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# **E-Government and User Experience: Evidence from Greek municipalities**

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## **Abstract**

This study investigates the digital presence and User Experience of local government websites in Greece, challenging the widespread assumption that low e-Government adoption is primarily due to citizens' digital illiteracy. Instead, it explores whether usability and design limitations serve as key barriers. Employing a mixed-methods approach, the research combines a qualitative survey with 26 participants, focusing on citizens' perceptions, emotional responses, and expectations, with a large-scale UX Audit of 138 municipal websites. The audit, based on a customized evaluation framework, assessed nine usability dimensions including navigation, content quality, accessibility, and interactivity. Findings reveal widespread inconsistencies in interface design, non-functional features (e.g., search, forms), and limited multilingual support, resulting in low overall performance. Survey participants expressed frustration, disengagement, and low trust toward their local governments' digital presence, despite increased digital maturity. Striking regional disparities were also observed, pointing to fragmented design practices and a lack of centralized digital governance. This systemic disconnect between citizens and public digital platforms highlights the urgent need for national-level standards and inclusive service design strategies. Improving usability, accessibility, and relevance of municipal websites is not only a matter of efficiency but also of democratic participation and digital equity.

**JEL Classification:** H83, O33, D83.

**Keywords:** citizens' experience, municipal websites, user experience, digital inclusion, public service design

## **1. Introduction**

The relationship between digital governance and civic engagement has become increasingly central in the era of public sector digitization. As local governments strive to modernize their services and improve accessibility, municipal websites are emerging as critical tools for fostering transparency, participation, and trust. Yet, the effectiveness of these digital platforms in supporting meaningful citizen interaction remains an open question.

To begin with, e-democracy as a general concept lacks a single, universally agreed-upon definition, as highlighted by Coleman and Norris (2005). Various interpretations have since attempted to frame it within the broader context of digital interaction between citizens and

government institutions (i.e. Backus, 2001; Hacker and van Dijk, 2000). When it comes to local e-democracy specifically, the OECD (2020) defines it as the use of digital tools and online platforms by local governments to foster civic participation, promote transparency, and enhance collaboration between citizens and municipal authorities. It encompasses a range of practices, from providing access to public information to enabling digital consultations, feedback mechanisms, and online service delivery (Ali, 2023). In the context of municipalities, e-democracy initiatives can serve as enablers of democratic engagement by offering citizens opportunities to influence local decisions, report issues, or access essential services without physical presence (Rodríguez Bolívar, 2016). However, the effectiveness of such initiatives often depends on the design, usability, and relevance of the digital systems in place (Ali, 2023; Aichholzer and Rose, 2020, Mihova, 2019). Therefore, e-democracy at the local level is not only a matter of digital access, but also of meaningful interaction supported by functional and user-friendly digital environments.

User Experience (UX) in the context of municipal websites refers to the quality of users' interactions with local government digital services, including aspects such as usability, accessibility, task efficiency, trustworthiness, and emotional response (Goldsmith, 2018). Good UX design in e-government platforms ensures that users can easily navigate content, complete tasks efficiently, and feel confident and satisfied throughout their digital journey (Almarashdeh and Alsmadi, 2016; Alshamsi et al., 2016; Galvez and Youngblood, 2016). Inadequate UX, on the other hand, can create barriers to access and frustrate users, leading to disengagement from public digital services altogether (Bataneh et al., 2017; Galvez and Youngblood, 2016; Huang and Benyoucef, 2014). Since municipal websites act as key gateways for citizens' interaction with their local governments, their design quality directly influences both user adoption and trust in public administration (Jun et al., 2014; Voutinioti, 2013; Scott, 2006). In this light, evaluating the UX of such platforms becomes critical to understanding how well they support citizens' needs and promote broader goals of digital inclusion and democratic participation (Abdurahman, 2022).

Previous studies on digital governance have primarily emphasized top-down implementations of e-Government platforms and the technical preparedness of public administrations (Balaji, 2025; Milacovich, 2021; Mergel et al., 2019; Cordella and Tempini, 2015; Dunleavy, 2005). However, the actual effects of these initiatives on public sector transformation remain contested (Baldwin et al., 2012; Kuhlmann and Bogumil, 2021; Nicholls, 2019). While the literature acknowledges the potential of digitalization to reshape governance processes, further empirical research is needed to uncover the mechanisms and sources of institutional change (Mahoney and Thelen, 2009), as well as its implications for organizational dynamics and performance outcomes.

In the Greek context, attention has often centered on barriers to adoption such as digital illiteracy, outdated infrastructures, and fragmented service delivery (Anastasopoulou et al., 2025; Chairistanidis and Rusu, 2024; Chourmouziadis, 2024; EC, 2020; Choudrie et al., 2018; Katsikas and Gritzalis, 2017). More recently, the discourse has shifted toward examining the maturity level of digital platforms (Patergiannaki and Pollalis 2024), as well as the overall quality of governmental municipal websites (Georgios and Nikolaos, 2021; Patergiannaki, 2023; Patergiannaki and Pollalis, 2022; 2021). These studies question the ongoing relevance of these systems to user needs (Patergiannaki and Pollalis, 2022) and emphasize the role of trust (Papadopoulou et al., 2010), in enabling user adoption. While several contributions have assessed the progress of central government platforms like gov.gr (Dimitreloy and Fouskas, 2023; Spinellis et al., 2022), the evaluation of local government websites, namely the municipal websites, particularly through the lens of user experience (UX), remains limited and fragmented.

Notably, a small number of technical audits have surfaced deficiencies in web performance, accessibility, and service availability across selected Greek municipalities (Panayiotou and Stavrou, 2019; Chatzopoulos, 2009, Patergiannaki et al., 2020). However, few studies have approached this issue through a comprehensive, citizen-centered framework that examines how design, usability, and content influence user trust and platform adoption at the local level (Tsatsani and Pollalis, 2024). Moreover, there is a marked absence of research that integrates qualitative citizen feedback with structured usability assessments across a broad regional sample. This has resulted in an incomplete understanding of the structural and experiential barriers that hinder engagement with municipal platforms.

### *Study Innovation*

This study represents the first large-scale empirical investigation into the usability and User Experience (UX) of Greek municipal websites, employing a dual-method approach. It combines a citizen survey—designed to capture users’ perceptions, expectations, and difficulties—with a customized UX Audit grounded in a tailored adaptation of David Travis’s “Experts’ Review Checkpoint List” (2014) for e-Government platforms. Applied to 138 municipalities, this framework moves beyond previous research that primarily emphasized technical or institutional barriers, drawing attention instead to the critical impact of design quality and functional relevance in either enabling or hindering local e-democracy. In doing so, the study introduces a replicable UX Audit tool that can be used for ongoing evaluations of public-sector digital services. To the best of our knowledge, this is the most extensive citizen-oriented UX assessment of local e-Government services in Greece to date, offering diagnostic insights alongside actionable recommendations for policy development, service design, and public administration.

## **2. Literature Review**

### **2.1 Importance of Municipal Websites for Citizen Interaction & Participation**

Municipal websites serve as the primary digital interface between local governments and citizens, playing a central role in enabling everyday interactions, delivering public services, and promoting civic participation. In democratic societies, especially within the framework of e-democracy, these websites are not merely administrative tools but essential infrastructures for ensuring transparency, accountability, and inclusiveness at the local level. Through municipal portals, citizens can access critical information, such as council decisions, budgets, and local initiatives, while also completing key administrative tasks—from submitting forms and paying fees to booking appointments and filing requests. More importantly, well-designed municipal websites can act as participatory channels, offering features like e-consultations, surveys, or feedback mechanisms that allow residents to voice their opinions and co-shape local decision-making.

The strategic value of municipal websites has been further amplified by broader trends in digital governance, where local authorities are expected to act not only as service providers but also as facilitators of dialogue and community engagement. In rural or geographically isolated areas, such as remote islands or mountainous municipalities, digital platforms may represent the only practical means of communication with local authorities, making their reliability and accessibility even more crucial. This function is especially vital in contexts with vulnerable populations (e.g., elderly citizens, migrants, or refugees), who may rely on digital access to seek services, information, or social support. Thus, municipal websites are increasingly positioned as key determinants of digital inclusion and citizen empowerment. Their quality, usability, and relevance directly affect citizens’ sense of connection to local

governance, their ability to navigate bureaucratic processes, and their overall trust in institutional responsiveness.

However, the potential of municipal websites to foster participation and inclusion is contingent on the extent to which they are designed with citizens in mind. Without accessible navigation, clear content structures, and language options, these platforms risk reinforcing existing inequalities and excluding less digitally literate users. As such, the role of User Experience (UX) design becomes central, not only as a technical matter but as a democratic imperative. Inadequate design or the complete absence of municipal websites limits opportunities for interaction, undermines transparency, and distances citizens from the political and administrative life of their communities. Ensuring that these digital touchpoints are functional, inclusive, and participatory is therefore essential for advancing local e-democracy and strengthening citizen–municipality relations in the digital era.

## **2.2 Digital Transformation in Local Governance**

The integration of Information and Communications Technology (ICT) in public administration has become central to contemporary efforts to modernize governance and enhance citizen engagement. Digital transformation in the public sector extends beyond technical infrastructure, encompassing institutional change, new governance models, and a reconfiguration of the citizen–state relationship. Within this context, e-empowerment refers to the use of digital technologies to enable citizens to participate more actively in public decision-making processes, strengthening democratic engagement and bottom-up influence (Wimmer, 2007; Macintosh, 2004).

The COVID-19 pandemic further accelerated the demand for digital public services, underscoring the importance of e-participation and collaborative governance infrastructures. In response, international and European institutions have developed frameworks to assess digital government performance. At the global level, the United Nations' E-Participation Index (EPI), part of the e-Government Development Index (EGDI), evaluates government support for e-information, e-consultation, and e-decision-making (UN, 2018). Greece has demonstrated notable progress in this area, improving its EPI ranking from 65th in 2016 to 34th in 2018, with gains across all participation dimensions (Costopoulou et al., 2021; UN, 2016; 2014).

At the European level, digital government performance is assessed through the lens of User Centricity, which includes online availability, usability, mobile-friendliness, and user support (EC, 2021; 2020). Although Greece has improved substantially in usability and mobile optimization, reaching 93% usability and a 15% increase in mobile-friendliness between 2016 and 2019, it continues to face challenges in service availability and digitization consistency. As a result, Greece has been classified as a “Non-Consolidated” and later “Unexploited” e-government country, reflecting persistent structural gaps despite increased digital penetration (EC, 2021; 2020).

This apparent paradox, namely the high infrastructure penetration combined with limited service maturity, highlights the need to shift analytical focus from connectivity to service design, usability, and functional relevance. Consequently, research attention has increasingly turned toward the evaluation of digital service maturity, particularly at the local government level. Maturity models emphasize strategic alignment, interactivity, and responsiveness to citizen needs; however, Greek municipalities remain at uneven and often early stages of digital maturity, with limited service scope and weak alignment with user expectations (Patergiannaki & Pollalis, 2024).

To address local-level assessment challenges, instruments such as the United Nations' Local Online Service Index (LOSI) have been introduced to evaluate municipal digital services while accounting for contextual variation (UN, 2018). Nevertheless, the applicability and consistency of LOSI across diverse local systems remain under discussion, suggesting the need for complementary evaluation approaches (Steinbach et al., 2019).

Empirical research at the municipal level in Greece further confirms these maturity gaps. Using the Citizen Web Empowerment Index (CWEI), Costopoulou et al. (2021) identified limited but emerging e-participation practices, primarily concentrated on e-information rather than interactive engagement. Similarly, Ntaliani et al. (2017) reported underdeveloped adoption of mobile technologies for civic engagement across Greek municipalities, emphasizing the absence of coherent implementation strategies.

A consistent finding across studies is the growing disparity between national and local digital platforms. While national portals such as gov.gr have advanced rapidly in usability, interactivity, and service coverage (Alexopoulos et al., 2018; Costopoulou et al., 2017), municipal websites largely remain informational and one-directional, offering limited interactive features such as online forms, feedback mechanisms, or participatory tools (Lappas et al., 2015). Despite selective ICT upgrades at the municipal level, progress in critical service domains and participatory functionalities remains fragmented, resulting in low overall digital maturity (Alexopoulos et al., 2018).

These structural and experiential gaps underscore the importance of incorporating users' perspectives into the evaluation of municipal digital platforms. Understanding how citizens perceive the usability, relevance, and participatory potential of local e-Government services is essential for informing strategic service design and increasing adoption (Costopoulou et al., 2021; Lappas et al., 2015).

Based on these insights, the following hypothesis guides the present study:

**H1.** Despite national progress in digital transformation, citizens perceive local municipal websites as insufficiently developed to address their service needs or support meaningful e-participation.

### **2.3 User Experience in Governmental Websites**

Usability is a multidimensional concept that encompasses both technical effectiveness and human-centered interaction. It refers not only to how efficiently a system performs its intended functions, but also to how intuitive, clear, and meaningful the overall User Experience is (Hartson and Pyla, 2012; Albert and Tullis, 2017; Bevan, 2008). Core usability dimensions include navigation, content accessibility, and information architecture, alongside perceptual and experiential elements such as aesthetics, clarity, trustworthiness, and emotional satisfaction (Hassenzahl & Tractinsky, 2006; Hassenzahl & Ullrich, 2007).

Within e-government contexts, usability and learnability are inherently interconnected. Citizens must not only complete tasks successfully but also understand the system's logic, navigate services efficiently, and trust the information provided. Greece is positioned within the "Unexploited eGov" quadrant of the European benchmark, characterized by medium digital penetration but low service digitalization. This imbalance suggests that although digital services are accessible, shortcomings in design quality and usability hinder sustained user engagement and adoption.

Prior research consistently demonstrates that usability deficiencies undermine the effectiveness of digital governance. Navigation and information architecture are frequently identified as critical pain points, with poor structure contributing to increased abandonment

rates and reduced trust (Sönmez et al., 2024). Similarly, interface clarity, content transparency, and trust-supporting design cues are central to user satisfaction, while technical errors and incomplete information further diminish system reliability (Elshan et al., 2022; Van Riel et al., 2001).

These challenges are particularly salient at the municipal level, where citizens often seek rapid access to localized services and essential information. Vasilikopoulou (2017), examining Greek e-government services, identified three persistent barriers: the absence of a unified portal, unclear service-related information, and misalignment between online interfaces and offline administrative procedures. These findings align closely with the present study's UX Audit, which evaluates municipal websites across dimensions such as Navigation, Page Layout, and Task Orientation.

User-centered design has therefore been widely proposed as the primary strategy for improving e-Government adoption. Contrary to earlier assumptions emphasizing digital literacy or demographic factors, evidence suggests that system performance, specifically speed, visual clarity, and intuitive interaction, plays a more decisive role in acceptance and reuse (Fernandes et al., 2013; Tan et al., 2008). Citizens' willingness to engage with digital public services depends predominantly on usability rather than individual characteristics (Tsatsani & Pollalis, 2024).

Consequently, the systematic evaluation of interface design, content quality, navigational clarity, and technical reliability constitutes a foundational pillar of effective e-Government strategy. When these elements are adequately addressed, municipal websites can function not only as service delivery portals but also as mechanisms for trust-building, transparency, and democratic participation. These insights lead to the formulation of the following hypothesis:

**H2.** Municipal websites that demonstrate higher usability, reflected in effective navigation, intuitive layout, relevant content, and technical reliability, are more likely to be perceived by citizens as trustworthy and satisfactory.

## **2.4 Existing Studies on Greek Municipal Websites**

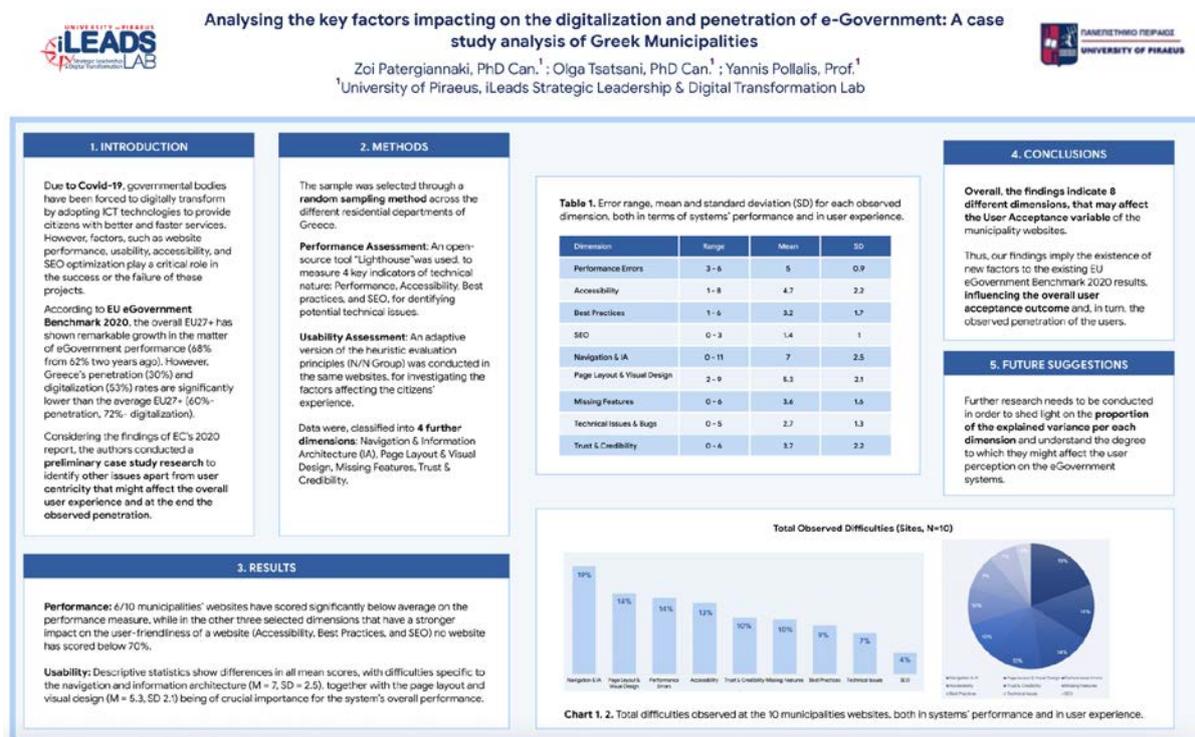
Over the past decade, a growing body of academic and institutional research has examined the digital presence and performance of Greek municipalities, consistently identifying structural limitations in usability, content quality, and interactivity. A recurring finding is that municipal websites predominantly operate as static information repositories rather than dynamic platforms supporting e-services or citizen participation (Ntaliani et al., 2017; Lappas et al., 2015).

Lappas et al. (2015), in an analysis of 52 municipal websites, reported limited use of interactive tools, shallow content depth, and minimal support for citizen engagement. Essential features such as online forms, feedback mechanisms, and multilingual support were largely absent. Similarly, Ntaliani et al. (2017) found that mobile access and mobile-oriented service design remained underdeveloped, reflecting weak strategic planning and limited responsiveness to evolving user needs.

A pilot study presented by Patergiannaki et al. (2020) evaluated 10 municipal websites using a combination of automated performance metrics and user-centered heuristic evaluation. Employing tools such as Lighthouse alongside Nielsen's usability principles, the study identified persistent issues in accessibility, navigation, and trust-related design elements. Navigation and information architecture emerged as the most problematic dimensions (19%), followed by page layout and visual design (14%) and performance-related errors (14%), indicating that usability shortcomings—rather than infrastructure alone—significantly constrain user satisfaction.

Building on these findings, Tsatsani and Pollalis (2024) conducted a follow-up study applying an Adapted UX Audit to the same set of municipalities. This approach integrated selected elements from David Travis’s (2014) Expert Review Checkpoint List with UX research principles and performance metrics, constituting the first holistic User Experience evaluation of Greek municipal websites. Results revealed uniformly low UX performance, with no website exceeding a 55% overall score. Technical performance and feature completeness were particularly weak (<50%), with common deficiencies including the absence of multilingual options, help mechanisms, and feedback channels. These deficits extend beyond usability concerns, directly impacting trust, satisfaction, and opportunities for civic participation.

**Figure 1.** Summary of UX and technical findings from the poster presentation at the International Conference on e-Government and e-Justice, Amsterdam, 2020. (Patergiannaki et al., 2020)



While national-level initiatives, such as the Citizen Web Empowerment Index (Costopoulou et al., 2021), have sought to assess transparency and citizen-oriented digital services, their scope remains limited and does not fully capture experiential usability dimensions. In contrast, the findings of EC's national platform gov.gr has evolved into a benchmark for integrated and user-friendly digital service provision. Municipal websites, however, continue to exhibit fragmented quality in navigation, content structure, and interface design, reinforcing a digital divide between national and local governance platforms (Alexopoulos et al., 2018).

Taken together, the accumulated evidence highlights persistent disparities in design quality, interactivity, and content relevance across Greek municipalities. These shortcomings motivate the following hypothesis:

**H3.** Despite infrastructure improvements, persistent usability issues in municipal websites—particularly in navigation, interactivity, and content relevance—limit user engagement and reinforce regional disparities in digital service adoption.

Addressing this methodological and empirical gap, the present study constitutes the first large-scale UX usability assessment of Greek municipal websites, employing a standardized, multidimensional audit framework across 138 local government platforms. This approach enables systematic Benchmarking of UX quality, reveals regional inequalities in digital service delivery, and contributes a citizen-centered perspective to the advancement of local e-government services.

## 2.5 Study Objectives

The primary objective of this study is to investigate citizens' expectations, evaluate their experiences with municipal services, and assess the overall digital performance of municipal websites. This research incorporates two distinct analyses:

1. A qualitative survey exploring citizens' opinions, expectations, and pain points regarding their interactions with municipalities and their digital platforms;
2. An Adapted UX Audit of 138 Greek municipal websites, evaluating key usability dimensions such as Navigation, Task Orientation, Page Layout, Content Clarity, Trust, and technical reliability.

By synthesizing user perception with expert-led audits, the study aims to provide a comprehensive, data-driven understanding of the current state of local e-Government services in Greece and to offer actionable recommendations for improving their usability, accessibility, and citizen adoption.

## 3. Methods

### 3.1 Study Design

This study employed a mixed-methods approach to provide a comprehensive evaluation of Greek municipal websites. The research combined qualitative data collection through a citizen survey with a systematic evaluation of website usability using an adapted UX Audit tool. The survey captured citizens' perspectives on the general effectiveness of their municipalities and their digital performance, focusing on their expectations, pain points, and prior experiences with municipal websites. This qualitative data provided valuable insights into user needs and satisfaction. Complementing this, the adapted UX Audit evaluated the User Experience of 138 municipal websites across Greece, representing a diverse sample of municipalities from different regions. The audit used a modified version of David Travis's "*Experts' Review Checkpoint List*" to assess key usability dimensions tailored to municipal services. This dual-method approach allowed for the integration of user feedback with objective usability metrics, ensuring a robust understanding of both the perceived and actual performance of municipal websites.

### 3.2 Survey

An online survey was conducted using Google Forms to gather insights into citizens' perspectives on Greek municipalities and their digital systems. The survey targeted a diverse sample and yielded 26 responses, focusing on two key domains: (a) citizens' perceptions of local government effectiveness and related service challenges, and (b) user perspectives on the digital performance of municipal websites. The survey was intentionally designed as a

qualitative, exploratory component of the study, aiming to capture in-depth perceptions and experiential patterns rather than to provide statistically generalizable results.

The survey instrument included both closed- and open-ended questions. Quantitative data captured variables such as frequency of engagement, familiarity with municipal services, and evaluations of digital performance using a 5-point Likert scale (1 = very poor, 5 = excellent). Qualitative data allowed participants to freely express their expectations, satisfaction levels, and perceived service deficiencies.

Data analysis followed a mixed approach. First, quantitative data were cleaned and processed in Excel to calculate descriptive statistics (means, standard deviations, frequencies), enabling a basic summary of user familiarity and perceived performance. For the open-ended responses, a six-step thematic analysis procedure was applied based on the framework by Braun and Clarke (2006). This involved familiarization with the responses, generation of initial codes, grouping of codes into broader categories, iterative review and refinement of themes, definition and labeling of thematic constructs, and quantification of thematic frequency. Coding and organization were completed manually to ensure close engagement with the dataset. Participants' comments were ultimately categorized into themes such as general opinions, pain points, expectations, past experiences, emotional responses, and proposed website improvements.

This combined analytical process enabled both a structured quantitative overview and a deeper understanding of subjective citizen experiences. Overall, this phase of the study provides a user-centered lens through which to identify actionable insights for improving municipal digital services in Greece.

### 3.3 UX Audit Assessment

#### 3.3.1 Original Expert Review Checkpoint List

The UX Audit tool used in this study is an adapted version of David Travis's "*Experts' Review Checkpoint List*" (2014), originally developed for e-commerce websites. The original checklist evaluates websites across nine dimensions: Homepage, Task Orientation, Navigation & Information Architecture, Forms & Data Entry, Trust & Credibility, Page Layout & Visual Design, Writing & Content Quality, Search, and Help, Feedback, Error Tolerance (Table 1). These dimensions include 247 individual statements that UX Experts can rate on a scale of -1, 0, or 1 based on the extent to which each statement is satisfied. The resulting scores are aggregated to provide an overall evaluation of a website's User Experience.

**Table 1.**  
Original Checkpoint List Framework with Dimensions and Corresponding Number of Statements (Travis, 2014)

Checkpoint List Dimensions	Number of Statements
Homepage	20
Task Orientation	44
Navigation & Information Architecture	29
Forms & Data Entry	23
Trust & Credibility	13

Page Layout & Visual Design	23
Writing & Content Quality	38
Search	20
Help, Feedback, Error Tolerance	37
Total	247

### 3.3.2 Adapted UX Audit – Framework

To tailor this tool to the specific context of municipal websites, the statements within each dimension were systematically reviewed and adapted. This adaptation ensured that the evaluation criteria were appropriate for municipal services, content, and user needs, diverging from the original e-commerce orientation. The process resulted in the removal, modification, or retention of specific statements within each dimension, guided by expert input to ensure content validity and maintain the theoretical integrity of the framework. The final adapted UX Audit checklist comprised nine dimensions with 216 total statements, reduced from the original 247, reflecting a more focused application for municipal websites (Table 2).

**Table 2.**

Adapted UX Audit tool with Dimensions and Corresponding Number of Statements

Checkpoint List Dimensions	Number of Statements
Homepage	19
Task Orientation	33
Navigation & Information Architecture	24
Forms & Data Entry	21
Trust & Credibility	10
Page Layout & Visual Design	19
Writing & Content Quality	37
Search	19
Help, Feedback, Error Tolerance	34
Total	216

The adaptation process ensured that the tool accurately captured the unique challenges and functionalities of municipal websites. For instance, statements originally related to product categories or purchasing workflows were modified to address municipal service categories and public administration processes. Similarly, statements regarding "checkout" and "shopping cart" were replaced with criteria relevant to forms, task completion, and government transparency. This careful adjustment provided a contextually relevant and reliable instrument to evaluate the performance of 138 municipalities out of the 336 total in Greece, making this study the first large-scale UX Audit of Greek municipal websites.

The following examples illustrate the adaptation process across key dimensions:

- **Homepage:** Adaptations included replacing statements like “*Product categories are provided and clearly visible on the homepage*” with “*municipality services' categories are provided and clearly visible on the homepage.*” Similarly, statements focused on e-commerce value propositions and corporate information were reframed to emphasize municipal information and transparency.
- **Task Orientation:** Several statements were removed due to irrelevance, such as those addressing pricing, shopping carts, or transaction workflows. Adapted examples include reframing “*The critical path (e.g. purchase, subscription) is clear, with no distractions on route*” to “*Critical paths (e.g. locate municipality services) are clear, with no distractions on route.*”
- **Navigation & Information Architecture:** Irrelevant criteria, such as the presence of site maps for product navigation, were removed while maintaining emphasis on effective and intuitive navigation for municipal content.
- **Trust & Credibility:** Statements emphasizing branding and marketing were reframed to address governmental transparency, e.g., “*The site's privacy policy is easy to find*” was adapted to “*The site's transparency policy (e.g., financial statements) is easy to find.*”
- **Writing & Content Quality:** Removed e-commerce-specific statements like “*Product pages contain the detail necessary to make a purchase*” and adapted others to emphasize municipal language clarity and accessibility.
- **Help, Feedback, Error Tolerance:** Statements related to e-commerce transactions were replaced with criteria relevant to municipal systems, such as feedback on page loading delays or navigation across multi-page forms.

This rigorous adaptation process preserved the theoretical robustness of the original framework while aligning the criteria with the distinct requirements of municipal websites.

Overall, beyond technical adjustments, the adapted UX Audit departs from the original e-commerce-oriented checklist by shifting the evaluative focus toward citizen-centric tasks, informational transparency, and public-service orientation. The tool emphasizes task discoverability, clarity of municipal services, and trust-related cues, reflecting the distinct goals and constraints of public sector digital platforms.

### 3.3.3 Methodology for Comparative Analysis of Municipal Website Performance

To assess the performance of municipal websites across regions, the analysis was conducted in three stages: (1) comparison of overall municipality scores by region, (2) identification of strengths and weaknesses across usability dimensions for each region, and (3) ranking of dimensions to highlight key usability issues for all investigated municipalities.

#### 3.3.3.1 Comparison of Overall Municipality Scores by Region

A one-way Analysis of Variance (ANOVA) was conducted to evaluate whether the overall municipality usability scores differed significantly across regions. Since the sample sizes of municipalities varied between regions, Welch's ANOVA was used to account for potential heterogeneity in variances. Post-hoc tests, specifically Games-Howell, were performed to identify which regions exhibited significant differences in usability scores. The results provided insights into regional disparities in digital performance and guided recommendations for targeted interventions.

#### 3.3.3.2 Regional Analysis of Usability Dimensions

To explore regional strengths and weaknesses, descriptive statistics, including mean, median, and standard deviation, were calculated for each usability dimension (e.g., Home, Navigation

& IA, Form & Data Entry) across regions. Dimension scores were ranked within each region to identify key areas of excellence and concern. For example, regions with low scores in "Home" were noted to have challenges with Homepage design and functionality, while regions scoring well in "Trust & Credibility" demonstrated stronger digital reliability and user trust. Visualization tools such as heatmaps and stacked bar charts were employed to communicate findings effectively.

### **3.3.3.3 Ranking Dimensions across Greek Municipalities**

To identify the most critical usability issues across all municipalities, the mean scores for each dimension were calculated and ranked in ascending order. A repeated-measures ANOVA was used to test whether the differences in mean scores between dimensions were statistically significant, further confirming the areas requiring the most urgent attention. This analysis revealed systemic issues affecting all regions, such as low scores in "Home" and "Page Layout & Visual Design," highlighting the need for targeted improvements in these areas.

## **3.4 Sampling and Data Collection**

The sampling process for the adapted UX Audit was designed to evaluate a representative subset of Greek municipal websites across different regions. Out of the 332 municipalities in Greece, 138 were randomly selected to ensure geographical and administrative diversity. Nine of these were excluded from the final analysis due to technical inaccessibility (e.g., non-functioning websites, redirection to Facebook pages, or absence of a secure domain). The goal was to maintain a feasible yet comprehensive sample that could offer meaningful insights across various regional contexts.

In terms of regional distribution, the Attica Region accounted for 33 evaluated municipalities out of 66. From the Thessaly and Central Greece Region, 3 out of 49 municipalities were included. Similarly, 3 municipalities were sampled from the Epirus and Western Macedonia Region, which comprises 31 municipalities in total. The Peloponnese, Western Greece, and Ionian Region was represented by 27 evaluated municipalities out of 31, while the Aegean Region contributed 23 out of 45. In the island of Crete, 15 municipalities were assessed out of a total of 24. Lastly, from the Macedonia and Thrace Region, 11 municipalities were included out of 60.

Overall, this resulted in a final analyzed sample of 129 municipalities, which corresponds to approximately 39% of the total municipalities in the country (see Table 3). This sample ensured the inclusion of municipalities from all major Greek administrative regions, allowing for a well-rounded and regionally diverse evaluation of website usability and performance. The adapted UX Audit tool was subsequently applied to these websites to systematically assess their User Experience across standardized criteria.

The total sample represents approximately **39% of all municipalities** in Greece, providing a substantial subset for evaluation. This sampling approach ensured that municipalities from all major Greek regions were included, allowing for a comprehensive evaluation of website performance across the country. The evaluation of these websites was carried out using the adapted UX Audit tool, providing insights into the User Experience of a significant portion of municipal websites.

**Table 3.** Distribution of Greek Regions with Total Municipalities, Sampled Municipalities, and Corresponding Sampling Percentages.

Administrative Region	Total Municipalities	Sampled Municipalities	Percentage Sampled
Attica	66	33	50%
Thessaly – Central Greece	49	3	6%
Epirus – Western Macedonia	31	3	10%
Peloponnese – Western Greece & Ionian	31	27	87%
Aegean	45	23	51%
Crete	24	15	62%
Macedonia – Thrace	60	11	18%
Total	332	129	39%

## 4. Results

### 4.1 Survey

To better understand citizens' awareness and perceptions regarding municipal services, a qualitative survey was conducted with 26 participants between 2021 and 2023. Thematic analysis was employed to synthesize responses related to prior interactions with municipalities and evaluate users' familiarity with and impressions of these services.

#### 4.1.1 Sample Characteristics

The sample consisted of 26 participants, 73% of whom were women and 27% men. The majority were between 30–39 years old (42.3%), followed by 18–29 (26.9%) and 40–49 (19.2%). Participants came from diverse employment backgrounds, with 34.6% working in the private sector, 19.2% being self-employed, and 15.4% unemployed. Regarding their residential history, 34.6% had lived in three different municipalities throughout their lives.

### 4.2 Citizen Experience with Local Municipalities

#### 4.2.1 User Familiarity & Citizen's Past Experience with Municipal Services

Participants were asked to indicate how familiar they felt with the services provided by their municipality and to evaluate their overall past experience interacting with municipal services. These questions aimed to contextualize their current opinions and emotional responses toward local government services and digital tools.

On a 5-point Likert scale (1 = "Not at all familiar", 5 = "Very familiar"), participants reported relatively low familiarity ( $M = 1.69$ ,  $SD = 0.84$ ). No one rated their familiarity above 3. When evaluating the quality of their past municipal interactions, the average score was moderate ( $M = 2.85$ ,  $SD = 1.16$ ), suggesting mixed or limited satisfaction with their experiences. These findings are summarized in Table 4.

**Table 4.** Descriptive statistics of the users’ familiarity and overall experience

	Mean	SD	Min	Max
User Familiarity	1.69	0.84	1.0	3.0
Overall Experience	2.85	1.16	1.0	4.0

In addition to rating their experience, participants were invited to describe past forms of engagement with their local municipalities. Thematic content analysis revealed six distinct types of municipal interactions (Table 5). The most frequently mentioned were **Administrative Services & Certificates** (23%), followed by **Infrastructure & Technical Services** (19%). Examples included document requests, road repair submissions, and contact with sanitation services. Notably, 15% of participants reported **no prior engagement** with their municipality.

**Table 5.** Thematic categorization of the reported reasons for citizens’ past engagement with municipal services

Thematic Category	Description	Frequency	Percentage (%)
Administrative Services & Certificates	Requests for certificates, permits, records	6	23
Infrastructure & Technical Services	Road repairs, sanitation, green space maintenance	5	19
Cultural, Social & Athletic Programs	Summer camps, festivals, community events, school award ceremonies	4	15
Requests & Complaints	Appeals, service reports, use of digital platforms like Novoville	4	15
Non-engagement	No previous contact or interaction with municipality	4	15
Political Involvement & Representation	Civic participation, volunteering, local council candidacy	1	4

Finally, participants offered brief open-ended justifications about their past experiences, which were thematically categorized into seven types (Table 6). Most frequently mentioned were **Delays & Low Responsiveness** (23%) and **Bureaucracy & Inefficiency** (19%), indicating systemic obstacles in local public service delivery. Other themes reflected both positive and negative perceptions regarding service organization (19%), professionalism of staff (15%), and the ease of digital interaction.

**Table 6.** Citizens’ evaluations of previous municipal services

Thematic Category	Description	Frequency	Percentage (%)
Delays & Low Responsiveness	Unfulfilled requests, long wait times, lack of follow-up	6	23
Bureaucracy & Inefficiency	Overlapping responsibilities, excessive paperwork	5	19
General Disorganization	Procedural confusion, lack of clarity in communication	5	19
Politeness & Professionalism	Positive or negative behavior from municipal staff	4	15
Timely & Effective Service	Fast, well-organized and efficient response	3	11
Digital Convenience & Accessibility	Reflections on ease or difficulty using online platforms	3	11
Negative Emotional Reactions	Expressions of frustration, fatigue, or disappointment	3	11

#### 4.2.2 Reported Current Pain Points with Municipalities

Participants were invited to share any pressing issues they currently face in their municipality. Thematic content analysis of the open-ended responses revealed nine distinct problem areas (Table 7).

The most frequently reported issue concerned waste management and public cleanliness (23%), including recurring complaints about poor sanitation services, irregular garbage collection, and inadequate recycling practices. A second cluster of concerns related to digital and User Experience barriers (19%), with participants describing outdated municipal websites, overloaded page layouts, and confusing navigation. Another 12% cited inadequate website structure and infrequent updates, while others expressed frustration with bureaucratic inefficiencies and slow administrative processes (12%). Infrastructure-related grievances, such as damaged roads, poor signage, or insufficient maintenance, also accounted for 12% of responses. Less frequent but notable issues included lack of transparency and responsiveness from municipal officials (8%), urban congestion and traffic disruptions (8%), and isolated mentions of safety concerns, public document inaccessibility, and deterioration of public services. These insights reflect a combination of operational, infrastructural, and digital pain points that affect both the physical and virtual engagement citizens have with their municipalities.

**Table 7.** Thematic categorization of citizen-reported current pain points regarding their municipality

Thematic Category	Description	Frequency	Percentage (%)
Waste Management & Cleanliness	Irregular garbage collection, lack of recycling, unsanitary streets	6	23
Digital Interface & UX Issues	Outdated websites, confusing layout, poor usability	5	19
Lack of Website Organization & Updates	Messy content structure, infrequent information refresh	3	11
Bureaucratic Inefficiencies & Delays	Slow processes, excessive paperwork, lack of automation	3	11
Infrastructure Problems	Damaged roads, bad signage, insufficient urban maintenance	3	11
Lack of Transparency	Perceived political bias, unclear procedures, missing accountability	2	8
Traffic & Urban Management	Poor traffic planning, disturbances from construction or waste pickup	2	8
Safety & Public Space Maintenance	Unsafe public spaces, lighting or policing issues	1	4
Document Retrieval Limitations	Difficulty retrieving public documents online	1	4

### 4.3 Citizen Experience with Municipalities’ Digital Portals

#### 4.3.1 Reasons for Visiting Municipalities’ Digital Portals

Participants were asked to reflect on their most recent experiences using their municipality’s digital platforms. The aim was to explore both the types of interactions that took place and the perceived quality of those interactions. Descriptive content analysis of the responses revealed five recurring themes of digital engagement (Table 8).

The most common reason for visiting municipal portals was information retrieval (30.8%), with citizens seeking administrative details, event announcements, or service availability. While some users were able to locate the information they needed, others encountered outdated or incomplete content. Another 26.9% of participants described successful task completion, reporting positive experiences related to form submissions, service applications, or document downloads. At the same time, usability and accessibility barriers (19.2%) were frequently mentioned, including non-intuitive design, visual clutter, and navigation issues. A smaller percentage (15.4%) expressed emotional reactions, ranging from satisfaction and pride to confusion or frustration. Finally, 7.7% of users shared specific use cases such as registering for summer activities, submitting objections, or reviewing municipal council decisions—demonstrating the breadth of user needs beyond administrative basics.

These findings underscore the dual role of municipal websites as both functional tools and experiential touchpoints. Usability, content clarity, and emotional resonance shape how citizens interact with and perceive their municipality’s digital presence.

**Table 8:** Thematic categorization of citizens’ reasons for visiting municipal websites

Thematic Category	Description	Frequency	Percentage (%)
Informational Retrieval	Accessing services, event listings, procedures	8	31
Successful Task Completion	Smooth interaction, form submission, service application	7	27
Usability & Accessibility Issues	Navigation problems, visual overload, layout difficulties	5	19
Emotional Responses	Satisfaction, confusion, frustration, indifference	4	15
Specific Use Cases	Unique actions like objections, council info, or summer registration	2	8

### 4.3.2 Digital Performance Rating

Participants were invited to justify their ratings by briefly describing their experience with the digital services offered by their municipality. They rated their municipality’s digital performance using a 5-point Likert scale (1 = "Very Poor", 5 = "Very Good"). Descriptive statistics revealed a modest overall evaluation (M = 2.65, SD = 1.06), with ratings ranging from 1 to 5. Most participants provided neutral to moderately positive ratings (3 or 4), while fewer respondents selected extreme values. These results suggest that while some users found municipal websites functional, overall perceptions of quality, usability, and utility remain mixed (Table 9).

**Table 9.** Descriptive statistics for digital performance rating

	Mean	SD	Min	Max
Digital Performance	2.65	1.06	1	5

Thematic content analysis of participants’ open-ended justifications revealed six recurring experience-related themes (Table 10).

The most frequently cited issue (23.1%) concerned outdated or ineffective User Experiences, with participants describing poorly designed websites, overloaded interfaces, and hard-to-navigate structures. Another 19.2% of participants emphasized a lack of core functionality, such as missing forms, service submission tools, or integration with digital platforms. Approximately 15.4% reported dissatisfaction with information overload or poor structure, citing difficulty locating content or a disorganized layout. In contrast, 15.4% of respondents reported positive experiences, including ease of use, fast service, or access to useful resources. Other themes included disinterest or low engagement with the portal (11.5%),

often due to unfamiliarity or perceived irrelevance, and frustration with politicized or promotional content (11.5%) that replaced service information with mayoral campaigns or outdated announcements.

These findings underscore varying levels of satisfaction with municipal digital platforms, highlighting opportunities for structural, functional, and content-level improvements.

**Table 10.** Thematic categorization of reasons behind citizens’ digital performance ratings

Thematic Category	Description	Frequency	Percentage (%)
Outdated or Ineffective User Experience	Poor usability, old design, difficult navigation	6	23
Lack of Functionality & Digital Integration	Missing tools (e.g., complaints, applications, automation)	5	19
Poor Information Architecture / Overload	Too much information, poor structure, hard to find content	4	15
Positive Digital Experience	Helpful, timely, and efficient interactions	4	15
Limited Use / Low Engagement	Lack of use, irrelevance, uncertainty about services	3	11
Politicized or Promotional Content	Use of website for political communication rather than services	3	11

#### 4.3.3 Emotional Responses during past Interactions with Municipal Websites

Participants described a wide spectrum of emotional responses resulting from their interactions with their municipality’s digital platforms. These emotions provide insight into both the perceived usability and the emotional tone of the digital experience. Thematic content analysis revealed five distinct emotional categories (Table 11).

The most frequently reported cluster was **confusion, doubt, and uncertainty** (29%), associated with disorientation, ambiguous navigation, and unclear service descriptions. **Frustration** (18%) followed closely, often linked to poor interface design, limited interactivity, and perceived misuse of the platform for non-service-related messaging. Another 15% of participants described **mental fatigue**, often due to overloaded pages, outdated content, or the absence of efficient pathways for task completion. On the positive side, **satisfaction, joy, and safety** were cited by 21% of respondents—typically in cases of successful task completion or clear information discovery. Lastly, 12% expressed a sense of **autonomy**, appreciating the ability to independently complete tasks through the website.

These emotional insights underscore the importance of not only functionality and design, but also emotional resonance in shaping user perceptions of public digital services.

**Table 11.** Reported emotions following past interaction with municipal websites

Thematic Category	Description	Frequency	Percentage (%)
Doubt, Confusion, Uncertainty	Disorientation, unclear pathways, lack of trust or guidance	10	29
Satisfaction, Joy, Safety	Positive outcomes, successful task completion, sense of security	7	21
Frustration	Annoyance, dissatisfaction, or perceived inefficiency	6	18
Fatigue	Cognitive overload, difficulty maintaining focus or navigating	5	15
Autonomy	Ability to self-serve, complete actions independently	4	12

#### 4.3.4 Website Capabilities Preferences

Participants were asked to indicate which features they would ideally like to access through their municipality’s digital platform. Thematic categorization of their multiple-choice responses revealed a clear prioritization of essential services and streamlined access points (Table 12).

The most commonly selected category was **Informational Access** (92.3%), with participants expressing a strong desire for clear, up-to-date information on local services, events, and announcements. This was closely followed by **Online Applications & Document Services** (88.5%) and **Downloadable Forms & Certificate Retrieval** (80.8%), reflecting a growing demand for digitized administrative procedures. Three additional categories—**Issue Reporting** (73.1%), **Financial Transactions** (73.1%), and **Online School Enrollments** (73.1%)—were equally prioritized, indicating that participants seek integrated, transactional capabilities on municipal portals. Lower, yet notable, preferences included **Waste Management Services** (61.5%) and **Direct Communication with Municipality** (57.7%). These responses highlight expectations for both operational clarity and citizen-to-administration feedback loops. Finally, a smaller cluster of responses (each under 4%) indicated interest in less commonly integrated features, such as **Parking Permit Management**, **Mental Health & Cultural Services**, and **Open Data or Civic Forums**.

These findings underscore a strong citizen preference for streamlined, efficient digital services that reduce administrative friction and support autonomous interaction.

**Table 12.** Preferred digital capabilities that citizens would like to be able to perform via their municipality's website (N = 26). Participants could select multiple options.

Thematic Category	Description	Frequency	Percentage (%)
Informational Access	Local services, events, updates	24	92
Online Applications & Receipt of official Documents	Digital submission and receipt of certificates	23	88
Downloadable Forms & Document Retrieval	PDF forms, application materials	21	80
Online School Enrollments	Submitting complaints or technical problems	19	73
Financial Transactions (e.g. fine payments)	Payment of fines, taxes, or other financial obligations	19	73
Issue Reporting (e.g. damage declarations)	Enrolling children in schools or municipal educational services	19	73
Waste Management Services	Garbage schedules, recycling, and reporting sanitation issues	16	62
Contact with Municipality	Contact forms, staff directories, direct feedback channels	15	58
Parking Permit Management	Application and renewal of residential parking permits	1	4
Mental Health & Arts Services	Listings for wellbeing support or cultural engagement	1	4
Cultural Association Memberships	Joining or accessing info on community groups	1	4
Open Data & Civic Forum Access	Public data access, participatory forums for dialogue or voting	1	4

#### 4.3.5 Functional Elements Preferences

Participants were asked to identify which functional elements they would ideally like to see integrated into their municipality’s website interface. As summarized in Table 13, responses revealed a broad interest in interactive, user-friendly components that support information discovery and citizen autonomy.

The most frequently selected response was “Search Engine” (42.3%), highlighting users’ need for quick and intuitive access to content. This was followed by a general preference for comprehensive design solutions, as 38.5% selected “All of the above”, signaling a desire for well-rounded, multifunctional portals. Interactive Maps with Points of Interest (34.6%) and Multimedia (30.8%) were also frequently mentioned, indicating the importance of geographic orientation and visual content in enhancing engagement. Online Booking tools were selected by 26.9% of participants, reflecting expectations for transactional features typically found in modern digital services. Less frequently mentioned but still noteworthy were tools such as Contact Information (11.5%), Business Directories (7.7%), and features like Accessibility tools, Contact Forms, Live Chat, and Municipal Apps with Notifications (each at 3.8%).

These responses suggest emerging citizen expectations around inclusivity, real-time communication, and personalized experiences.

**Table 13.** Preferred functional features for Municipal websites. Participants could select multiple options.

Thematic Category		Frequency	Percentage (%)
Search Engine	Easy-to-use search engines to locate services and content	11	42
All of the above	All options, indicating a multifunctional digital platform	10	39
Interactive Maps	Maps with points of interest and location-based info	9	35
Multimedia Integration	Photos, videos to enhance content presentation	8	31
Online Booking Tools	Tools to schedule appointments or access services	7	27
Contact Information	Email, phone numbers for municipality, local businesses or departments	3	12
Business Directory	Listings of local companies and services	2	8
Accessibility	WCAG compliance, mobile support	1	4
Contact Forms	Online contact or request submission forms (e.g., complaint forms, drop-down service menus)	1	4
Live Chat	Real-time chat functionality for citizen support	1	4
App with Notifications	Dedicated municipal mobile app with real-time personalized notifications	1	4

#### 4.3.6 Traveller - Oriented Information Preferences

Participants were asked to identify the types of information they would like to access when visiting the website of a municipality they are traveling to. Thematic categorization of responses revealed a clear preference for rich, visitor-oriented content (Table 14).

The majority of participants expressed interest in comprehensive coverage of all available categories (38%), including accommodation, local gastronomy, cultural events, transport schedules, and local products. This preference suggests a strong demand for unified, easy-to-navigate digital tourism portals hosted on municipal websites. Accommodation-related information was the second most commonly selected feature (31%), followed by equal interest in local activities (31%) and local products (31%). Other important categories included museums and cultural events (27%), transportation options (27%), and gastronomy (27%). Entertainment and leisure options were mentioned by 12% of respondents.

These insights reflect an opportunity for municipalities to evolve their digital presence not only as administrative service hubs but also as informative and appealing gateways for domestic tourism.

**Table 15.** Thematic categorization of traveler-oriented information preferences. Participants could select multiple options.

Thematic Category	Description	Frequency	Percentage (%)
All of the above	All options, indicating an all-in-one tourism content	10	39
Accommodation	Hotel info, short-stay options, booking links	8	31
Local Activities	Things to do, guided tours, outdoor and cultural activities	8	31
Local Products	Access to info about local food, crafts, and souvenirs	8	31
Museums & Cultural Events	Exhibitions, events, festivals, historical attractions	7	27
Transportation	Routes, timetables, and accessibility of local transit	7	27
Gastronomy	Local cuisine, dining options, food markets	7	27
Entertainment	Nightlife, live shows, and leisure options	3	11

#### 4.3.7 Perceived Potential of Municipal Websites in Addressing Local Service Challenges

Participants were asked whether they believed municipal websites could assist in resolving ongoing problems they encounter with local government services. Thematic content analysis of their open-ended responses revealed six functional expectations (Table 16).

The most frequently mentioned benefit was improved guidance and navigation (26.9%), with participants emphasizing the need for intuitive website structures that explain available services and assist citizens in finding the correct actions. The second most common theme (23.1%) involved request and complaint management, where users desired tools for digitally submitting issues and receiving updates. A similar proportion of participants (19.2%) envisioned enhanced communication, including more consistent updates and direct contact with departments. Additionally, participants expressed the need for clear and accessible information (19.2%), such as service descriptions, forms, and structured menus. A smaller portion (7.7%) emphasized reduced bureaucracy and fewer physical visits, while 3.8% proposed expanded digital capabilities, including payment integration and multilingual support.

These findings underline citizens' demand for digital services that prioritize usability, transparency, and functionality.

**Table 16.** Thematic categorization of how citizens believe municipal websites could help solve local challenges

Thematic Category	Description	Frequency	Percentage (%)
Guidance & Simplicity	Clear navigation, service explanation, user-centered architecture	7	27
Request & Complaint Management	Submit and track complaints/issues	6	23
Communication & Responsiveness	Faster contact, real-time updates, active content maintenance	5	19
Accessible Information & Clarity	Process details, downloadable forms, structured menus	5	19
Bureaucracy Reduction	Minimize physical presence, ease routine tasks	2	8
Advanced Digital Capabilities	Payments, segmented portals, multilingual options	1	4

#### 4.4 Adapted UX Audit

##### 4.4.1 Comparison of Overall Municipality Scores by Region

To explore regional disparities in municipal website User Experience across Greece, the study compared the overall UX scores among the seven administrative regions. A preliminary inspection of normality and homogeneity of variance assumptions indicated violations, warranting the use of non-parametric tests. Thus, a Kruskal–Wallis H test was performed to assess whether the distributions of overall UX scores differed significantly across regions.

Descriptive statistics (Table 17) suggested substantial variation in central tendency and dispersion between regions. For example, municipalities in Epirus–Western Macedonia showed the highest mean UX score ( $M = 0.67$ ,  $SD = 0.06$ ), whereas those in the Peloponnese–Western Greece & Ionian region scored lowest ( $M = 0.43$ ,  $SD = 0.14$ ). The Thessaly–Central Greece region demonstrated relatively high performance with the least variability ( $SD = 0.03$ ).

**Table 17.** Descriptives statistics of overall UX scores by region

Administrative Region	Mean Overall UX Score	Median	SD	Min	Max
Attica	0.57	0.57	0.17	0.25	0.90
Macedonia-Thrace	0.47	0.44	0.15	0.20	0.81
Thessaly-Central Greece	0.62	0.62	0.03	0.59	0.64
Peloponnese-Western Greece & Ionian	0.43	0.41	0.14	0.22	0.78
Epirus-Western Macedonia	0.67	0.70	0.06	0.59	0.71
Crete	0.46	0.37	0.22	0.28	0.89
Aegean	0.46	0.45	0.15	0.22	0.78

In addition, Table 18 reports the results of the Kruskal–Wallis H test conducted to examine whether overall UX scores differ significantly across administrative regions. The test revealed a statistically significant difference between the groups,  $H(6) = 18.77$ ,  $p = .005$ , indicating that at least one region's median score differs from the others. The test statistic was adjusted for ties.

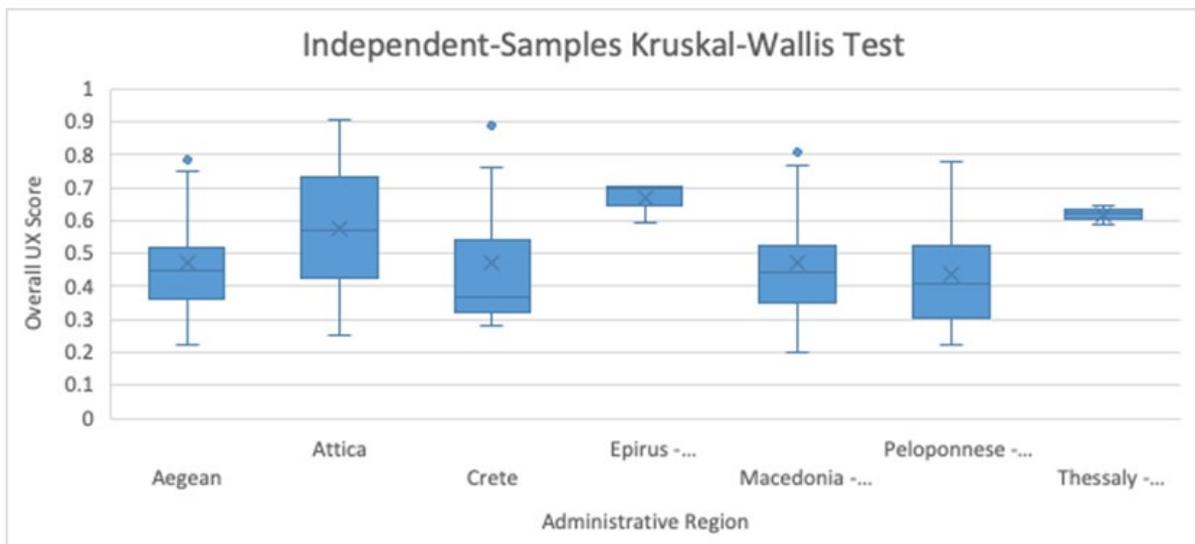
**Table 18.** Kruskal-Wallis Test Summary

**Independent-Samples Kruskal-Wallis Test Summary**

Total N	129
Test Statistic	18.774 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.005

a. The test statistic is adjusted for ties.

**Figure 2.** Boxplot of overall UX Scores by administrative region



Further, Figure 2 illustrates the distribution of overall UX scores across the seven administrative regions. Each box represents the interquartile range, the line within the box marks the median, and whiskers indicate the range. Outliers are shown as individual dots. The plot reveals substantial variability among regions, with Epirus–Western Macedonia and Thessaly–Central Greece exhibiting higher and more consistent scores compared to regions such as Crete and the Aegean.

Pairwise comparisons using Bonferroni-adjusted p-values (Table 19) revealed statistically significant differences in the overall UX scores between several administrative regions. Specifically, municipalities in Attica scored significantly higher than those in both Crete ( $p = .017$ ) and the Aegean ( $p = .017$ ). Additionally, Thessaly–Central Greece significantly outperformed Peloponnese–Western Greece & Ionian ( $p = .002$ ), while Epirus–Western Macedonia also demonstrated significantly higher scores compared to Peloponnese–Western Greece & Ionian ( $p = .043$ ).

**Table 19.** Pairwise comparisons (Bonferroni Adjusted)

Region Pair	Adjusted p-value
Crete – Attica	.017
Peloponnese – Thessaly	.002
Aegean – Attica	.017
Peloponnese – Epirus	.043

These results indicate that specific administrative regions outperform others in municipal website usability, underscoring regional disparities in digital infrastructure quality.

#### 4.4.2 Regional Analysis of Usability Dimensions

This section examines whether usability dimension scores vary significantly across Greece's administrative regions. For each of the nine dimensions evaluated in the UX Audit, normality checks indicated violations of parametric assumptions. As such, Kruskal–Wallis H tests were performed to detect regional differences. Where significant effects were found, Bonferroni-adjusted pairwise comparisons were conducted to identify specific group differences.

In particular, Table 20 presents the mean usability scores across the nine evaluation dimensions for each administrative region. The region of Epirus – Western Macedonia consistently outperforms others, with particularly high scores in Trust & Credibility (0.80), Writing & Content Quality (0.67), and Page Layout & Visual Design (0.70). In contrast, the Aegean and Peloponnese – Western Greece & Ionian regions exhibit the lowest scores across multiple dimensions, including Homepage, Trust, and Help & Feedback, suggesting significant usability limitations in these areas.

To test whether these observed differences were statistically significant, Kruskal–Wallis H tests were conducted for each dimension.

**Table 20.** Mean usability scores per dimension across administrative regions

Dimension	Aegean	Attica	Crete	Epirus - Western Macedonia	Macedonia - Thrace	Peloponnese - Western Greece & Ionian	Thessaly - Central Greece
Home	0.33	0.53	0.34	0.71	0.39	0.33	0.61
Task Orientation	0.4	0.53	0.4	0.68	0.35	0.36	0.52
Navigation & IA	0.47	0.6	0.48	0.64	0.46	0.42	0.66
Form & Data Entry	0.57	0.58	0.54	0.67	0.56	0.55	0.66
Trust & Credibility	0.51	0.67	0.61	0.8	0.66	0.52	0.75
Writing & Content Quality	0.5	0.61	0.44	0.67	0.43	0.44	0.64
Page Layout & Visual Design	0.45	0.58	0.43	0.7	0.48	0.4	0.69
Search	0.49	0.5	0.49	0.55	0.5	0.48	0.55
Help, Feedback & Error Tolerance	0.39	0.52	0.4	0.58	0.43	0.35	0.49
<b>Overall Score</b>	<b>0.46</b>	<b>0.57</b>	<b>0.46</b>	<b>0.67</b>	<b>0.47</b>	<b>0.43</b>	<b>0.62</b>

#### 4.4.2.1 Dimension 1. Homepage

Regional differences in Homepage usability were examined using a Kruskal–Wallis H test. As shown in Table 21, the analysis revealed a statistically significant overall effect,  $H(6) = 14.13$ ,  $p = .028$ . However, Bonferroni-adjusted post hoc comparisons did not identify statistically significant differences between specific regional pairs (all  $p > .05$ ), suggesting that the observed variation reflects subtle and distributed disparities rather than distinct regional contrasts.

**Table 21.** Kruskal-Wallis Test Summary for the Homepage dimension

##### Independent-Samples Kruskal-Wallis Test Summary

Total N	129
Test Statistic	14.134 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.028

a. The test statistic is adjusted for ties.

#### 4.4.2.2 Dimension 2. Task Orientation

A statistically significant regional variation was observed in Task Orientation scores (Table 22),  $H(6) = 17.39$ ,  $p = .008$ . Despite the overall effect, Bonferroni-adjusted pairwise comparisons did not yield statistically significant differences between individual regions (all  $p > .05$ ), indicating a pattern of general variability rather than clearly delineated regional groupings.

**Table 22.** Kruskal-Wallis Test Summary for the Task & Orientation dimension

##### Independent-Samples Kruskal-Wallis Test Summary

Total N	129
Test Statistic	17.387 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.008

a. The test statistic is adjusted for ties.

#### 4.4.2.3 Dimension 3: Navigation & Information Architecture

The Kruskal–Wallis test indicated a significant regional effect for Navigation & Information Architecture (Table 23),  $H(6) = 19.62$ ,  $p = .003$ . Nevertheless, none of the Bonferroni-adjusted pairwise comparisons reached statistical significance (all  $p > .05$ ), suggesting that the overall difference stems from dispersed performance variations across regions rather than specific group disparities.

**Table 23.** Kruskal-Wallis Test Summary for the Navigation & Information Architecture dimension

**Independent-Samples Kruskal-Wallis Test Summary**

Total N	129
Test Statistic	19.624 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.003

a. The test statistic is adjusted for ties.

**4.4.2.4 Dimension 4: Forms & Data Entry**

No statistically significant regional differences were found for Forms & Data Entry usability (Table 24),  $H(6) = 9.29$ ,  $p = .158$ . This finding suggests that User Experience related to form completion and data entry remains relatively consistent across the examined administrative regions.

**Table 24.** Kruskal-Wallis Test Summary for the Forms & Data Entry dimension

**Independent-Samples Kruskal-Wallis Test Summary**

Total N	129
Test Statistic	9.287 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.158

a. The test statistic is adjusted for ties.

**4.4.2.5 Dimension 5: Trust & Credibility**

Analysis of Trust & Credibility scores revealed a statistically significant overall regional effect (Table 25),  $H(6) = 13.91$ ,  $p = .031$ . However, Bonferroni-adjusted post hoc tests did not identify significant differences between specific regional pairs (all  $p > .05$ ), again pointing to broadly distributed variation rather than localized contrasts.

**Table 25.** Kruskal-Wallis Test Summary for the Trust & Credibility dimension

**Independent-Samples Kruskal-Wallis Test Summary**

Total N	129
Test Statistic	13.906 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.031

a. The test statistic is adjusted for ties.

**4.4.2.6 Dimension 6: Writing & Content Quality**

Significant regional variation was also observed in Writing & Content Quality scores (Table 26),  $H(6) = 19.77$ ,  $p = .003$ . Despite this overall effect, Bonferroni-adjusted comparisons did not reveal statistically significant differences between individual regions (all  $p > .05$ ), suggesting widespread variability rather than isolated under- or over-performing regions.

**Table 26.** Kruskal-Wallis Test Summary for the Writing & Content Quality dimension

<b>Independent-Samples Kruskal-Wallis Test Summary</b>	
Total N	129
Test Statistic	19.766 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.003

a. The test statistic is adjusted for ties.

**3.3.2.7 Dimension 7: Page Layout & Visual Design**

The Kruskal–Wallis test for Page Layout & Visual Design yielded a statistically significant result (Table 27),  $H(6) = 14.13$ ,  $p = .028$ . Nonetheless, Bonferroni-adjusted pairwise comparisons were not statistically significant (all  $p > .05$ ), indicating that the observed regional differences reflect general trends rather than distinct regional contrasts.

**Table 27.** Kruskal-Wallis Test Summary for the Page Layout & Visual Design dimension

<b>Independent-Samples Kruskal-Wallis Test Summary</b>	
Total N	129
Test Statistic	14.127 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.028

a. The test statistic is adjusted for ties.

**4.4.2.8 Dimension 8: Search Functionality**

No statistically significant regional differences were identified for Search functionality (Table 28),  $H(6) = 5.37$ ,  $p = .497$ . This result suggests a relatively uniform level of Search usability across the examined administrative regions.

**Table 28.** Kruskal-Wallis Test Summary for the Search Functionality dimension

<b>Independent-Samples Kruskal-Wallis Test Summary</b>	
Total N	129
Test Statistic	5.373 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	.497

a. The test statistic is adjusted for ties.

**4.4.2.9 Dimension 9: Help, Feedback & Error Tolerance**

The strongest regional effect was observed for Help, Feedback & Error Tolerance (Table 29), with the Kruskal–Wallis test indicating a highly significant difference,  $H(6) = 30.16$ ,  $p < .001$ . Bonferroni-adjusted post hoc analysis identified one statistically significant pairwise difference between Peloponnese–Western Greece & Ionian and Attica ( $p = .000$ ), highlighting pronounced regional disparities in user support and error-handling features.

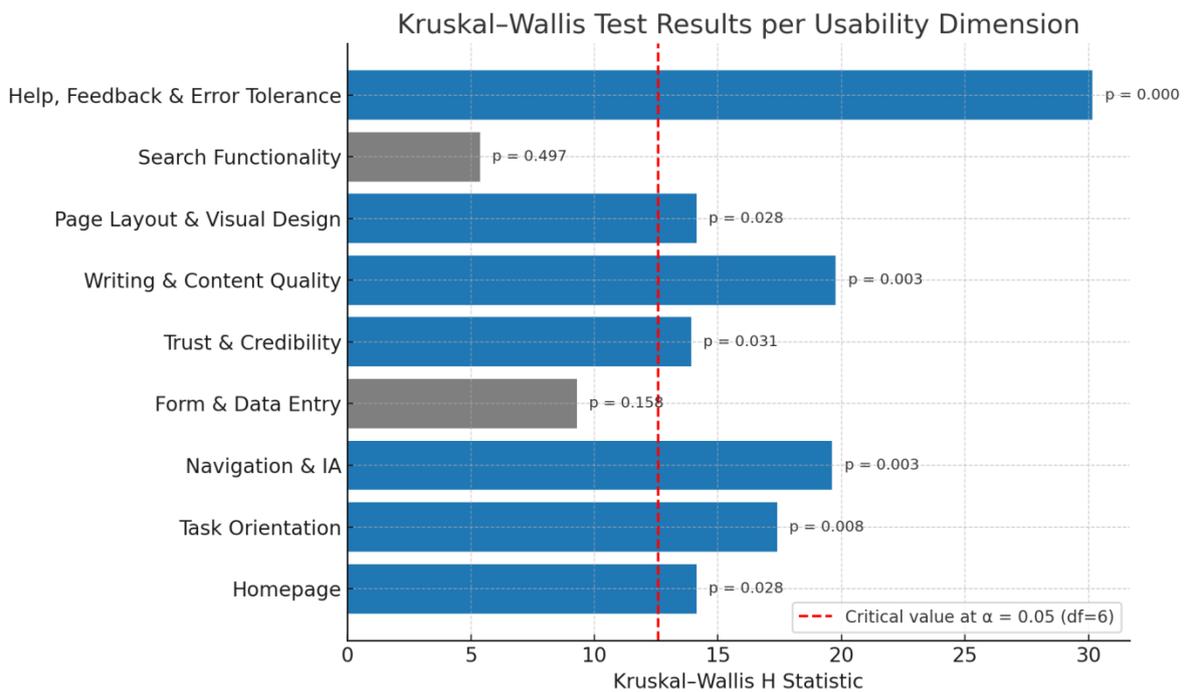
**Table 29.** Kruskal-Wallis Test Summary for the Help, Feedback & Error Tolerance dimension

*Independent-Samples Kruskal-Wallis Test Summary*

Total N	129
Test Statistic	30.163 <sup>a</sup>
Degree Of Freedom	6
Asymptotic Sig.(2-sided test)	<.001

a. The test statistic is adjusted for ties.

**Figure 3.** Schematic representation of Kruskal–Wallis H test results across usability dimensions



To synthesize the findings across all dimensions, Figure 3 presents a summary of Kruskal–Wallis H test results for each of the nine usability dimensions examined in the UX Audit. The y-axis displays the H statistic, while the dashed red line marks the critical chi-square value for statistical significance ( $\chi^2(6) = 12.59$ ,  $p = .05$ ). Dimensions that exceeded this threshold are highlighted in blue, indicating statistically significant regional differences. In contrast,

grey bars represent dimensions where no significant variation was detected. This overview illustrates that while certain aspects of usability, such as Help & Feedback, Writing & Content, and Navigation, exhibited strong regional disparities, others remained relatively consistent across Greece’s administrative regions.

#### 4.4.3 Rank Dimensions for Overall Greek Regions

To investigate whether certain usability dimensions outperformed others across the national sample of Greek municipalities, a repeated-measures ANOVA was conducted using the nine UX evaluation dimensions as within-subjects factors.

**Table 30.** Mauchly’s Test of Sphericity

Mauchly's Test of Sphericity							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse - Geisser	Epsilon Huynh - Feldt	Lower Bound
Dimension	.074	324.977	35	<.001	.513	.532	.125

Mauchly’s test indicated a violation of the sphericity assumption,  $\chi^2(35) = 324.98$ ,  $p < .001$ ; therefore, the Greenhouse-Geisser corrections were applied (Table 30). The results showed a statistically significant effect of dimension on usability scores,  $F(4.10, 524.92) = 29.72$ ,  $p < .001$ ,  $\eta^2p = .188$ , indicating that certain dimensions were consistently rated higher or lower than others across all administrative regions (Table 31).

**Table 31.** Repeated-Measures ANOVA Results

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Dimension	Sphericity Assumed	4.397	8	.550	29.715	<.001	.188
	Greenhouse - Geisser	4.397	4.101	1.072	29.715	<.001	.188
Error (Dimension)	Sphericity Assumed	18.942	1024	.018			
	Greenhouse - Geisser	18.942	524.921	.036			

**Table 32.** Mean usability scores across dimensions

**Descriptive Statistics**

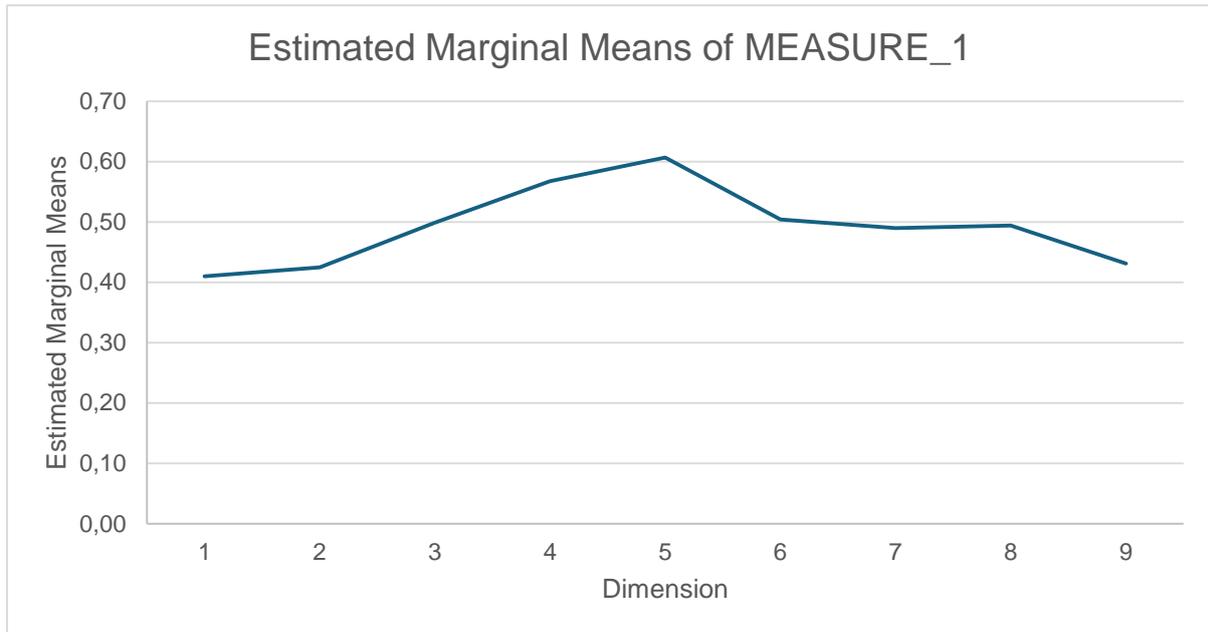
Dimension Scores	Mean	Std. Deviation	N
Homepage	.41	0.30	129
Task Orientation	.43	0.24	129
Navigation & Information Architecture	.50	0.21	129
Forms & Data Entry	.57	0.09	129
Trust & Credibility	.61	0.23	129
Writing & Content Quality	.50	0.21	129
Page Layout & Visual Design	.49	0.25	129
Search Functionality	.49	0.15	129
Help, Feedback & Error Tolerance	.43	0.14	129

As shown in Table 32, the highest-performing dimensions included Trust & Credibility (M = .607), Forms & Data Entry (M = .568), and Writing & Content Quality (M = .504), while Homepage (M = .410) and Help, Feedback & Error Tolerance (M = .431) received the lowest usability scores.

These findings underscore which aspects of municipal website UX are perceived as more functional or satisfactory nationwide, and which are more problematic regardless of regional affiliation.

**Figure 4** presents the estimated marginal means for each UX dimension. The line plot illustrates clear strengths in **Trust & Credibility**, with gradually lower scores across dimensions ending in **Help, Feedback & Error Tolerance**, the lowest-rated category. This visualization highlights systemic usability gaps in areas crucial for supporting user autonomy and satisfaction—particularly among older or less digitally literate populations.

**Figure 4.** Estimated marginal means of usability dimensions



Profile plot displaying the estimated marginal means for each usability dimension across all municipalities. The x-axis represents the nine dimensions, while the y-axis shows the average usability score. The trend highlights relative strengths and weaknesses in the evaluated categories.

## 5. Discussion

This study explored the User Experience of Greek municipal websites from two complementary perspectives: the lived experiences and expectations of citizens, and the objective evaluation of website usability across regional governments. By integrating survey responses with a large-scale UX Audit of 138 municipal websites, the findings reveal systemic barriers to usability, functional inconsistency, and a fragmented national digital strategy for local governance.

**RQ1.** How do citizens perceive the capacity of local municipal websites to meet their service needs and support meaningful e-participation, despite national progress in digital transformation?

**H1.** Despite national progress in digital transformation, citizens perceive local municipal websites as insufficiently developed to address their service needs or support meaningful e-participation.

### 5.1 Limited Familiarity and Sporadic Engagement with Municipal Services

In line with H1, the findings of this study reveal a generally low level of citizen familiarity with the services provided by local municipalities. The mean score on a 5-point Likert scale was just **1.69**, with no participant indicating high awareness. This limited familiarity appears to reflect a broader disconnect between citizens and their local governments (Helling et al., 2005), weakening their ability to navigate administrative processes or engage with available resources. Although a few respondents reported isolated positive interactions, such as successful online form submissions or helpful municipal staff, these were frequently overshadowed by accounts of delays, lack of responsiveness, or procedural opacity. Crucially, a significant portion of participants reported **no prior engagement at all** with their municipality, suggesting that barriers extend beyond usability and into deeper issues of **trust, perceived relevance, and institutional visibility**.

This disengagement is especially striking when considered in the context of rising digital literacy, particularly among younger demographics like Millennials and Gen Z (Stefán et al., 2025; 2024). For these users, shaped by seamless digital experiences in the private sector, basic usability features, such as intuitive navigation, quick feedback, and transparent workflows, are no longer luxuries but expected norms. Municipal websites that fall short are not merely inconvenient; they are perceived as outdated or untrustworthy (Tan et al., 2008; Schuck, 2014). The absence of a citizen-centered digital strategy reinforces this perception and alienates those most likely to engage online. Furthermore, the **failure to proactively include all user groups**, including migrants, elderly citizens, and people with disabilities, raises critical questions of equity and democratic inclusion. Municipal websites must evolve beyond static repositories of information and become participatory infrastructures that foster transparency, reduce access barriers, and support civic empowerment (Alexander, 2025). The current gap is not only technical but **strategic and cultural**, requiring municipalities to reimagine their role as digital service providers in an increasingly participatory governance landscape.

## **5.2 Citizens' Expectations for Transactional and Interactive Features**

Supporting H1, the survey revealed a striking mismatch between citizens' actual experience with municipal websites and their expectations for digital service delivery. While familiarity remains limited, participants articulated a clear and ambitious vision of what local e-Government platforms should offer. Transactional efficiency emerged as a top priority, with 88% of respondents requesting online certificate applications, 80% document retrieval, and 73% issue reporting functionalities. These preferences suggest that citizens increasingly expect routine administrative tasks to be handled seamlessly online, minimizing the need for in-person visits or paper-based procedures. Importantly, this expectation extends beyond mere convenience: it signals a desire for time-saving, autonomous interactions that reflect the digital service norms already adopted in other sectors (e.g., banking, utilities, gov.gr).

Beyond core transactions, participants also highlighted a need for interactive and user-centric tools. A significant share requested features such as online appointment booking (27%), multimedia content (31%), and interactive mapping tools (35%), while nearly 40% selected "all of the above", a strong indicator of demand for integrated, multifunctional platforms. Moreover, open-ended responses revealed a latent desire for features like smart search engines, personalized dashboards, and real-time communication (e.g., chat, messaging systems). These expectations reflect shifting digital norms, particularly among younger users who benchmark municipal sites against platforms like banks, gov.gr, or logistics apps (Lotsis et al., 2024; Kyriakogkonas et al., 2023). Citizens increasingly perceive access to functional, user-friendly digital services as a civic right, not a luxury (Milakovich, 2012). When municipalities fail to meet this standard, the result is not mere inconvenience but a decline in trust and engagement. In alignment with H1, the findings underscore a missed opportunity for municipalities to embrace user-centered, responsive digital governance that meets modern expectations (Alexander, 2025; Wirtz and Kurtz, 2016).

## **5.3 Expanding the Role of Municipal Websites: From Utility to Destination**

While traditionally viewed as administrative portals, municipal websites are increasingly expected to function as comprehensive civic platforms serving a variety of user types beyond local residents. Survey results highlight citizens' aspirations for a broader and richer digital offering, including localized content such as accommodation listings, gastronomy guides, transportation updates, and cultural event calendars. These preferences suggest a shift in expectations: users no longer seek municipal sites solely for transactional efficiency but also for informational depth and community relevance. In this context, the digital municipal

presence becomes an entry point into the identity and daily life of each locality, a role that is especially critical in municipalities located in touristic, insular, or culturally rich regions. However, most Greek municipal websites fail to deliver on this potential. Participants noted limited or outdated content, poor design, and the absence of tailored information for transient users, such as tourists, students, or recent migrants.

This limited scope points to an underutilization of municipal digital infrastructure and a missed opportunity for strategic value creation. International civic technology trends emphasize the role of municipal platforms in place-branding and local economic development, yet the Greek context lags behind. Citizens reported a striking lack of multilingual content, accessibility features, and real-time updates, especially in Aegean regions where the audience is diverse and often international. These omissions are not merely usability flaws, they reinforce digital exclusion, reduce institutional visibility, and diminish perceived legitimacy. Furthermore, qualitative responses suggest that citizens associate inactive or minimal web presences with institutional inertia or disinterest. A well-designed and regularly updated municipal site, by contrast, fosters perceptions of reliability, transparency, and civic engagement. Reframing these platforms as destinations, not just utilities, requires both technical upgrades and a cultural shift: municipalities must begin to see themselves as digital hosts with a responsibility to serve diverse publics dynamically, inclusively, and meaningfully.

**RQ2.** What usability and content features in municipal websites are most strongly associated with citizens' perceptions of trustworthiness and overall satisfaction?

**H2. Municipal websites that demonstrate higher usability, reflected in effective navigation, intuitive layout, relevant content, and technical reliability, are more likely to be perceived by citizens as trustworthy and satisfactory.**

#### **5.4 Emotional Experiences Reflect Usability Failures and Trust Deficits**

Citizens' evaluations of their municipalities' digital platforms revealed widespread dissatisfaction, with an average satisfaction rating of just 2.65 on a 5-point scale, supporting our second hypothesis. This negative perception was primarily linked to usability limitations such as unintuitive navigation, outdated design, and non-functional or broken features. Participants consistently reported issues like overloaded Homepages, disorganized menu structures, and the absence of clear visual hierarchies, which led to confusion and disrupted task completion. Open-ended responses highlighted frustration when basic services, like retrieving a document or submitting a request, could not be completed without obstacles or workarounds. Citizens, especially younger ones, compare public platforms to seamless private-sector experiences (Koya et al., 2021). As a result, poor usability is interpreted as institutional neglect or obsolescence (Sundberg and Gidlung, 2024; van den Broek, 2023). Vulnerable users, including those with low digital literacy or accessibility needs, are particularly affected (Choi and Chang, 2025; Helsper, 2021).

The emotional toll of these encounters was evident across the dataset. Thematic analysis highlighted reactions such as irritation, cognitive fatigue, and disorientation, especially when users struggled to find the information they needed or complete simple tasks. These responses are symptoms of deeper usability failures that go beyond aesthetics or performance, they reflect a system misaligned with user capabilities and expectations. In some cases, successful experiences, such as completing a task smoothly, generated satisfaction or empowerment, but these instances were rare. Notably, the disappointment expressed was not limited to digital design but extended to perceptions of municipal engagement. Several participants described their municipalities as "absent" or "only responsive during elections," linking technical

inefficiency with political disengagement. These findings suggest that poor digital design does not only hinder service delivery, it actively erodes trust (Tan et al., 2008; Schuck, 2004). Thus, emotional usability becomes central to trust-based, inclusive digital governance (Yenugula, 2024).

### **5.5 Regional Variation in Overall UX Performance**

The analysis uncovered substantial regional disparities in the overall usability of municipal websites across Greece, as confirmed by a Kruskal–Wallis H test [ $H(6) = 18.77, p = .005$ ]. Municipalities in Epirus–Western Macedonia and Thessaly–Central Greece achieved the highest average UX scores, paired with low internal variability, suggesting greater coherence in design approaches or shared institutional support mechanisms. In contrast, regions like the Aegean and Peloponnese–Western Greece & Ionian performed significantly worse, with broader score dispersion indicating inconsistent quality and possible gaps in technical capacity or strategic alignment at the local level. Notably, Attica, home to the urban hub of Athens, scored above the national average and showed statistically significant differences from underperforming regions such as Crete and the Aegean, likely due to centralized resources, higher user expectations, or access to skilled digital teams.

These discrepancies extend beyond interface design, they signal underlying inequities in municipal capacity, digital governance, and institutional prioritization, suggesting deeper structural imbalances (Schwoerer, 2025; Tsatsani et al., 2024). In the absence of unified national guidelines or coordinated UX strategies, each municipality is left to navigate digital transformation independently (Patergiannaki, 2023). This results in a fragmented landscape where a citizen's access to functional, usable, and inclusive digital services depends more on geographical location than actual need or vulnerability. In this light, the UX score emerges as more than a design metric, it becomes a proxy for political will, administrative maturity, and commitment to digital equity. Without targeted interventions to uplift underperforming regions, existing disparities risk deepening, particularly for rural, island, or economically constrained communities that depend on digital channels for access to essential public services.

### **5.6 Regional Analysis of Usability Dimensions**

A closer examination of the individual usability dimensions revealed stark regional discrepancies across Greek municipalities. Homepages were broadly ineffective (Brinck et al., 2022), with the Aegean and Peloponnese–Western Greece & Ionian regions showing the weakest performance. Common issues included visual overload, broken entry points, and absent multilingual access. Task Orientation was similarly limited, with most websites offering static information instead of actionable tools. Only a few municipalities, primarily in Thessaly and Epirus, demonstrated more structured workflows and integrated access to national services. Navigation and Information Architecture suffered from deep menu nesting, redundant categories, and vague labels, undermining usability (Dabrowski et al., 2014), especially in Attica and Macedonia–Thrace. Even though Forms and Data Entry scored comparatively higher, this often reflected the bare minimum, basic contact forms with minimal interactivity rather than robust transactional systems, undermining user trust (Edelmann and Baumann, 2024).

Other dimensions further illustrated the uneven digital landscape. Trust and Credibility appeared stronger in Thessaly, Epirus, and parts of Attica, where municipalities offered transparency tools and a professional tone (Evans et al., 2018; Gritzalis et al., 2014). However, sporadic content updates and political undertones in messaging weakened perceived integrity in several cases. Writing and Content Quality varied significantly, with

regions like Peloponnese and the Aegean struggling with outdated language and inaccessible phrasing. Visual Design and Layout problems were nearly universal—marked by clutter, broken UI elements, and poor mobile responsiveness. Critically, Search Functionality was the most underdeveloped area: over half of the websites lacked search tools entirely, and those available often failed to return relevant results. Help and Feedback mechanisms were equally weak, with error messages and contact forms offering little guidance. Overall, while Thessaly and Epirus demonstrated relative strength, many rural and island municipalities showed systemic usability deficits, signaling the need for coordinated national UX standards and localized capacity-building.

### **5.7 Rank Dimensions for Overall Greek Regions**

A comparative ranking of average usability scores across the nine UX Audit dimensions revealed significant regional disparities, offering insight into which administrative areas are investing in coherent digital strategies. Epirus–Western Macedonia and Thessaly–Central Greece emerged as the highest-performing regions, excelling in dimensions such as Task Orientation, Content Quality, or Trust and Credibility. These results suggest a structured, citizen-oriented approach to digital service delivery despite these regions' limited geographic or infrastructural advantages. In contrast, Attica, despite its metropolitan character and population density, ranked unexpectedly low in several areas, including interactivity, navigation, and form usability, indicating that digital scale does not guarantee service maturity.

Regions like Macedonia–Thrace and the Aegean Islands consistently underperformed across most categories, with critical weaknesses in visual design, search functionality, and error tolerance. High-performing regions shared common traits: consistent design, clear information architecture, and a baseline of user-centered thinking. Poor-performing areas, however, often lacked even essential features like functioning search bars or mobile responsiveness. These discrepancies point to a broader digital inequality across Greece, where access to usable and trustworthy municipal platforms is determined not by citizen need but by local administrative capability. Without national UX benchmarks or centralized digital governance, these regional gaps risk deepening existing inequalities in public service access and digital participation.

**RQ3.** To what extent do persistent usability issues in navigation, interactivity, and content relevance contribute to regional disparities in citizens' engagement with local e-Government services?

**H3.** Despite infrastructure improvements, persistent usability issues in municipal websites, particularly in navigation, interactivity, and content relevance, limit user engagement and reinforce regional disparities in digital service adoption.

### **5.8 Reassessing Barriers to the Adoption of Local e-Government Services**

Despite significant advancements in the digitization of public services at the national level, Greece continues to face challenges in citizen adoption of municipal e-Government platforms. While limited digital skills are often cited as a primary barrier, the present findings suggest that systemic platform shortcomings play a more central role. Across regions, the UX Audit revealed widespread usability deficits, minimal transactional features, and accessibility gaps. At the same time, survey results show that many citizens, particularly younger users, are digitally competent, familiar with modern web standards, and expect intuitive, efficient, and inclusive digital services.

This disconnect between user expectations and platform delivery points to a structural imbalance: the problem lies less in user readiness and more in inadequate digital design and

governance at the municipal level. The limited adoption of local e-Government services appears to reflect this quality gap rather than user reluctance. To address this, national digital policy must shift its focus from generalized assumptions about digital literacy to more targeted interventions that improve platform usability, consistency, and relevance. Without national standards, regional discrepancies in UX may persist, limiting citizens' equitable access to functional public services and reinforcing existing geographic divides (Lnenicka et al., 2024; Kumar et al., 2017). A strategic emphasis on user-centered design could significantly boost both adoption rates and public trust in local digital governance.

### **5.9 Implications for Local Digital Governance**

The findings of this study carry important implications for both municipal practice and national digital strategy. First, they highlight the necessity of adopting a user-centered approach in the design, development, and maintenance of municipal websites. Current systems often fall short of citizens' expectations, particularly in terms of usability, interactivity, and task completion capabilities. This suggests that local authorities must go beyond basic information provision and instead invest in platforms that enable seamless, secure, and intuitive digital interactions.

Second, the results point to the importance of standardization and strategic oversight. While certain municipalities perform notably better than others, the lack of consistent design principles, accessibility features, and service depth across regions undermines citizens' ability to rely on digital services nationwide. National-level frameworks or guidelines for local e-Government UX design, similar to those used in centralized platforms like gov.gr, could help ensure a baseline of quality and functionality across municipalities.

Third, the study challenges the assumption that low adoption is primarily due to citizens' limited digital skills. Instead, the data support the view that a digitally literate public is met with underperforming digital infrastructures. This disconnect suggests that boosting engagement will require improvements in system quality rather than solely investing in user education.

Finally, from a governance and civic participation perspective, improved municipal platforms could serve as gateways to more inclusive e-democracy. When well-designed, these platforms have the potential to enhance trust, transparency, and civic involvement—especially when they incorporate participatory tools such as feedback forms, consultative processes, or real-time service tracking.

In sum, advancing local e-Government in Greece requires not only technical upgrades but also a paradigm shift toward citizen-centric digital service delivery. This involves aligning technological development with users' needs, habits, and expectations—an approach that is foundational for meaningful and sustainable digital transformation at the municipal level.

### **4.10 Study Limitations & Future Research Recommendations**

This study presents certain limitations that should be acknowledged. First, the citizen survey involved a relatively small sample size ( $N = 26$ ), which limits the statistical generalizability of the findings across the broader Greek population. However, the survey was intentionally designed as an exploratory qualitative component, providing rich insights that contextualize and complement the results of the large-scale UX Audit. Future research could build on these results by employing larger, more demographically diverse samples to validate and expand upon the themes identified here. Second, the UX Audit, although methodologically rigorous, covered 138 out of 332 municipalities. An expanded evaluation encompassing all municipal websites would allow for more comprehensive regional comparisons and Benchmarking. Additionally, future studies could incorporate user testing and physiological methods (e.g.,

eye tracking, EEG) to further validate usability issues from an experiential perspective. Finally, longitudinal research would be valuable to track whether improvements in municipal platforms lead to increased adoption and civic engagement over time.

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## APPENDIX

### **Benchmarking International Best Practices: What Greek Municipalities Can Learn**

The challenges identified in the present study—ranging from low usability to missed opportunities for inclusive and transactional design—stand in sharp contrast to international best practices. Countries such as **Estonia, Denmark, Finland, Canada,** and the **Netherlands** have established citizen-centered municipal web platforms that exemplify both functionality and inclusion.

For example, **Estonia’s municipal portals** are integrated within the broader “e-Estonia” ecosystem, allowing seamless transactions via eID authentication, with services ranging from tax payments to school enrollment. **Denmark’s municipal websites**, such as that of Copenhagen, provide multilingual content, live chat assistance, and interactive tools that resemble best-in-class private-sector platforms. **Finland** and **Canada** further stand out for embedding accessibility standards (e.g., WCAG, AODA compliance) and for incorporating participatory features such as feedback forms and consultation hubs. Meanwhile, **Amsterdam’s municipal portal** demonstrates exemplary personalization, with services dynamically adapting based on the user’s profile (e.g., family status, age, business ownership).

What these municipalities share is not just technical excellence, but **a cultural and strategic commitment to digital governance**. Their success is underpinned by:

- **Centralized digital strategies** that mandate standards across all municipalities.
- **Unified design systems** ensuring visual consistency and usability.
- **Real-time interaction** features (e.g., status tracking, live response).
- **Multilingual, mobile-friendly, and accessible-by-default platforms**.
- **Digital inclusion policies**, targeting youth, elderly, migrants, and people with disabilities.

By comparison, the Greek municipal ecosystem appears fragmented and reactive. The absence of a national UX or digital performance framework contributes to wide disparities across regions and often results in websites that fall short of basic expectations—even for digitally literate citizens.

**For Greece to close this gap**, lessons from these countries suggest the need for:

- A **national digital design system** applied across municipalities.
- **Central UX standards**, enforced through policy and training.
- **Participatory service models** enabling feedback and local democratic involvement.
- A **commitment to multilingualism, accessibility, and personalization**, especially for regions with tourism or diverse populations.

In short, municipal websites should evolve from static repositories to dynamic civic platforms—equipped not only to deliver services but to **empower, include, and engage citizens** at every level of digital readiness.