



# PROTECTING USER DATA: ANALYSING CONSENT NOTICES AND BEHAVIOURAL PATTERNS IN E-COMMERCE

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## Abstract:

In recent years, e-commerce has made everyday life much easier by enabling quick and convenient shopping. However, this brings with it both advantages and risks. One of the biggest challenges is to protect user data. Thanks to the GDPR and the CCPA, users are given greater transparency and control over their data when interacting online.

In this context, consent notices have become a key element of online interactions, providing users with clear information about how their data is being used. These notices often appear when visiting a website or when there are changes to the privacy policy, allowing users to make informed decisions about their privacy. Through properly designed notices, users are allowed to control their data and express their consent in a way that suits their needs and preferences. This represents an important step towards strengthening user trust in the online environment and improving privacy protection on the Internet.

The research analyses in detail the acceptance of the use of cookies on the e-commerce site. It focuses on how users react to cookie notifications and what options they choose when deciding whether to accept or reject cookies. The goal of the research is a deeper understanding of user behaviour and preferences regarding privacy and data protection when shopping online.

## Keywords:

Consent Notices, User Privacy, E-commerce, GDPR, Cookies.

## INTRODUCTION

In today's digital era, where nearly every aspect of our lives is moving online, the most important things are data protection and user privacy. The rapid development of technologies brings us many advantages, but on the other hand, it brings us some risks.

E-commerce is one of the greatest things that evolved from surging internet and technology development. It has made our lives easier in many ways. Time-saving, increased purchasing flexibility, and increased customer loyalty are just some of the numerous advantages. E-commerce enables customers to purchase quickly and easily. During online shopping, users share sensitive information such as credit card numbers, addresses, and some private data.

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Therefore, there are risks of misuse of users' private data and unauthorized access.

In recent years, laws have come into force that deal with the protection of user privacy. These are the European Union's General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA). GDPR is the EU's data protection and security law [1], while the CCPA is a law covering the use of California citizens' data [2]. These laws support independent decision-making through information, increasing transparency requirements in companies' data collection practices, as well as strengthening the rights of individuals regarding their data.

The GDPR's impact was very important. Websites now ask users for consent before placing cookies in the form of cookie banners when users visit the website. In that way, users can control whether and how much they allow their movement on the site to be tracked [3].

The primary objective of this research is to conduct a systematic analysis of the design of existing consent notices and user behaviour during the consent process on web pages. The analysis will be based on samples collected from the Serbian e-commerce website over a period of one month. Through this, researchers will investigate whether users accept all cookies, partially accept their use, or do not accept cookies, identifying patterns and trends in user behaviour. By analysing the collected data, researchers will gain insight into user preferences regarding the acceptance of cookies.

## 2. CONSENT NOTICES

Consent notices are notices displayed on websites or applications to inform users about the use of cookies, tracking pixels, and other similar data collection technologies. They usually appear when users visit a website for the first time or when there are changes to a website's privacy policy or cookies. These notices inform users of the website's data collection practices and provide options for users to accept or decline the use of these tracking technologies [4].

The use of consent notices became more prominent in the late 2000s and early 2010s, with the rise of online privacy concerns and increased regulatory scrutiny. Before this period, data collection practices on websites were often less transparent, and users had limited awareness of how their data was collected and used.

Consent notice use has been further encouraged by the passage of stronger privacy rules, such as the California Consumer Privacy Act (CCPA) in the United States and the General Data Protection Regulation (GDPR) in the European Union. According to these rules, websites and other online platforms must get users' express agreement before collecting and using their personal information. [5].

In recent years, consent notices have become commonplace on most websites and apps, reflecting the growing emphasis on transparency and user control over their personal data [6]. Although their implementation varies across platforms and legal frameworks, consent notices play a key role in empowering users to make informed decisions about their online privacy and data protection.

### 2.1. A HISTORICAL OVERVIEW OF CONSENT NOTICES: EVOLUTION OVER TIME

In the early days of the Internet, user data collection practices were less regulated, and notices about the use of cookies or other tracking technologies rarely appeared.

Cookies have become a more popular method of gathering user data at the start of the 21st century. Not everyone, though, was aware of their usage. After the 2009 modification to the EU ePrivacy Directive (EPD), which addressed concerns about the trust of digital communications and monitoring on the Internet, consent screens began to appear on websites. [7].

Consent interfaces have become more widespread after the general data protection of the European Union Regulation (GDPR), the comprehensive privacy legislation that has a global impact, entered into force in May 2018 [5]. Under the GDPR, organizations must seek consumer consent to process personal data beyond what is necessary to fulfill a legitimate business interest. GDPR has inspired several other national privacy laws, including one in Canada, Japan, South Korea, Colombia, Argentina, and South Africa [7]. GDPR also set the stage for the California Consumer Privacy Act (CCPA), which went into effect in January 2020.

California state law requires certain companies to notify consumers related to data collection. Among other privacy rights, it gives California residents have the right to opt out of personal data sold to third parties, for example, for marketing purposes [7]. The California Privacy Rights and Enforcement Act (CPRA), which entered into force in November 2023, it builds on the CCPA.



The law provides additional privacy rights for California consumers, including the right to give up the business using sensitive personal data and yes to give up part of the information with third parties (in addition on sale).

Furthermore, the CPRA expressly prohibits the use dark patterns design in consent interfaces [7]. As it may be too early to judge the organization's response CCPA, there is evidence of mixed compliance with GDPR consent requirements. After the GDPR went into effect in May 2018, 6,579 websites were evaluated, and Dege-ling's measuring study et al. discovered a 16% increase in cookie consent interface display.

So while consent notices have only become wide-spread in the last few years, their development has been a result of the evolution.

### 3. PROPERTIES OF CONSENT NOTICES

The consent notices found on the websites are different in terms of their user interfaces and their basic functionality. Some are only capable of displaying a notification that the website uses cookies or collects user data without providing any functionality to make the website comply with the visitor's choice. In contrast, other cookie notices are provided by third-party services that offer complex opt-in choices and block cookies until the user consents explicitly [8]. Certain graphical interface variables significantly affect the design and effectiveness of the consent notice itself. Size, colour, typeface, element order, use of graphics or photos, and interactive features like buttons or links are a few examples of these variables. Users' perceptions and their propensity to accept or reject the usage of cookies and other tracking technologies can be greatly influenced by these variances. Thus, in order to create consent notices that strike the best possible balance between user information, aesthetics, and functionality, it is crucial to give careful consideration to these factors [9].

Some of the most important variables are size, position, blocking, and choices.

**Size.** The size of the consent notice depends on some factors. Generally, on smartphones, the consent notification is displayed over the entire screen, while on computers, the notification is displayed in one part of the screen. The size of the consent notice may also be predetermined by the design itself.

**Position.** The position of the consent notice can be displayed in one of seven positions: in one of the four corners, in the middle, at the top, and at the bottom of the page.

**Blocking.** Some consent notices prevent visitors from interacting with the website before making a decision.

**Choices.** Consent notices offer website visitors several possible options:

1. **No notification.** The website informs the user about the use of cookies without any possibility of interaction;
2. **Confirmation only.** Banners have a confirmation button with text like "OK" or "I agree", clicking on it interprets as an expression of consent of the user;
3. **Binary.** Banners have 2 buttons: to accept or reject the use of all web cookies on the website; and
4. **Category.** Banners that allow the user to make a choice. Visitors can allow or disallow cookies for each category individually [8].

### 4. RESULTS AND DISCUSSION

Based on the research that was done, several user behaviours were seen in relation to approving or refusing the use of cookies. The user must indicate his agreement to the usage of cookies in order to access the website. This consent notice requests the user's consent to use analytical and advertising cookies while informing them that cookies are required for the website to function properly. The user can choose to refuse the use of advertising and analytical cookies, accept them fully, or only in part.

Google Analytics tools are used for analysis, while Google Ads is used for advertisements. The data analysis was performed on the number of users who visited the website in a period of one month.

It was found that 53% of users accepted all cookies – including analytical and advertising cookies, 31% accepted partially - analytical or advertising cookies and 16% refused to use cookies – they accepted only necessary cookies. Figure 1 shows a chart representing the percentage of people who accepted, partially accepted or accepted only necessary cookies.

Of the 31% of users who partially accepted the use of cookies, 37% approved the use of Google Analytics, and 63% approved the use of Google Ads. Figure 2 shows a chart representing the percentage of people who accept Google Analytics cookies and accept Google Ads cookies.



### ANALYSIS



Figure 1. Acceptance Chart.

### PARTIALLY ACCEPT COOKIES

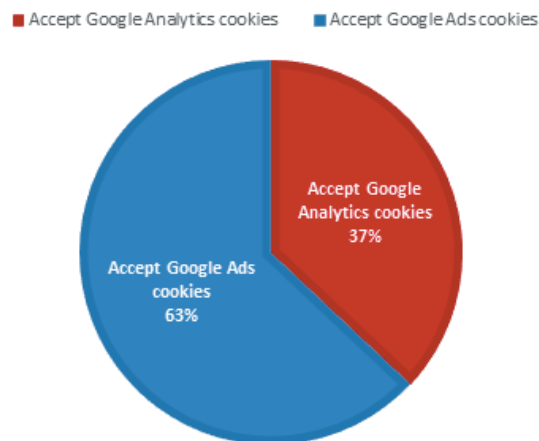


Figure 2. Partially Acceptance Chart.

## 5. CONCLUSION

This analysis highlights the importance of providing transparent information and privacy control options to users, to respect their preferences and ensure that their experience on the website they visit is in line with their expectations. Also, these results can serve as a basis for further adjustment of cookie policies and communication strategies with users, which would contribute to improving their satisfaction and trust in the platform.

The fact that a certain number of users have accepted the use of cookies for Google Ads indicates that users accept and want personalized advertising content to be shown to them on other websites and social networks.

That fact alone shows that there is an increasing need for artificial intelligence and automation within digital marketing. Platforms like Segmentify and Klaviyo allow for easier personalization and automation.



## 6. REFERENCES

- [1] “General Data Protection Regulation (GDPR),” [Online]. Available: <https://gdpr-info.eu/>.
- [2] “California Consumer Privacy Act (CCPA),” [Online]. Available: <https://oag.ca.gov/privacy/ccpa>.
- [3] D. Lin and M. C. Loui, “Taking the byte out of cookies: privacy, consent, and the Web,” *ACM SIGCAS Computers and Society*, vol. 28, no. 2, pp. 39-51, June 1998.
- [4] O. Pantelic, K. Jovic and S. Krstovic, “Cookies Implementation Analysis and the Impact on User Privacy Regarding GDPR and CCPA Regulations,” *Sustainability*, p. 14, 2022.
- [5] G. Burkhardt, F. Boy, D. Doneddu and N. Hajli, “Privacy Behaviour: A Model for Online Informed Consent,” *Journal of Business Ethics*, 2022.
- [6] H. Wang, M. K.O. Lee and C. Wang, “Consumer Privacy Concerns about Internet Marketing,” *Communications of the ACM*, p. 7, 1998.
- [7] H. Habib, M. Li, E. Young and L. Cranor, ““Okay, whatever”: An Evaluation of Cookie Consent Interfaces,” in *CHI '22: Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*, New Orleans, 2022.
- [8] C. Utz, M. Degeling, S. Fahl, F. Schaub and T. Holz, “(Un)informed Consent: Studying GDPR Consent Notices in the Field,” in *ACM SIGSAC Conference on Computer and Communications Security (CCS '19)*, London, 2019.
- [9] S. Mager and J. Kranz, “Consent Notices and the Willingness-to-Sell Observational Data: Evidence from User Reactions in the Field,” in *European Conference on Information Systems*, 2021.