The Cost of Manipulation: An Experimental Study of Dark Patterns in E-Commerce Platforms and Their Impact on Consumer Behavior Among Adults in the Philippines

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ABSTRACT

Digital technology has transformed global commerce, with e-commerce at the forefront of modern consumer activity. However, its growth has also led to the rise of dark patterns, which are design practices that push users toward choices not necessarily in their best interests. While previous studies have examined the relationship between trust and consumer behavior, their connection to dark patterns remains underexplored. This study addresses that gap by examining how low-stock, high-demand, and activity messages affect trust, purchase intention, and purchase impulse among Filipino ecommerce users. It involves two phases: an observational review of major e-commerce platforms and an online experiment using mock product pages. Data was analyzed through non-parametric tests and reflexive thematic analysis. The observational phase demonstrates that low-stock messages, countdown timers, and activity messages are the most prevalent dark patterns. However, the experimental results show that these subtle static cues did not significantly change trust, intention, or impulse, as users relied more on product information, layout quality, and personal relevance. Nonetheless, trust displayed strong positive correlations with intention and impulse in low-stock and activity message conditions, indicating that credibility remains a key pathway in purchase decisions. We therefore suggest that providers prioritize transparency and avoid manipulation strategies.

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Author Keywords

dark patterns, e-commerce, consumer behavior, Philippines, human-computer interaction

CCS Concepts

•**Human-Computer Interaction** → **Dark Patterns;**

INTRODUCTION

Over the past two decades, the advancement of digital technologies has reshaped how people live. The rise of these technologies, especially the Internet, has revolutionized the global economy, leading to the development of the e-commerce industry [1]. E-commerce, a shortened form of electronic commerce, is the modernized process of buying and selling products and services through online platforms. It provides businesses with more efficient operations and wider market reach, while giving consumers convenient accessibility and greater exposure to products and services [11]. According to [2], as of 2024, the Philippines is the second fastest-growing e-commerce market globally, with Shopee and Lazada as the leading platforms. From these, e-commerce has become an integral part of modern business and consumer life.

However, the rise of e-commerce has also raised questions about how these platforms are designed and how they influence consumer behavior. A study by [5] emphasized that the rise of e-commerce introduced malicious design practices that use human weaknesses to manipulate user behavior. Beyond serving as simple avenues for transactions, these platforms strategically shape consumer choices through interface elements that may be manipulative or confusing. These design practices, known as dark patterns, exploit cognitive biases and behavioral tendencies to steer users toward actions misaligned with their best interests [16]. These patterns include misleading statements, tricky questions, and confirmation sharing tactics [29]. In a crawl of around 53,000 product pages from 11,000 shopping websites, [17] identified 1,818 dark pattern instances

across 15 types and seven categories. This has motivated us to understand the importance of consumer-centered e-commerce platforms and to study the effects of dark pattern-influenced platforms on user behavior.

Significantly, research on consumer behavior in e-commerce highlights trust as a primary factor influencing online purchasing decisions. The article of [19] established trust as a multi-level construct linking disposition, beliefs, and consumer behavior. Similarly, [9, 15] showed that trust enhances purchasing intention in an e-commerce context, emphasizing its essential role in shaping consumer decisions.

Following this, several studies have shown that website design influences consumer trust. A study by [12] demonstrated that e-servicescape, the virtual environment of online platforms, specifically its aesthetic appeal, layout and functionality, and financial security, helps build consumer trust and drives purchase intentions. Similarly, the work of [24] emphasized that website design, reliability, and perceived ease of use positively influence consumer behavior, particularly perceived trust. Generally, these highlight the essential role of website design in shaping consumer behavior.

On the other hand, researchers have also examined the influence of dark patterns on user behavior. Particularly, the study of [16], which conducted experiments among American consumers, found that dark patterns are likely to manipulate users into actions they later regret. Similarly, the study of [14], which conducted an experiment on Singaporean adults, has shown that products containing dark patterns are more likely to be selected and purchased. Additionally, the work of [26], which has exposed participants to three types of dark patterns, concluded that these design considerations increased purchase impulsivity. All of these studies illustrate significant behavioral effects resulting from exposure to dark patterns.

Given these findings, research has established the role of trust in shaping consumer behavior and the various effects of dark patterns on user decisions. However, there have been limited empirical studies and direct formal experiments that demonstrate the influence of dark patterns on consumer behavior, particularly with perceived trust, purchase intentions, and purchase impulsivity. Additionally, there have been no studies that have studied these variables collectively, relating them in the context of dark patterns. Moreover, all of these have been conducted in a non-Philippine context, leaving a gap in understanding the presence of dark patterns as well as their effects among adults in the Philippines.

Given these gaps, this study aims to explore the concept of dark patterns in the Philippine context and understand their influence on perceived trust, purchase intention, and purchase impulse among adults in the Philippines. Specifically, this aims to answer the following research questions:

- **Main Research Question**

MRQ: How do dark patterns in e-commerce platform interfaces in the Philippines influence consumer behavior, particularly with respect to perceived trust, purchase intentions, and purchase impulse, among Filipino adults?

- **Supporting Research Questions**

RQ1: What types of dark patterns are most relevant and commonly implemented in e-commerce platforms in the Philippines?

RQ2: How do different types of dark patterns in e-commerce platform interfaces influence their perceived trust, purchase intentions, and purchase impulse among adults in the Philippines?

RQ3: How does perceived trust, purchase intentions, and purchase impulse relate to one another in the context of each dark pattern type?

RQ4: What e-commerce platform interface design recommendations can be proposed to minimize the manipulative effects of dark patterns on consumer behavior?

With these objectives in place, several difficulties arise alongside them. Specifically, studying the effects of dark patterns is complex due to their subtle and multifaceted nature. Particularly, each type of dark pattern varies in nature, form, and intent, making them complicated to specify, standardize, and classify. This can be seen from the study of [17] that pursued the establishment of standards and specifications to enhance classification and distinguishability among these types of dark patterns. Additionally, understanding their effects involves subjective psychological factors such as trust, purchase intention, and purchase impulse, requiring the use of a careful approach and validated instruments to ensure quality insights. Lastly, the lack of Philippine-based literature as support to this study requires a careful adaptation of foreign findings and approaches. Addressing these difficulties is essential for producing accurate and contextually relevant insights.

Despite these difficulties, this study is significant as an additional academic contribution to the existing knowledge within the HCI community and to the stakeholders in the e-commerce industry. Particularly, it broadens literature on dark patterns and consumer behavior in the Philippine context. Similarly, it raises awareness among members of the HCI community and the technological field about the implications of manipulative design. Additionally, it provides insights for platform designers, regulators, and administrators regarding perceptions of and reactions to dark patterns. All of these contributions support a deeper understanding of dark patterns and their influence on consumer behavior.

To conduct this research, two methodological phases were executed. In the first phase, an observational study identified the most relevant dark pattern types in Philippine e-commerce platforms. Seven platforms were explored using standardized procedures simulating a new user experience, and observed dark patterns were manually recorded, classified, and analyzed based on frequency. In the second phase, a between-subjects online survey experiment was conducted among a sample of adults in the country to evaluate how dark pattern exposure influences perceived trust, purchase intentions, and purchase impulse. Participants were randomly divided into treatment and control groups and shown a hypothetical shopping scenario with static product mockups containing different dark pattern types depending on their group. Afterwards, they

answered a questionnaire that provided both quantitative measurements of the focused variables and qualitative data that can supplement those findings. Quantitative data were analyzed using non-parametric tests, while qualitative data underwent thematic analysis.

To give an overview, the following sections of this paper explain the various aspects that comprise our research. The Related Work section discusses previous research that establishes the foundation and context for our investigation into consumer behavior and dark patterns. This also presents the different approaches used by past researchers, which form a basis for the methodology of our study. Following this, the Preliminaries section provides essential background on dark patterns in e-commerce and the specific types used in our methodology. Subsequently, the Methodology section details the full process of the observational study and the online survey experiment. Afterwards, the Results section presents the findings derived from both phases of the study. This is followed by the Discussion section, which interprets these findings in relation to existing literature and the study's objectives. Finally, the Conclusion and Recommendations section summarizes the key insights, outlines the study's contributions, and offers recommendations for future research and practical applications.

RELATED WORK

Dark patterns, or deceptive patterns, are user interface (UI) designs intentionally created to manipulate user behavior, often at the cost of user autonomy and well-being. Early works by [4], who coined the term "dark patterns," described these designs as deliberate attempts to trick users into actions that benefit the platform rather than the individual. Building on this, [10] developed a taxonomy categorizing dark patterns into five groups: nagging, obstruction, sneaking, interface interference, and forced action, and argues that malicious intent is essential for a design to qualify as a dark pattern. Their work emphasized that all design is persuasive, placing ethical responsibility on designers to avoid unintentionally harmful interfaces.

Expanding this foundation, [17] empirically demonstrated the prevalence and diversity of dark patterns through a large-scale crawl of about 11,000 shopping websites. Their study extended the conceptual categories of [10] by identifying five characteristic dimensions: asymmetric, covert, deceptive, hides information, and restrictive, which are commonly observed across commercial platforms. These works bridged ethical framing and empirical observation: [10] highlighted the moral implications of manipulation, while [17] revealed its real-world pervasiveness. Later studies refined these classifications further, [8] and [3] examined user recognition of deceptive interfaces, finding that accuracy varies depending on context and the subtlety of the design.

Despite increasing research attention, inconsistencies remain regarding how dark patterns are defined and categorized [18]. Some frameworks focus on user outcomes such as frustration or loss of control, while others emphasize trust and ethical responsibility [7]. These differing viewpoints have produced competing interpretations of what makes a design "dark." Most researchers, however, agree that dark patterns exploit cognitive biases and undermine trust by manipulating decision-making [10, 17, 20]. Collectively, these foundational studies establish the basis for examining how such manipulative designs shape user behavior, trust, and purchasing decisions in e-commerce environments.

Empirical evidence consistently shows that dark patterns influence user behavior and compliance, though effectiveness depends on the pattern type, context, and user characteristics. Early experimental work by [16] on data protection enrollment demonstrated that manipulative elements significantly increased compliance; exposure to more aggressive patterns raised acceptance rates but also heightened frustration. This suggests that manipulative tactics often trade off short-term compliance with reduced satisfaction and trust. Similar findings appear in later studies [13, 28], reinforcing that not all dark patterns exert equal influence.

In commercial contexts, dark patterns significantly alter purchasing decisions. The study of [14] found that products featuring dark patterns were selected more frequently, especially among younger users, and that demographic factors such as gender or impulsivity had minimal influence. This suggests dark patterns exploit biases that transcend basic traits. Supporting this, [26] reported that scarcity cues, such as low stock or high demand messages, and social proof through activity messages reliably increased impulse buying. These findings align with earlier research showing that scarcity and social validation leverage psychological heuristics like fear of missing out and normative influence [20, 17].

While these studies demonstrate the power of dark patterns, they also reveal key nuances. The study of [16] found that more educated users were less susceptible to manipulation, whereas [14] observed that awareness interventions did not significantly reduce compliance over time. This highlights the difficulty of mitigating manipulative design effects. Across studies, a recurring theme emerges: the immediate behavioral effectiveness of dark patterns often masks long-term costs in trust and experience [10, 28]. The literature suggests that dark patterns strongly shape short-term decisions but may harm long-term user relationships and brand credibility. Our study builds on this by examining how scarcity cues: low stock and high-demand messages, as well as social proof through activity messages affect trust, purchase intention, and impulse buying.

Beyond influencing compliance, dark patterns affect how users perceive and experience digital platforms. Experimental research by [13] found that designs such as nagging, obstruction, and interface interference achieved high completion rates but increased frustration due to longer completion times, whereas patterns like sneaking and forced action led many users to abandon tasks. These findings indicate that deceptive designs compromise usability and satisfaction by creating unnecessary friction [8, 16].

Researchers have also examined how these manipulative designs shape emotional responses and brand attitudes. The study of [28] showed that exposure to multiple dark patterns

during online shopping heightened annoyance and reduced brand trust, with sneaking tactics, such as adding items to carts, particularly damaging perceptions of honesty. Similar results across related studies show that the more deceptive the interface, the lower the trust and long-term engagement [10, 17, 7]. Thus, while dark patterns may boost short-term conversions, they undermine user experience and erode the trust required for sustainable platform relationships.

A key factor in how dark patterns influence behavior is whether users recognize them as manipulative. Research consistently shows that users often fail to identify deceptive designs unless they already possess prior awareness [8, 18]. Participants viewing demonstrations of apps containing dark patterns rarely detected them, though recognition improved with repeated exposure [8]. The study of [3] further found that detection accuracy depends on interface-related and perceptual variables such as frequency, perceived trustworthiness, frustration, misleading behavior, and visual design. Some patterns, such as forced continuity, were more easily identified than others like roach motels, indicating that recognizability varies by pattern type and user experience.

Context also shapes detection. Research comparing mobile and desktop interfaces found that mobile users were more vulnerable to emotionally charged prompts and covert tactics like "sneak into basket" patterns [27]. The physical and cognitive constraints of mobile interfaces, including smaller screens, touch navigation, and limited visibility, may make deceptive designs harder to detect. Overall, recognition of dark patterns is inconsistent across users and contexts [14, 10]. This uneven awareness underscores the need to examine how specific groups, such as Filipino adults, who are heavy mobile users and active online shoppers, perceive and respond to manipulative designs. Their recognition capabilities shape how strongly dark patterns influence trust, satisfaction, and purchasing behavior, addressing the gap our study explores.

Trust is a major factor influencing consumer behavior in e-commerce, as it reduces uncertainty and encourages purchasing [19, 6, 24]. When platforms appear reliable and transparent, users engage more and remain loyal [9, 12]. Deceptive design elements such as dark patterns weaken these trust relationships by introducing manipulation [10, 17].

However, trust is easily threatened when platforms employ manipulative tactics. Studies show that dark patterns undermine both trust and purchase intention. The study of [28] found that exposure to multiple dark patterns reduced perceived brand trust, while [18] observed that awareness of manipulation can diminish trust across digital markets. The study of [7] further emphasized that when platforms prioritize organizational gain over ethics, credibility erodes. Although such designs may boost short-term compliance, they often lead to long-term dissatisfaction and reduced willingness to repurchase [13, 25]. Scarcity and social proof illustrate this trade-off: while these cues may raise conversions by suggesting urgency or popularity, perceived falsity quickly reverses their benefits, lowering trust and purchase intention [26, 28, 17].

Drawing from this literature, our study examines how low-stock, high-demand, and activity messages, three common forms of scarcity and social proof, affect trust, purchase intention, and impulse buying among Filipino consumers. Prior research has given little attention to Southeast Asian markets despite their strong digital presence [2]. Since Filipino consumers are among the region's most active online shoppers and mobile users, understanding how they interpret dark patterns offers valuable insight into trust and purchasing behavior in e-commerce.

PRELIMINARIES

Answering RQ1 required us to identify different dark patterns present across various e-commerce platforms in the Philippines, using the work by [17] as a basis. It established seven broad categories, subdivided to 15 different types of dark patterns found on e-commerce websites. These types can be found in Appendix A.

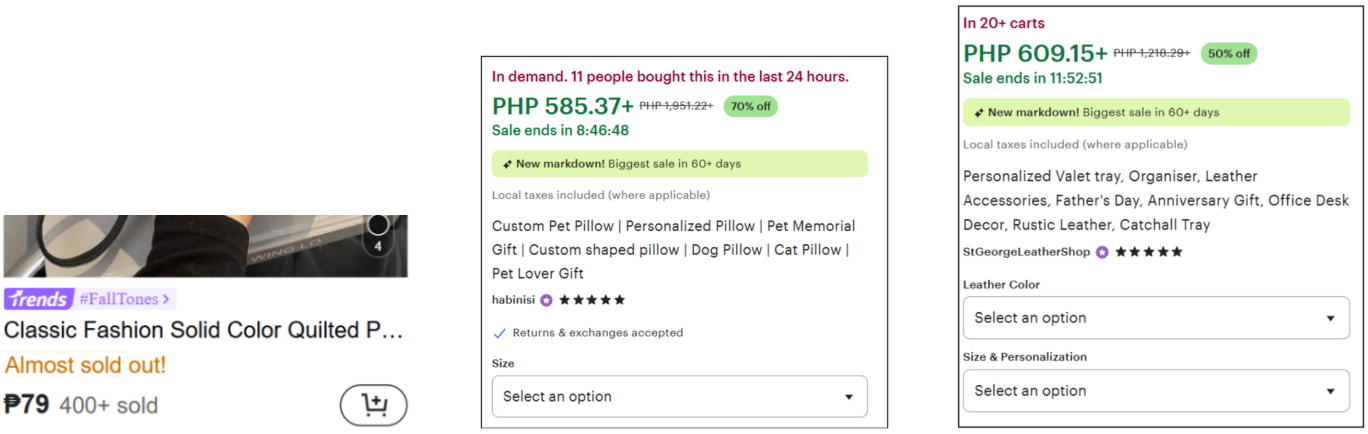
Because the line between persuasive design and dark patterns is unclear and lacking a conventional definition for dark patterns, the process was flexible when determining what constitutes a dark pattern [18, 8]. Some studies argue that design elements are only considered dark patterns if they contain malicious intent [10]. Since it can be difficult to capture the intentions and deceptive nature of design choices due to the subjectivity of what makes a design deceptive, we only considered whether the final design matches the descriptions of the 15 established types from [17] in terms of appearance. These design choices can still result in users' manipulation regardless of intent.

For RQ2 and RQ3, we focused on three types of dark patterns taken from the categorizations of [17]: low-stock messages, high-demand messages, and activity messages. Only three dark patterns are considered due to time constraints. These three are specifically chosen from the list, as dark patterns that exploit social influence and scarcity bias have been found to be some of the most prominent in e-commerce sites [26].

The selected dark pattern types are defined as follows [17]:

- **Low-Stock Message**: Message for a particular product that signals its limited quantity, as seen in Figure 1a.
- **High-Demand Message**: Message that signals a product is in high demand, implying that it is likely to sell out soon, as seen in Figure 1b.
- **Activity Message**: Message that informs the user of the activity of other users within the website. This can take the form of text indicating the recent purchase of a product by other users, the number of users who have a particular product in their cart, or the number of users who viewed a particular product [16, 26]. This can be seen in Figure 1c.

Additionally, measures created by [6, 26] were used to measure trust, purchase intent, and purchase impulse. Trust was measured using the scale adapted from [6] which utilized 11 7-point Likert-scale items related to user perceptions of e-commerce sites while purchase intention was measured using a single 7-point Likert-scale item. All trust and purchase



(a) (b) (c)

Figure 1: Examples of dark pattern message types: (a) Low-stock message from shein.com (yellow text), (b) High-demand message (red text, first sentence) and activity message (red text, second sentence) from etsy.com, (c) Activity message (red text) from etsy.com.

intention statements were anchored by "Strongly Disagree" and "Strongly Agree" to match commonly used Likert-scale questions used in the Philippine context to avoid confusion. Lastly, purchase impulse was measured by asking participants to rate their urge to buy the product on a scale from 1 to 7, anchored by 'no urge' and 'very strong urge' [26].

Ratings were made to be 7-point with clearly defined anchors to be consistent with previous measures established by the works of [6, 26], making the findings more reliable and comparable as a result.

METHODOLOGY

Observational Study

To address RQ1, this study identified prevalent dark patterns across high-traffic e-commerce platforms in the Philippines. In order to select relevant platforms, website popularity metrics from two Search Engine Optimization tools: Semrush and SimilarWeb were used. Although these tools may not always be perfectly accurate, they are still useful for obtaining rough estimates of what websites are relevant in certain contexts [22, 23]. Single-provider sites were excluded to prioritize multi-vendor marketplaces, with the scope being limited to mobile applications.

After looking through the data, we decided on the following seven e-commerce platforms:

- **Shopee**
- **Lazada**
- **AliExpress**
- **Shein**
- **Amazon**
- **Temu**
- **Ebay**

Each of these platforms were assigned to each researcher to conduct observations on, ensuring efficient data collection and consistent documentation. Particularly, the next steps for this phase are based on the work of [8]. To reduce confounding variables, all procedures were conducted on a single and newly created Gmail account. For each application, we allotted a 10 minute time limit to complete six tasks: (i) account creation, log in, and log out, (ii) closing and reopening of application, (iii) homepage browsing, (iv) product searching, (v) view product page, and (vi) checkout. Figure 2 provides a visual representation of this procedure.

To simulate the experience of a first-time shopper and minimize variables from preexisting data, we utilized a fresh Google account to create a new profile on each platform. The procedure began by logging into the application and subsequently restarting it. On the homepage, we scrolled through product listings, opening every fifth item to ensure consistent browsing behavior. After viewing five products, we logged out, restarted the application, and repeated the browsing protocol to standardize data collection in a logged-out state.

Following this, we logged back into the account to perform two product searches: 'black cotton t-shirt' and 'mini-fridge', both of which were verified beforehand as available across all platforms. For each search, we selected and viewed the first result. Finally, we navigated to the 'Proceed to Checkout' stage (or its equivalent) without finalizing any transactions. This was replicated across all seven applications.

Identified dark patterns were classified according to the taxonomy established by [17] (see Appendix A) and manually recorded in Google Sheets. To avoid bias from limited exposure time, each type of dark pattern was only recorded once per website. Multiple instances of the same dark patterns were not counted. After the data collection period, analysis was done on the collected frequencies. Analysis was limited to descriptive statistics describing the distribution of dark pattern types across the seven platforms. Inferential tests were not

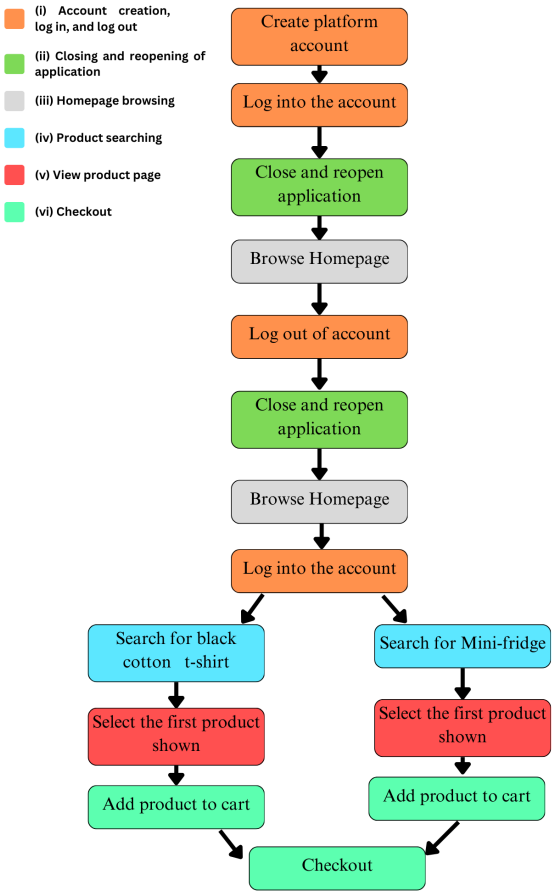


Figure 2: Flowchart of the standardized observational procedure.

used due to the small sample size and the categorical nature of the data.

Experimental Design and Hypotheses

The second phase of the study focused on answering RQ2 and RQ3. The experimental setup was based primarily on the work of [26] and used a between-subjects online survey experiment conducted via Google Forms. The participants were randomly divided into three treatment groups and one control group with each group containing 10 participants. Figure 3 illustrates the between-subjects experimental design used in this phase.

Moreover, the following hypotheses were examined:

H1: Trust Hypotheses

H1a) There is no significant difference in trust between participants exposed to low-stock messages and those not exposed to dark patterns.

H1b) There is no significant difference in trust between participants exposed to high-demand messages and those not exposed to dark patterns.

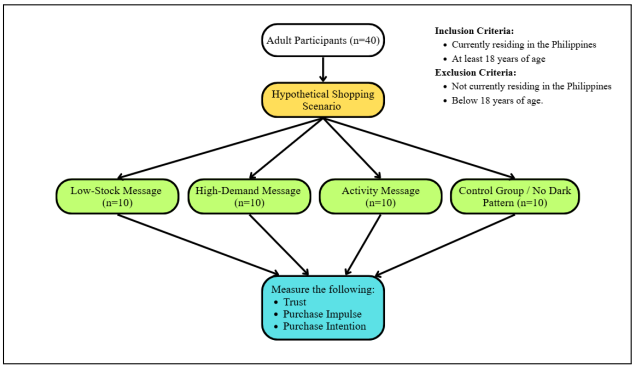


Figure 3: Diagram of the between-subjects experimental design.

H1c) There is no significant difference in trust between participants exposed to activity messages and those not exposed to dark patterns.

H1d) There is no significant difference in trust across all experimental groups.

H2: Purchase Intention Hypotheses

H2a) There is no significant difference in purchase intentions between participants exposed to low-stock messages and those not exposed to dark patterns.

H2b) There is no significant difference in purchase intentions between participants exposed to high-demand messages and those not exposed to dark patterns.

H2c) There is no significant difference in purchase intentions between participants exposed to activity messages and those not exposed to dark patterns.

H2d) There is no significant difference in purchase intentions across all experimental groups.

H3: Purchase Impulse Hypotheses

H3a) There is no significant difference in purchase impulse between participants exposed to low-stock messages and those not exposed to dark patterns.

H3b) There is no significant difference in purchase impulse between participants exposed to high-demand messages and those not exposed to dark patterns.

H3c) There is no significant difference in purchase impulse between participants exposed to activity messages and those not exposed to dark patterns.

H3d) There is no significant difference in purchase impulse across all experimental groups.

H4: Correlation Hypotheses

H4a) There is no significant relationship between trust and purchase intentions for the low-stock message dark pattern type.

H4b) There is no significant relationship between trust and purchase impulse for the low-stock message dark pattern type.

H4c) There is no significant relationship between trust and purchase intentions for the high-demand message dark pattern type.

H4d) There is no significant relationship between trust and purchase impulse for the high-demand message dark pattern type.

H4e) There is no significant relationship between trust and purchase intentions for the activity message dark pattern type.

H4f) There is no significant relationship between trust and purchase impulse for the activity message dark pattern type.

Participants

A sample of 40 adults in the Philippines (age > 18) were gathered through convenience sampling. This method was chosen to accommodate the limited time available for data collection. The participants were randomly divided into three treatment groups and one control group with each group containing 10 participants.

Procedure

Each experimental group was provided with a different Google Forms link. The form began with an informed consent section, in which participants indicated their agreement to take part in the study, followed by the experiment proper.

Participants were first presented with a hypothetical shopping scenario involving only one item: a cheap mini fridge. The product was selected to elicit genuine purchase consideration among participants. It is sufficiently uncommon to minimize strong pre-existing preferences, yet familiar enough for participants to realistically imagine wanting to buy it.

After reading the scenario, participants were shown a static mockup of the product page, designed in Canva and embedded as an image within the survey form. To ensure sufficient exposure, participants were instructed to spend at least 15 seconds viewing the page. Although Google Forms could not strictly enforce this viewing time, this limitation was acknowledged.

Because the mockup was embedded within Google Forms, it was static and non-interactive, allowing only basic scrolling. This approach was appropriate given the nature of the dark pattern types being tested, as they can exert influence through exposure alone. The mockup was based on Shopee's mobile interface, reflecting one of the most widely used platforms in the Philippines and providing some familiarity for participants. For consistency, the product, layout, and price remained identical across all participants. The item was priced at PHP 1,300, roughly based on the lower-end prices of existing mini fridges on Shopee and Lazada, in order to reflect something that was both affordable and believable.

Each treatment group was shown a version of the product page containing a different type of dark pattern, while the control group was shown a clean version with no dark patterns. The four versions of the product page are shown in Figure 4: a low-stock message ("Almost Sold Out!") (Figure 4a), a high-demand message ("In High-Demand!") (Figure 4b), an activity message ("In 16 Other Carts!") (Figure 4c), and a clean control version with no dark patterns (Figure 4d).

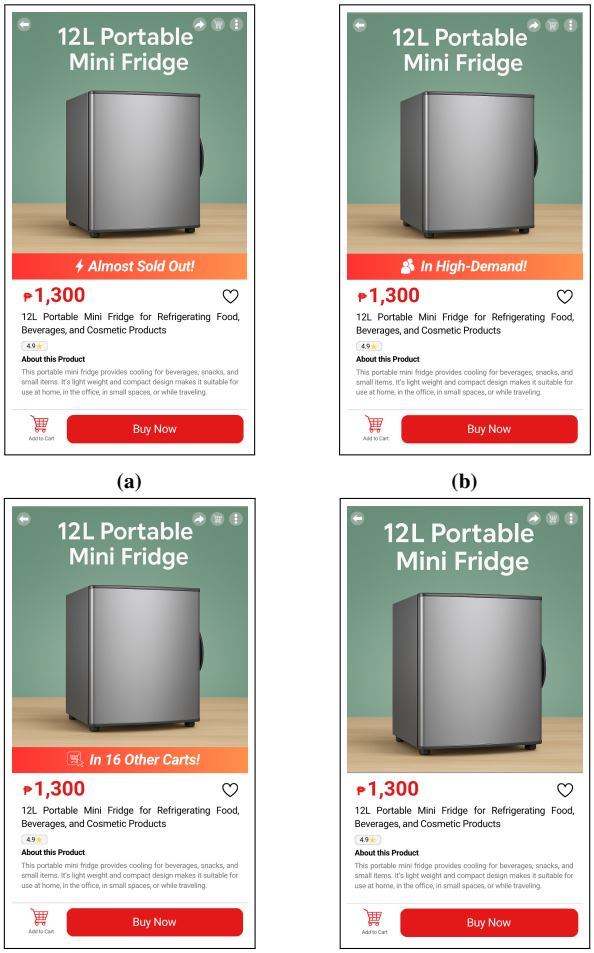


Figure 4: Variants of the product page prototype shown to participants: (a) low-stock message, (b) high-demand message, (c) activity message, and (d) control.

After viewing the product page, participants were asked to complete a series of questions to measure trust, purchase intention, and purchase impulse. The data collected was anonymized for the privacy of each participant. Measures of trust, purchase intention and purchase impulse were measured as discussed in the Preliminaries section.

At the end of the survey, participants were asked to answer three open-response questions about their impressions of the page in order to provide supplemental insights and help contextualize findings.

Lastly, although no personal information was collected, participants were allowed to request to withdraw from the study, in

which case their questionnaire responses were to be excluded from the data analysis and results.

Data Analysis

Because the data collected were ordinal, non-parametric tests were used. To answer H1-H3, Mann-Whitney U tests were conducted between each dark pattern type and the control group for each of the three dependent variables (trust, purchase intention, and purchase impulse). Kruskal-Wallis tests were also performed to examine whether there were any significant differences in the dependent variables across all three dark pattern types and the control group.

To answer H4, Spearman's correlation was used to determine the relationships between the dependent variables for each dark pattern type. Specifically, the relationships between the following pairings were explored: trust and purchase impulse, and trust and purchase intention.

Open-ended responses were analyzed through thematic analysis using an inductive and reflexive approach, where themes were determined by the data itself without relying on a predefined framework. The process involved carefully reading responses, highlighting keywords, generating codes, and grouping these codes into themes. These themes were then analyzed across each experimental group to supplement and contextualize the quantitative findings.

RESULTS

Limitations

This study has several limitations that should be considered. First, the observational phase covered only a limited number of e-commerce platforms and one existing taxonomy of dark patterns, so the descriptive picture of which patterns appear in the Philippine context is necessarily incomplete. Second, the experimental design relied on a single static product page rather than a realistic, interactive storefront. Although this helped isolate the effect of the message banners, it likely reduced ecological validity and may not fully capture how users respond to dark patterns in actual shopping environments with scrolling, navigation, and multiple decision points.

The sample and measurement choices also constrain generalizability. Participants were recruited using a non-random sampling approach. This, combined with the relatively low sample size, limits the extent to which the results can be applied to the broader population. Additionally, several key constructs, particularly purchase intention and purchase impulse, were measured using single items in a hypothetical scenario rather than through behavioral data or repeated measures. More comprehensive scales and a richer experimental context might capture these constructs more sensitively.

Finally, the study focused on a small set of dark pattern types, one product category, and a specific page layout. Other dark patterns, interface designs, and product types may produce different effects, especially when combined or presented over longer interaction sequences. These design choices mean that any effects observed in this study should be interpreted cautiously and should not be generalized to all forms of dark patterns or all e-commerce contexts.

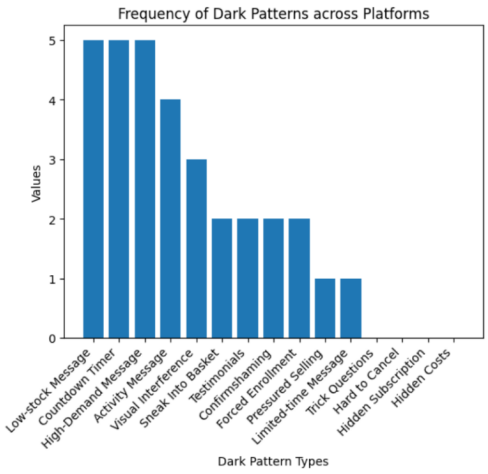


Figure 5: Frequency of each dark pattern found across the seven platforms.

Observational Study

From the sample size of seven Philippine e-commerce platforms, the Dark Pattern types Low-stock Message, Countdown Timer, and High-Demand Message have been found to be the most dominant, having a mode of 5 or a 71.43% presence rate amongst the platforms. Followed by Activity Message having a mode of 4 or a 57.14% presence rate. The frequency of each dark pattern type can be seen in Figure 5 .

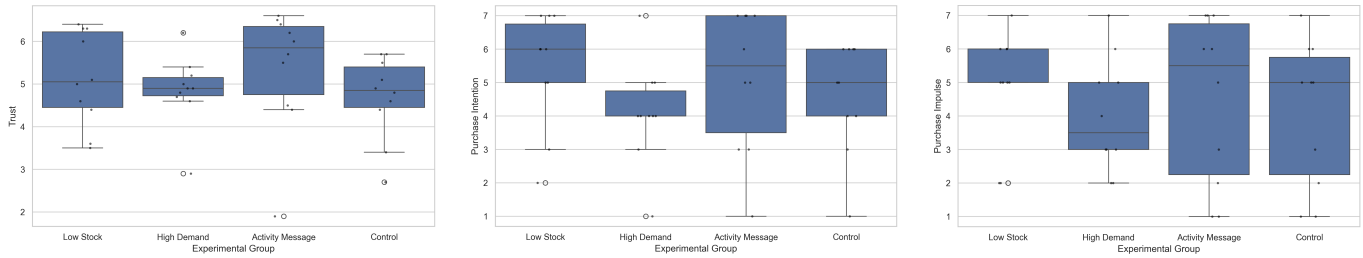
Drawing upon the taxonomy established by [17], this study focuses on three prevalent dark pattern categories: Urgency, Social Proof, and Scarcity. Urgency patterns, such as countdown timers, impose temporal constraints to accelerate user decision-making. Social Proof mechanisms, including activity messages, leverage the influence of peer behavior to steer user actions. Finally, Scarcity cues, manifested as low-stock or high-demand messages, signal limited availability to heighten product desirability.

Across the seven Philippine e-commerce platforms observed, the average number of dark patterns per platform was 4.57, with a median of 5. Shein exhibited the highest diversity of deceptive tactics, applying eight distinct dark pattern types, followed by Lazada with six. In contrast, Amazon demonstrated the lowest prevalence, using only a single type (high-demand messages).

Experimental Study

As shown in Figure 6, there are some visible differences in median scores across groups. However, the boxplots for trust, purchase intention, and purchase impulse show substantial overlap across all experimental conditions, and no condition clearly stands out as consistently higher or lower than the others. To formally test for differences, Mann–Whitney U and Kruskal-Wallis tests were performed.

The Mann–Whitney U results for trust, purchase intention, and purchase impulse (see Table 1) showed no statistically significant differences between participants exposed to the dark patterns and those in the control condition. This finding con-



(a) Trust **(b) Purchase Intention** **(c) Purchase Impulse**

Figure 6: Distributions of (a) trust, (b) purchase intention, and (c) purchase impulse across the four experimental groups.

Hypothesis	Variable	Dark Pattern	U	p	r
H1a	Trust	Low Stock	37.500	0.393	0.211
H1b	Trust	High Demand	46.000	0.796	0.068
H1c	Trust	Activity Message	28.000	0.105	0.372
H2a	Intention	Low Stock	33.500	0.247	0.279
H2b	Intention	High Demand	63.000	0.353	0.220
H2c	Intention	Activity Message	38.500	0.436	0.194
H3a	Impulse	Low Stock	39.500	0.481	0.177
H3b	Impulse	High Demand	52.000	0.912	0.034
H3c	Impulse	Activity Message	42.000	0.579	0.135

Table 1: Mann–Whitney U results for dark pattern group vs control group.

Hypothesis	Dependent Variable	H	p	η^2
H1d	Trust	3.393	0.335	0.011
H2d	Intention	4.194	0.241	0.033
H3d	Impulse	1.296	0.730	−0.047

Table 2: Kruskal–Wallis results between all experimental groups.

Hypothesis	Dark Pattern	Variables	ρ	p
H4a	Low Stock	Trust vs Impulse	0.669	0.034
H4b	Low Stock	Trust vs Intention	0.838	0.002
H4c	High Demand	Trust vs Impulse	0.461	0.180
H4d	High Demand	Trust vs Intention	0.553	0.097
H4e	Activity Message	Trust vs Impulse	0.914	0.000
H4f	Activity Message	Trust vs Intention	0.856	0.002

Table 3: Spearman's results for trust vs purchase impulse and trust vs purchase intention across each dark pattern group.

trasts with expectations based on prior literature. The range of p-values was relatively high, reaching as low as $p = 0.105$, suggesting a slight but still non-significant tendency toward higher trust among participants who viewed the Activity Message banner. In contrast, the High Demand condition yielded a p-value as high as $p = 0.912$ for purchase impulse, providing no evidence of a difference from the control group.

A similar pattern emerges when examining the effect sizes. Although most r-values were small, the largest effect size appeared in the Activity Message group for trust, which demonstrated a moderate effect size ($r > 0.3$). The second-highest effect size was observed for purchase intention in the Low Stock condition, which exhibited a low-to-moderate effect size ($r \approx 0.3$). Despite these trends, none of the effects reached statistical significance.

The Kruskal–Wallis tests (see Table 2) further confirmed that no significant differences exist among the four groups in trust, purchase intention, or purchase impulse ($p > 0.05$). The corresponding effect sizes were similarly small, indicating minimal differences in consumer behavior across dark pattern types.

Finally, the Spearman correlations between trust and purchase impulse, and between trust and purchase intention, revealed significant relationships within the Low Stock and Activity Message groups ($p < 0.05$) (see Table 3). With Spearman $\rho > 0.66$, these associations indicate strong positive correlations in conditions where participants perceived the product page as more trustworthy. In contrast, the correlations in the High Demand condition were only moderately positive and not statistically significant. This is likely due to the small sample

size for that group ($n = 10$), which reduced the statistical power to detect meaningful effects.

Thematic Analysis

To gain insight into how participants perceived the dark patterns and the product page as a whole, a reflexive thematic analysis was conducted on all written responses. Because the survey questions did not directly mention dark patterns, the analysis focused on how participants themselves described what stood out to them. Three themes captured how they made sense of the page: (1) first impressions shaped by visual design, (2) reliance on social proof signals, and (3) practical and personal criteria used when evaluating the product.

Theme 1: Clean and Minimalist Design as a Baseline for Trust

Participants frequently described the product page as clean, user-friendly, and minimalist, often interpreting this as a sign of professionalism. The simple layout made the page feel organized and legitimate, with many noting that the interface was clear, easy to navigate, and free from distracting clutter, which increased their confidence in the store. A few explicitly compared the aesthetic to platforms like Shopee or other familiar online stores, usually saying they trusted it about as much as those platforms. Overall, a neat and familiar layout worked as a quick cue for forming initial impressions.

However, the same simplicity led to skepticism for a subset of participants when it coincided with limited information. One participant said they felt skeptical because the page looked "too simple" (High-Demand, P10). Another noted that "the simplicity of the page is too much" and that it looked "AI-generated" (Activity Message, P6), adding that "the lack of technical information made it difficult to think the store and product was legitimate." In these cases, minimalism without supporting details such as branding or specifications became a potential red flag rather than a sign of professionalism.

This theme suggests that visual design acted as a fast heuristic for judging the store but was not sufficient on its own. Clean, minimalist layouts generally helped participants view the page as a normal, competent online store, creating a baseline level of trust. Yet when simplicity coincided with missing details like branding, specifications, or reviews, some participants began to question the legitimacy of the store instead of feeling reassured by the design.

Theme 2: Social Proof as a Powerful Factor for Shaping Perceptions

This theme captures how participants relied on social proof cues, such as ratings and reviews, to judge the credibility of both the seller and the product. Across responses, these cues played a major role in shaping trust and purchase urge, especially when other information was limited. Participants also noticed when these cues were missing or vague, which reduced their confidence. Together, the responses show that social proof is one of the strongest elements participants used to make sense of the product page, whether it was genuine information or a dark pattern designed to simulate popularity.

When describing what influenced their urge to purchase, many participants referred to the high rating displayed on the page. Several treated the 4.9 stars as a shortcut for judging both the seller and the product. One participant said the rating gave them "more confidence in the seller's legitimacy and the product's quality" (Control, P5), while another said it made the seller seem more "trustworthy" (Low Stock, P6). In these cases, the rating functioned as a strong social proof cue. Even without much additional detail, the rating implied that other buyers had already validated the product.

At the same time, participants pointed out what was missing from the social proof. They noted the absence of reviews, visible review counts, and number of sales, and described these as important when deciding whether to trust a store or product. One participant commented that having more customer feedback would "make the page more informative and help potential buyers make more confident decisions" (Activity Message, P9). This indicates that while a high rating can boost perceived credibility, many still look for richer evidence, such as written reviews and purchase numbers, before fully trusting what they see.

Dark patterns that attempted to leverage social proof showed a similar pattern. Only a small number of participants directly named the dark pattern banners, but the Activity Message ("In 16 other carts") stood out as an interesting case. Participants who mentioned this cue often did so positively, saying it made the product and seller seem trustworthy and of quality (Activity Message, P7, P8, P9), and one described it as a good feature to have on the page (Activity Message, P4). For these participants, the activity message felt less like a manipulative trick and more like a concrete sign that other people were interested in the product. This suggests that dark patterns exploiting social proof (e.g., showing how many users have the item in their cart) may be more effective than vague scarcity labels, as long as they present specific and interpretable information.

Overall, participants did not interpret the page in isolation but through the lens of social proof. High ratings and activity signals acted as powerful heuristics that could quickly boost trust and purchase motivation, especially in the absence of detailed information. However, their sensitivity to missing reviews, sales numbers, and vague labels shows that they still expected concrete evidence behind these cues. Dark patterns that mimicked genuine social proof, such as the "in 16 other carts" message, were more readily accepted than vague scarcity cues, indicating that participants are more persuaded when popularity is framed in specific, interpretable terms rather than generic urgency.

Theme 3: Information and Personal Relevance as Core Product Evaluation Criteria

This theme reflects how participants evaluated the product itself beyond visual appeal or persuasive cues. Their judgments were shaped by practical considerations such as price, completeness of information, and personal relevance. These factors often constrained the positive impressions created by the clean design, high rating, or dark pattern messages.

Price was a key way participants assessed value. Some saw the low price as clearly attractive, calling it "really cheap for a mini fridge" and saying they "would buy it" at that price (Low Stock, P5). Others were suspicious, stating that "there is no such thing as a refrigerator worth ₱1,300 unless it is sold secondhand or not at its best state" (Control, P1) or that the price was "not commensurate to market price" (Activity Message, P5). For these participants, a very low price raised doubts about quality or the seller's intentions rather than acting as a simple incentive.

Information about the product and seller played a similar role. Several participants mentioned missing details they considered essential, such as technical specifications, branding, or customer feedback. Comments like "does not show specs of the fridge, like power consumption" (Low Stock, P7) or noting that the lack of branding and sale numbers made purchase feel "risky" (Activity Message, P10) show how information gaps undermined confidence. Even when the page looked clean and the rating was high, the absence of specs, reviews, or sales indicators made it harder for some participants to justify the purchase.

Finally, many participants grounded their responses in personal relevance: whether the product fit their needs or situation at all. Some explicitly said they "don't really need a fridge" (Control, P10) or that it was "an unnecessary product so I wouldn't consider it" (High-Demand, P7), even if they acknowledged that the price or rating looked good. Others recognized the product as useful in general but not for them right now, or noted that they already owned something similar. For these participants, no amount of persuasive design, social proof, or pricing created a strong urge to buy when the product did not feel necessary.

Taken together, this theme shows that participants were not simply led by surface-level cues. Clean design, high ratings, and activity messages contributed to positive impressions, but many still evaluated the page through the lens of price realism, informational completeness, and personal need. When any of these were lacking, they held back, regardless of how convincing the interface appeared.

Discussion

This study investigated dark patterns in e-commerce through two major phases: an observational study and a survey experiment. The observational phase addressed which dark pattern types appear most frequently on e-commerce platforms commonly used in the Philippines (RQ1). The experimental phase then examined how selected scarcity and social-proof dark patterns (Low Stock, High Demand, Activity Message) relate to trust, purchase intention, and purchase impulse (RQ2), as well as to the relationships between these dependent variables (RQ3). A reflexive thematic analysis of open-ended responses was further performed to provide qualitative insight into how participants interpreted the product page and the provided dark pattern cues. Finally, the study also considered what design recommendations could be proposed to minimize the manipulative effects of dark patterns in e-commerce interfaces (RQ4).

RQ1: Prevalence of Dark Patterns on Philippine E-commerce Platforms

The results of the study proved to be consistent with [17], having found that the top three most common dark patterns are Low-Stock Messages ($n = 632$), Countdown Timers ($n = 393$), and Activity Messages ($n = 313$). Similarly, High-Demand Messages ranked seventh in their taxonomy. However, Confirmed Shaming and Limited-Time Messages—ranked fourth and fifth by [17]—were less common in the present study, appearing on only 28.57% and 14.29% of e-commerce platforms, respectively.

The prevalence of these specific dark patterns suggests that Philippine e-commerce platforms prioritize strategies that engineer a strong sense of Fear of Missing Out (FOMO). With these dark patterns present, platforms potentially create an environment where a user's primary motivation to purchase a product is not necessarily its utility, but rather the fear of losing the opportunity to buy it. Subsequently, the perceived value of the product is presumably increased due to "high demand."

RQ2: Effects of Dark Patterns on Trust, Purchase Intention, and Purchase Impulse

For trust (H1), the study extended dark pattern research by testing perceived trustworthiness of an online store in response to different message banners. Trust has been underexplored as a primary outcome in dark pattern work, despite its central role in e-commerce. Our approach was informed by [6] trust scale, which focuses on perceived trustworthiness of online shops, and conceptually overlaps with constructs such as "brand trust" employed in [28] dark pattern study. Their findings suggested that dark patterns can reduce brand trust, whereas our study did not detect statistically significant differences in trust across dark pattern type and control.

A significant difference between the two experiments that may explain the discrepancy lies in the dark patterns used. The work of [28] employed intentionally intrusive dark patterns, whereas our experiment selected dark patterns designed to subtly affect user behavior. Another factor is the difference in experimental setup. The work of [28] used an interactive prototype paired with a shopping task, while our participants evaluated a static product page. The original trust scale was validated in interactive contexts; thus, presenting a static screenshot may have weakened sensitivity to subtle manipulations.

For purchase intention and purchase impulse (H2 and H3), our null results differ from some earlier work. The work of [13] did not directly compare intention between dark pattern and control groups; instead, they examined how different user experiences influenced intention within dark pattern conditions. Their findings showed stronger effects in some cases, but their manipulations involved different dark patterns from those in our study. This limits comparability but suggests that some dark patterns may not consistently increase purchase intention, aligning with the absence of significant group differences in our data.

A closer methodological comparison can be made with [26], whose study informed much of our experimental design. We adopted their single-item proxy for purchase impulse and used similar manipulations using a static message. However, we replaced their "positive testimonials" condition with an activity message, as distinguishing fake testimonials from authentic feedback is difficult in a static format. Because both testimonial-based and activity-message dark patterns leverage social proof [17], the activity message served as a suitable substitute. While [26] reported significantly higher purchase impulse in all dark pattern conditions relative to control, our impulse scores did not significantly differ across groups. Differences in interface design, product type, and participant expectations may have contributed. Their study used a generic web layout and red yeast rice as the product, whereas we used a mobile-inspired Shopee-like interface and a mini-fridge.

Another potential explanation lies in participant demographics. The work of [26] sampled participants from the United States through Mechanical Turk, with more than 60% aged 25–44 and only 3.4% aged 18–24. In contrast, our study recruited only Philippines-based respondents through convenience sampling, resulting in a participant pool composed mostly of undergraduate students. This demographic difference, alongside the common use of social-proof-based dark patterns in Philippine e-commerce, may have made the manipulations less impactful or less noticeable, reducing the likelihood of detecting statistically significant effects.

The thematic analysis provides insight into why the banner manipulations did not yield measurable differences in trust, intention, or impulse. Although the banners were visually distinct, only a minority of participants explicitly mentioned noticing them. Instead, participants anchored their evaluations in more fundamental aspects of the product page. Many emphasized presentation quality, completeness of product information, and price realism. Customer feedback such as reviews and ratings emerged as especially important forms of social proof. Participants also noted that their urge to purchase depended heavily on personal relevance and whether they felt they needed the product at all. Taken together, the themes indicate that the banner messages were overshadowed by broader considerations such as interface quality, informativeness, and perceived personal necessity.

RQ3: Relationships Between Trust, Purchase Intention, and Purchase Impulse

Our final hypothesis (H4) explored whether trust correlated with purchase impulse and purchase intention. A consistent finding across e-commerce research is that higher trust in an online store increases purchase likelihood. In our study, both pairings were significant with moderate-to-strong Spearman ρ effect sizes within the Low Stock and Activity Message groups. Notably, the Activity Message group yielded the strongest effects and lowest p-values. This aligns with Theme 2, where a subset of participants described social proof cues—particularly reviews, ratings, and the "in 16 other carts" message—as important indicators of credibility rather than manipulative attempts.

Although no distinct qualitative theme emerged uniquely for the Low Stock or High Demand banners, participant feedback still offers plausible explanations. Some participants noted that the banners created urgency, but the High Demand message was criticized as vague, whereas the Low Stock message appeared more concrete and actionable. This suggests that scarcity messages may only meaningfully influence trust or purchase tendencies when perceived as specific, credible, and aligned with users' evaluative criteria.

RQ4: Design Recommendations for Ethical and User-Centered E-commerce Interfaces

In light of the findings and limitations of this study, several design recommendations can be offered. Participants valued transparent, credible, and informative elements more than subtle persuasive cues. This suggests that platforms should emphasize user-centered transparency by providing verified reviews, clear stock information, and complete product specifications, rather than relying on urgency-driven dark patterns that may be dismissed as unconvincing. Because users rely heavily on genuine social proof and detailed information, investing in accurate and trustworthy interface components is likely to foster more positive user experiences.

At the same time, the findings caution against persuasive strategies that pressure users or attempt to steer decisions without clear justification. Since overly subtle dark patterns may go unnoticed and intrusive ones may undermine trust, platforms should adopt ethical persuasive techniques that support rather than manipulate decision-making. Design nudges that clarify options, highlight relevant information, or facilitate informed choices can improve user satisfaction without compromising autonomy. Overall, the results indicate that ethically grounded design practices not only align with user expectations but may also be more effective than traditional dark pattern strategies in influencing genuine purchasing behavior.

CONCLUSION

This study investigated the prevalence of dark patterns in e-commerce platforms commonly used in the Philippines and evaluated how scarcity and social proof tactics influence the trust, purchase intention, and purchase impulse of Filipino consumers. The observational study of seven widely used mobile platforms confirmed that Low-Stock Messages, Countdown Timers, High-Demand Messages, and Activity Messages are among the most prevalent dark patterns in this context. These findings align with previous international research, suggesting that platforms available in the Philippines employ persuasive tactics similar to those found in other markets.

However, statistical analysis revealed that these specific dark patterns had little to no significant impact on consumer behavior compared to the control group. Participants exposed to High-Demand, Low-Stock and Activity Message cues showed no meaningful difference in trust or purchase metrics. The study also found strong correlation between trust and purchase intention, specifically within the Low Stock and Activity Message conditions, indicating that trust remains the central pathway for purchasing decisions. The thematic analysis further supports these findings, revealing that participants prioritized

product information, interface quality, and personal relevance over persuasive interface.

Building on these insights, this study offers design recommendations to reduce the manipulative effects of dark patterns. We recommend that e-commerce designers and platforms prioritize transparent and user-centered design. Since consumers rely on genuine social proof, clear product information, and credible interface elements, e-commerce platforms should avoid manipulative urgency cues and instead invest in trust-building features such as verified reviews from real customers and transparent indicators of remaining stock. Platforms should also adopt ethical forms of persuasion that support user decision-making, instead of pressuring them to make certain decisions using intrusive dark patterns, as said dark patterns risk eroding trust.

RECOMMENDATIONS

Future studies should consider using interactive prototypes or more realistic e-commerce environments instead of static product pages. Simulating actual shopping flows, including navigation, scrolling, and checkout steps, may better capture how dark patterns operate across multiple decision points and may elicit stronger and more natural purchase intentions and impulses. Prototypes that closely mirror the look and feel of real platforms can also increase immersion and make trust and purchase-related responses more ecologically valid.

In addition, future studies should also examine how different user characteristics and dark pattern types shape responses. Demographic and contextual factors such as age, familiarity with e-commerce platforms, experience with dark patterns, and broader cultural expectations may all influence how shoppers perceive and react to persuasive interface elements. In addition, expanding beyond relatively subtle banner messages to include more intrusive or behaviorally impactful dark patterns could reveal clearer effects on trust, intention, and impulse, as well as other behavioral outcomes.

APPENDICES

Appendix A

Category	Type	Description
Sneaking	Sneak into Basket	Adding additional products to users' shopping carts without their consent.
	Hidden Costs	Revealing new charges to users right before completion of purchase, often revealed at the end of the checkout process (e.g. Handling Fee, Service Fee).
	Hidden Subscription	Charging of a recurring fee for a service without full disclosure. These subscriptions may be disguised as a free trial or a one-time fee.
Urgency	Countdown Timer	Dynamic countdown timer to signal that a deal or discount will expire soon.
	Limited-time Message	Indicating that a deal or discount will expire soon without a specified deadline.
Misdirection	Confirmshaming	Using language and emotion to steer users away from making a certain choice.
	Visual Interference	Using style and visual presentation to influence users into making certain choices over others.
	Trick Questions	Using confusing language to influence users into making certain choices over others (e.g., "Uncheck the box if you prefer not to receive update").
	Pressured Selling	Using high-pressure tactics to steer users into purchasing a more expensive variant of a product or purchasing related products (e.g., pre-selecting the most expensive item by default).
Social Proof	Activity Message	Message that informs the user of the activity of other users within the website.
	Testimonials	Positive customer testimonials whose origin is unclear.
Scarcity	Low-stock Message	Message for a particular product that signals its limited quantity.
	High-demand Message	Message that signals a product is in high demand with the implication that it is likely to sell out soon.
Obstruction	Hard to Cancel	Making cancellation of a service significantly harder than signing up for it.
Forced Action	Forced Enrollment	Forcing users to create accounts or share information to complete their tasks.

Table 4: Dark pattern categories, types, and descriptions.

Appendix B: Measurement Items

All items were measured on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree), unless otherwise specified.

Trust [6].

- This provider is very competent.
- This provider is able to fully satisfy its customers.
- One can expect good advice from this provider.
- This provider is genuinely interested in its customers' welfare.
- This provider puts customers' interests first.
- If problems arise, one can expect to be treated fairly by this provider.
- This provider operates in a very careful manner.
- You can believe the statements of this provider.
- This provider's methods of operation are clear.
- This provider keeps its promises.
- I would rely on advice from this provider.

Purchase Intention [6].

- I would buy from this provider in the future.

Purchase Impulse [26].

- On a scale of 1–7, how would you rate your urge to buy the product displayed on the store page?

Open-ended questions.

- What made you rate your urge to buy the product that way, and why?

- Aside from the product itself, what stood out to you the most about the product page, and why? Feel free to point out anything from the design to the information presented on the page.
- How did the design of the product page make you feel about the online store overall?

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