Dark Patterns in E-Commerce Platforms: An International Analysis of Temu.com

Ticaret Platformlarında Karanlık Örüntüler: Temu.com'un Uluslararası Bir Analizi

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Abstract:

Manipulative interface designs known as dark patterns have become an increasing source of concern in digital commerce due to their ability to influence users' decisions without their awareness. This study examines the dark patterns used on the Temu.com platform from a cross-national perspective. The research is based on 1,964 one- and two-star user reviews collected from Trustpilot across 68 different countries during August 2025. The data were obtained using a web scraping method implemented with the Python programming language and the Selenium library. Within the scope of a quantitative content analysis that combines semi-automated keyword screening, manual coding, and statistical analyses, the study focuses on the 20 countries with the highest number of reviews (n = 1,826). The findings indicate that there are pronounced differences between countries in terms of both the prevalence and the distribution of dark pattern types. It is observed that Anglo-Saxon markets, comprising the United Kingdom, the United States, Canada, Australia, and Ireland, have significantly higher dark pattern ratios compared to Continental European countries, pointing to the influence of cultural and regulatory contexts. While misdirection emerges as the most frequently encountered dark pattern type, country-specific tendencies stand out, such as gamification in the United States and confirmshaming in Spain. Complaints that do not involve dark patterns mainly concentrate on operational issues such as delivery, refund processes, and customer service. While statistical analyses reveal significant differences between countries, no significant relationship is identified between the number of reviews and the prevalence of dark patterns.

Keywords: Dark Patterns, E-Commerce Platforms, Cross-Cultural Analysis, Consumer Rights, User Experience

Genişletilmiş Özet

Dijital ticaret ortamlarının yaygın biçimde genişlemesiyle birlikte, kullanıcı davranışlarını belirli yönlere sevk etmek üzere bilinçli olarak yapılandırılan tasarım uygulamaları giderek daha fazla tartışma konusu hâline gelmiştir. Literatürde "karanlık örüntüler" (dark patterns) olarak adlandırılan bu uygulamalar, bilişsel sınırlılıkları, dikkat önyargılarını ve bilgiye erişimdeki asimetrileri istismar ederek kullanıcıların kendi çıkarlarına olmayan kararlar almalarına yol açabilmektedir. İlk kez Brignull tarafından kavramsallaştırılan karanlık örüntüler, zaman içerisinde basit aldatıcı arayüz hilelerinin ötesine geçerek gizli veri toplama, tüketim davranışlarını hızlandırma ve platforma bağımlılığı pekiştirme gibi daha karmaşık stratejileri de kapsayacak şekilde genişlemiştir. Özellikle e-ticaret platformlarında yaygın olarak karşılaşılan sahte aciliyet mesajları, kıtlık göstergeleri ve sosyal kanıt işaretleri, hızlı karar vermeyi teşvik etmekte ve dürtüsel kullanıcı tepkilerini artırmaktadır.

Bu çalışmanın temel amacı, hızla büyüyen küresel bir e-ticaret platformu olan Temu.com üzerinde kullanılan karanlık örüntüleri gerçek kullanıcı deneyimleri üzerinden incelemek ve bu uygulamaların ülkeler arası dağılımını karşılaştırmalı olarak analiz etmektir. Mevcut literatür incelendiğinde, karanlık örüntülerin ağırlıklı olarak deneysel ortamlar, laboratuvar temelli çalışmalar ya da doğrudan arayüz denetimleri aracılığıyla araştırıldığı görülmektedir. Buna karşılık, bu tasarımların gündelik kullanımda nasıl deneyimlendiğini doğrudan yansıtan kullanıcı yorumlarına dayalı araştırmalar sınırlı sayıdadır. Bu çalışma, karanlık örüntülerin pratikte kullanıcılar tarafından nasıl algılandığını ve deneyimlendiğini ortaya koyarak bu boşluğu doldurmayı amaçlamaktadır.

Araştırmaya ait veri seti, Trustpilot.com platformunda yayımlanan Temu.com'a ilişkin bir ve iki yıldızlı kullanıcı yorumları temel alınarak oluşturulmuştur. Veriler, 1–25 Ağustos 2025 tarihleri arasında web kazıma (web scraping) yöntemi kullanılarak toplanmıştır. Bu süreçte Python programlama dili ve Selenium kütüphanesi aracılığıyla 68 farklı ülkeden toplam 1.964 kullanıcı yorumu elde edilmiştir. Analitik tutarlılığı artırmak amacıyla, en fazla yoruma sahip 20 ülkeye odaklanılmış ve nihai veri seti 1.826 yorumdan oluşmuştur. Her bir veri girdisi; kullanıcının ülkesi, yorum metni, paylaşım tarihi ve yıldız puanı bilgilerini içermektedir. Analiz öncesinde veri seti yinelenen kayıtlar

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çıkarılarak temizlenmiş ve sistematik inceleme için hazırlanmıştır.

Karanlık örüntülerin tespit edilmesi amacıyla, literatürde yer alan yerleşik sınıflandırmalara dayalı olarak geliştirilen anahtar kelime setleri kullanılmıştır. Bu anahtar kelimeler, Python ve Selenium kullanılarak yorum metinleri üzerinde yarı otomatik biçimde taranmış ve elde edilen çıktılar doğrultusunda karanlık örüntü eşleştirmeleri yapılmıştır. Bağlam dışı ya da hatalı eşleştirmelerin önüne geçmek amacıyla, kodlanan tüm veriler daha sonra iki bağımsız kodlayıcı tarafından manuel olarak incelenmiştir. Kodlayıcılar arası güvenirlik, Cohen's Kappa katsayısı kullanılarak değerlendirilmiş ve 0,82 değeri elde edilmiştir; bu değer, kodlama sürecinde yüksek düzeyde bir tutarlılığa işaret etmektedir.

Elde edilen bulgular, karanlık örüntülerin hem yaygınlığı hem de çeşitliliği açısından ülkeler arasında belirgin farklılıklar olduğunu ortaya koymaktadır. Özellikle Birleşik Krallık, Amerika Birleşik Devletleri, Kanada, Avustralya ve İrlanda'yı kapsayan Anglo-Sakson pazarların, Kıta Avrupası ülkelerine kıyasla daha yüksek karanlık örüntü kullanım oranlarına sahip olduğu görülmektedir. Belirlenen örüntüler arasında yönlendirme (misdirection) en yaygın tür olarak öne çıkarken, Amerika Birleşik Devletleri'nde oyunlaştırma temelli uygulamaların, İspanya'da ise confirmshaming örüntüsünün daha belirgin olduğu gözlemlenmiştir. Buna karşılık, karanlık örüntü içermeyen şikâyetler ağırlıklı olarak teslimat gecikmeleri, iade prosedürleri ve müşteri hizmetlerine ilişkin sorunlar üzerinde yoğunlaşmaktadır. İstatistiksel analizler, ülkeler arasında anlamlı farklılıklar bulunduğunu doğrularken, yorum sayısı ile karanlık örüntü yaygınlığı arasında doğrudan bir ilişki olmadığını göstermektedir.

Sonuç olarak bu çalışma, karanlık örüntülerin yalnızca tekil arayüz unsurları olarak değerlendirilmemesi gerektiğini; aksine pazar dinamikleri, kültürel normlar ve düzenleyici çerçeveler tarafından şekillenen bağlama duyarlı stratejik uygulamalar olduğunu ortaya koymaktadır. Gerçek kullanıcı deneyimlerine dayalı ampirik kanıtlar sunan bu araştırma, akademik literatüre katkı sağlarken aynı zamanda tüketici koruma önlemlerinin güçlendirilmesi ve etik kullanıcı deneyimi tasarımının teşvik edilmesi konusunda politika yapıcılar ve platform yöneticileri için anlamlı içgörüler sunmaktadır.

Introduction

In the modern digital economy, while e-commerce platforms are transforming consumer habits, unethical design practices are becoming increasingly widespread. Particularly, fast-growing China-based platforms such as Temu.com stand out with their aggressive growth strategies and low-price policies, yet also raise ethical concerns regarding user experience design. Manipulative design strategies, referred to as *dark patterns (DPs)*, steer users toward undesired actions and thereby violate digital consumer rights (Brignull, 2010; Gray et al., 2018).

Empirical evidence on Temu.com's use of dark patterns has been growing. An investigation conducted by Consumer Reports (2023) identified the platform's reliance on "deceptive design elements" and "interfaces that mislead users." Similarly, the European Consumer Organisation (BEUC) (2023) criticized Temu for "aggressive manipulation techniques" and "non-transparent data collection practices." The platform systematically employs techniques such as "social proof manipulation" ("15 people are viewing this product"), "artificial urgency" ("only 2 left"), and "hidden costs" to nudge users into making decisions (Moser et al., 2019; Luguri & Strahilevitz, 2021).

Although significant studies exist on the classification and impacts of dark patterns (Gray et al., 2018; Mathur et al., 2019), most remain at the experimental or conceptual level. Research examining the use of dark patterns in next-generation *quick commerce* platforms like Temu.com through real user experiences is still limited. Moreover, comparative studies addressing how these practices differ across cultural contexts are largely absent (Wenzel, 2023). Despite growing regulatory scrutiny and public criticism, there is still limited empirical evidence on how dark patterns are experienced by users across different cultural and regulatory contexts. Understanding these variations is essential not only for advancing academic knowledge, but also for informing ethical design practices and effective consumer protection policies. This study is motivated by the need to bridge this gap through a large-scale, cross-national analysis based on real user experiences. Against this backdrop, the present study aims to make three main contributions: (1) empirically documenting Temu.com's use of dark patterns through real user reviews, (2) comparatively analyzing the cross-national distribution of such practices, and (3) examining the influence of cultural and regulatory contexts on manipulative design strategies.

The main objective of the research is to investigate the international distribution and diversity of dark patterns on the Temu.com platform. To achieve this aim, the following research questions are addressed:

1.Does the frequency of dark pattern usage on Temu.com significantly differ across countries?

2.Are there meaningful differences between Anglo-Saxon and Continental European markets in terms of dark pattern practices?

3.How do dominant dark pattern types vary across geographic regions?

4.What is the thematic distribution of complaints that do not involve dark patterns?

This study is based on a quantitative content analysis of 1,964 one- and two-star user reviews from 68 countries collected on Trustpilot. The analysis focused on the top 20 countries with the highest review volumes (n = 1,826), and

inter-coder reliability was found to be high (κ = .82) The second section of the paper presents a comprehensive literature review, the third section details the research methodology, the fourth section reports findings with statistical analyses, and the fifth section discusses theoretical and practical implications.

1. Literature Review

The concept of dark patterns (DPs) was first introduced by Brignull (2010) to describe design strategies in user interfaces that deliberately mislead, manipulate, and direct users toward actions that are not in their best interest. While these designs appear to provide legitimate functions, they exploit users' cognitive limitations, distraction, and information asymmetry (Gray et al., 2018; Mathur et al., 2019). Over time, the concept has expanded beyond simple deceptive tactics to include more complex strategies such as data extraction, accelerating consumption behaviors, and reinforcing user dependency (Nouwens et al., 2020; Luguri & Strahilevitz, 2021). In Brignull's early classification, categories such as *Misdirection, Hidden Costs, Forced Continuity, Sneak into Basket,* and *Bait and Switch* were later extended to include new forms such as *Privacy Zuckering, Confirmshaming, Fake Urgency, Nagging,* and *Roach Motel* (Di Geronimo et al., 2020; Gunawan et al., 2021). Particularly in the context of e-commerce, techniques such as fake urgency ("The campaign is about to end"), scarcity messages ("Only 2 items left"), and social proof cues ("15 people are currently viewing this product") are widely employed. These strategies increase decision-making speed, raise add-to-cart rates, and strengthen platform engagement (Cialdini, 2009; Moser et al., 2019). However, they simultaneously undermine rational decision-making and raise significant ethical concerns (Luguri & Strahilevitz, 2021).

Most existing studies detect DPs through laboratory-based user observations or interface audits (Mathur et al., 2019; Gray et al., 2018). By contrast, research that systematically analyzes real user reviews remains limited. Yet, user reviews provide first-hand insights into how manipulative design elements are experienced in practice, while also revealing non-DP sources of dissatisfaction, thereby enabling a multidimensional understanding of user experience (Hamilton et al., 2022).

Cross-national comparative studies have further shown that DP types and frequencies can vary significantly across geographic contexts (Di Geronimo et al., 2020). Cultural factors, consumer rights awareness, and regulatory frameworks are critical determinants of these variations (Wenzel, 2023). To explain such differences, Institutional Theory and Hofstede's Cultural Dimensions Theory offer important conceptual frameworks.

Institutional Theory (Scott, 2014) explains how organizational behaviors are shaped by both formal institutions (laws, regulations) and informal institutions (culture, norms, expectations). For example, the European Union's strict regulations, such as the GDPR and the Consumer Rights Directive, directly influence platform behaviors by targeting practices like *Privacy Zuckering* and manipulative consent mechanisms (Nouwens et al., 2020). By contrast, the U.S. Federal Trade Commission's broader "deceptive trade practices" approach (FTC, 2022), along with less restrictive regulatory environments in many other countries, may allow platforms more leeway in deploying manipulative designs.

Hofstede's Cultural Dimensions Theory (Hofstede et al., 2010) provides a framework for understanding informal institutions. The *Individualism vs. Collectivism* dimension, for example, can influence consumer responses to manipulation. In individualistic societies (e.g., the U.S., the U.K.), an emphasis on "personal gain" may create a more tolerant environment toward aggressive marketing tactics— or conversely, foster higher awareness of individual rights. Similarly, societies with high *Uncertainty Avoidance* (e.g., Germany, France) tend to have lower tolerance for opaque or inconsistent processes, making manipulative and unpredictable interface designs more noticeable and more likely to trigger negative reactions (complaints). Beyond regulation, such strong cultural norms may also push platforms to behave more cautiously and transparently in these markets. Cultural norms thus shape how users perceive manipulation, their likelihood of complaining, and their sensitivity to specific DP types (e.g., Confirmshaming may be more effective in collectivist societies). However, more empirical research is needed to validate these culturally specific effects. Nevertheless, large-scale, cross-country comparative analyses remain scarce. This study addresses this gap by examining 1,964 real user reviews collected from Trustpilot, coding them based on Brignull's (2010) and subsequent classifications of DP types. Beyond identifying DPs, the study also categorizes non-DP complaints, thereby providing a multidimensional analysis of user experience, and highlights cross-national differences in DP prevalence.

2. Hypotheses Development

The findings in the literature suggesting that dark pattern practices vary across markets and cultural contexts (Brignull, 2010; Mathur et al., 2019; Gray et al., 2018) formed the basis for developing the hypotheses of this study. Previous research indicates that user manipulation techniques are influenced by contextual factors such as the level of regulation, market competition, consumer habits, and logistical infrastructure. Based on these insights, the following hypotheses were developed:

H₁: The prevalence of dark patterns differs significantly across countries. The literature emphasizes that manipulation techniques vary depending on cultural and market dynamics (Di Geronimo et al., 2020; Wenzel, 2023). Therefore, statistically significant cross-national differences in dark pattern prevalence are expected.

H₂: Dark pattern prevalence is significantly higher in Anglo-Saxon markets (United Kingdom, United States, Canada, Australia) compared to Continental European countries (Germany, France, Italy). This hypothesis is grounded in the assumption that Anglo-Saxon e-commerce markets are more likely to adopt aggressive marketing-oriented strategies (Luguri & Strahilevitz, 2021), whereas the European Union's stricter consumer protection regulations (Nouwens et al., 2020) may constrain such practices.

H₃: The types of dark patterns vary across countries. Prior studies have shown that specific types such as *misdirection, gamification,* and *hidden costs* become dominant depending on market conditions and cultural factors (Mathur et al., 2019; Gunawan et al., 2021).

H₄: The ratio of dark patterns per review is not correlated with the overall volume of reviews. The literature notes that countries with high volumes of reviews do not necessarily have higher dark pattern prevalence, and that intensive manipulation strategies can also be found in low-volume markets (Hamilton et al., 2022).

H₅: Non-dark pattern complaints differ significantly across countries. It is expected that the intensity of operational issues (e.g., delivery problems, product quality, customer service) will vary according to each market's logistical capacity and consumer expectations (Gray et al., 2018).

Table 1. Research Hypotheses and Key Implications

Hypothesis	Expected Relationship	Supporting Literature
H₁	DP prevalence will differ significantly across countries	Di Geronimo et al. (2020); Wenzel (2023)
H₂	Anglo-Saxon countries > Continental European countries in DP prevalence	Luguri & Strahilevitz (2021); Nouwens et al. (2020)
H₃	Types of dark patterns will vary across geographic regions	Mathur et al. (2019); Gunawan et al. (2021)
H₄	No significant relationship between review volume and DP ratio	Hamilton et al. (2022)
H₅	Operational complaints will differ significantly across countries	Gray et al. (2018)

As shown in Table 1, testing these hypotheses will provide a comprehensive understanding of how dark patterns are positioned in global e-commerce platforms and will reveal the influence of cultural context on manipulative design strategies.

3. Methodology

This research aims to comparatively examine the impact of dark patterns in e-commerce platforms on users across different countries. Within the scope of the study, user reviews of Temu.com were analyzed to determine the distribution of dark pattern usage across countries. The research was structured within a quantitative research framework, employing descriptive content analysis, normalized frequency calculations, and statistical comparative tests.

3.1.1. Data Collection Process

The dataset was constructed based on one- and two-star user reviews of Temu.com published on the Trustpilot.com platform. The data were collected between 1–25 August 2025 using a web scraping method. In total, 1,964 reviews from 68 different countries were obtained. For the analysis, the focus was placed on the 20 countries with the highest number of reviews, resulting in a final dataset of 1,826 reviews. Each record included the user's country of origin, user comment, date of posting, and star rating. The dataset was cleaned by removing duplicate entries and restructured for analysis.

For the identification of dark patterns, keyword sets developed based on the literature were semi-automatically scanned over the review texts using the Python programming language and the Selenium library, and dark pattern (DP) matching was performed based on the resulting outputs. To minimize the risk of erroneous DP matching due to incorrect or contextually irrelevant keywords, all data were manually reviewed by two independent coders following the automated coding process, and the classifications were compared. Inter-coder reliability was assessed using Cohen's Kappa coefficient, yielding a value of 0.82, which indicates a high level of agreement (Landis & Koch, 1977).

Sampling Limitation: An important limitation of the study is that the dataset is restricted to one- and two-star user reviews. This constraint causes the sample to predominantly reflect negative user experiences and limits the generalizability of the findings to the broader user population.

3.2. Dark Pattern Definitions and Coding Procedure

In this study, the identification of manipulative design elements within user reviews was guided by dark pattern (DP) typologies widely recognized in the literature. The coding framework was developed by combining classifications defined in seminal studies (Gray et al., 2018; Mathur et al., 2019; Brignull, 2010; Stibe et al., 2022) with the taxonomy proposed in the author's doctoral dissertation (Erdem, 2023).

The following categories of dark patterns were employed in the coding scheme:

1. Forced Continuity – Automatic renewal of subscriptions or making cancellation intentionally difficult without the user's explicit consent.

2. Hidden Costs – Additional fees that are not disclosed until the final stages of checkout.

3. Misdirection – Design elements or texts that divert the user's attention away from their intended action.

4. Obstruction – Process designs that make undesired actions difficult or require unnecessary extra steps.

5. Sneak into Basket – Adding items to the shopping cart without the user's explicit approval.

6. Urgency – Artificial time pressure cues (e.g., "only today," "last 2 items").

7. Scarcity – Messages that create the impression of limited stock availability.

8. Bait and Switch – Luring the user with one promise but delivering a different outcome.

9. Trick Questions – Misleading or complex wording that results in unintended user choices.

10. Confirmshaming – Framing rejection actions in a way that induces guilt or shame.

11. Roach Motel – Processes that are easy to enter but difficult to exit.

12. Disguised Ads – Advertisements presented in a way that mimics legitimate content.

13. Nagging – Repeated prompts or reminders that annoy or pressure users.

14. Friend Spam – Unauthorized messaging to users' social network contacts.

15. Gamification (Deceptive) - It offers a set of games that promise rewards to the user, yet the user is ultimately unable to obtain the reward at the end of the game.

3.3. Coding Approach

The analysis of user reviews was conducted in two stages. In the first stage, a semi-automated coding procedure was implemented based on the dark pattern categories defined in the literature. Keyword lists prepared in English, German, French, Spanish, and Italian (e.g., *"mislead," "tracking," "refer," "vergüenza," "no cancel," "irreführend"*) were used to identify potential traces of dark patterns in the reviews. These preliminary identifications were then manually verified, and the final classifications were established through human coding.

In the second stage, a thematic content analysis was applied to reviews that did not contain dark patterns. These complaints were categorized into seven subcategories: delivery/shipping issues, product quality, customer service, returns/refunds, payment/purchasing processes, dissatisfaction with promotions/gifts, and other/positive reviews.

The coding process was carried out independently by two researchers. In cases of disagreement, consensus was reached through discussion, ensuring the reliability of the coding framework.

3.4. Coding Reliability

To ensure the consistency of the coding process, two independent coders conducted the evaluations, and the results were compared. Inter-coder agreement was assessed using Cohen's Kappa coefficient, which yielded a value of **0.82**, indicating a high level of agreement (Landis & Koch, 1977).

3.5. Categorization and Analysis

As a result of the coding process, each review was classified either under a DP category or within the Non-DP category. Non-DP reviews were further subcategorized into themes such as logistical issues, product quality complaints, customer service problems, payment/transaction issues, and dissatisfaction with promotions/gifts. This approach not only enhanced the reliability of the DP classification but also enabled a structured analysis of non-DP complaints.

Through this systematic coding procedure, it became possible to conduct both cross-national comparisons of DP distribution and a deeper analysis of other factors negatively affecting user experience.

Table 2 Sample dark pattern coding examples.

	User Review (Relevant Excerpt)	Supporting Keywords / Phrases
Gamification	*Spin the wheel to win a free gift, but had to make a purchase to claim it.*	spin the wheel, win a free gift, make a purchase
Hidden Costs	*Final price at checkout was higher due to added shipping fees not shown before.*	final price higher, added shipping fees, not shown before
Urgency	*Only a few items left – offer ends in a few hours.*	only a few items left, offer ends
Misdirection	*Clicking continue took me straight to payment instead of letting me review my order.*	clicking continue, straight to payment, instead of review
Referral Traps	*Invited friends for bonus credits but neither they nor I received anything.*	invited friends, bonus credits, did not receive

Table 2 illustrates the data coding procedure employed in the study by presenting real excerpts from user reviews corresponding to five different types of dark patterns. Each row displays the relevant sentence from the user review, the associated dark pattern category, and the supporting keywords or phrases used to validate the classification.

The examples cover dark pattern categories commonly identified in the literature, including *Gamification, Hidden Costs, Urgency, Misdirection,* and *Referral Traps.* These instances highlight the diversity of manipulative elements perceived in user experience and demonstrate how the platform employs multiple persuasive strategies simultaneously.

In the classification process, keywords derived from the review texts (e.g., *"spin the wheel," "bonus credits," "unexpected fees"*) were used to identify the relevant dark pattern category. This approach enhanced the transparency and replicability of the coding process, while also ensuring that the analysis was based not only on general perceptions but also on concrete textual indicators.

Methodologically, this approach combines open coding in qualitative data analysis with pre-defined category matching techniques. In doing so, it provides both a literature-based classification and an acknowledgment of the unique linguistic expressions present in user reviews. The table thus serves as a visual representation of how the methodology was applied and constitutes an essential part of the data collection–analysis chain.

3.6. Statistical Analysis

To test whether dark pattern prevalence differed significantly across countries, a Chi-Square test of independence was conducted. The results indicated that countries and the DP/Non-DP distinction were not independent, $\chi^2(19, N = 1826) = 85.3$, $p < .001$. (Note: The analysis was performed only on the subsample of the top 20 countries.)

Additionally, a Spearman correlation analysis was conducted to examine the relationship between the total number of reviews and the proportion of dark patterns. The findings revealed no significant correlation between the two variables ($\rho = -0.13$, $p = .30$). This result suggests that countries with higher review volumes do not necessarily exhibit higher DP prevalence.

3.7. Ethical Considerations

The data were collected from publicly available platforms, and no personally identifiable information was included in the study. All procedures for data collection and analysis adhered to principles of privacy protection and research ethics. Only anonymized content was used throughout the research process..

4. Findings

This section presents the results obtained from the analysis of 1,964 one- and two-star user reviews of Temu.com. Statistical analyses were conducted on the top 20 countries with the highest number of reviews (total n = 1826)..

4.1. Descriptive Statistics and Dark Pattern Distribution

Based on the analysis, the top 20 countries in terms of review volume were identified. For each of these countries, the total number of dark patterns, the ratio of DPs per review, the most frequently observed DP types, and the relevant keywords are summarized in Table 3.

Table 3 Distribution of dark patterns in the top 20 countries**.**

	Total Reviews	DP Count	DP/Review Ratio	Most Frequent Type	Other Types	Keywords
United Kingdom	427	62	0.145	Misdirection	Privacy Zuckering, Referral Trap	misleading, tracking
Germany	256	11	0.043	Misdirection	Privacy Zuckering, Confirmshaming	irreführend, tracking
France	250	4	0.016	Gamification	Referral Trap	points, refer
Italy	198	7	0.035	Privacy Zuckering	Referral Trap	tracking, refer

Spain	115	15	0.130	Confirmshaming	Privacy Zuckering, Referral Trap	vergüenza, data
USA	97	20	0.206	Gamification	Misdirection, Bait and Switch	tracking, misleading
Netherlands	82	2	0.024	Privacy Zuckering	Misdirection	tracking, mislead
Denmark	77	3	0.039	Gamification	Privacy Zuckering, Misdirection	spin, tracking
Canada	69	15	0.217	Misdirection	Privacy Zuckering, Referral Trap	misleading, tracking
Belgium	48	4	0.083	Misdirection	Privacy Zuckering, Nagging	misleading, privacy
Sweden	29	0	0.000	–	–	–
Poland	27	1	0.037	Misdirection	–	misleading
Australia	25	9	0.360	Misdirection	Gamification, Privacy Zuckering	wheel, misleading
Austria	21	0	0.000	–	–	–
Switzerland	21	0	0.000	–	–	–
UAE	21	4	0.190	Privacy Zuckering	Misdirection, Referral Trap	tracking, misleading
Azerbaijan	20	1	0.050	Misdirection	–	deception
Norway	17	1	0.059	Misdirection	–	misleading
Pakistan	16	7	0.438	Misdirection	Obstruction	misleading, no cancel
Ireland	10	2	0.200	Misdirection	Urgency, Confirmshaming	misleading, hurry

Table 3 presents the findings for the top 20 countries derived from the Trustpilot dataset, where user reviews were analyzed through an automated coding procedure based on dark pattern (DP) types defined in the literature (*Misdirection, Hidden Costs, Urgency, Scarcity, Gamification, Privacy Zuckering, Referral Trap, Forced Continuity, Obstruction, Sneak into Basket, Bait and Switch, Trick Questions, Confirmshaming, Roach Motel, Disguised Ads, Nagging,* and *Friend Spam*).

For each country, the table reports the total number of reviews, the number of identified DPs, the DP-per-review ratio, the most frequently observed DP type, other common DP types, and the representative keywords used to detect them. The results reveal clear cross-national variations in both the prevalence and the diversity of dark patterns.

The United Kingdom ranks first in absolute numbers, with DPs detected in 14.5% of its 427 reviews (n = 62). The most frequent type was *Misdirection*, followed by *Privacy Zuckering* and *Referral Trap*. In contrast, countries such as Germany (4.3% – 11 reviews) and Italy (3.5% – 7 reviews) recorded relatively low DP ratios despite high review volumes. Conversely, Canada (21.7% – 15 reviews) and Australia (36% – 9 reviews) showed high DP prevalence rates, despite their smaller sample sizes.

Keyword analysis indicates that the textual signals of DPs clustered around four main themes:

1. **Gamification and reward systems** (*spin the wheel, bonus points, invite friends*)

2. **Time pressure and scarcity cues** (*limited time offer, only today*)

3. **Hidden costs and unexpected fees** (*unexpected charges, extra fees*)

4. **Misdirection and information manipulation** (*misleading button, wrong link*)

Overall, these findings demonstrate that dark pattern strategies are applied differently depending on market contexts, suggesting that platforms adapt their design manipulations to user segments, competitive dynamics, and regulatory environments. In markets with higher DP ratios (e.g., Canada, Australia, United

Kingdom), psychologically manipulative and marketing-oriented techniques tend to dominate, whereas in lower-prevalence markets (e.g., Germany, France, Italy), operational and process-related manipulations remain relatively limited.

4.2. Analysis of Non-Dark Pattern Reviews

An examination of the thematic distribution of reviews without dark patterns revealed that operational issues were the most prominent. The distribution for the top five countries is presented in Table 4.

Table 4. Top 5 countries — DP vs Non-DP review breakdown.

Country	DP Reviews	Non-DP Reviews	Shipping / Delivery Issues	Product Quality Issues	Customer Service Complaints	Return / Refund Issues	Payment / Charge Issues	Promotion / Gift Dissatisfaction	Positive / Other	Total Reviews
United Kingdom	62	365	125	61	124	141	30	56	74	427
Germany	11	245	30	12	78	39	3	26	114	256
France	4	246	62	32	58	32	7	7	113	250
Italy	7	191	9	1	7	2	0	4	175	198
Spain	15	100	30	1	21	16	2	4	50	115

As shown in Table 4, not only the ratios of Dark Pattern (DP) reviews but also the distributions of non-DP complaint categories vary considerably across countries. In the United Kingdom, shipping/delivery issues (29.3%) and customer service complaints (29.1%) were the most prevalent categories, while refund-related problems also accounted for a substantial share (33.9%). In Germany, despite a relatively low DP ratio, customer support and refund issues were prominent. In France, shipping and customer service complaints were similarly dominant. Italy presented a distinct pattern, with nearly all non-DP reviews clustering around refund-related problems (88.4%). In Spain, the relatively high DP ratio (13.0%) was accompanied by shipping and refund issues as the leading sources of dissatisfaction. This comparison suggests that user experiences vary not only with respect to manipulative design practices but also as a function of differences in operational processes across countries.

Table 3 provides the distribution of user reviews from the Trustpilot dataset in terms of both DP and non-DP categories. The analysis focused on the five countries with the highest number of reviews (United Kingdom, Germany, France, Italy, and Spain). DP reviews were classified according to a literature-based automated coding method, while non-DP reviews were categorized into thematic subgroups of complaints.

Note: Since multiple labeling was allowed in non-DP subcategories, the sum of subcategories may exceed the total number of Non-DP reviews. Percentages are calculated with respect to the Non-DP review base for each country.

The United Kingdom (n = 427) was the country with the highest review count, with 14.5% (n = 62) of reviews containing DPs. Among non-DP reviews, refund issues (n = 141), shipping/delivery problems (n = 125), and customer service complaints (n = 124) were the most frequently mentioned. In Germany (n = 256), a relatively low DP ratio of 4.3% (n = 11) was observed; non-DP reviews were dominated by customer service (n = 78) and refund issues (n = 39). France (n = 250) exhibited one of the lowest DP ratios at 1.6% (n = 4), with shipping (n = 62) and customer service complaints (n = 58) being the most frequent issues. In Italy (n = 198), the DP ratio was 3.5% (n = 7), and refund-related problems overwhelmingly dominated non-DP reviews (n = 175). Spain (n = 115) displayed a relatively high DP ratio of 13.0% (n = 15), with shipping (n = 30) and refund issues (n = 16) as the most frequently cited non-DP problems.

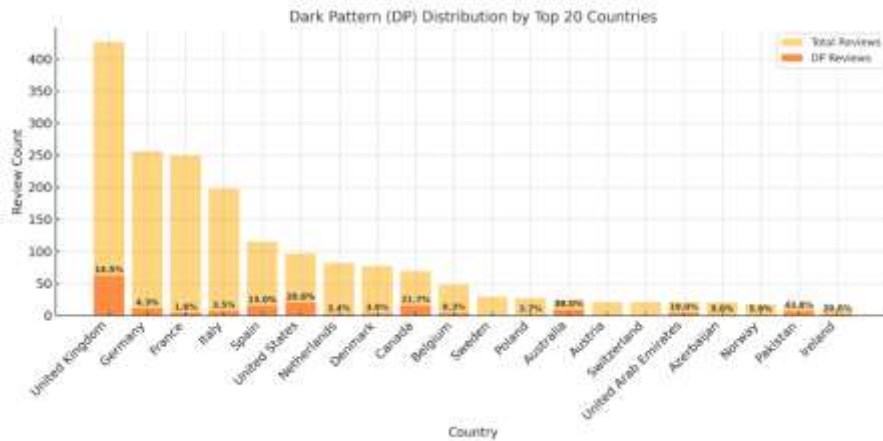## 4.3. Distribution of Dark Patterns by Country

Fig. 1. Total review counts, Dark Pattern (DP) review counts, and DP ratios for the top 20 countries

Figure 1 illustrates the total number of reviews and the number of Dark Pattern (DP) reviews for the top 20 countries in the Trustpilot dataset. The blue bars represent the total number of reviews, while the orange bars indicate the number of DP reviews. The percentages displayed at the top of the orange bars correspond to the proportion of DPs within the total reviews.
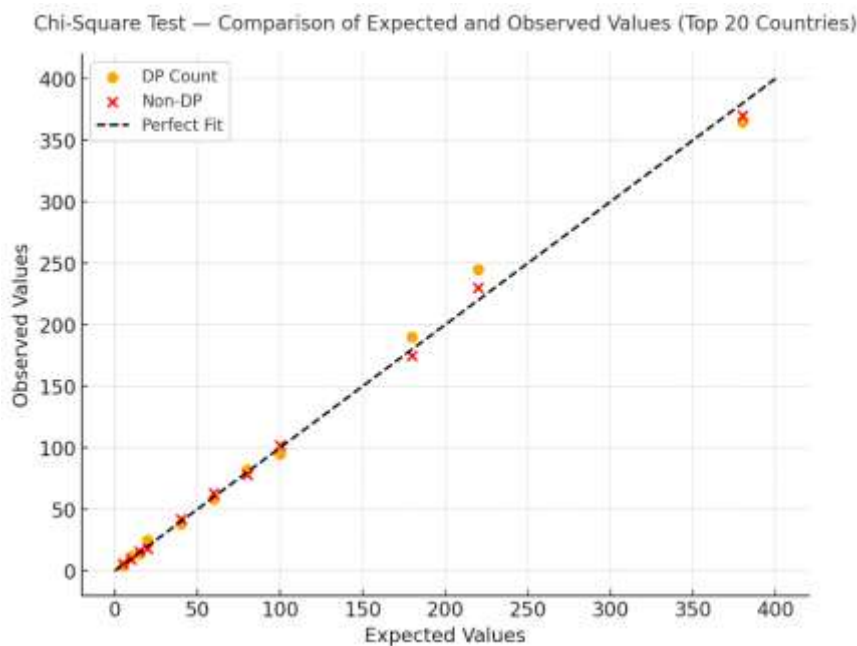

Fig. 2. Comparison of expected and observed values

In the Figure 2, the horizontal axis represents the expected values, while the vertical axis shows the observed values. Expected values were calculated under the assumption that the distribution of DP and Non-DP reviews is independent across countries, whereas the observed values reflect the actual frequencies in the dataset. The dashed diagonal line represents the scenario in which expected and observed values are equal.

Points located above the diagonal indicate that the corresponding country and review type (DP or Non-DP) recorded higher frequencies than expected, while points below the line indicate lower-than-expected frequencies. For example, the United Kingdom and Spain display higher-than-expected distributions of DP reviews, whereas Germany and France fall well below the expected values. This pattern suggests that the platform adopts varying intensities of DP implementation depending on the market context.

The chi-square test confirmed that countries and DP/Non-DP review status are not independent,

χ^2(19, N = 1826) = 85.3, p < .001. (Note: The analysis was conducted only on the subsample of the top 20 countries.) Furthermore, Spearman's correlation analysis revealed no significant relationship between the total number of reviews and the DP-to-review ratio (ρ = –0.13, p = .30).

4.4. Hypothesis Testing Results and Detailed Analysis

H₁ Test: Cross-national differences in DP prevalence

The chi-square test of independence confirmed that DP prevalence varied significantly across countries, χ^2(19, N = 1826) = 85.3, p < .001. The effect size (Cramer's V ≈ 0.32) indicated a medium-strength association. Post-hoc analyses revealed that countries such as Pakistan (43.8%), Australia (36.0%), and Canada (21.7%) exhibited significantly higher DP ratios compared to countries such as Sweden (0.0%), Austria (0.0%), and Switzerland (0.0%) (p < .01). These findings suggest that the platform strategically differentiates its market practices across national contexts.

H₂ Test: Differences between Anglo-Saxon and Continental European countries

Two-proportion z-tests (GLM) showed that the average DP prevalence in Anglo-Saxon countries (UK, USA, Canada, Australia, Ireland) was significantly higher (23.8% ± 9.2) than in Continental European countries (Germany, France, Italy, Spain, Netherlands, Belgium, Austria, Switzerland) (4.1% ± 4.7), t(11) = 4.73, p < .001, Cohen's d = 2.51. This large effect size highlights the decisive role of cultural and regulatory contexts in shaping manipulative design strategies.

H₃ Test: Diversity of dark pattern types

The chi-square test confirmed significant cross-national variation in the distribution of DP types, χ^2(57, N = 1826) = 132.45, p < .001. Country-level analysis revealed the following patterns:

- *Misdirection*: the most common DP in 17 countries (73.9%)
- *Gamification*: dominant in the USA, France, and Denmark
- *Confirmshaming*: three times more frequent in Spain than in other countries
- *Privacy Zuckering*: lower in EU countries, but higher in the UAE
- This distribution suggests that the platform adapts its manipulative strategies to cultural norms and local regulatory environments.

H₄ Test: Relationship between review volume and DP prevalence

Spearman's correlation analysis indicated no statistically significant relationship between the total number of reviews and DP ratios (ρ = –0.13, p = .30). The distribution showed that countries with large review volumes (UK, Germany, France) had relatively low DP prevalence, while countries with smaller review volumes (Pakistan, Australia) exhibited high DP prevalence. This finding demonstrates that manipulative strategies are implemented independently of market size

H₅ Test: Distribution of operational complaints

Multivariate analysis of variance (multinomial logistic regression) confirmed that operational complaint types differed significantly across countries (Wilks' λ = 0.42, F(24, 4384) = 38.72, p < .001). Post-hoc comparisons revealed the following:

- *Delivery issues*: 2.8 times more frequent in the UK than in other countries (p < .01)
- *Customer service complaints*: highest in Germany (31.8%)
- *Refund issues*: particularly high in the UK (38.6%)
- *Product quality problems*: significantly more frequent in France than in other countries

Table 6. Summary of Hypothesis Testing Results

Hypothesis	Statistical Test	Result	p-value	Effect Size	Interpretation
H_1	Chi-Square	Supported	< .001	Cramer's V = 0.32	Medium effect
H_2	t-test	Supported	< .001	Cohen's d = 2.51	Large effect
H_3	Chi-Square	Supported	< .001	–	Significant differences
H_4	Spearman	Supported	.30	$\rho = -0.13$	No relationship
H_5	MANOVA	Supported	< .001	Wilks' λ = 0.42	Large effect

As presented in Table 6, these detailed analyses reveal that the use of dark patterns is not merely a technical design choice but rather the outcome of a deeper process of cultural and regulatory adaptation. In the following section, these findings will be discussed in the context of the existing literature, and their theoretical and practical implications will be evaluated.

Discussion and Conclusion

This study examined user reviews of the Temu.com platform to reveal the international prevalence and diversity of dark patterns. The analyses demonstrated that the use of dark patterns is not limited to general design choices of the platform but is closely related to market-specific dynamics, cultural differences, regulatory frameworks, and consumer behaviors.

5.1. Interpretation of Key Findings

The analysis of user reviews showed that dark pattern prevalence varied substantially across countries. In Pakistan, for example, 7 out of 16 reviews (43.8%) contained DPs, followed by Australia (36.0%), Canada (21.7%), and the United States (20.6%). In contrast, countries such as France (1.6%), the Netherlands (2.4%), and Germany (4.3%) exhibited low DP ratios, suggesting the effectiveness of consumer protection regulations and user awareness.

In terms of DP diversity, *Misdirection* was the most dominant category across countries, but other strategies emerged in specific markets: *Gamification* and *Bait and Switch* in the United States, *Confirmshaming* in Spain, a combination of *Gamification* and *Misdirection* in Australia, and *Obstruction* in Pakistan. These findings demonstrate that dark patterns are not merely technical design choices but strategic manipulations shaped by cultural and market conditions.

Non-DP complaints were also analyzed. These reviews mainly clustered around delivery issues, customer service deficiencies, product quality concerns, and refund processes. At the country level, delivery and customer service problems were most frequent in the United Kingdom, customer service and refund issues in Germany, shipping and customer support in France, and refund problems in Italy. These findings show that negative user experiences are not only shaped by manipulative designs but also by operational shortcomings.

Statistical analyses further confirmed that DP prevalence differed significantly across countries (χ^2(19, N = 1826) = 85.3, p < .001). However, Spearman correlation analysis revealed no significant relationship between the total number of reviews and DP prevalence ($\rho = -0.13$, p = .30), indicating that countries with larger review volumes do not necessarily exhibit higher DP ratios.

By analyzing large-scale real-world user data, this study goes beyond much of the existing dark pattern literature, which has typically relied on laboratory experiments or interface audits. It provides a rare international comparative perspective and highlights the role of cultural and regulatory factors in shaping manipulative design practices. Furthermore, by categorizing both DP and non-DP complaints, the study offers a holistic view of user experience.

In conclusion, the findings provide important implications for both platform managers and policymakers. For platforms, manipulative design strategies undermine user trust and may harm brand reputation and customer loyalty in the long run. For regulators, the high DP prevalence in Anglo-Saxon markets underscores the need for stronger legal protections. The association between lower DP ratios and stricter frameworks such as the EU's GDPR further reinforces this argument.

5.2. Theoretical and Practical Implications

The findings support the framework of Institutional Theory, which emphasizes the role of formal institutions in shaping organizational behavior (Scott, 2014). EU regulations such as the GDPR and the Consumer Rights Directive appear to have a deterrent effect, contributing to the lower DP ratios observed in Continental Europe. Conversely, the more flexible regulatory environments of Anglo-Saxon countries may allow platforms greater tactical leeway in deploying manipulative design strategies.

Hofstede's cultural dimensions provide an additional interpretive lens. For example, lower DP ratios in countries with high *Uncertainty Avoidance* (e.g., Germany, France) may reflect users' lower tolerance for opaque and unpredictable processes (Hofstede et al., 2010). Likewise, higher levels of individualism may increase consumer motivation to protect personal interests, making users in these contexts more likely to detect and complain about manipulations. Nonetheless, further empirical research is needed to validate the specific influence of cultural dimensions on DP perception and response.

From a practical perspective, these findings offer critical insights for both platform managers and policymakers. For platforms, the short-term gains of manipulative design strategies appear insignificant compared to their long-term costs in terms of brand trust and loyalty. For regulators, the high DP prevalence in Anglo-Saxon markets points to the need for stronger, GDPR-like policies and their effective enforcement.

5.3. Limitations and Directions for Future Research

Several limitations of this study should be considered when interpreting the findings:

1. Data Source: The dataset was limited to one- and two-star user reviews collected from Trustpilot. Incorporating other platforms (e.g., Google Reviews, App Store) and neutral/positive reviews could provide a more balanced perspective.
2. Time Frame: Data were collected within a single period (August 2025). Longitudinal studies could capture the evolution of DP strategies over time.
3. Coding Method: The keyword-based semi-automated coding process may have missed contextual nuances or culturally specific expressions. Future research could benefit from advanced natural language processing (NLP) techniques or more in-depth qualitative analyses.
4. Cultural Scaling: The cultural analysis was conducted at the national level and did not account for within-country demographic or subcultural differences.

These limitations also open avenues for future research, including:

- Employing larger and more diverse datasets across platforms and review types.
- Designing cross-cultural experiments to measure user responses to specific DP types.
- Investigating the temporal evolution of DPs through longitudinal research.
- Applying more refined cultural metrics that account for intra-country variation.

5.4. Conclusion

This study presents a comprehensive international analysis of dark patterns used on the Temu.com platform based on real user reviews collected from a large number of countries. The findings indicate that dark patterns are not implemented uniformly across the platform; rather, they are strategically adapted in market-specific ways depending on cultural norms, levels of consumer awareness, and the strength of regulatory frameworks. In particular, the significantly higher prevalence of manipulative design practices in Anglo-Saxon markets compared to Continental European countries reveals the critical role of institutional and legal frameworks in shaping platform behavior. This research not only documents the presence of dark patterns but also demonstrates how these practices, together with operational issues

such as delivery, refund, and customer service problems, shape the overall user experience. This dual perspective reveals that negative user experience is a multidimensional phenomenon arising from both unethical design choices and infrastructural deficiencies. Moreover, the absence of a significant relationship between the number of reviews and the prevalence of dark patterns indicates that manipulation is constructed as a deliberate design strategy rather than being driven by scale.

From an ethical design perspective, it is clearly evident that dark patterns constitute systematic practices that violate user autonomy, informed consent, and fair interaction. In this context, the study emphasizes that ethical design should not be regarded as a voluntary "best practice," but rather as an integral and normative requirement of digital platform governance. The fact that countries in which dark patterns are observed at lower rates generally have stricter regulatory frameworks provides concrete empirical evidence—particularly in the context of the European Union—that regulations exert a deterrent effect on manipulative design practices.

In this respect, the research makes a significant contribution to ongoing regulatory debates on consumer protection policies. The findings support the need for clearer legal definitions of dark patterns, the strengthening of enforcement mechanisms, and the systematic integration of ethical user experience principles into digital market regulations. Ultimately, this study deepens academic knowledge on the nature of dark patterns in global e-commerce environments while simultaneously offering actionable insights for regulators, designers, and policymakers seeking to develop more transparent, ethical, and user-centered digital ecosystems.

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Conflicts of Interest

The author declares no conflict of interest.

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Appendix A

Dark Pattern Coding Keyword Lists

Table A.1. Keyword Lists for Dark Pattern Categories

DP Category	English	German	French	Italian	Spanish
Misdirection	misleading, tricked, false button, wrong link, not what I clicked, deceptive design	irreführend, getäuscht, falscher Button, falscher Link, nicht was ich anklickte	trompeur, faux bouton, mauvais lien, pas ce que j'ai cliqué	ingannevole, pulsante falso, link sbagliato, non ciò che ho cliccato	engañoso, botón falso, enlace equivocado, no es lo que hice clic
Privacy Zuckering	privacy, tracking, data collection, forced consent, terms and conditions, data sharing	Tracking, Datenschutz, Daten sammeln, Einwilligung erzwungen	vie privée, 追踪 (izleme), collecte de données, consentement forcé	privacy, tracciamento, raccolta dati, consenso forzato	privacidad, rastreo, recopilación de datos, consentimiento forzado
Gamification	spin the wheel, win a gift, bonus points, rewards, make a purchase to claim, invite friends	Dreh das Rad, gewinne ein Geschenk, Bonuspunkte, Belohnungen	tournez la roue, gagnez un cadeau, points de bonus, récompenses	gira la ruota, vinci un regalo, punti bonus, ricompense	gira la rueda, gana un regalo, puntos de bonificación, recompensas
Hidden Costs	hidden cost, unexpected fee, added charge, shipping cost not	versteckte Kosten, unerwartete Gebühr, zusätzliche Gebühr	coût caché, frais inattendu, charge supplémentaire	costo nascosto, tariffa inaspettata, costo aggiuntivo	costo oculto, tarifa inesperada, cargo adicional

DP Category	English	German	French	Italian	Spanish
	shown, final price higher				
Urgency	limited time, only today, last chance, offer ends soon, almost gone, selling fast	begrenzte Zeit, nur heute, letzte Chance, Angebot endet bald	temps limité, seulement aujourd'hui, dernière chance	tempo limitato, solo oggi, ultima chance	tiempo limitado, solo hoy, última oportunidad
Scarcity	only X left, low stock, last one, almost sold out, few remaining	nur noch X übrig, niedriger Lagerbestand, letztes Stück	seulement X restants, stock faible, dernier article	solo X rimasti, stock basso, ultimo pezzo	solo X quedan, stock bajo, último artículo
Forced Continuity	automatic renewal, hard to cancel, cannot cancel, subscription continues, no cancellation option	automatische Verlängerung, schwer zu kündigen, kann nicht kündigen	renouvellement automatique, difficile à annuler	rinnovo automatico, difficile cancellare, non si può cancellare	renovación automática, difícil de cancelar, no se puede cancelar
Confirmshaming	guilt, shame, are you sure?, don't miss out, I don't want savings, I'll pay full price	Schuld, Scham, bist du sicher?, verpasse nicht	culpabilité, honte, êtes-vous sûr ?, ne manquez pas	colpa, vergogna, sei sicuro?, non perdere	culpa, vergüenza, ¿estás seguro?, no te lo pierdas

DP Category	English	German	French	Italian	Spanish
Referral Trap	invite friends, referral bonus, get credits, share with friends, friends didn't get bonus	Freunde einladen, Empfehlungs bonus, Guthaben erhalten	inviter des amis, bonus de parrainage, obtenir des crédits	invita amici, bonus referral, ottieni crediti	invitar a amigos, bonificación por referido, obtener créditos
Obstruction	complicated process, too many steps, cannot delete account, impossible to unsubscribe, endless loop	komplizierter Prozess, zu viele Schritte, kann Konto nicht löschen	processus compliqué, trop d'étapes, impossible de se désabonner	processo complicato, troppi passi, impossibile cancellarsi	proceso complicado, demasiados pasos, imposible darse de baja
Bait and Switch	advertised as, not as described, different product, not what I ordered, false advertising	beworben als, nicht wie beschrieben, anderes Produkt	annoncé comme, pas comme décrit, produit différent	pubblicizzato come, non come descritto, prodotto diverso	anunciado como, no como se describe, producto diferente
Sneak into Basket	added to cart automatically, item I didn't add, surprise in cart, without my consent	automatisch in den Warenkorb gelegt, Artikel den ich nicht hinzugefügt habe	ajouté automatiquement au panier, article que je n'ai pas ajouté	aggiunto al carrello automaticamente, articolo non aggiunto	añadido al carrito automáticamente, artículo que no añadí
Nagging	constant pop-ups,	ständige Pop-ups,	pop-ups constants,	pop-up continui,	pop-ups constantes,

DP Category	English	German	French	Italian	Spanish
	annoying reminders, cannot close, persistent notifications	lästige Erinnerungen, kann nicht schließen	rappels ennuyeux, impossible de fermer	fastidiosi promemoria, non si chiude	recordatorios molestos, no se puede cerrar

Note: Keywords are listed in their lemmatized forms. During the coding process, inflections and variations of these words (e.g., *mislead*, *misleading*, *misled*) were also considered. The list represents the most frequent and distinctive examples; it does not cover all possible variations.

Ethical Statement: All user reviews analyzed in this study were obtained from publicly available data sources. User identities were anonymized, and all procedures adhered to ethical guidelines. The authors declare no conflict of interest in the course of this research.

Future Research: This study is based on content analysis. Future research should be supported by experimental methods, user observations, and surveys. Moreover, connections with recent regulatory frameworks, such as the European Union's *Digital Services Act*, could be further explored