The Construction of Social Cooperation System and Its Application in the Location Selection of Tourism Equipment Manufacturing Base under Mobile Internet

Jianzhu Sun [1, a, *]

[1] School of Economics and management, Liaoning Institute of Science and Technology, China

[a, *] bxsunjianzhu@163.com

Abstract. To study the application of social collaboration system in Tourism Equipment Manufacturing base selection under mobile Internet, firstly, Spring MVC framework and Activiti workflow engine technology are adopted to analyze the requirements of base location selection system based on the design idea and implementation method of mobile Internet base location selection system. Then the base site selection system based on social collaboration system is designed. Finally, the system is tested in user information management, site data management and site selection process management modules. The Activiti process framework can realize the business process modeling of the system, and can effectively help the site selection personnel to carry out site selection planning. At the same time, site selection personnel can carry out online interaction, facilitate site selection personnel to conduct on-site operations to obtain real-time data, and reduce workload and information errors, and improve the speed and quality of site selection under the design of mobile Internet. Therefore, the social cooperation model based on mobile Internet can reduce the cost of site selection and provide a basis for site selection.

Keywords: Social Collaboration Systems; Location Selection of Tourism Enterprises; Spring MVC Framework; Activiti Workflow Engine.

1. Introduction

Mobile Internet communication is the most basic livelihood facilities in China and plays a very important role in people's daily life. With the acceleration of the information process, a series of applications of Internet of things, cloud computing and other technologies have emerged, which directly affect the level and development of the country's economy, politics, and culture [1,2]. At the same time, the integration of mobile communication and Internet makes people more and more dependent on the mobile communication network, and the explosive growth of data volume also has higher and higher requirements on the mobile communication network, requiring communication operators to provide higher density high-speed ports and stronger multicast capabilities [3].

As the information exchange station of mobile data, Manufacturing base plays the role of transmitting information between mobile terminals and network nodes and is an important part of mobile Internet communication [4,5]. In the construction of Manufacturing base, site selection is the most critical step, which determines whether the construction of the base can be completed in time and quality, and also determines the safety and stability of the base in the process of use [6]. In recent years, with the increase in the number of base constructions, the efficiency of base construction is also increasingly high. The management and deployment of traditional base site selection work are arranged by operators in their own internal independent systems, which can't cope with the current situation [7]. A social collaboration system based on the mobile Internet is urgently needed to improve the communication efficiency and work transparency of mobile base location selection to meet the actual needs [8].

Based on this, the Spring MVC framework and Activiti workflow engine technology are adopted to analyze the requirements of the base location selection system and design a base location selection system based on the social collaboration system. The system is tested in user information management, site data management and site selection process management modules. It is expected to reduce cost, improve efficiency and provide the basis for site selection of Manufacturing base.

2. Literature Review

2.1 Research Progress Abroad

Seo et al. (2018) proposed two non-orthogonal random access (NORA) technologies for 5G mobile communication network and analyzed the performance of the proposed system in terms of access latency, throughput and energy efficiency. That the maximum throughput of NORA technology can exceed 0:7, which is significantly higher than the maximum throughput of conventional random access 0:368 [9]. To avoid the inefficient transmission of mobile stations from one base station to another, Pinem et al. (2018) studied the effects of the cost and window length attributes of the inferior signal degradation switching (SDH) on the switching performance parameters. The simulation results show that the increase of cost and average length leads to the increase of signal attenuation and delay, and the decrease of the number of inter-region switching. The optimal cost (c) of average window length (Dr) 0 and 10 is 0.65 and 0.25 [10].

2.2 Domestic Research Progress

Li et al. (2017) proposed a new architecture based on a passive optical network (PON) for the mobile back trip to enhance connectivity between adjacent bases, and introduced media access control protocol and dynamic bandwidth allocation algorithm. PON based mobile backhaul network can achieve low latency (less than 1ms packet latency) of communication between any adjacent base [11]. Wang et al. (2017) proposed a differential positioning algorithm for mobile base stations based on the Beidou navigation system, aiming at the problem that fixed base stations could not be established in the fixed measurement environment so that precise positioning could not be carried out. Moreover, the verification experiment based on the Beidou navigation system's external geometric parameter detector was designed to achieve the static relative positioning accuracy of mm and the relative positioning accuracy of RTK in cm [12]. He et al. (2017) proposed a new dual-wideband dual-polarization base station antenna array for the existing mobile communication system operating in 0.79-0.96ghz and 1.71-2.17ghz. The antenna array has a good broad-edge radiation characteristic, obtaining peak gain of about 15.1 dBi and 17.3 dBi in the lower and higher frequency bands respectively, which is suitable for the existing 2G /3G applications in modern mobile communication systems [13].

To sum up, the research on the mobile base has made some progress, but the research on Manufacturing base is still less, and the site selection work based on social cooperation system is not much involved. Therefore, based on the design idea and implementation method of the mobile Internet base site selection system, the Spring MVC framework and Activiti workflow engine technology are adopted to analyze the requirements of the base site selection system. The base site selection system based on social collaboration system is designed, and the system in user information management, site data management and site selection process management module are tested, which is expected to provide a basis for others to study the site selection of Manufacturing base based on social collaboration system.

3. Methods

3.1 The WeChat Public Platform Developer Model

In this study, the WeChat public account of the mobile social platform is taken as the mobile client that interacts directly with users, and the WeChat public account is developed through the mode of developer, so as to embed related functions of WeChat into the system and make the system have the function of social cooperative office. The developer creates the menu by calling the interface provided by the WeChat public platform and makes the rules and contents of message receiving, processing and response according to the system requirements.

The developer first writes the address of the self-developed server to the message interface and the processing flow of the message between the client. Figure 1 shows the WeChat server and the self-developed server.

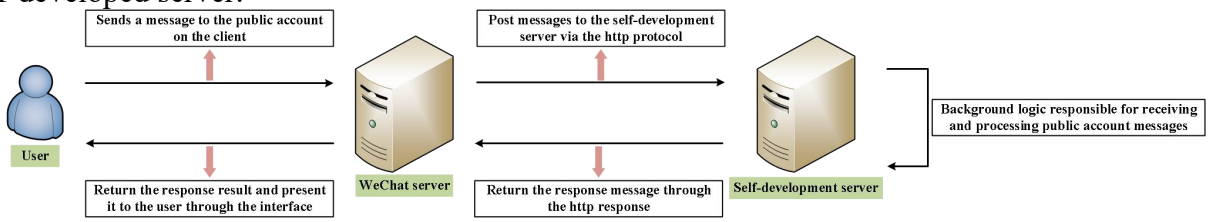

Figure. 1 WeChat public platform information processing flow chart

Figure 2 shows the interface of the WeChat public platform. The developer should estimate the interface call frequency in advance according to the application and then apply for the public account of the corresponding level. The developer must do the following two things before invoking the common interface.

Step 1: WeChat public account is applied to obtain Appid and App secret.

Step 2: Access token is obtained by retrieving the credential interface.

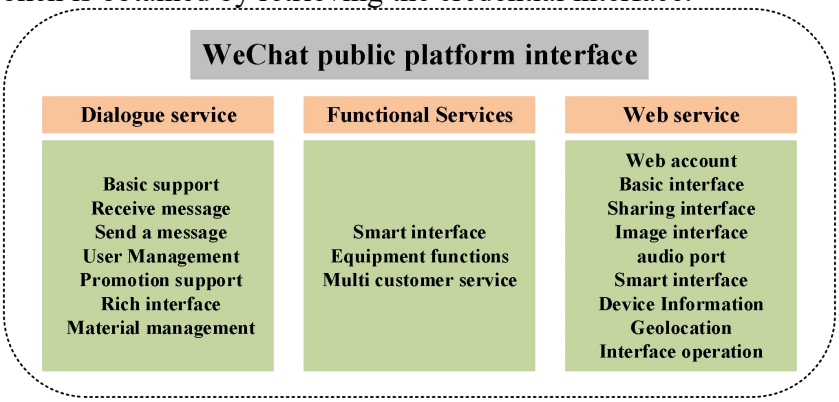

Figure. 2 The WeChat public platform interface

3.2 The Spring MVC Technology

Based on the MVC design pattern, the Spring MVC framework integrates all the functional components of the Web, including the business model, user interface and controller [14]. In the process of realizing the background of the system, the request information sent by the user is firstly encapsulated and then transmitted to the logical processing unit. It then returns the processed wrapper object and the corresponding view. Finally, the user is presented with the specified view rendering and data filling. The implementation principle is shown in Figure 3.

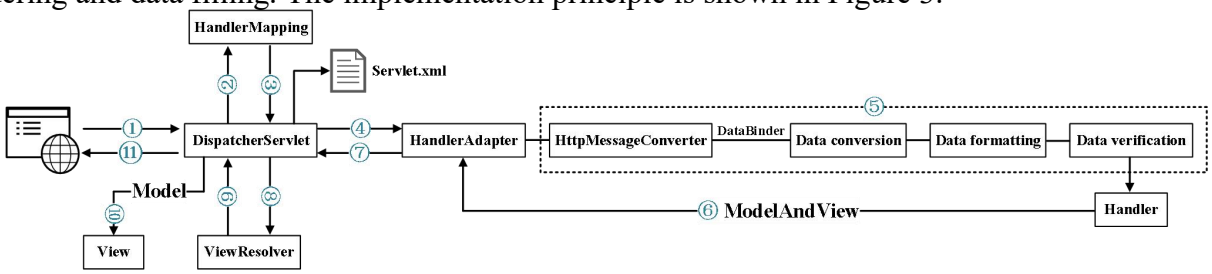

Figure. 3 Spring MVC framework implementation principle

DispatcherServlet is the core component part of the Spring framework, as well as the front controller of MVC. Complexity dictates that each component can handle a request cooperatively. Figure 3 shows the process flow of the framework for a request is as follows:

Step 1: The browser first sends the request to the DispatcherServlet dispatcher;

Step 2: DispatcherServlet forwards the request to the HandlerMapping processor mapper;

Step 3: To judge this request, HandlerMapping finds the processor responsible for processing this request and returns it to the DispatcherServlet as the handler execution chain;

Step 4: The DispatcherServlet finds the HandlerAdapter that executes the handler based on the processor encapsulated in the handler chain;

Step 5: The DispatcherServlet calls the interceptor front end method in the handler execution chain, and then HandlerMapping calls to execute the handler;

Step 6: The Handler Handler encapsulates the execution result and view as a ModelAndView and returns it to the HandlerAdapter;

Step 7: The HandlerAdapter returns the result to the DispatcherServlet;

Step 8: The DispatcherServlet calls the interceptor back-end method in the handler execution chain, modifies the ModelAndView and forms the final result. DispatcherServlet then calls ViewResolver ViewResolver, encapsulating ModelAndView as a view object;

Step 9: ViewResolver returns the encapsulated view object to the DispatcherServlet;

Step 10: DispatcherServlet calls the view object, populates the data and renders it to form the final response view. AfterCompletion () in the handler execution chain is carried out to issue a final response to the request;

Step 11: The DispatcherServlet returns the response to the browser.

3.3 The Workflow Engine Technology

BPM agrees to manage business processes by orchestrating services to ensure that tasks are performed by specified people at specified times and states. To implement BPM, it needs to use a unified process language to describe the predetermined process rules, which are driven by the process engine.

BPMN 2.0 defines various standard primitives that can be dragged and connected to create business rules so that the same process can have the same execution effect in different process engines. This system uses the actiBPM plug-in for developers to customize the process according to the attributes of each node. After the business process is edited using the actiBPM plug-in, the process file is converted to XML format through middleware.

The Activiti workflow engine is fast, stable, and easy to integrate with the Spring MVC framework. Figure 4 shows its core architecture. Activiti starts with Process Engine and interacts with the engine API to obtain the Process Engine object Process Engine [15] through the Process Engines class included in the Activiti jar.

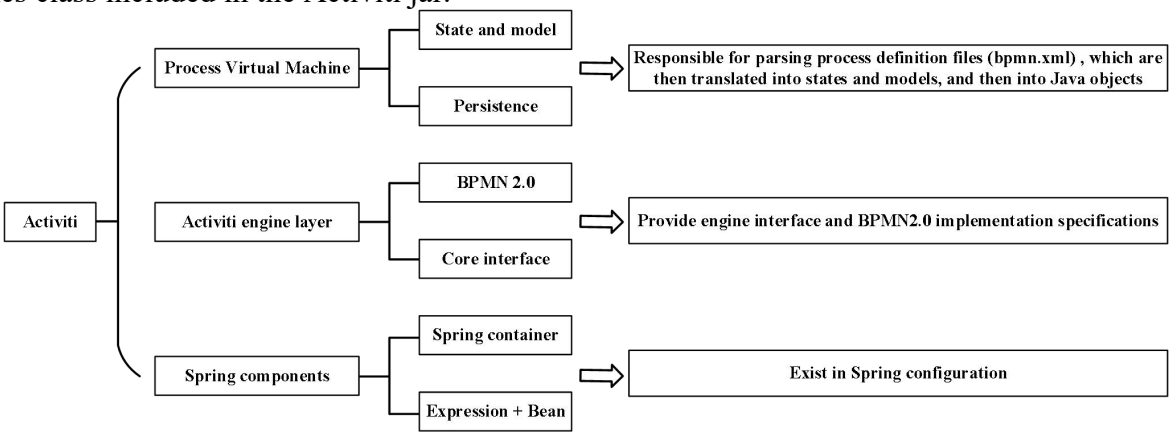

Figure. 4 Activiti engine architecture

3.4 Base Location System Requirements

Figure 5 shows the functions of the site selection system, including user information management, site data management, site selection process management, report query, and WeChat public platform. From the perspective of users, the base site selection system shall have user registration and login, administrator's review of registered users, user's inquiry of their own information, modification and execution of business processes, and so on. And the system administrator should have user management, data management and process supervision and other functions.

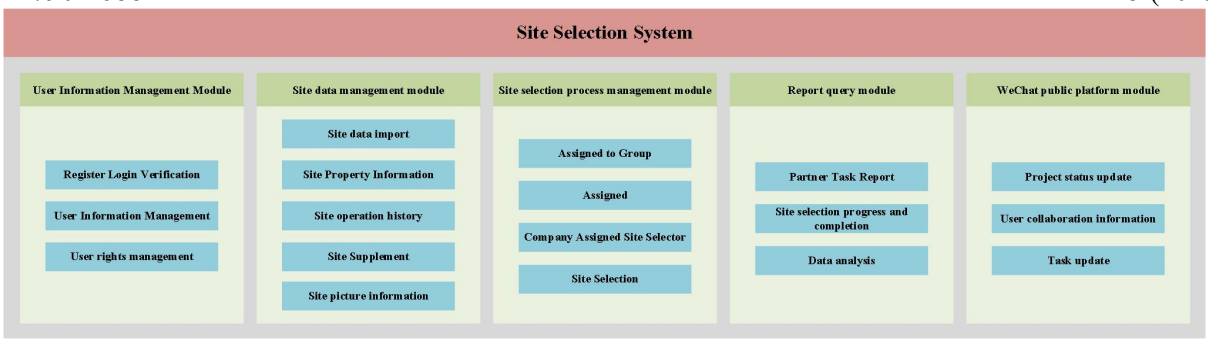

Figure. 5 Base location selection system function module

Figure 6 shows the siting business process requirements for the base siting system. In the figure, there are 9 main operations, including assignment to the group, assignment, delisting, site selection, company site selection, acceptance, acceptance, completion of the contract and compulsory recovery. The first eight operations are user operations, and the last one is system operations.

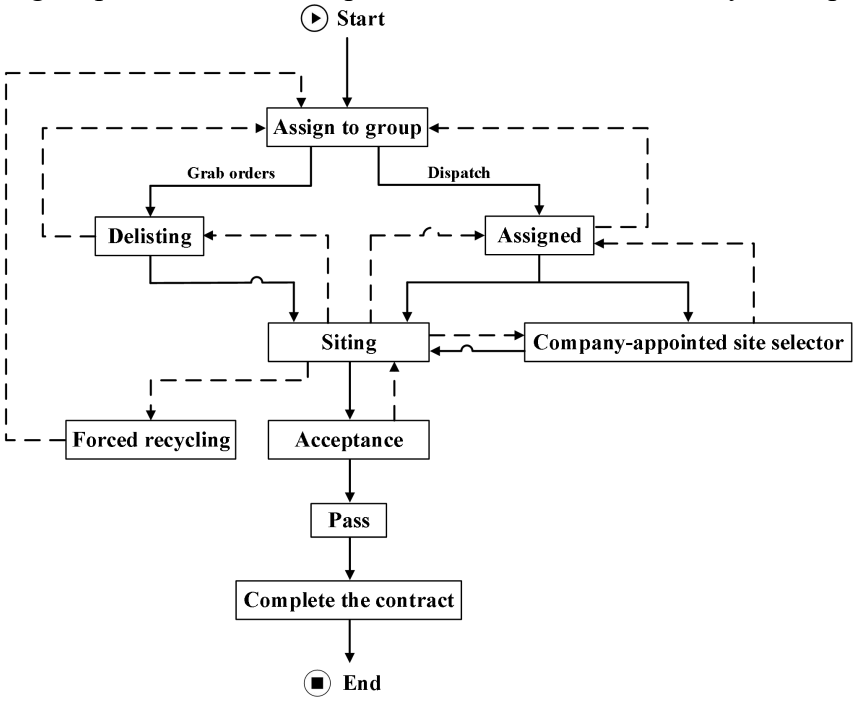

Figure. 6 Transaction Flow Diagram

3.5 Site Selection System Design

Based on the Spring MVC framework, the MVC pattern is applied to decouple and make the application easier to extend and maintain. The part of the system is separated that handles the business requirements from the data part of the database table, as shown in Figure 7.

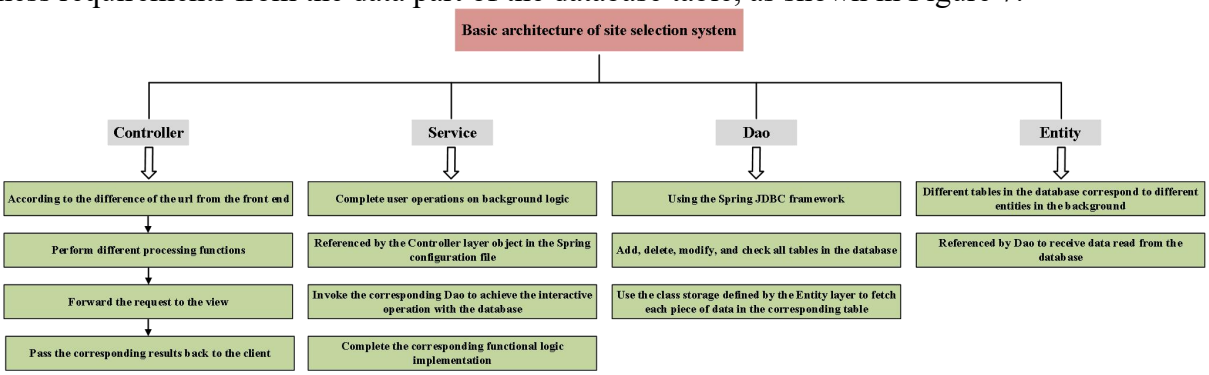

Figure. 7 The basic architecture of site selection system

4. Results

4.1 User Information Management Module Test Results

Figure. 8 shows the user information management module test.

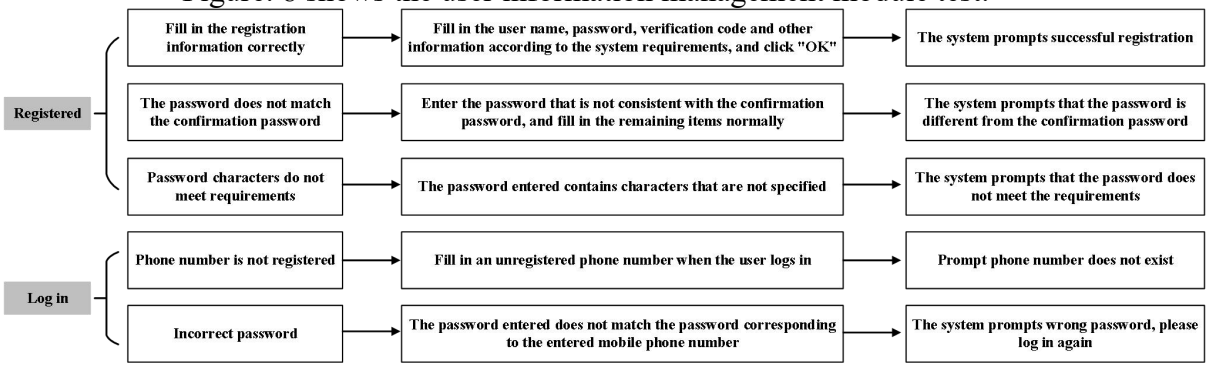

Figure. 8 User information management module test cases

4.2 Site Data Management Module Test Results

Figure. 9 shows the site data management module test.

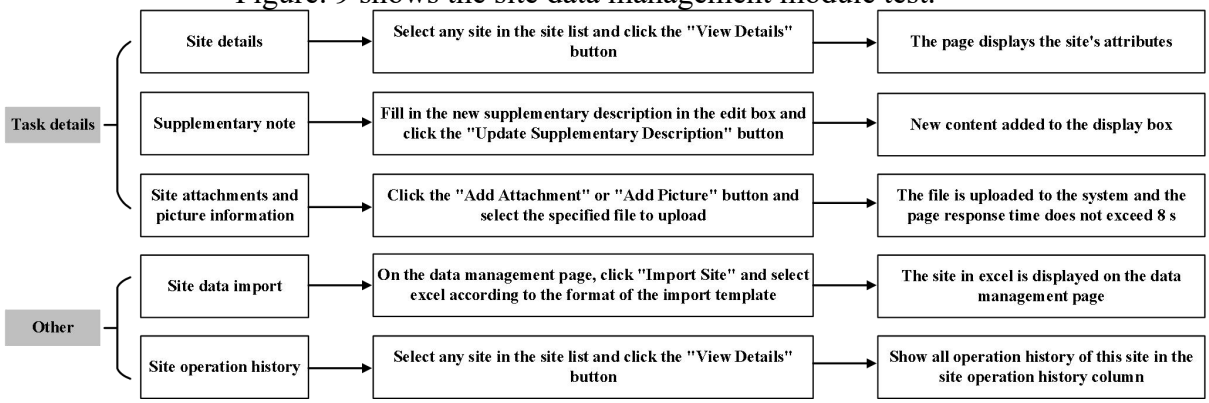

Figure. 9 Site data management module test cases

4.3 Test Results of Site Selection Process Management Module

Figure. 10 shows the site selection process management module test.

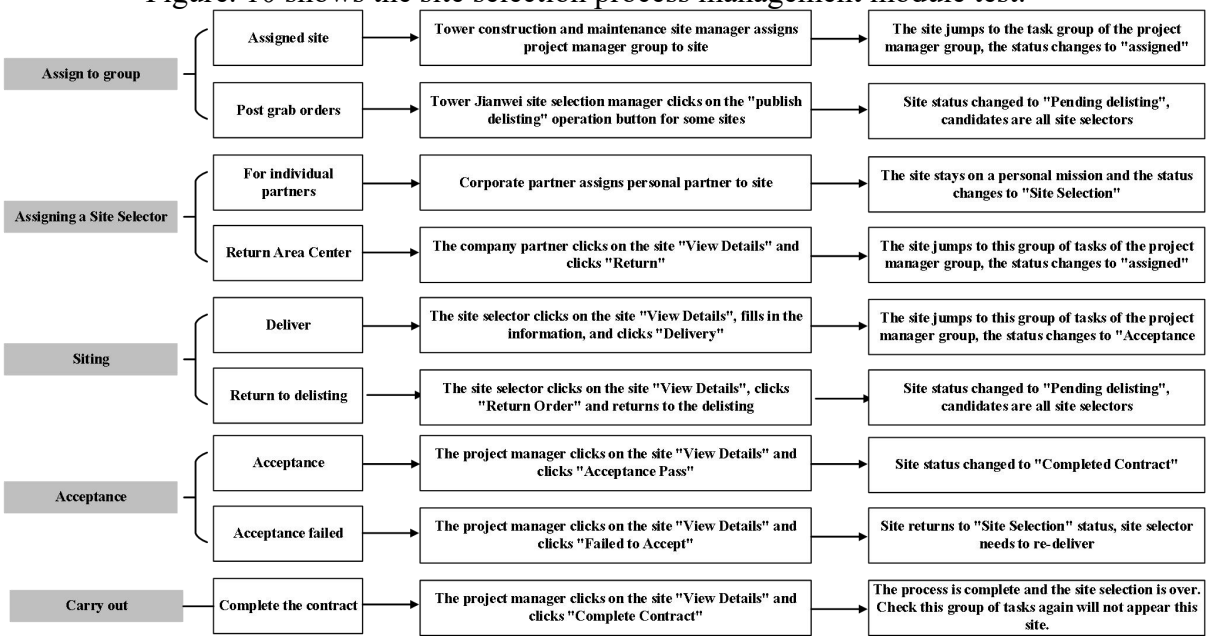

Figure. 10 Site data management module test cases

5. Discussions

In order to realize the application of the social collaboration system in Manufacturing base site selection under mobile Internet, a base site selection system using the Spring MVC framework and Activiti workflow engine technology is designed. In the traditional site selection model, each operator works in its own independent internal system, which is managed by the database. Meanwhile, the system runs on a single PC platform [16]. While the Manufacturing base site selection system designed in this study is in the process of site selection, information exchange is conducted between the tower company and the operator, the system is managed by the workflow, and is operated on the social cooperation platform. The unified management and analysis of data are realized to avoid duplication and save costs.

At the same time, the use of Activiti workflow engine technology can simplify the business process, quickly respond to market changes, improve the efficiency of enterprise production and operation, and achieve automation of business management. Based on the WeChat public platform, the system can carry out the status update, task update and other operations on the mobile terminal to improve site selection efficiency. Through the unified management and analysis of the data, users can know the progress of the project and existing problems in real-time, and carry out predictive analysis to provide improvement Suggestions. The system can be designated by personnel according to the pre-established rules to execute the site selection process and functions, perfect realization of the site selection business process requirements. This system still runs stably when the number of users is large, the operation of users is normal, there is no significant delay, it meets the performance requirements, and reaches the expected design target of the system. Wang et al. (2018) proposed an adaptive framework for service operation to reduce the response time of business objectives and improve the success rate [17]. At the same time, distributed dynamic description logic (D3L) is used to eliminate semantic conflicts between services, and local and global planning algorithms based on AI planning are designed to handle runtime exceptions at service level and path level. By implementing the system through workflow engine Activiti and business process language BPMN 2.0, the framework can ensure higher efficiency and success rate.

6. Conclusions

Based on the design idea and implementation method of the mobile Internet base site selection system, the requirements of the base site selection system by using the Spring MVC framework and Activiti workflow engine technology are analyzed. Based on the social cooperation system, the base site selection system is designed and tested in the modules of user information management, site data management and site selection process management. Using the Activiti process framework can realize the business process modeling of the system and effectively help the site selection personnel to carry out site selection planning. At the same time, based on the design of the mobile Internet, site selection personnel can carry out online interaction, facilitate site selection personnel to conduct on-site operations to obtain real-time data, reduce workload and information errors, improve the speed and quality of site selection, and provide a basis for site selection. However, if the data volume is too large, the system performance requirements will also continue to improve, so in the subsequent research, the system needs to be optimized at the data level.

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