

Hotel Information Platform Design and Implementation Based on Cloud Computing

Liu Na, Wang Xueyuan and Xu Yulian

*School of Management, Harbin University of Science and Technology, Harbin
China, 150080
liuna727@163.com*

Abstract

In today's information age, how to effectively integrate the information resources of tourism and leisure has received widespread attention in the tourism and leisure industry. This article analyzes platform user requirement for the current situation of single function of information service platform, and simple interactive as well as limited contents. The structure and function of hotel information platform based on cloud computing is brought forward in this paper, the framework and required key technologies of platform customization service implementation are also offered.

Keywords: *hotel information platform, cloud computing, implementation, design*

1. Introduction

According to Media Research data, in 2014 the market size of Chinese online travel has reached over 300 billion Yuan, in 2015 it will reach 465.54 billion Yuan. Information service providers in China include hotel official website, travel channel of portal site, tourism destination management organizations, professional tourism e-commerce website, travel social networking sites and local life service website. They have similar content and diverse modes, the business modes includes media information (such as China travel, Meadin), the official website (such as live in China, Home Inn Group official website), agent (such as elong and Ctrip), vertical search engine (such as Qunar), social communication (such as ant cellular content), C2C (such as Airbnb), group purchase (such as Meituan), which basically realize the product on line inquiry, booking and payment, offline service experience, and the return to online evaluation, that is called O to O to O (online to offline to online) business model. However, many hotel platforms take hotel products as marketing carrier, and still depend on hotel room sales profit model, platforms have similar functions, service items is limited, and are less involved in destination leisure tourism service design, and lack of the service on personalized customer demand and supplier customized services. In view of the present situation of hotel information platform, combined with advanced information technology-cloud computing, it's imperative to establish different hotel information platform and provide customized services for the users. Construction of the hotel information platform based on cloud computing is not only to enrich the theory of competition strategy of the hotel, and provides a new perspective for reconstruction of enterprise competitive advantage, but also provides the development direction and technical support for hotel industry practical operation. It has an important theoretical and practical value for integration and utilization of tourism destination leisure resources.

2. Literature Review

2.1 Customized Service of Hotel Information Platform

The overall number of domestic and foreign literatures on hotel information platform in recent years is relatively smaller, the contents are focused on the construction of tourism e-commerce platform and service management solutions according to modern information technology such as internet, networking, and concurrent distributed [1-3], and evaluation system are analyzed taking Ctrip and elong platform for example [4]. Some scholars put forward SNS tourism electronic commerce development mode from the aspects of complementary advantages between social network and tourism electronic commerce [5]. For the multi factors integration characteristics of tourism products, Dong Bing put forward the framework of e-business platform multi organization collaboration and integration technology [6], in order to achieve related subjects collaboration in tourism industry chain and improve the efficiency of data sharing in electronic commerce platform. With the coming of experience economy era, customized services become the main services mode of enterprise [7], the research on mass customization service is mainly focused on servicing platform construction [8-9], modularization design of platform construction and service combination method [10-11] and so on, in order to achieve service module sharing and the maximization utility. In recent years, customized travel methods to meet personalized needs appeared in tourism industry, such as private custom and travel advisory, tourism operators gradually realized that they must be transferred from tourism elements package to service designer for customer [12], and relying on the whole tourism value chain, provide differentiated product portfolio for customers and create a unique customer experience. Research on tourism customized service platform mainly includes: the construction of tourism mass customization service platform based on multilateral win-win industry concept from strategy level [13] and personalized service customization system design and implementation tactics are offered under B2C business model [14]; the feasibility of tourism customized services platform implementation is explored from the technical point of view, for example Feng Wei constructed the tourism electronic commerce recommendation method based on personalized recommendation technology [15] and Zeng Li (2013) recommended to improve the tourism platform using Web mining technology and synchronization technology of virtual community to meet the individual needs [16]. Tian Lei (2009) applied geographic information system (GIS) and cross media technology into tourism planning management and visitor services [17]. From the above, it can be seen that the research of tourism information platform is mainly on the design and management of tourism electronic business platform, which is lack of research and design on hotel industry information service platform. Most research explore the tourism information platform customized services from technical point of view, which is lack of detailed system description of information platform customized service process from the perspective of management.

2.2 The Application of Cloud Computing Technology in Platform

Cloud computing is an extension of distributed computing and parallel processing, by giant calculating and treating ability of the computer network, it automatically divided programs needs to be treated into many small routines, and offered them to giant system consisting of multiple servers to make search, calculation and analysis, and finally the results will be sent back to the user [18-19], to realize resource sharing and network coordination. In recent years, cloud computing technology is widely used in platform research, such as small and medium-sized enterprise cloud manufacturing service platform based on cloud computing, networking technology from a technical point of view [20], a multi-agent information retrieval system framework [21] and the elastic

cloud platform [22]; From the angle of the service model, explore how to realize platform interactive services [23] and the differentiated services [24] based on cloud computing technology, and put forward cloud service selection mechanism [25], update mechanism [26], and cloud service quality [27] and safety problem [28] based on computing capability, business needs and enterprises preferences.

To sum up, the literature number of tourism information service platform is limited, and the research content is mainly on structure design and technology realization of the tourism business platform, which is lack of the service process design and specific realization methods. The key technologies of platform are modern information technologies, such as web and networking technology, which is lack of cloud computing technology application in tourism information platform. In this paper, hotel information platform will be established based on cloud computing platform, from the perspective of customized services, taking customer demand as the main construction of hotel, and the customized service process and the required key technologies will be brought forward, in order to enhance the user experience and promote whole marketing of travel destination tourism and leisure services.

3. The Function and Structure of Hotel Information Platform

3.1 The Function of the Platform

According to the data of the National Tourism Bureau, in 2014 domestic tourism is over 3.6 billion passengers, outbound tourism is over 0.109 billion passengers. 96% domestic tourists and more than 65% outbound tourists complete tourism leisure life experience through online tourism information platform, most of which are standardized product, such as hotel booking, air tickets and tourism tickets booking; and the non standard products of tourism destination leisure activities still have great development space. At the same time, Chinese hotel customer demand is becoming more and more leisure, that is to say diverse needs concurrently exist, such as accommodation, catering, business, travel, social networking, and other daily leisure life. Changes in hotel consumer demand and behavior make hotel become the whole solutions provider of travel/recreation/business of tourism destination, which also provide a broad space for innovation in hotel information platform function increase and service mode reform. Based on the concept of sharing economy, information platform relying on Internet, networking, cloud computing, wireless radio and other modern information technology, offers customized services to users including customer faced product information query, exchange, booking, payment and evaluation and suppliers faced product marketing, decision support solution as well as the electronic management services of background internal process etc., based on various types of terminal equipment, in order to realize fast and efficient intelligence service of supply and demand of resources, service composition and selection and evaluation, etc. the detailed function of the platform are as follows:

3.1.1 Intelligent Interactive Information Service: The platform using the business module and community module offers intelligent interactive information service to users through intelligent interactive system according to customer needs that query tourism and leisure information anytime and anywhere. The platform not only acts as the tourism and leisure information media of the destination, providing information connecting services and information searching service on living, traveling, purchasing and recreational and sports activities (hotel product information, enterprise supply information, public cultural activities and folk group activities information, user evaluation, product price comparison, etc.) but also can offer intelligent interactive information services and personalized recommendation information at anytime and anywhere based on user geographic position and demand of the user and historical behavior information, which include a scheduled

release of information in real time, real-time personalize information recommendation, information changes based on tracking itinerary, helping users to grasp the dynamic resource scheduling, and flexible adjustment. At the same time it also can push different adaptation engine styles and optimize webpage display effect according to user terminal access equipments. Intelligent interactive information service can help the users obtain the tourism resources information at anywhere and at any time, which is an important way for information intelligent pushing and demanded information resources obtaining. Intelligent information processing and automated network division and cooperation can enhance the quality of information services. Community share and communication is a special character of hotel information platform, which takes users conveniently sharing as the core, integrating leisure travel diary publishing, and comments, tourism sharing, experience exchanging and goods trade and self-help groups and other functions as a whole. On the one hand provide users a free interactive environment with rich information, equal exchanging and harmonious atmosphere, which can enhance customer emotional attachment to the community, and can indirectly increase consumer loyalty to the enterprise; On the other hand, it can form a powerful Consumer Union by purchase consumer polymerization through the social networking site, and they can enjoy preferential prices when make collective bargaining and group competition on price.

3.1.2 A Key Customized Service: Based on the characteristic of openness and user participation, the platform offers a key customized service for users (customers and suppliers) by fully mobilizing resources, according to customers personalized and diversified needs. Customer faced service themes are chosen and planned by the customers and customers make clear travel purpose, scope and the number of participants, the platform is responsible for confirming themes, organizing and planning and completing a trip. Supplier faced customized service is to offer intermediary services, financial services and other services for suppliers through explicit of tacit knowledge based on resources demand analysis and owned resources sharing with alliance members. Intermediary services include resource requirement analysis, such as hardware, network equipment and personnel leasing information, and internal and external communication and coordination, and alliance member enterprise management consulting, and so on. Financial services is mainly to provide small amount finance services through the Internet based on credit and combined with technical supervision; incubator service is to provide incubation services for small and micro supplies “business mentor and task Crowd sourcing”, to promote structure upgrading of local tourism and leisure services industry.

Hotel information platform is the platform that can make collecting, scheduling, matching, combination and management on supplied and demanded resources, taking flexible and convenient customized service as the goal based on the networking and cloud computing technology, the specific structure of which are as follows: ①the infrastructure layer, includes the system hardware and software facilities and intelligent collection terminal node and center node / area nodes/ business node; ②the virtual resource layer, includes customer demand information and the supply information of human / property / facilities / space / time / technology / skills / knowledge / information platform, and the platform offer on-demand service by virtual package at anywhere and anytime according to the user demand; ③the information processing layer, includes data integration, data mining, storage and monitoring based on intelligent routing / load balancing / distribution model and other technologies; ④the service layer, includes customer service provision of leisure tourism information query, reservation, transaction, evaluation and social sharing service and supplier service provision of intermediary, financial and incubation services *etc.* ⑤The portal layer is supply and demand interaction and communication interface, including physical store and online store, the users can access the service by entering the hotel information platform through any interface, which is shown in Figure 1.

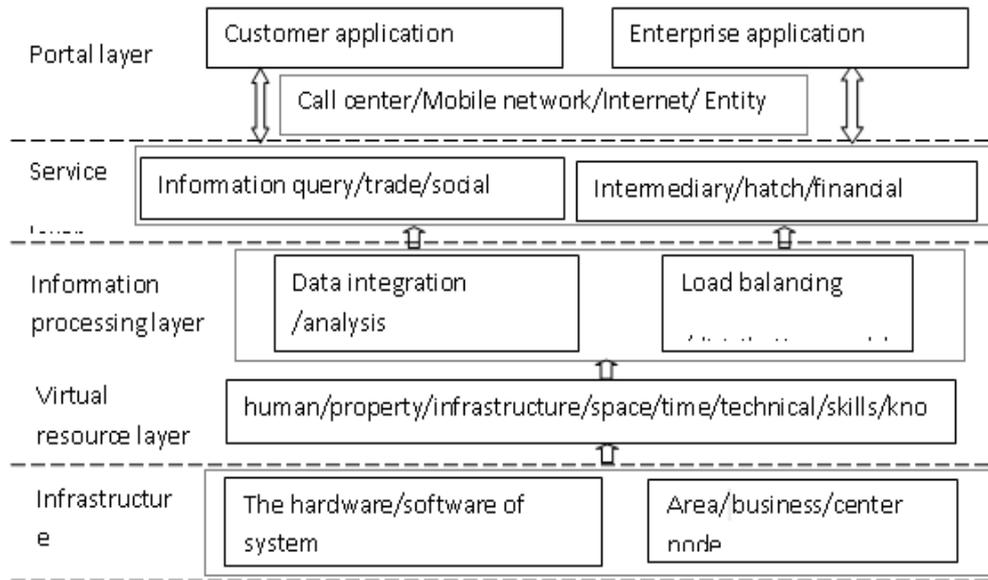


Figure 1. Logical Structure of Hotel Information Platform based on Cloud

4. The Realization of the Hotel Service Information Platform

Hotel information platform is developed based on Microsoft Net Framework platform, and makes foreground and background connection management using C#, Microsoft SQL Server 2008 is adopted in database, developing environment is Visual Studio 2010, which basically realizes the retrieval service, service matching and combination, service evaluation and sharing service process, by the utilization of vector retrieval algorithm, massive distributed storage technology, virtual construction technology and other key technologies.

4.1 Platform Customized Service Realizing Process

Hotel information platform collects and classifies supply and demand information and forms supply and demand resources ware through industry information platform and intelligent terminals. It constructs virtual project team through platform information processing layer, and makes service searching, matching and combination, and then gives platform service layer optimal results feedback to the user for selection, evaluation, exchange and sharing; and finally forms careful selection service ware (community selection tactics ware) based on integration of selected results and evaluating information to offer decision support for supply service project design and service process optimization. Supply and demand information collection and retrieval is the basis of platform service realization, service matching and combination is the balancing tool for multi-supply resource synergy and sharing; service selection and trade is the guarantee of platform service realization, service evaluation and sharing is the driving force of service innovation, which is shown in Figure 2.

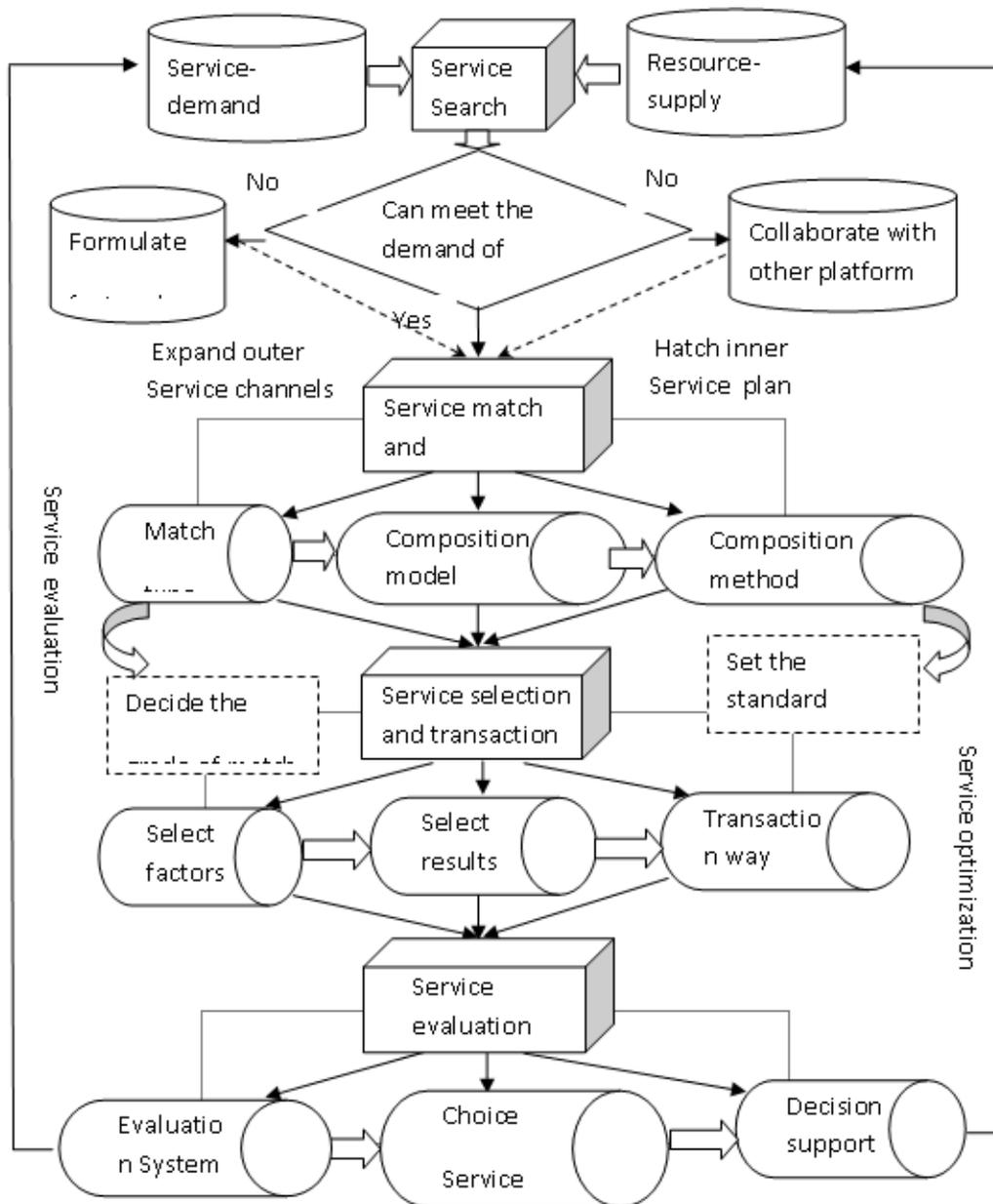


Figure 2. The Service Process Frame of Hotel Information Platform

4.2 The Realization of Intelligent Information Interactive Service

The realization of platform intelligent information interactive service includes information collection, creating services list and service retrieval three aspects, which mainly uses distributed mass storage technology to form storage resource pool with high performance and scalable capacity, in order to meet the massive data storage requirements. Hotel information platform uses unrelated database technology, at in central node public basic coding and core sharing information are stored centrally, in other nodes high frequency access and shared information are stored, which can improve the retrieval speed.

4.2.1 Supply and Demand Information Collection: Platform form supply and demand resources pool by collecting multi source, multi node, multi forms of supply and

demand information through intelligence perception system, and the collecting process includes supply and demand information searching and obtaining, supply and demand information identification and description and information collection classifiably, which can be seen in Figure 3.

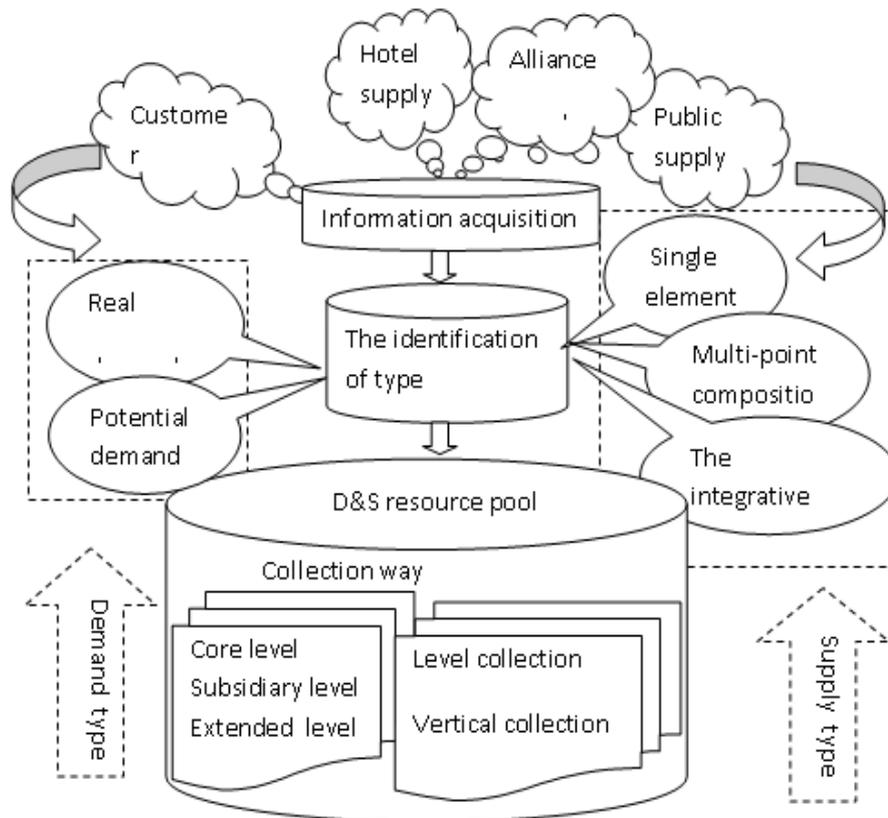


Figure 3. The Process of Supply and Demand Information Collection

Supply and demand resource pool can be divided into the core layer, affiliated layer and extension layer according to collecting level. the core layer resources is from hotel reception system; the affiliated layer resource is from alliance enterprise, such as food, housing, travel, shopping, entertainment, culture and other elements, which can realize the integration of tourism and leisure experience; The extension layer resource is from public services system and data model and network knowledge distributed in different geographical. Resources pool collection methods include horizontal and vertical and networking collection. Horizontal collection only collects one kind element among a class of elements, such as life, travel, purchase, and entertainment and so on. Facing common demand vertical collection collects supply and demand of resources along the vertical tourism and leisure industry chain and forms common needs and supply combination schemes; network collection is the multi type and multi-level integration of eight elements for specific needs, and forms customized solutions to meet the individual needs.

4.2.2 Establishment of service searching directory: The platform aggregates supply resource with similar characteristics using K-Means clustering technology and forms service root directory, which includes customer service, community service and supply services three kinds. The platform further uses the K-Means algorithm to narrow the range of cluster and forms the second level directory, the specific performances are: ① The single service in customer service module includes tangible entity service, staff

service and space atmosphere service; ②Composition service refers some extension services taking customer demand as the core, such as the integration of tourism and leisure services, free activities planning and home economics, home furnishing decoration services; ③Single service in community share service refers to online / offline leisure travel diary, instant chat tool / game; Service composition refers to leisure travel searching tactics and forum. supply enterprise application includes intermediary services, financial services and the latest trends of the industry information, which can be seen in Figure 4.

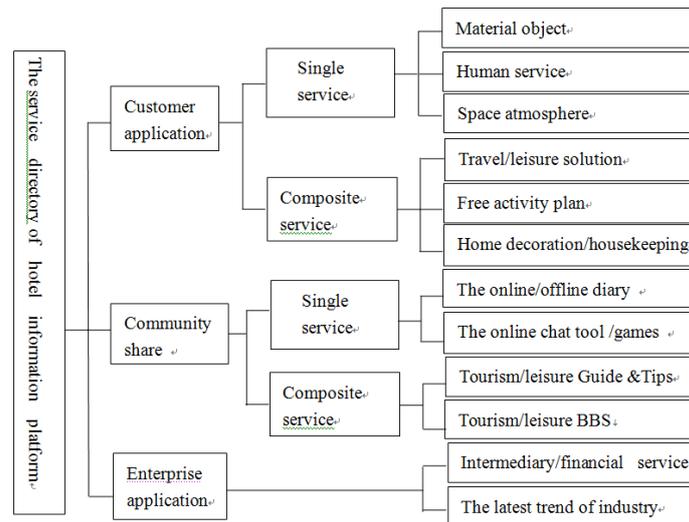


Figure 4. The Service Directory of Hotel Information Platform

4.2.3 Service Retrieval Model: Platform customized service retrieval model combines the advantage of directory search and personalized recommendation algorithm; it's a kind of service mode which information searches user, mainly including service directory, key word ware, searching device, optimization results, user interface and the supply & demand resource pool module. The service directory is the basic description information of platform service, before user searching, it can filter search range based on service classification. Keywords management module parses service description file WSDL uploaded to the information platform, and extracts service description, function description and other keywords, finally stores them in keywords ware. The service directory and keywords ware information are from demand & supply resource pool, which not only collect supplier and user information, but also update user clustering ware information by collecting the optimization results in order to realize the real-time dynamic update cycle of retrieval process. Searching device is to find out information documents being similar with what user retrieval from user clustering model ware, and parses retrieval words using the WSDL analysis module, turns users natural language into access system identified language. Then it makes correlation matching calculation between system identified language and similar user model sets according to personalized recommendation algorithm, and sorts search service results, finally obtains optimized service and transforms it into the language users can understand, the personalized search is completed. User interface can provide users a visual query input and output interface, and it connects with service catalog and searching device, which on one hand input searching words into the system, on the other hand offer system optimized results to the user, which can be seen in Figure 5.

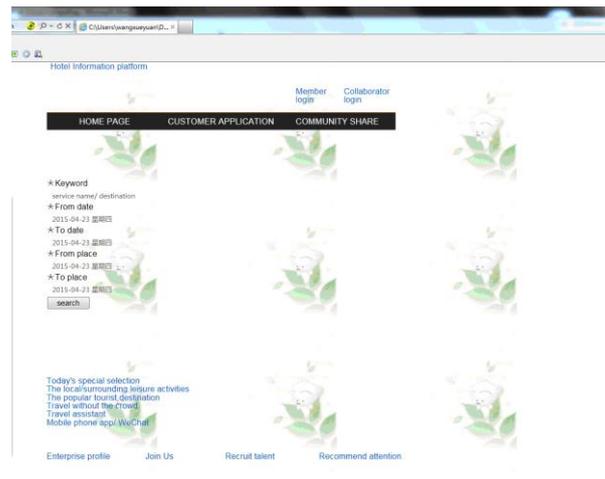


Figure 5. Hotel Information Platform Interfaces

Platform service retrieval model utilizes personalized vector retrieval algorithm, specific steps can be seen in literature [29].

4.3 Realization of A Key Service Customization

The function of A key service customization relies on the implementation of service match, composition, selection and transaction by virtual service technology. The technology packages the hardware facilities, storage function, network infrastructure, personal service and space atmosphere into virtual service and makes the application layer and the physical layer to be loose coupling state,. The packaged virtual service which is either simple information query or a complex combination solution can be dynamically allocates and composites the D&S resources of the platform.

4.3.1 Service Match and Composition: A key service customization is the result of bilateral optimal matching based on the collection and classification of D&S resources. According to the retrieval system, the platform can identify service match type, and match the supply resource to the user's needs by the tripartite consultation. Service match type includes exact match (supply resource and service demand are on all fours), partial match (supply resource can meet partly the service demand), select match (a variety of supply resource can meet the service demand) and extended match (no supply resource can meet the demand of service; platform can utilize the outer resource to meet the service demand).

After the identification of service match type, the integrative solution can be packaged by service composition system which is composed of composite method and composite pattern. Composite methods include the automatic interaction by intelligent machines interface, D&S bilateral consultation by multi-intelligent terminal, and the integrative smart terminal. They can exactly and efficiently coordinate and package the service demand and supply resource by the way of man-machine intimate interaction. Service composite patterns include information intermediary, knowledge coordination, and intelligent integration. The pattern of information intermediary applies to some standardized service requirements, which can match up with the price according to the time, type, and level; The pattern of knowledge coordination applies to some standard-personalized service demand, which include package service and menu service based on expert opinion and integration of multiple supply elements; The pattern of intelligent integration applies to some specific service demand, and formulates the integrative solution based on the resources and ability of the platform, which is composed of

customer-oriented tourism/leisure plan and supplier-oriented decision support solution, which can be seen in Figure 6.

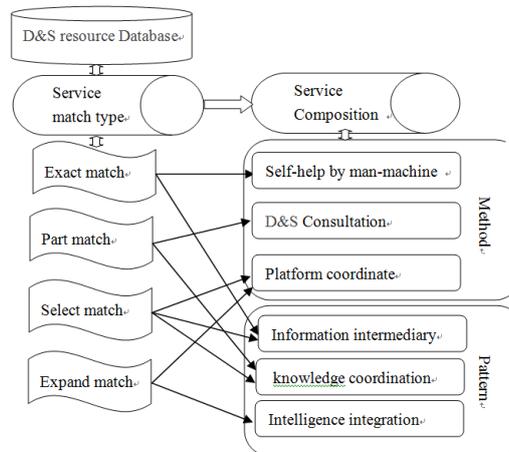


Figure 6. Service Match and Composition Model

4.3.2 Service Selection and Transaction: Service selection is composed of three modules, which is selection influence factors, personalized consultant and the way of transaction. Selection influence factors include user's interests, credibility of resource supply, and the time/content/price of customization service etc. Personalized consultant is the characteristics module of hotel information platform, the personalized travel plan can be provided for customer in 24 hours, the customer can acquire more than one travel plans for his scheme, and choose the most satisfactory solution before the deadline. Then he can consult with the consultant on details by personalized-to-personalized communication, and finally confirm the service solution. The ways of transaction include cash, bank card, online payment, and the membership card.

5. Conclusion

This paper put forward a new perspective, that is to build the hotel information platform by integrating the tourism and leisure information of destination based on cloud computing technology to provide customized service for the hotel customer, in order to realize the wide utilization of supply and demand resources, and effectively meet the information sharing demand of the tourism and leisure industry chain., provides a new Angle for the research of information platform for the hotel. The research of tourism information platform based on cloud computing is still in the primary phase.

This article only describes the logical framework of the platform customization, and lacks the support of relevant empirical research. therefore, the combination the hotel information platform with things and Wearable technology will become one of research directions in the future, at the same time, the customization management mode and empirical research of the hotel information platform o will become the focus of the next new research point.

Acknowledgements

This work has been supported in part by the National Natural Science Foundation of China Youth Fund Project (71403070); nature science foundation of Heilongjiang Youth Project province(QC2012C044); Heilongjiang Province philosophy social sciences innovation team construction plan (TD201203); philosophy social science project of Heilongjiang province (13C024).

References

- [1] Z. Hongyan, "Research and design of intelligent tourism platform", *Internet of things technology*, vol. 11, (2014), pp. 73-75.
- [2] Y. Ping and L. Yan-Ling, "Model Innovation and Platform Design of Tourism E-business in China", *Computer and Modernization*, vol. 7, (2011), pp. 179-182.
- [3] D. Jun, "Research and Design of Distributed Tourism Service Models and Management Platform", Tian Jin University Master Dissertation, (2012).
- [4] X. Qianqian, "Fuzzy Comprehensive Evaluation of Traveling E-commerce Based on Value Creation-Empirical Research On CTRP and ELONG", Xia Men University Master dissertation, (2009).
- [5] W. Lepeng and Z. Yiwen, "A Mode Study on the Integration between SNS Websites and Travel E-Commerce", *Commercial Economy*, vol. 8, (2012), pp. 72-73.
- [6] D. Bing, "Research on integrative technology of tourism E-business collaborative Platform", Fu Dan University Master dissertation, (2009).
- [7] B. J. Paul, P. Melani and P. Leyland, "From service factory to service theatre: Solving the positioning dilemma in the medical practice", *Journal of Medical Marketing*, vol. 7, no. 1, (2007), pp. 55-63.
- [8] M. S. K. Shu, J. Simpson, T. W. Kumara and R. T. Soundaer, "A module-based service model for mass customization: service family design", *IIE Transactions*, vol. 43, no. 3, (2011), pp. 153-163.
- [9] Y. Su, W. H. Liao, Y. Guo and Q. L. Ding, "International Key technologies for ASP-based product customization service system for SMEs small and medium-size enterprise: a case study", *Journal of Advanced Manufacturing Technology*, vol. 42, (2009), pp. 381-397.
- [10] M. Bottcher and S. Klingner, "Providing a method for composing modular B2B services", *Journal of Business & Industrial Marketing*, vol. 26, no. 5, (2011), pp. 320-331.
- [11] A. Tarang, S. Anuj, F. K. Jude, T. M. Kumar and K. D. Young, "A hybrid model of component sharing and platform modularity for optimal product family design", *International Journal of Production Research*, vol. 51, no. 2, (2013), pp. 614-625.
- [12] N. Avlek, Z. Xinmei and S. Hua, "Changes in marketing strategies of tour operators: From "made in tour operators" to "made in the tourism value chain", *Tourism Tribune*, vol. 28, no. 2, (2013), pp. 12-15.
- [13] H. Yuling and X. Haotian, "Research on Implementation of Tourism Mass Customization Based on Platform Strategy", *Journal of Beijing International Studies University*, vol. 11, (2014), pp. 9-15.
- [14] Y. Xiaoping, "Research on personalized service of B to C Tourism electronic business", Dong Hua University Master dissertation, (2007).
- [15] F. Wei, "Research on tourism e-commerce oriented data mining", Hangzhou Dianzi University Master dissertation, (2013).
- [16] Z. Li, "The Study of Tourism Platform Online Communication Services Based on User Demand", *Journal of Modern Information*, vol. 7, (2013), pp. 172-177.
- [17] T. Le, G. Tong-Qiang, J. Shou-Cun and W. Bin-Wei, "Location-based push service system of tourism information", *Journal of Computer Applications*, vol. 29, no. 12, (2009), pp. 36.
- [18] "Wikipedia. Cloud computing", [http://en.wikipedia.org/wiki/cloud computing](http://en.wikipedia.org/wiki/cloud%20computing), vol. 4, (2012).
- [19] W. Caolei and S. Junpeng, "Research on Grid Management Technology of Workshop Manufacturing Resources Based on Cloud Manufacturing", *Journal of Harbin University of Science and Technology*, vol. 18, no. 5, (2013), pp. 37-41.
- [20] H. Biqing, L. Chenghai, Y. Chao and Z. Xinpei, "Cloud manufacturing service platform for small- and medium-sized enterprises", *International Journal of Advanced Manufacturing Technology*, vol. 65, no. 9, (2013), pp. 1261-1272.
- [21] Y. M. Zaw, "Multi-Agent Based Cloud Service Composition using Contract Net Protocol for Information Retrieval Purpose", *Journal of Engineering & Technology*, vol. 5, no. 1, (2015), pp. 26-30.
- [22] D. Wanchun, Q. Lianyong, Z. Xuyun and C. Jinjun, "An evaluation method of outsourcing services for developing an elastic cloud platform", *Journal of Supercomputing*, vol. 63, no. 1, (2013), pp. 1-23.
- [23] F. Andrew, T. David and R. Wenny, "Ontology as a Service (OaaS): a case for sub-ontology merging on the cloud", *Journal of Supercomputing*, vol. 65, no. 1, (2013), pp. 185-216.
- [24] C. Vidyand and V. Joseph, "The Impact of Cloud Computing: Should the IT Department B Organized as a Cost Center or a Profit Center?", *Journal of Management Information Systems*, vol. 30, no. 2, (2013), pp. 67-100.
- [25] G. Zhipeng, Y. Chaowei, X. Jizhe and H. Qunying, "A Service Brokering and Recommendation Mechanism for Better Selecting Cloud Services", *PLoS ONE*, vol. 9, no. 8, (2014), pp. 1-20.
- [26] Q. Qi, J. Liao and Y. Cao, "Cloud service-aware location update in mobile cloud computing", *IET Communications*, vol. 8, no. 8, (2014), pp. 1417-1424.
- [27] S. Ali and S. Schneider, "Cloud Services Certification", *Communications of the ACM*, vol. 56, no. 2, (2013), pp. 33-36.
- [28] R. Arpan, S. Santonu, G. Rajeshwari and G. Geetika, "Secure the Cloud: From the Perspective of a Service-Oriented Organization", *ACM Computing Surveys*, vol. 47, no. 3, (2015), pp. 41-60.
- [29] Z. Liyan, "The Research on Railway Information Sharing Platform and Key-Technologies Based on Cloud Computing", China Academy of Railway science doctoral dissertation, (2013).

