

# Dark Patterns in Digital Platforms: An Economic Analysis of How UI Design Influences Consumer Choice in India

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**Abstract:** *Dark patterns-deceptive user-interface and user-experience choices crafted to trick or pressure users into actions they would not otherwise take- have become one of the most economically significant features of modern digital platforms. The term was coined by the user-experience designer Harry Brignull in 2010 as a deliberate play on the idea of a “design pattern,” and the field has since grown from a niche design critique into a subject of formal regulation across the European Union, the United States, and India. This paper provides an economic analysis of how interface design steers consumer choice, drawing on behavioural economics- in particular the contrast between a benign “nudge” and a welfare-reducing “sludge”- to explain why small design decisions such as a pre-ticked box, a countdown timer, or a guilt-laden opt-out button can produce large and systematic distortions in markets. The analysis is grounded in the Indian context, where the Central Consumer Protection Authority (CCPA) issued the landmark Guidelines for Prevention and Regulation of Dark Patterns, 2023, which came into force on 30 November 2023 and enumerated thirteen specified dark patterns, followed by a June 2025 advisory requiring e-commerce platforms to conduct self-audits. Through tabular comparisons, a process flowchart, and visual data, the paper examines the existing persuasive-design ecosystem, the proposed transparency-by-design framework, the advantages and disadvantages of regulation, and the future scope of ethical interface design. The findings suggest that dark patterns generate short-term private revenue for firms while imposing diffuse and often invisible welfare costs on consumers, eroding trust and competition, and that a combination of clear regulation, algorithmic detection, and consumer awareness is required to align interface design with genuine consumer sovereignty.*

**Keywords:** Dark Patterns, Deceptive Design, Behavioural Economics, Consumer Choice, UI/UX, Nudge and Sludge, CCPA Guidelines 2023, Consumer Protection, Digital Markets, India.

## 1. Introduction

Every interaction on a digital platform is mediated by design. The position of a button, the colour of a link, the wording of a checkbox, and the order in which options appear are not neutral conveniences; they are deliberate choices that shape what a user notices, how long they hesitate, and ultimately what they decide. When these choices are made in the user’s interest- making a beneficial action easier or a risky one slower- they are simply good design. When they are engineered to extract value from the user against their own interest, they become dark patterns.

The economic stakes of this distinction are no longer trivial. India is now home to one of the largest digital-consumer populations in the world, with hundreds of millions of citizens transacting daily through e-commerce sites, food-delivery and ride-hailing applications, travel aggregators, and subscription services. In such a market, even a one-percent shift in conversion caused by a manipulative interface translates into billions of rupees redistributed from consumers to firms. Interface design has therefore become a quiet but powerful instrument of market power, capable of influencing aggregate consumption, savings, and data-sharing behaviour at national scale.

Conventional economic theory assumes a rational consumer who, given full information, maximises their own welfare. Dark patterns succeed precisely because real human

decision-making departs from this ideal. Consumers operate under limited attention, rely on mental shortcuts, are averse to losses, and tend to accept whatever option is presented as the default. A well-designed dark pattern does not break these tendencies; it exploits them, converting predictable psychological biases into predictable commercial gains. The interface becomes, in effect, a tax on inattention.

This paper analyses dark patterns through an explicitly economic lens. It traces the conceptual origins of the term and its behavioural foundations, contrasts the existing persuasive-design ecosystem with a proposed transparency-by-design framework, and evaluates the advantages and disadvantages of regulating manipulative design. The discussion is anchored in India’s pioneering regulatory response- the CCPA’s Guidelines for Prevention and Regulation of Dark Patterns, 2023- and integrates tabular comparisons, a process flowchart, and visual data to present an interactive, evidence-based assessment of one of the most consequential design questions of the digital economy.

## 2. Conceptual Foundations and Historical Background

The study of dark patterns sits at the intersection of design, psychology, law, and economics. Understanding its conceptual lineage is essential before its market effects can be analysed. Figure 1 presents two of the most familiar dark patterns- a false-urgency countdown and a confirm-shaming

dialogue- as they typically appear to an Indian online shopper.



**Figure 1:** Two everyday dark patterns as they appear to consumers: a false-urgency “flash sale” countdown and a confirm-shaming subscription prompt that frames the decline option as an embarrassing admission.

The term “dark pattern” was coined in 2010 by the user-experience designer Harry Brignull, who registered the website darkpatterns.org as a “pattern library” dedicated to naming and shaming deceptive interfaces. His original definition described a dark pattern as a user interface carefully crafted to trick users into doing things- such as buying overpriced insurance or signing up for recurring bills- that they would not otherwise have chosen. The phrase was a deliberate counterpoint to the established notion of a “design pattern,” a reusable solution to a common problem; a dark pattern is its ethical inverse. In recognition of the unintended connotations of the word “dark,” Brignull and many scholars now prefer the term *deceptive patterns*, though “dark patterns” remains the dominant term in law and public discourse.

The economic mechanism behind dark patterns is best explained through behavioural economics. Richard Thaler and Cass Sunstein popularised the idea of a “nudge”- a small change in the choice architecture that steers people toward

decisions that improve their own welfare, while preserving freedom of choice. A dark pattern is the malicious twin of a nudge. Behavioural scientists call this a “sludge”: friction or manipulation deliberately inserted into the choice architecture to make the welfare-improving option harder to reach and the firm-favouring option easier. Where a nudge lowers the cost of acting in one’s interest, a sludge raises it. Dark patterns are, in this sense, sludge weaponised for profit.

Empirical research confirms how widespread these techniques have become. A large-scale audit of popular shopping websites by Mathur and colleagues at Princeton University in 2019 catalogued thousands of instances of manipulative design, with scarcity messages, low-stock warnings, and countdown timers among the most frequently deployed. The recognition of dark patterns has since moved decisively from academic critique into binding regulation, as the timeline in Table 1 illustrates.

**Table 1:** A comparative timeline of the recognition and regulation of dark patterns, 2010–2025

Year	Milestone	Significance
2010	Harry Brignull coins “dark patterns” (darkpatterns.org)	Names and catalogues deceptive interfaces, founding the field of study.
2019	Princeton audit (Mathur et al.) of ~11,000 shopping sites	First large-scale empirical evidence of how common manipulative design is online.
2022	European Union Digital Services Act (DSA)	Among the first laws to explicitly prohibit manipulative interface design on online platforms.
2023	U.S. FTC action against Amazon over Prime sign-up and cancellation	Landmark enforcement treating deceptive “roach-motel” flows as an unfair practice.
2023	India: CCPA Guidelines for Prevention and Regulation of Dark Patterns	Effective 30 November 2023; lists 13 specified dark patterns under the Consumer Protection Act, 2019.
2025	India: CCPA self-audit advisory (5 June 2025)	Directs e-commerce platforms to audit and remove dark patterns within three months.

### 3. Existing System and the Proposed Idea

#### 3.1 The Existing Persuasive-Design Ecosystem

The prevailing design culture of the digital economy is built around a single dominant metric: conversion. Product, design, and growth teams are routinely measured by how reliably an interface converts a visitor into a buyer, a free user into a subscriber, or a cautious individual into a sharer

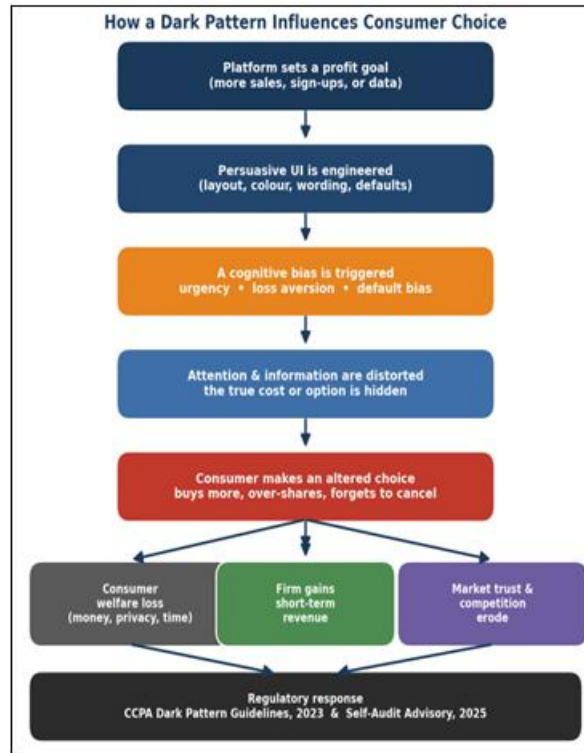
of personal data. Within this incentive structure, manipulative design is not an aberration but a rational, low-cost, high-return strategy. As Brignull has observed, dark patterns are attractive precisely because they are cheap to build, easy to A/B test, and immediately profitable. A countdown timer costs almost nothing to add yet measurably increases purchases; a pre-ticked insurance box generates revenue from every customer who fails to notice it.

Under the existing system, the consumer bears the cost of vigilance. The burden falls on the individual to read the fine print, to spot the hidden charge, to find the deliberately obscured cancellation link, and to resist the artificial urgency of a fake timer. Because each individual manipulation is small — a few rupees here, a forgotten subscription there — the harm rarely justifies a formal complaint, yet in aggregate it amounts to a vast and silent transfer of wealth. The market, left to itself, does not correct this, because the firm that abandons dark patterns may lose short-term revenue to competitors that retain them. This is a classic race to the bottom.

### 3.2 The Proposed Idea: Transparency-by-Design and Welfare Regulation

The proposed remedy reframes the problem from one of individual vigilance to one of structural design accountability. Its central principle is transparency-by-design: interfaces should be engineered so that the choice presented to the consumer reflects their genuine intent, with the true price, the default state, and the consequences of each option disclosed clearly and at the moment of decision. Rather than asking consumers to defend themselves against manipulation, the framework places a positive obligation on platforms to design honestly.

India’s CCPA Guidelines of 2023 embody precisely this shift. Issued under Section 18 of the Consumer Protection Act, 2019, by an authority established in 2020, the Guidelines prohibit thirteen named dark patterns across e-commerce platforms, advertisers, and sellers, and apply even to foreign entities offering goods or services to Indian consumers. The 2025 self-audit advisory operationalises the framework by requiring platforms to proactively detect and remove manipulative design rather than waiting for complaints. The economic logic of this proposal is illustrated in Figure 2, which traces how a single design decision propagates into market-wide consequences and ultimately invites a regulatory response.



**Figure 2:** Flowchart of the economic mechanism of a dark pattern, from a platform’s profit goal through the triggering of a cognitive bias to an altered consumer choice, its distributional outcomes, and the resulting regulatory response

### 3.3 Taxonomy of the Thirteen Specified Dark Patterns

The CCPA Guidelines provide a working taxonomy of manipulative design. Table 2 lists each of the thirteen specified dark patterns, describes how it operates, and identifies its principal economic effect on the consumer — the distortion it introduces into an otherwise rational decision.

**Table 2:** The thirteen dark patterns specified by the CCPA Guidelines, 2023, with their mechanism and economic effect on the consumer

Dark Pattern	How It Operates	Economic Effect on Consumer
False urgency	Fake countdowns, scarcity or popularity claims (“only 2 left”).	Rushes the decision and raises willingness to pay.
Basket sneaking	Extra items or charges added to the cart without consent.	Inflates the bill by exploiting inattention.
Confirm shaming	Guilt-laden wording on the decline option.	Emotional pressure produces unwanted purchases.
Forced action	Service withheld unless the user signs up or shares data.	Bundles unwanted obligations; raises switching cost.
Subscription trap	Easy to subscribe, deliberately hard to cancel.	Recurring charges sustained by inertia.
Interface interference	Hidden information, pre-ticked boxes, misleading buttons.	Distorts attention away from the true choice.
Bait and switch	Advertises one outcome but delivers another.	Wastes search effort; defeats expectations.
Drip pricing	Fees revealed in stages; true total hidden until the end.	Understates price after effort is already sunk.
Disguised advertisement	Ads presented as neutral content or search results.	Corrupts the information used to choose.
Nagging	Repeated prompts and interruptions for one action.	Wears down resistance over time.
Trick wording	Confusing or double-negative phrasing.	Causes misreading and unintended consent.
SaaS billing	Recurring hidden charges within software services.	Generates silent, unnoticed revenue.
Rogue malware	Fake system or security warnings to force downloads or payment.	Exposes the consumer to fraud and security risk.

### 4. Advantages of Regulating Dark Patterns

Although manipulative design is privately profitable, curbing it through transparency-by-design and regulation

produces substantial benefits for consumers, for honest firms, and for the market as a whole. The principal advantages are enumerated below.

- **Restoration of Consumer Sovereignty:** When prices, defaults, and consequences are disclosed honestly, consumers can once again choose in line with their true preferences. Decisions reflect genuine value rather than engineered confusion, which is the foundational condition for an efficient market.
- **Reduction of Hidden Welfare Losses:** Eliminating drip pricing, basket sneaking, and subscription traps directly returns money to consumers that was previously extracted through inattention, particularly benefiting first-time and less digitally literate users.
- **A Level Playing Field for Ethical Firms:** Regulation breaks the race to the bottom by removing the competitive penalty for honesty. A firm that designs transparently is no longer undercut by rivals exploiting manipulation, allowing competition to shift back to genuine quality and price.
- **Stronger Long-Term Trust and Retention:** Dark patterns generate one-time gains at the cost of repeated betrayal. Transparent design builds the trust that underpins customer loyalty, repeat purchases, and durable brand value — a more sustainable foundation for revenue.
- **Better Data and Privacy Outcomes:** Curbing forced action and trick wording aligns with the consent requirements of the Digital Personal Data Protection Act, 2023, ensuring that data sharing is genuinely voluntary rather than coerced through interface design.
- **Accessible Redress for Consumers:** The framework is reinforced by practical complaint channels, including the National Consumer Helpline (1915), the consumerhelpline.gov.in portal, and the Jagriti application, lowering the cost of seeking redress for ordinary citizens.

## 5. Disadvantages and Criticism

Regulating interface design is far from straightforward, and the approach has attracted legitimate criticism. The principal disadvantages and challenges are catalogued below.

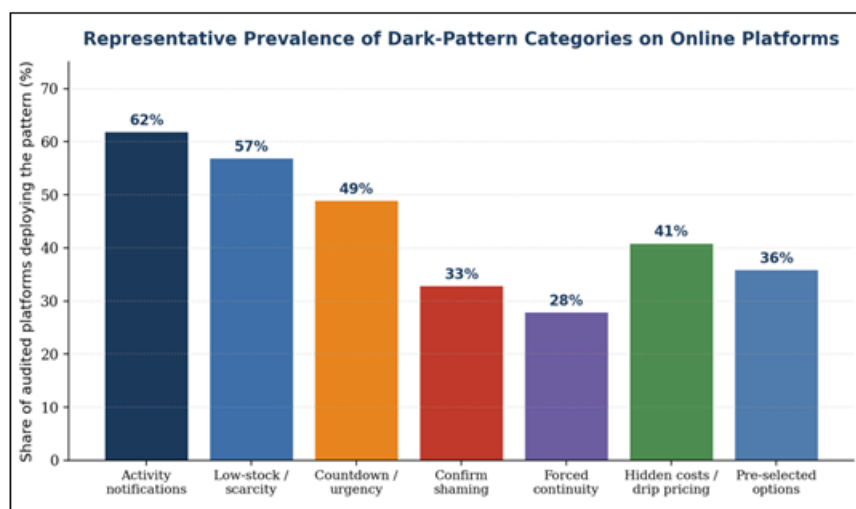
- **The Blurred Line Between Persuasion and Manipulation:** Not every persuasive design is deceptive.

A genuine limited-time festival sale and a fake countdown timer can look identical. Drawing a clear legal boundary between legitimate marketing and a prohibited dark pattern is inherently difficult and invites disputes.

- **Weak and Uncertain Enforcement:** The 2023 Guidelines specify no independent penalty of their own; consumers must rely on the broader unfair-trade-practice provisions of the Consumer Protection Act. Critics argue that without dedicated, predictable sanctions the rules remain “soft law” with limited deterrent effect.
- **Rapidly Evolving Tactics:** Dark patterns mutate faster than regulation. As soon as one technique is named and banned, designers devise subtler variants, and increasingly use automated experimentation to discover new manipulations, leaving any fixed list of thirteen patterns perpetually behind the curve.
- **Compliance Burden, Especially for Small Firms:** Mandatory self-audits, documentation, and design reviews impose real costs. Large platforms can absorb these, but small Indian start-ups and sellers may find the compliance overhead disproportionate.
- **Cross-Border and Jurisdictional Complexity:** Although the Guidelines claim extraterritorial reach over foreign platforms, enforcing them against entities based abroad is practically difficult and depends on international cooperation.
- **Risk of Over-Correction:** Excessively cautious rules could discourage beneficial nudges — such as default enrolment in safety features or savings- if firms fear that any influence on choice might be challenged, potentially reducing welfare-improving design.

## 6. Economic Impact Analysis

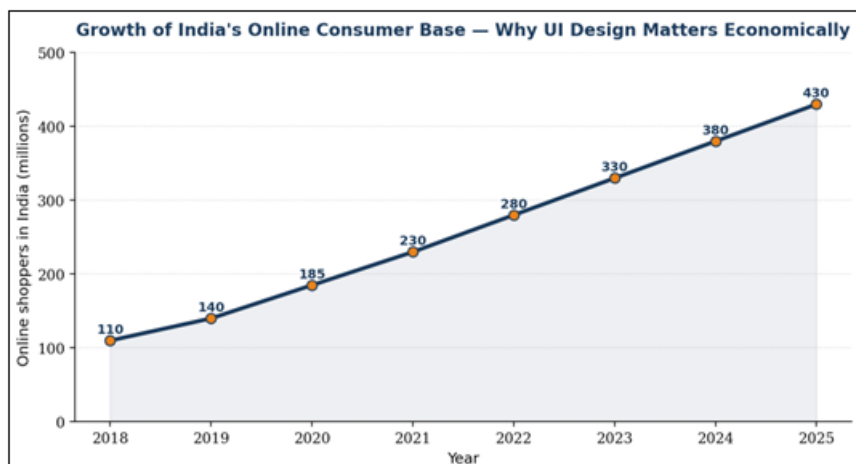
To make the analysis concrete and data-driven, this section presents visual and tabular evidence on the prevalence of dark patterns, the economic scale of the market they affect, and the structural contrast between ethical and deceptive design. Figure 3 shows the representative frequency with which different categories of dark pattern appear on audited online platforms.



**Figure 3:** Representative prevalence of major dark-pattern categories on online platforms (illustrative, based on the pattern frequencies reported by Mathur et al., 2019). Scarcity and urgency cues dominate because they are cheap to deploy and highly effective.

The economic significance of these techniques scales directly with the size of the digital market they operate on. Figure 4 depicts the rapid expansion of India’s online

consumer base, the population over which even a marginal manipulation is multiplied into enormous aggregate value.



**Figure 4:** Illustrative growth of India’s online consumer base. As the number of online shoppers rises, the aggregate welfare effect of interface design- whether honest or deceptive- grows proportionally, making UI design a question of macroeconomic relevance.

The fundamental policy question is not whether interfaces should influence choice- they unavoidably do- but whether that influence serves the consumer or exploits them. Table 3

contrasts ethical (nudge-based) design with deceptive (sludge-based) design across the dimensions that matter economically.

**Table 3:** A comparison of ethical nudge-based design and deceptive sludge-based design across key economic dimensions.

Dimension	Ethical Design (Nudge)	Deceptive Design (Dark Pattern / Sludge)
Intent	Help the user choose in their own interest.	Extract value from the user for the firm.
Information	True price and consequences shown clearly.	Cost or default hidden, delayed, or disguised.
Default option	Set to the welfare-improving choice.	Set to the firm-favouring choice.
Reversibility	Easy to undo, cancel, or opt out.	Deliberately difficult to reverse or cancel.
Consumer welfare	Increased; better-matched decisions.	Reduced; money, time, and privacy lost.
Long-run trust	Built and reinforced.	Eroded after repeated exposure.
Status in India	Encouraged and lawful.	Prohibited under the CCPA Guidelines, 2023.

Finally, dark patterns are a global regulatory concern, and India’s approach can be situated alongside the responses of other major jurisdictions. Table 4 offers a comparative overview.

**Table 4:** A comparative overview of regulatory approaches to dark patterns in India, the European Union, and the United States

Jurisdiction	Key Instrument	Approach & Example
India	CCPA Guidelines for Prevention and Regulation of Dark Patterns, 2023; Consumer Protection Act, 2019.	Lists 13 specified patterns; extraterritorial reach; 2025 self-audit advisory for e-commerce platforms.
European Union	Digital Services Act, 2022; General Data Protection Regulation.	Broadly prohibits manipulative interface design and coerced consent on online platforms.
United States	Federal Trade Commission Act, Section 5 (unfair practices).	Case-by-case enforcement, e.g., action against Amazon’s Prime cancellation flow (2023) and the Noom and Publishers Clearing House settlements.

## 7. Future Scope and Possible Innovations

The regulation of dark patterns is only the beginning of a broader project to align digital design with consumer welfare. Several promising innovations and directions deserve attention.

- **AI-Powered Dark-Pattern Detection:** Machine-learning systems can be trained to scan interfaces automatically and flag manipulative elements- fake timers, pre-ticked boxes, hidden cancellation paths- at scale, transforming the labour-intensive self-audit into a continuous, automated compliance check for regulators and platforms alike.

- **“Fair-Pattern” Certification:** Just as energy-efficiency or organic labels signal quality, an independent fair-design certification could allow honest platforms to advertise their ethical interfaces, turning transparency into a competitive advantage rather than a cost.
- **Behavioural Nudges for Good:** The same behavioural science that powers dark patterns can be redirected. Pro-consumer nudges- clear total-price displays, friction added before impulsive high-value purchases, and easy one-click cancellation- can improve decisions without removing freedom of choice.
- **Standardised, Honest Interface Components:** Industry-wide design standards for cancellation flows,

consent screens, and price disclosure could make honesty the path of least resistance, much as standardised nutritional labels did for food.

- **Digital and Financial Literacy:** Embedding awareness of dark patterns into school curricula and public campaigns equips consumers, especially first-time internet users in India, to recognise and resist manipulation- a durable, demand-side complement to regulation.
- **Dynamic, Adaptive Regulation:** Because tactics evolve quickly, the list of prohibited patterns should be treated as a living document, updated regularly by the CCPA in consultation with designers, economists, and consumer groups, supported by a dedicated penalty regime to strengthen deterrence.
- **Interoperability with Data-Protection Law:** Closer integration between the dark-patterns framework and the Digital Personal Data Protection Act, 2023, would ensure that consent obtained through manipulative design is treated as invalid, closing a major loophole in data governance.

## 8. Conclusion

Dark patterns represent a fundamental challenge to the assumption, central to economics, that markets aggregate the free choices of informed consumers. By engineering interfaces that exploit predictable psychological biases urgency, loss aversion, and a tendency to accept defaults digital platforms can systematically steer choice toward outcomes that serve the firm rather than the user. The economic consequence is a quiet but pervasive transfer of welfare: firms capture short-term revenue, while consumers absorb diffuse losses of money, time, and privacy, and the market as a whole suffers an erosion of trust and a distortion of competition.

This paper has argued that the problem is structural rather than individual, and that the remedy must be structural too. The existing system, which relies on consumer vigilance, produces a race to the bottom in which even honest firms are pressured to manipulate. The proposed transparency-by-design framework exemplified by India's CCPA Guidelines of 2023 and its 2025 self-audit advisory shifts the obligation onto platforms to design honestly. The advantages of this approach, from restored consumer sovereignty to a fairer competitive field, are significant, but so are the challenges: the blurred line between persuasion and manipulation, weak enforcement, rapidly evolving tactics, and cross-border complexity.

The broader lesson is that design is never neutral, and that the choice architecture of the digital economy is now a matter of public economic interest. Just as the same behavioural insight can produce either a helpful nudge or a harmful sludge, the future of digital markets will be determined by which of these two paths firms and regulators choose. Aligning interface design with genuine consumer welfare through clear and adaptive regulation, automated detection, ethical-design standards, and an informed public is not merely a consumer-protection task but a precondition for honest, efficient, and trustworthy digital markets in India and beyond.

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