronomic and cultural heritage. Coop organizes food and wine tastings and activities, such as wine tastings and cooking shows featuring Coop-branded products, alongside cooking classes and	The Coop brand is governed by rigorous quality and safety requirements: no GMOs, no colorings, no hydrogenated fats, no palm oil, no artificial flavors, and limited use of: Additives, Preservatives, Mycotoxins, Allergens, Parasites, Tropical Oils	Coop is committed to promoting sustainable development that satisfies consumers while protecting the environment and natural resources. It integrates respect for the environment into its values and throughout the entire supply chain, reducing waste and the impact of packaging and encouraging reuse and recycling. It supports environmental regulations, manages logistics sustainably, and promotes initiatives and innovations to protect and enhance the environment.	<u>La nostra organizzazione Coop</u>

	<p>workshops with chefs to learn how to best showcase the products. The calendar also includes cultural events, conferences, and guided tours dedicated to food, local areas, and supply chains, as well as special events and initiatives reserved for members. These events take place in stores and local communities and are updated regularly, strengthening the connection between Coop, consumers,</p>			
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	and the local area.			
CONAD	<p>Specific sections of the website are designed to support consumers, by promoting Coand-branded products, on topics such as health, wellness, and both physical and mental well-being. This provides consumers with advice not only on how to take care of themselves but also those around them.</p>	<p>This commitment not only benefits our health and environmental well-being, but also supports local communities and promotes more responsible farming practices. For this reason, we at Conad are constantly expanding our range of organic, eco-sustainable and local products. This is our concrete commitment to the environment that also supports local communities</p>	<p>We promote projects that benefit the community, are environmentally friendly, and support local businesses, because we believe in the unique value of every community. Quality of our products This is how we created “Supporting the Future,” a comprehensive program that encompasses the three dimensions of sustainability that Conad actively commits to.</p>	<p><u>Conad percorso qualità, la filiera controllata Conad</u></p>

		and the most virtuous production chains.		
Edeka	Specific sections on the website aimed at scientifically and objectively informing consumers not only about nutrients: important aids for metabolism, health and energy, but also about the forms and concepts of nutrition in order to help consumers make informed choices and guide them towards the principles of a balanced diet.	Sustainably produced food, maximum transparency: EDEKA offers high-quality regional products, strengthening local agriculture and doing something good for the environment. This includes a seasonal selection of regional fruits and vegetables, ensuring shorter delivery times.	Edeka relies on product-specific testing programs, consumer transparency, and sustainably produced products from certified farms to uphold its quality promises. The company offers high-quality regional products, strengthening local agriculture and doing something good for the environment by offering seasonal regional fruits and vegetables, ensuring shorter delivery times.	<u>Die EDEKA Eigenmarken – entdecke unsere Vielfalt!</u>

<p>Esselunga</p>	<p>The uniqueness of being a Food Company represents the distinguishing feature of the Company, which has always aimed to meet the needs of its customers by producing private-label products in both the food and non-food sectors. The product offering includes 4,583 references covering a large part of the product categories, all with a common denominator: ensuring both the quality and food safety of the products.</p>	<p>In 2024, Esselunga strengthened its commitment to promoting collective health and well-being. It participated in educational initiatives such as the regional project to reduce salt in bread, “With Less Salt in Bread There’s More Taste... and Health Benefits,” and supported activities aimed at young people, including the distribution of fruit in schools, the “Stay Healthy” program in collaboration with the University of Milan, and the</p>	<p>A focus on responsibility that we constantly monitor by involving management, our Sustainability Ambassadors, and other dedicated figures within each business function, participating in the most important international initiatives, and building a continuous dialogue with all our stakeholders.</p>	<p><u>Il Nostro Impegno 2024</u></p>
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	Over the years, several brands have emerged that, responding to the specific expectations and needs of consumers, have successfully adapted to the evolving habits and demands of customers.	<p>Madegus – Masters of Taste initiative, which teaches children the importance of a balanced and sustainable diet.</p> <p>Additionally, it promoted the values of sports by becoming a partner of the Milan-Cortina 2026 Olympic and Paralympic Games and the Italian national football teams, recognizing sports as a fundamental tool for growth and inclusion.</p>		
Mercadona	Mercadona is improving its labeling to make nutritional values and	The company undertakes a comprehensive review of its product composition in	<ul style="list-style-type: none"> • Sustainable Logistic • Energy Efficiency 	<u>Mercadona’s commitment to healthy eating - Mercadona</u>

	<p>nutrient quantities easier to read. This is done by standardizing the layout of nutrition tables, making them easier to read (increasing the font size beyond legal requirements, changing the background colors, and rearranging the information), and enhancing the nutritional information per serving, providing clear information for each portion. Furthermore, the company also aims to share ideas</p>	<p>collaboration with specialized suppliers, with the aim of improving their nutritional value wherever possible. Through this approach, the company tailors its selection to meet specific quality criteria, ensuring that its products are healthy and excellent in flavor</p>	<ul style="list-style-type: none"> • Responsible waste management • Sustainable production and animal welfare 	
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	and recipes and provide advice on healthy eating under the slogan "Your Balanced Basket"			
REWE	<p>We actively support local communities in many regions of the world. The development of children and young people is particularly important to us. One area in which we are striving to make a difference is in combating inequality. Here, we rely on strong partners and involve customers and employees in</p>	<p>We actively promote a balanced diet through various projects and measures. Our wide range of organic products is one example. Organic foods are an important and growing consumer segment. Made using socially and ecologically more sustainable production methods and with increased animal welfare</p>	<p>In our dealings with partners, in the composition of our product lines, and also in our relationships with our employees. Our goal is to establish sustainable consumption and tourism across the breadth of the market. We have already pioneered many new approaches that have since become standards in the industry. The REWE Group sustainability strategy is based on the four pillars, Green Products, Energy, Climate & Environment,</p>	<p><u>Commitments and projects - REWE Group</u></p>

	<p>our projects, which both strengthens the sense of community and extends the reach of the projects. We are involved in a great many projects in the areas of action ‘conscious diets and exercise’, ‘opportunities for children and adolescents’, ‘vigilant approach to food’ and ‘biodiversity and environmental protection’.</p>	<p>standards, these products have a positive impact on humans, animals and the environment. This is an area in which we can make a big difference, especially with our private-label brands. For the suppliers and farms that produce our organic private-label products, we have formulated a list of comprehensive requirements that in many cases go beyond the EU rules on producing and labelling</p>	<p>Employees, and Social Commitment.</p>	
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		organic products.		
Tesco	At Tesco, we recognise the critical role we have to play in helping customers access affordable, healthy and sustainable food	We firmly believe that maintaining an affordable, well-balanced, healthy and sustainable diet is one of the best ways we can look after our health and the health of the planet. Over three-quarters of our customers tell us they want their supermarket to help them eat more healthily.	We want to do all we can to address the impacts the food system has on climate and nature. With the vast majority of our environmental impact being in our wider value chain, our focus is on partnering with our suppliers and farmers to ensure we provide our customers with healthy, sustainable, affordable food. Our work in this area has been brought together in our planet plan.	<u>Sustainability Report 2025</u>
Sainsbury	Nature is essential for the health of our planet, stability of our economy and resilience of our business.	We know that it can be difficult for customers to have the time, money, or inspiration to access the joy that good food	Better for the planet In the face of the climate and nature crises, we need more leadership and collaboration than ever before. We	<u>Plan for Better J Sainsbury plc</u>

	<p>From forests and soil to freshwater and oceans, the natural world provides the food our customers eat and the products they buy. At Sainsbury's, we depend on nature and want to ensure that through our direct operations, our supply chains and wider system, we are working to protect and regenerate it.</p>	<p>can bring. We have a clear ambition to provide access to affordable, nutritious, diverse food to everyone, every day to ensure the sustainability of the planet for future generations. We want to inspire customers to adopt a balanced diet, in line with the Eatwell Guide by making healthier choices easier to identify, accessible, affordable and, most of all, enjoyable and delicious.</p>	<p>intend to play our role in mobilising action across our value chain to protect and restore our planet.</p>	
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Source: Company website accessed on February 4th, 2026

Online Appendix 4 – Low vs. high commitment stimuli – Examples

Area	Focus	Low Commitment stimulus / scale	High Commitment stimulus / scale	Reference
No-profit				Waymer, D., Gilliland, M. W., & Barbour, J. B. (2022). Examining the role of individuals' perceptions of likelihood of sustained commitment in corporate-nonprofit partnership CSR advertisements. <i>International Journal of Advertising</i> , 41(2), 258-283.
	CSR, Short vs. Long Term commitment			Rim, H., Park, Y. E., & Song, D. (2020). Watch out when expectancy is violated: An experiment of inconsistent CSR message cueing. <i>Journal of Marketing Communications</i> , 26(4), 343-361.
Food, water protection	CSR intensity			Krystallis, A., Zaharia, V., & Zairis, A. (2021). "when" does it pay to be good? attributions mediate the way CSR elements impact on consumer responses, and are controllable. <i>Sustainability</i> , 13(11), 5869.

Luxury	CSR Commitment	the CSR initiative had been established since 2019	high commitment conditions, the CSR initiative had been established since 2009	Teah, K., Phau, I., & Sung, B. (2025). CSR commitment and consumer situational scepticism of luxury brands: antecedents, moderator and outcomes. <i>International Journal of Ethics and Systems</i> , 41(2), 372-391.
Environment	CSR	Unconnected with the environment (low commitment manipulation).	Interdependent with the natural environment (high commitment manipulation).	Wesselmann, E. D., Boyd, S. W., Arellanes, J. A., Driskell, A., & Hesson-McInnis, M. S. (2022). Manipulating environmental commitment: A replication and extension. <i>Psychological Reports</i> , 125(4), 2178-2190.
Voluntary contribution games		A low commitment treatment where subjects are asked to declare their personal opinion on the benefits of contributing before doing so (Declaration)	A high commitment treatment as subjects are asked to sign the information displayed on the benefits of contributing before doing so (Commitment)	Bazart, C., Lefebvre, M., & Rosaz, J. (2019). Promoting socially desirable behaviors: experimental comparison of the procedures of persuasion and commitment.
Micro MultiNational 1	Operation mode	high commitment operation mode (wholly owned subsidiary)	low commitment operation mode (international joint venture)	Kyriakopoulos, P., Narooz, R., & Ji, J. (2025). Ownership choices of emerging market micromultinationals (mMNEs) under uncertainty: a real option

				approach. <i>International Business Review</i> , 102403.
Politics	Government support	The government presented as a formal minority government and the support parties as pseudo-opposition parties, or	the government was presented as a substantial minority government and the support parties as ad hoc support parties	Hjermitslev, I. B. (2023). Between cabinet membership and opposition: Commitment and responsibility of support parties. <i>Party Politics</i> , 29(5), 981-987.
Telco	Time span of CSR commitment	The news release described the company as being “recently recognized for” and “relatively newly involved in” the CSR cause	The news release described the company as having a “longstanding commitment”	Yue, C. A., Tao, W., & Ferguson, M. A. (2023). The joint effect of corporate social irresponsibility and social responsibility on consumer outcomes. <i>European management journal</i> , 41(5), 744-754.
Insurance	Donation	Absence of a corporate donation/advocacy	Substantial company donation	Zhao, W., & Ji, Q. (2025). Corporate responsibility to race: the impact of corporate commitment and participatory CSR campaigns. <i>Corporate Communications: An International Journal</i> , 1-18.

<p>Food/ Beverage</p>	<p>CSR</p>	<p>JY is portrayed only as a successful brand with economic impact, showing no explicit social or environmental responsibility.</p>	<p>JY is portrayed as a company with strong, long-term social and environmental commitment embedded in its products, operations, and corporate values.</p>	<p>Xue, J., Kim, C., & Ham, S. (2019). <i>An Effect of CSR Engagement on Brand Image in the Food Service Industry</i>. <i>Journal of the Digital Industry and Information</i>, 15(1), 157–172.</p>
<p>Food</p>	<p>Healthiness</p>	<p>No explicit signal of corporate social responsibility commitment.</p>	<p>Strong and direct health-related commitment, emphasizing food safety, ingredient quality, and explicit concern for consumer health.</p>	<p>Wei, W., Kim, G., Miao, L., Behnke, C., & Almanza, B. (2018). <i>Consumer inferences of corporate social responsibility (CSR) claims on packaged foods</i>. Journal of Business Research, 83, 186–201.</p>
<p>Food</p>	<p>CSR</p>	<p>No explicit signal of corporate social responsibility commitment.</p>	<p>Indirect CSR commitment through environmental responsibility and sustainable</p>	<p>Wei, W., Kim, G., Miao, L., Behnke, C., & Almanza, B. (2018). <i>Consumer inferences of corporate social responsibility (CSR) claims on packaged foods</i>. <i>Journal of Business Research</i>, 83, 186–201.</p>

			packaging practices.	
Sustainability	Green Purchase	under the condition of high social norms, the prompt information obtained by the subjects was as follows: “According to the results of our survey of students in this school, about 85% of the students choose to buy degradable shopping bags after shopping in the supermarket.”	Under the condition of low social norms, the prompt information the subjects got was as follows: “According to the results of our survey of students in this school, about 25% of the students choose to buy degradable shopping bags after shopping in the supermarket.”	Sun, X., Tian, Z., Wang, J., & Su, W. (anno). <i>The impact of environmental commitment on green purchase behavior in China</i> . International Journal of Environmental Research and Public Health.

