

Analysis of the Resource Delivery Capability of the Changchun Municipal Government Portal

Yaojie Chen*

Hainan University, Haikou China

*1648838565@gg.com

Abstract. The resource delivery capability of government websites is concerned with how government websites deliver complex information to users, so that they can quickly and easily access the information they need. Compared to the Harbin municipal government portal, the Changchun municipal government portal has deficiencies in organizational structure, identification system, navigation system, intelligent search, and accessibility for the elderly and disabled, which hinder the improvement of its resource delivery capability. Relevant measures should be taken to solve these problems, such as establish a "user-centred" concept for website construction, setting up a reasonable website organisation system, enhancing the standardisation and recognition of the logo, improving the intelligence of the search system, and continuing to promote ageing and barrier-free, so as to promote the enhancement of its resource transfer ability.

Keywords: The Changchun municipal government portal; Information Architecture; Resource delivery capability

1 Introduction

The construction of a digital government is a foundational and pioneering project for building a digital China. It is a crucial initiative for innovating government governance concepts, forming a new pattern of digital governance, and advancing the modernization of the national governance system and governance capabilities. Governament websites, as a critical component of digital government construction, are of paramount importance. They not only reflect the level of governmental governance capabilities but also significantly impact the sense of fulfillment experienced by the public. Governament website construction in China was initially established in 1999. Since 2018, China's development of government website construction has entered a new stage, with increasingly stringent national requirements and more standardized management practices.

The twenty-second government website performance evaluation index released by China Software Evaluation Centre evaluates local government websites in terms of six first-level indicators, namely, resource aggregation capability, data application capability, resource delivery capability, demand response capability, security and operation and maintenance guarantee capability, and excellent cases. Since 2022, resource delivery capability has been designated as a primary indicator and received more detailed and explicit specifications in the 2023 evaluation criteria., which shows the importance of resource transfer capability in the construction of local government websites. In the 22nd Government Website Performance Evaluation, the resource delivery capability index of the Changchun municipal government portal ranked last, reflecting the short-comings in the construction of the government portal of the city government, which greatly affects the people's sense of experience in accessing information resources and their evaluation of the government. Therefore, Changchun municial government must pay attention to the shortcomings of the website and improve the resource delivery capability.

After the China Software Evaluation Centre first set the resource delivery capability as a first-level indicator separately, the academic community has not conducted any relevant research on the resource transfer capability. Through searching relevant literature, it is found that the resource delivery capability in the assessment index is essentially the pratical application of information architecture in the construction of government websites. Therefore, research on the resource delivery capability of the Changchun municipal government portal cannot be separated from an exploration of its information architecture. This paper takes the Changchun municipal government portal as the research object, researches its resource delivery capability through the method of network research, explores the current situation of the portal website's resource transfer capability, and adopts the method of comparative analysis find the existing problems in the comparative analysis with Harbin municipal government portal. And then puts forward specific countermeasures and suggestions to promote the improvement of the resource transfer capability of the Changchun municipal government portal.

2 Overview of Information Architecture

2.1 Information Architecture and its Application in Government Portals

Information architecture was first proposed by Mr Waldman, an American architect, in 1976. In his book "Information Suspense", he defined it as "how to organise information to make complex information simple and clear, so as to help people achieve their information needs effectively"^[1]. Since its creation, information architecture has been widely used in the field of library intelligence and intelligence science. In recent years, the research of foreign scholars mainly focuses on the definition and process of information architecture, and enriches the content of information architecture through practical application^[2]. In 2002, Professor Zhou Xiaoying pioneered the introduction of "information architecture" in China through his book "Information Construction: A New Hotspot of Information Science Research," which gained recognition within academic circles. After the introduction of information architecture into China, the academic community conducted relevant research and applications in this field. Cao Ling and Wang Baohong conducted experimental research on information retrieval barriers

on government websites. They identified factors influencing the information architecture of these websites. Their findings underscored that only by placing the public at the center of website design and adhering to this principle can barriers to public information retrieval be effectively eliminated^[3]. Based on the information architecture theory, Zhao Hui and Liu Jun designed a government website information resource evaluation index system, and used action research and case study methods to evaluate and intervene in the website's organisational system, signage system, navigation system, and search system, in order to realise the "de-islanding" of the government website's information resources^[4]. Chen Lingxia combines search engine optimisation and information architecture, discussing the significance of information architecture of government websites based on SEO, and proposes corresponding strategies from four dimensions: organisational information system, navigation system, signage system and search system^[5].Xu Xin conducted an empirical study from the perspective of information architecture on the thematic portal websites established under the European Region of the World Health Organization (WHO). They identified issues in thematic navigation and proposed recommendations across three levels: macro, meso, and micro^[6].

The reason why information architecture can be applied to the construction of government portals can be understood from two aspects. Firstly, the emphasis of information architecture on "turning complexity into clarity" fits the characteristics of government portals. The government holds a large amount of effective information of the whole society, and the information users have a high degree of recognition and dependence on it. As a window for the government to deliver information, the government portal must process complex information in order to help the users find the required information more conveniently. Secondly, the emphasis on "making information understandable" in information architecture is in line with the concept of serving users of government portals. The "user-centred" nature of government portals determines that the construction of government portals must consider the needs of users and provide them with understandable information. Only when the information is understood by users can they actually accept it and make use of it.

The information construction of government portal mainly includes four core elements, which are organisation system, identification system, navigation system and retrieval system. The organisation system emphasises the sequencing and systematic processing of messy and disorderly information in accordance with some sort of ordering, so that the information is no longer isolated individuals, but forms a logical whole^[7]. The marking system emphasises the representation of information content, identifying names, labels or descriptions for the content, and drawing the user's attention to it through names, graphics, colours, fonts, sizes, brightness and other markings. The navigation system refers to help users to quickly locate themselves in web browsing until where they are, thus facilitating the browsing and movement of information. The search system is responsible for helping users to search for information, searching the content of the website through certain search algorithms, and presenting the results of the search to the user.

2.2 Introduction of Resource Delivery Capability

The resource delivery capability of government websites refers to their ability to convey and express information resources. It encompasses how the government and its related departments aggregate the information they possess and utilize the government website platform to deliver these resources to users, thereby facilitating easy access and utilization after aggregating the information resources in their possession. In the twenty-second local government website evaluation indicators released by the China Software Evaluation Centre, the capability to deliver resource includes three secondary indicators: navigation system, intelligent search, ageing and accessibility. These indicators become an important basis for assessing the resource delivery capability of local government websites. A government website with a high evaluation index of resource delivery capability must be user-centered and pay attention to the availability and visualization of information resource, so that users can obtain and use information resource efficiently and effectively.

The information architecture of the government portal includes four parts: information organisation system, signage system, navigation system and retrieval system. The resource delivery capability includes three indicators: "navigation system", "intelligent search" and "age-friendly and accessible design". Among them, "navigation system" and "intelligent search" can directly correspond to the information navigation system and retrieval system. Although "age-friendly and accessible design" cannot be directly classified as information construction, they can be included in the scope of information construction based on the principle of "user-centred" information architecture. In other words, the capability of government websites to deliver information resource, is compatible with information architecture to help users access information quickly and effectively. Therefore, the information architecture theory is applicable in this study.

3 Current Status of the Resource Delivery Capacity of the Changchun Municipal Government Portal

3.1 Website Organisation System

In terms of content logical organization, government portals typically categorize information either by theme or by user type. It is generally suitable to have between 4 to 10 main channel sections, as having too many sections can hinder users' ability to quickly locate and find information. In addition, the drop-down menu channel design is more conducive to the integration of the number of channels, when the user moves the mouse to the column, the column's secondary categories will be presented, which makes the columns refined and neat and comprehensive and detailed, easy to find and locate. At the same time, the website's category level is more reasonable in 3-4 levels. The survey revealed that the Changchun municipal government portal employs a dual classification system based on theme and content. The primary website channel is divided into five modules, each corresponding to a specific theme: "Party and Government Information," "Government Affairs," "Government Services," "Interaction," and "Into Changchun."

In the "Government Services" section, the dual classification method combining theme and content is utilized, and the design is more appropriate. At the same time, the website has set up four levels of categories, which is reasonable in design and rich in content. However, the channel design of the website does not adopt the drop-down menu design, which is not conducive to users' quick search for the information they need.

In terms of the spatial distribution system of content, a government portal with clear distinction between content panels, eye-catching and conspicuous important information, and prominent display of various columns will give people a sense of wholeness and organisation. Although the content modules on the homepage of the Changchun municipal government portal are separated by boxes, the layout lacks logical and systematic organization. The content modules are not arranged according to the five themes, giving users a sense of information clutter. This may lead to user fatigue when browsing information, which is detrimental to the website's development. Additionally, the website does not adhere to the principle of diminishing importance, which entails placing crucial information in prominent locations. Half of the homepage is occupied by news updates, predominantly in the upper section, thereby overshadowing the government services information that users are more interested in. This negatively impacts the user experience in obtaining the information they seek.

3.2 Website Identification System

The majority of government websites primarily disseminate information to users through text and graphics. The dimensions, shape, and color of the logo can significantly influence the user experience. A straightforward and intuitive logo name can leave a profound impression on users, whereas a complex and disorderly logo name may leave users perplexed. In designing the logo system for government websites, it is essential that the identifier be able to distinguish the type of object, that the logo accurately convey the content, that it be easy for users to understand, and that the color be simple, eye-catching, and strong. According to the research, the Changchun municipal government portal uses the text of the information content loosely and defines the scope of the word in a relatively vague manner. For instance, the three words "Party and Government Information," "Government Affairs," and "Government Services" have overlapping meanings in the theme column. Consequently, users may be unable to locate the information they require in a timely manner due to their own understanding. The information conveyed by the three themes indicates that it may be beneficial to consider re-naming "Party and Government Information" as "(Party and Government) News and Trends" and "Government Affairs" as "Open Government Affairs." Additionally, the website employs a limited number of color icons, with the primary color of the web pages being white, which may not provide sufficient visual stimulation for users. The key information may not be readily apparent to users, potentially leading to difficulties in identifying it.

3.3 Website Navigation System

The website navigation system consists of four distinct types of navigation: global navigation, local navigation, situational navigation, and supplementary navigation. The Changchun municipal government portal employs global navigation and local navigation to present the structure and content of the website. It also utilizes situational navigation and supplementary navigation to enhance the clarity and ease of understanding of the website. The global navigation of the website is prominently positioned at the top of the homepage, facilitating rapid identification by users. Local navigation is situated at the top left of each page, in accordance with the typical browsing patterns of users. Situational navigation employs location indicators to inform users of their current location on the website, thereby addressing the issue of "where" Supplementary navigation is reflected in the site group navigation, which encompasses the central government portal, the Jilin provincial government portal, the Changchun municipal government portal, and the Changchun municipal government department websites. This feature facilitates rapid navigation to the complete website.

3.4 Website Intelligent Search

In contrast to traditional search, intelligent search has emerged as the dominant trend in government portal development. This approach enables portals to comprehend user needs and address user issues, rather than merely facilitating information retrieval^[8].

In terms of intelligent input, the Changchun municipal government portal has a search box located under the main menu bar, where users can enter relevant terms to search. The page will then jump to the content page, which can meet the simple needs of users. However, it does not yet have intelligent features. Specifically, the website does not have an intelligent prompt function for search terms. When a keyword is entered, the search box does not display content related to that keyword. Secondly, the website lacks a function for correcting search terms or for intelligent conversion of pinyin searches. When users enter incorrect keywords or conduct a pinyin search, the search system is unable to identify and convert them in an intelligent manner. Thirdly, the website lacks a recommendation function. The website lacks the ability to present the most popular search terms directly to users, indicating that it does not fully utilize the convenience of technology in the era of big data to pay attention to and process the most relevant information that users are concerned about. Fourth, the website does not support complex multi-condition mixed searches, which cannot meet the higher requirements of users for searches. The lack of advanced search functions means that users cannot obtain the information they need through more precise search settings, which affects the user experience.

In terms of intelligent output, the Changchun government portal is also relatively low in intelligence. Firstly, the website fails to visualize policy content and policy data in the search results, and lacks the function of using technology to visually present relevant content. Secondly, regarding the logical organization of government services, the Changchun municipal government portal only employs a traditional search method, categorizing search results into "Policy Documents," "Government News," "Notices

and Announcements," and "Interactive Communication." It fails to integrate highly relevant and logically connected items based on user needs and business logic, thereby not offering integrated, scenario-based, and navigational one-stop services. This indicates that the website's design did not consider the user's perspective, violating the user-centered principle of information architecture.

3.5 Age-Friendly and Accessible Design

The concept of age-friendly and accessible design underscores the necessity of prioritizing the needs of elderly and disabled individuals in the design of government websites. This entails designing websites in accordance with their physical and mental characteristics, which directly reflects the concept of "user-centeredness." The Changchun municipal government portal has been designed to be age-appropriate and accessible. In response to the characteristics of the elderly, such as declining eyesight and difficulty in concentrating, the website provides voice announcements and expanded buttons on the page, which facilitate access to information for the elderly. The website is designed to meet the needs of disabled people in accessing information. However, the website's aging and accessibility design is not sufficiently detailed. It merely incorporates clicking functions, yet lacks a more comprehensive processing and layout of information content following operation. This hinders the ability of special groups to access information, and thus, the website fails to adequately address the needs of these groups for convenient access to government information.

4 Comparative Analysis

4.1 Selection of Comparison Cases

The results of the 22nd government website performance evaluation in 2023 indicate that among the 15 sub-provincial cities, the Harbin government portal ranks first in terms of resource transfer capability, with a score of 0.9, while the Changchun government portal ranks last, with a resource transfer capability index of 0.4. The selection of Harbin City as the comparison object of Changchun City is primarily based on the following considerations. Firstly, both Harbin City and Changchun City are located in the Northeast region, with a similar level of socio-economic development. Furthermore, both cities are sub-provincial cities with the same level of city, making them comparable. Secondly, the Harbin municipal government portal demonstrates a high level of resource delivery capability, whereas the Changchun municipal government portal exhibits a markedly different pattern. This contrast is of significant value in terms of both revelation and reference.

4.2 Comparative Analysis

In terms of website organization system, both websites have adopted the classification by topic and by user. Neither of them employs a drop-down menu design. There is not much difference between them in terms of content logic organization system. However, in terms of the spatial organization system of content, the Harbin municipal government portal's home page is arranged in a top-down order, with a greater distinction between content and a certain degree of rationality. In addition, the "government services" module, which is of high importance to users, is placed at the top of the page, which addresses the needs of users and facilitates their inquiries. In contrast, the layout of the content panels of the Changchun municipal government portal lacks logic and rationality, and important information is not placed in eye-catching positions from the user's point of view, which is easy to give the user the feeling of information piling up.

In terms of website identification systems, both websites employ text and graphics for identification, aligning with the prevailing design principles of most websites. However, the Harbin municipal government Portal stands out from the two in terms of simplicity, intuitiveness, and visual appeal. The site's primary color is blue and white, which serves as a unifying element across various content sections. The use of color shades in the display of information provides a more engaging and intuitive experience for users, allowing them to easily grasp the key points. Additionally, the color combination reflects the city's distinctive ice and snow characteristics, enhancing its visual identity. The Changchun municipal government portal employs a more limited number of color identifications, which has the effect of reducing the impact of color matching, thereby impeding the ability of users to rapidly identify key information. Besides, The Changehun municipal government portal exhibits a lack of clarity in defining terms, such as "party and government information," "government affairs," and "government services," which are not as well defined as those in the Harbin municipal government portal. For instance, the terms "Party and government information," "government affairs," and "government services" in the subject columns lack the precision and clarity of "news and developments," "government affairs," and "government services" in the Harbin municipal government portal. This discrepancy may influence the user experience.

In terms of website navigation system, both websites have global navigation, local navigation, contextual navigation and supplementary navigation. However, in the navigation of station groups, the Harbin municipal government portal has set up more website links. On the basis of the central government portal, the Jilin Provincial government portal, the county government portal of Changchun and the websites of various departments in Changchun, the websites of national ministries and commissions and provincial and municipal governments have been added, which shows that Harbin has considered more comprehensively when designing website navigation. The site is considered on a national scale.

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City, which suggests that Harbin municipal government portal is more comprehensively considered in its design.

In terms of intelligent search on the website, the difference between the two websites is relatively obvious. Firstly, in the intelligent input, Harbin municipal government portal fully embodies the characteristics of intelligent and convenient, in addition to setting up a search box for searching to meet the simple needs of users, the site's intelligent search platform is designed to be more intelligent and humane. When a user enters a keyword in the search box, related information appears below the search bar. This allows users to quickly click on the relevant search results based on their needs, thereby improving their search efficiency. The site also has a search term error correction and pinyin search intelligent conversion function for the user to enter the wrong words or unconventional words intelligent identification and transformation. And it has the functions of error correction of search terms and intelligent transformation of pinyin search. which can intelligently identify and transform the wrong terms or unconventional terms inputted by users. Similarly, the use of big data to present hot search terms is the embodiment of the site's attention to user needs and the effective use of science and technology, the site shows the relevant words including "professional title", "institution", "statistics public office" and "social security", fully embodies the design of the website from the reality of the concept. In addition, the site supports complex multi-criteria mixed search, and can be searched precisely by setting the relevance, search location, attachment type and spatial scope, and its advanced search is even set up with comprehensive and detailed qualifications, which greatly improves the accuracy of users' searches. However, the Changchun municipal government portal does not have these intelligent functions. Secondly, in terms of intelligent output, although both websites do not have the functions of policy content visualisation and policy data visualisation, the Harbin municipal government portal integrates highly relevant and logical matters according to user needs and business logic, providing users with integrated, scenariobased and navigational services. This reflects the "user-centred" construction concept.

In terms of age-friendly and accessible design, both have modified their websites for special groups. However, when compared to the Changchun municipal government portal, the Harbin municipal government portal's design is more detailed, reflecting a greater consideration for users. The Harbin municipal government portal has established a number of webpage versions, including an accessible version, a caring version, and a simplified version. These versions are designed to accommodate the diverse browsing characteristics of different user groups. The text in the caring version is larger, and the page is simpler and clearer, which aligns with the reading needs of the elderly and individuals with disabilities.

4.3 Problem Analysis

Through the comparative exploration of the two websites, it can be found that there are considerable gaps between the Changchun municipal government portal and the Harbin municipal government portal, and behind these gaps reflect the problems in the construction of the Changchun municipal government portal.

First of all, the construction of Changchun municipal government portal has not been "user-centered". Taking the site's content space layout as an example, it shows that the site design did not stand in the user's point of view, nor did it conduct sufficient research, but simply stacked the plates together, thus affecting the user's experience.

Secondly, the standardization of the Changchun municipal government portal needs to be improved. Under normal circumstances, the information transmitted by the government portal is reliable, and the public is more willing to believe it, which means that every detail must be fully considered when designing the website, and it must be carefully standardized. However, in terms of the logo of the website, there are vague definitions of words, resulting in ambiguity, and the public may have doubts.

Again, the Changchun municipal government portal fails to be designed with the help of information technology and has a low level of intelligence. A comparative analysis with Harbin found that Changchun's retrieval system is relatively outdated, both in terms of intelligent input and intelligent output, which greatly affects the user's search experience and restricts the site's ability to deliver resources.

At last, the design of the Changchun municipal government portal lacks of systematicness. A successful information construction system can consider all aspects of information construction and closely integrate users and information. In terms of resource transmission, the website does not integrate the information and users, and the lack of integrity of information construction restricts the website's transmission of information resources.

In conclusion, the resource delivery capability of the Changchun municipal government portal has problems that cannot be ignored, and in order to follow the mainstream in the construction of local government portals, it must be designed from the perspective of information architecture.

5 Suggestions

5.1 Relevant Departments Should Pay Attention to the Construction of Government Portals

Firstly, it is essential to refer to pertinent policy documents for construction. The relevant documents issued by the State Council and the evaluation indicators for local government websites published by the China Software Testing Center on an annual basis represent important reference standards, and they are of significant value in improving the resource delivery capabilities of the Changchun municipal government website. Therefore, the design of the Changchun municipal government portal should be based on policy documents and closely follow the development direction of government website construction.

Second, it is imperative to prioritize the user as the primary focus and enhance the user experience. The construction of government websites should eschew the practice of merely satisfying the release of government information resources online, and instead prioritize the practicality, usability, and user experience satisfaction of the website. Therefore, the Changchun municipal government portal must be designed from the user's perspective to enhance the user's experience.

Third, it is necessary to manage information resources correctly and provide effective information. Users log on to local government websites for specific purposes and needs. The navigation system, identification system, and search system of the website are all designed to enable users to obtain information resources conveniently and effectively. Therefore, before conveying information to users, the relevant departments must correctly manage information resources, screen and process the massive information they have obtained, and provide users with high-quality information.

5.2 Setting Up a Reasonable Website Organisation System

To address the problems in the organisational system, the Changehun municipal government portal should optimise the spatial distribution of content on the website. Different content modules should be placed in reasonable positions according to the degree of importance, with important modules placed in prominent positions and unimportant modules placed in less prominent positions. For example, modules such as government services, which have a high degree of user attention, should be placed in a prominent position on the page, so as to facilitate users' access to relevant information resources.

5.3 Improve the Standardization and Identification of the Logo

When designing the logo of Changchun municipal government portal, it is necessary to carefully consider whether the logo will cause misunderstanding and ambiguity, and it should be in line with the general cognition of the users, and be designed from the angle of "comprehensibility" of the users to ensure its normality. At the same time, the aesthetics of colour matching can be applied to the design, so that important information can be conveyed to users through eye-catching features.

5.4 Establish an Intelligent Retrieval System

We should make full use of modern information technology to improve the intelligent level of input on the search platform. First, we should improve the setting of intelligent prompts for search terms, and carry out prompts for search terms in accordance with the classification of modules. Second, we should optimise the operation mechanism of error correction for search terms, and strengthen the function of backstage processing, so as to make it have a more powerful function of identifying and correcting errors. Third, we should set up the function of Pinyin Intelligent Search, so as to satisfy the different needs of users. Forth, we should make the recommended guidance more detailed. Fifth, we should set up the search bar flexibly, so that it can achieve more accurate search.

It is necessary to construct a reasonable display of search results. First, key information in policy documents should be extracted and presented to users in the form of figures and graphical plug-ins. Second, data of high concern should be extracted for combined display. Third, integrated, scenario-based and navigational government services should be constructed to improve the user's sense of experience and satisfaction. Fourth, real-time presentation of certain data should be carried out.

5.5 Strive for Excellence in Age-Appropriate and Barrier-Free Design

Before the Changchun municipal government portal carries out ageing adaptation and barrier-free design, it should fully and comprehensively understand the physical and mental characteristics of the elderly and special groups, and then optimise the design of the page according to these characteristics, so as to conform to the usage habits of these groups, and reflect the concept of "user-centredness" in every detail.

6 Conclusion

As an important indicator for measuring the construction of government websites, the ability to deliver resources not only reflects the government's concept of information delivery, but also concerns the public's experience and feelings. A good government website must organise and construct information from the user's point of view, and deliver the information in a way that is easy to understand and humane, so as to truly be "user-centred". In the future, the construction of Changchun municipal government portal should be guided by information construction, and improve its organisational system, logo system, navigation system, intelligent search, age-friendly and accessible design, so as to improve its resource delivery capacity, and better serve the public.

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