

Chapter 7

Research on the Dynamic Information System of Global Cruise Economy on the Basis of Internet



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Abstract The cruise economy information system involves many aspects, such as urban public service system, cultural service system, education service system, health service system and safety service system, etc. It needs the collaborative support of relevant departments, cruise upstream and downstream industries. With the rapid development of new Internet technology, the integration of information platform and technical resources will greatly increase the efficiency of cruise economic information services and promote the development of cruise economy. This paper studies the cooperation and coordination among the relevant organizations of the cruise industry based on dynamic information, artificially controls and manages the dispersed, closed and isolated cruise information resources, realizes the full utilization and maximum value-added of the cruise economic information resources, and realizes the sharing of the cruise economic information resources on a broader and open platform. The paper also puts forward the corresponding countermeasures and suggestions by discussing the challenges and opportunities, policy bottlenecks, value evaluation and measurement methods of the implementation of the cruise industry informatization strategy.

Keywords Dynamic information and information resources · Dynamic information · Information strategy

1 Introduction

The cruise industry is comprehensive without clear boundary. Whether in government decision-making, macro-control, industrial restructuring or infrastructure planning,

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the cruise industry focusing on cruise tourism should be included as a very important aspect in the overall consideration of the government. The coordination and comprehensiveness of the cruise economy information system depend on the diversity and relevance of the cruise industry. One of the important contents is to build a platform to coordinate the relationship between governmental departments concerned, port cities, route areas, and related upstream, midstream and downstream cruise enterprises and consumer groups, so as to ensure the smoothness of cruise tourism activities and promote the development of the cruise industry.

2 Research Background and Significance

2.1 Research Background

2.1.1 The Importance of Integrated Application in Cruise Industry Data Becoming More and More Prominent

According to the data in *Ecology Map of China's Big Data Industry and the White Paper of China's Big Data Industry Development in 2017* (hereinafter referred to as the "White Paper of Big Data Industry"), the integrated application layer is the focus of the future development of the big data industry, and its development stage is as shown in Table 1.

2.1.2 Linear Industrial Value Chain Gradually Evolving to Net Value Chain

In the past five years, the drawbacks of the industrial value chain of the vertically integrated linear structure of the cruise industry chain have gradually emerged, and each link creates value while increasing costs according to the linear trend. The cruise economy information system on the Internet can transform this linear value chain based on technical division of labor into a net value chain based on service correlation formed by value division of labor, so that the enterprise competition foundation in the cruise industry chain will be changed, and the core enterprises on the value chain will become the standard setters. For example, the current new generation of consumers is initially forming the habits of searching and consuming based on the Internet. After the introduction of Internet platform in the port and business travel service market in the midstream and downstream of the cruise ships, the integration of cruise ships, hotels, catering, transportation and entertainment in the port cities will become a comprehensive solution, and the targeted release to consumers is possible, which is one of the high-end representation forms of the integration of the cruise industry value chains.

Table 1 Development of big data application under internet background

Application stage	Year	Application content	System tool
Data precipitation, and launching of business information system	2005–2010	The large customer groups, mainly in finance, insurance, banking, telecommunication, power grid and medical care, have successively launched various information systems and business systems. The data precipitation period is 3–5 years, and a certain data scale was formed in 2013	Similar to ERP, CRM, OA and HIS etc.
Big data analysis architecture for enterprise application	2011–2013	Concepts such as cloud computing and big data begin to appear before the public	Data analysis architecture represented by Hadoop, and various analysis tools represented by SAP BO, Oracle BIEE and IBM Congos
Solutions in big data industry for market application	2013–present	The whole process of big date analysis includes data collection, interactive query, machine learning and visualization, and the data analysis under business scenarios has become the top priority	Hardware and software vendors continue to emerge

2.1.3 Coordinated Development of Cruise Industry, Regional Economy and Information System

The mutual promotion between the cruise industry system, the regional economy system and the information system is an organic whole. Under the technical support of the information system, the cruise industry interacts with the regional economy and develops together, the information system is the technical guarantee, and the regional economy system is the basic support (Fig. 1).

The cruise industry can increase national income and foreign exchange income, optimize and adjust regional industrial structure, enhance cross-regional cooperation and exchange, drive related industries, increase regional employment, and promote

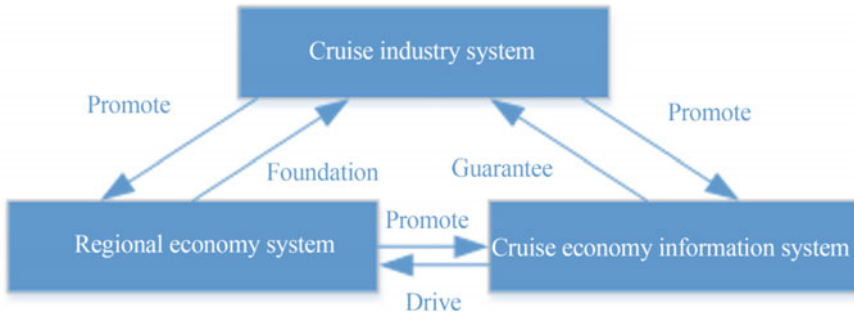


Fig. 1 Coordinated development of cruise industry, regional economy and information industry systems

ecological environmental protection. Further, there are more regional characteristics in cruise tourism information products and information services, which will promote the development of the information system. Vice versa, a good regional economic development level cannot only stimulate cruise tourism consumption, but also provide financial support for the development of cruise industry in the aspects of the development of cruise tourism resources, port infrastructure construction and cruise service improvement, and provide abundant financial support, talent guarantee and other basic conditions and support for the development of cruise economy information, and can promote the demand for information equipment and information services of the tertiary industry, and promote the development of the cruise economy information system.

2.2 Research Significance

2.2.1 Improving the Contribution of Cruise Ports to the Development of the Industry Chain

The construction of the cruise economy information system will help integrate the cruise home port infrastructure construction operation information, cruise maintenance information, and cruise lines operation management information, which will increase the number of cruise ships, voyages, products and tourists etc., thus promoting the derivatives of cruise tourism products, driving the development of surrounding industries and increasing the contribution to the development of cities and the industry chain.

2.2.2 Promoting the Gradual Penetration into the Cruise Tourism Market in China

The cruise economy information system can improve the market penetration rate of cruise tourism. The tourists' consumption propensities and consumption preferences are analyzed, consumers' demands are stimulated, and consumption habits are cultivated by capturing the expectation of cruise tourists on destinations and cruise tourism diversification.

2.2.3 Promoting the Formation of a Complete System of Cruise-Related Policies

The macro management departments of the governments can use the cruise economy information system to conduct scientific forecast, analysis and planning, and then formulate relevant policies. The construction of the cruise economy information system can also promote the establishment of the information sharing and exchange mechanism between different functional governmental departments, promote the collaborative work among various functional departments, help the formation and issuance of relevant policies, and improve the overall operational efficiency of the cruise industry.

2.2.4 Improving the Layout of the Industrial Chain to Avoid and Control Risks

For the construction of the cruise economy information system, firstly, it will help the establishment of a financial soft environment, and avoid and control risks; secondly, it will promote the downstream online transfer and form a multi-channel capital pool; thirdly, it will help to integrate the resources of the midstream; and finally, it can effectively promote the overall evolution of the cruise industry chain, and form a higher level of complete industrial chain layout in the aspects of integrating operation, building and supporting facilities, so as to avoid and control risks to the maximum extent, enhance the scope of industrial radiation at the same time, and drive the development of the cruise economy.

2.2.5 Integrating Existing Information Resources to Avoid Repeated Construction

By planning the functions and building framework of the cruise economy information platform in a united manner, upstream manufacturing enterprises can release, inquire and receive supporting information such as cruise manufacturing supply chain and financing, midstream operating enterprises can release, inquire and receive cruise operation information such as tickets, routes and products and dynamic port infor-

mation, downstream consumers can release, inquire and receive consumer experience information, governmental departments can release, inquire and receive public information services such as transportation, travel, weather, industry, inspection and quarantine, and research institutions can release, inquire and receive relevant monitoring and research information. Therefore, the transparency of the cruise industry can be improved, and the barrier between higher and lower levels or between different departments and regions of cruise organizations can be broken, providing support and guarantee for the development of the cruise economy.

3 Conceptual Framework of the Cruise Economy Information System on the Internet

With the support of emerging technologies, it is possible to combine information resources scattered across multiple organizations into an integrated and coherent economic information supply system. The tourism administrative departments at all levels, the government supervision departments, the upstream, midstream and downstream enterprises of the cruise ships, and the non-profit organizations are regarded as network nodes, and the business collaboration and information resource sharing across organizations are emphasized.

3.1 Research Thought

The dynamic cruise economy information system is not only the result of the mutual influence and interaction between the inter-organizational and inter-departmental construction and organizational systems, policies and social environment within the information service field, but also the result of a new value formed on basis of the public service concept and the focus on the greater public interest, and the result of the development of new strategic partnerships between governmental departments, enterprises and non-profit organizations. Therefore, the research of the system involves not only the technical level, but also the management level. It is the process of integrating technology with policies, systems and management. The role of non-technical factors is more complicated and more important than technical factors.

3.2 Collaboration Mode of Cross-System Information Service

3.2.1 The Government as the Leader and Organizer of the Construction and Maintenance of the Cruise Economy Information System

Governmental departments can plan the long-term development of cruise informatization globally, establish a corresponding commercial market regulation system, integrate functional departments and the strengths and resources of relevant parties, provide a good market service environment, establish relevant standards and specification system, promote the establishment of the internal information system and the cruise e-commerce platform of the cruise enterprises, and realize the interconnection between the cruise ships and the business information system of the bank, customs and public security.

3.2.2 Establishing a Consultation Mechanism Between Information Sharing Entities

A cruise travel route covers a wide region, and the regional economic and social development levels are different. The members of the cruise economy information sharing entities are required to discuss and clarify the scope of the cruise information exchange, the objects to be exchanged, the building of the information platform, the construction of the network infrastructure, the provision of business data, the powers and obligations of the relevant parties, and the relevant systems are required for guarantee.

3.2.3 Establishing a Cooperative Joint Conference System Between Information Sharing Entities

It is possible to understand the cruise policy and its implementation effect, duly track the development of the cruise industry and the operation status of cruise companies, and promptly respond to the demand for the tourism market and products. Relying on the information platform, the supervision authorities can standardize the order of the cruise market, urge related parties to improve their service quality, inform them of security situation etc., and publish the above relevant information on the information platform, so that the joint members can know the real-time situation, and analyze and judge the market information.

3.2.4 Establishing an Operation and Maintenance Functional Organization of Cruise Economy Information Platform

The management and maintenance of the cruise economy information system platform should be conducted by professional organizations, such as the establishment of a cruise tourism information exchange center, with main tasks including mining and publishing cruise industry resources, investment opportunities, cruise market dynamics, and information about cruise tourism services. The upstream, midstream and downstream enterprises of cruise industry and the departments and institutions concerned can be recruited as members, and an information sharing system can be developed.

3.3 *Conceptual Model of Dynamic Cruise Economy Information System*

3.3.1 Cruise Tourism Information Service Oriented to Cruise Tourism Consumers

It is committed to improving the cruise tourism experience, with the most extensive application, mainly in the form of cruise tourism websites, information management and information infrastructure construction.

3.3.2 Economic Operation Information Service Oriented to the Development of the Cruise Industry

The cruise economic operation information service covers the public service system of the relevant information of the cruise industry chain, the port cities and the route areas, such as the health care service system, the tourism culture service system, the security guarantee service system and the ship supply logistics system etc., and it is integrated and systemic. Specific services include comprehensive analysis on cruise economic operation, the trend analysis on travel, trade, traffic and fleet etc. of cruise tourism between different regions, the analysis on attention, attitude tendency and emotional changes of consumers during the development of cruise economy in different regions and industries, the tracking and analysis on the authoritative comments of experts and scholars, the more comprehensively reflection of the needs of users, and the forecast of market conditions and capital flows etc. (Fig. 2).

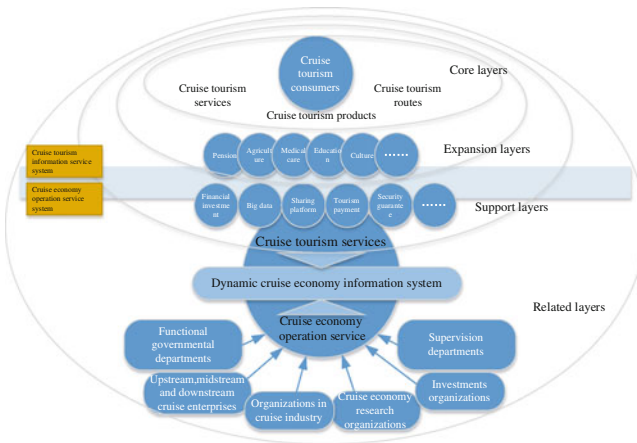


Fig. 2 Conceptual model of cruise economy information system

3.4 Design of the Cruise Economy Information System Under Internet Background

3.4.1 Overall Architecture Design

The data is provided by the governmental departments, cruise ports, cruise lines, cruise travel agencies and research institutions for the system, and the system is managed by relying on the Internet big data platform, and data interfaces are provided for the cruise tourism information service system and the cruise economic operation service system. These two systems rely on the data provided by the platform to serve consumers, enterprises, institutions and governmental departments.

3.4.2 Information Platform Analysis

The system design of the cruise economy information platform is mainly carried out in four aspects: the cruise basic data resource system, the cruise information exchange system, the cruise economy information service system and the cruise tourism management information system. The application system is comprised as shown in Fig. 3.

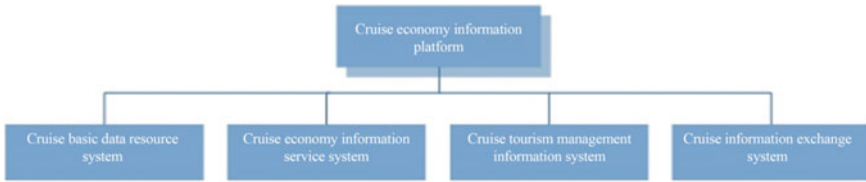


Fig. 3 The composition systems of the cruise economy information platform

3.4.3 Application System Design

Cruise economy information data is mainly stored on the big data platform. Data are provided and managed regularly by governmental departments concerned, cruise ports, cruise lines and cruise travel agencies. The big data platform provides a data interface for network nodes at specified IP addresses, so that it can provide data support for the cruise economy information service system and the cruise tourism management information system, enabling them to serve consumers, businesses, governmental departments and other institutions (Fig. 4).

3.4.4 Application of Dynamic Cruise Economy Information System Functions

For the effective operation and maintenance management of the cruise economy information platform, the members sharing the cruise economy information system use the unified query interface, unified network interface and standardized information distribution methods of the platform to establish a dynamic information base, and link their respective cruise industry related information resources. The cruise tourism information, cruise product information, route promotion information, government publicity information, and other information in each region can be published through the information center to establish a unified overall cruise image externally, which is beneficial to consumers and potential consumers to fully understand cruise products. On the other hand, it also enables members of the organization to know well the cruise economy operation in the region in real time (Fig. 5).

The realization of the application framework of the cruise economy information system is divided into two parts: the realization of the top-level user-oriented application development community and the realization of the data interface and data asset management in the figure. The former is the realization at the technical level, and the latter mainly depends on the realization at the management level.

The realization process at the technical level is as shown in Fig. 6. The realization at the management level mainly depends on the establishment of consultation mechanism, joint conference mechanism and full-time organizations between the information sharing entities mentioned above.

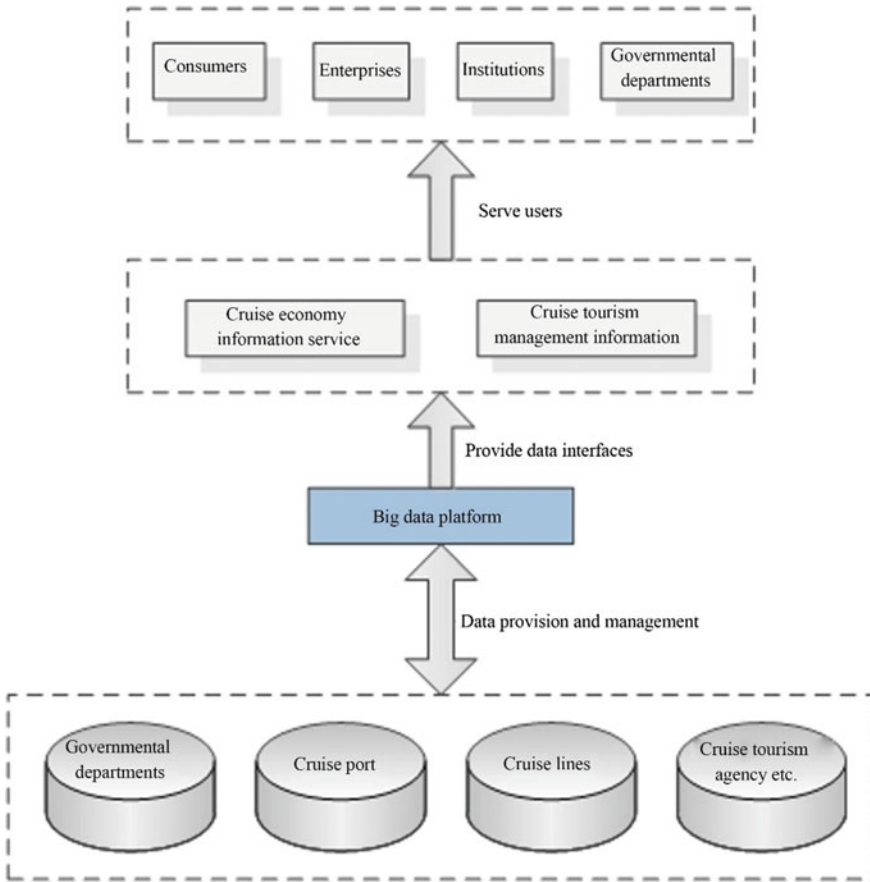


Fig. 4 Architecture diagram of dynamic cruise economy information application system

At the integrated application layer, the comprehensive cruise economy information services for will be provided by use of shipping services, finance, cruise shipbuilding, customs clearance and border control, cruise operation condition, ship supply logistics, transportation services, tourism, security, social contact, geographic information, human resources, port operation, journey marketing and other big data.

At the data service layer, the cruise economy information platform is required to provide data transaction service, data collection and pre-processing services, data analysis, visualization service, and data security service.

At the basic support layer, the infrastructure and tools of the cruise economy information platform include big data storage management, big data analysis software, big data platform technology solutions, big data related hardware facilities, network and system management, and big data processing algorithms and tools.

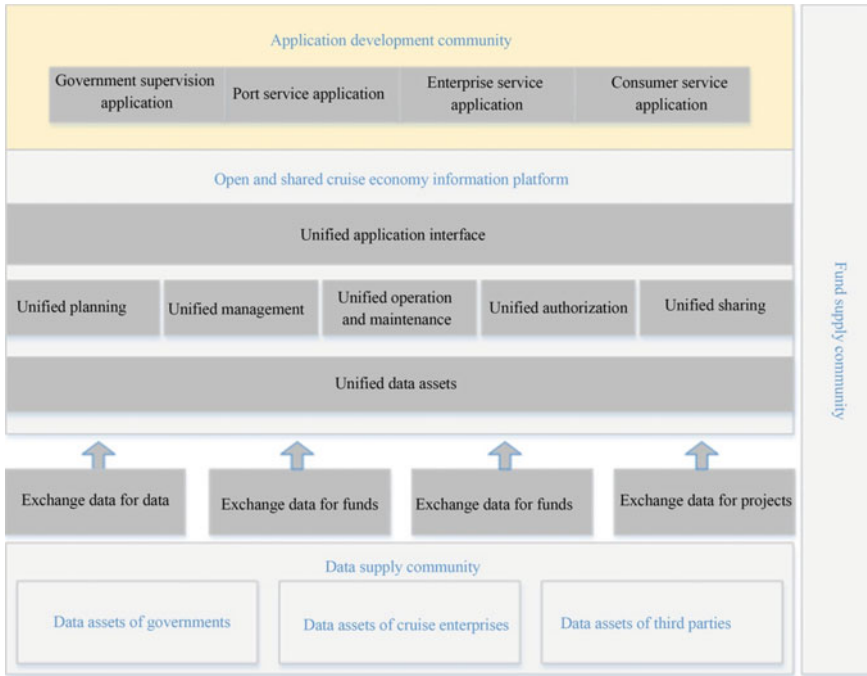


Fig. 5 Application framework of cruise economy information system

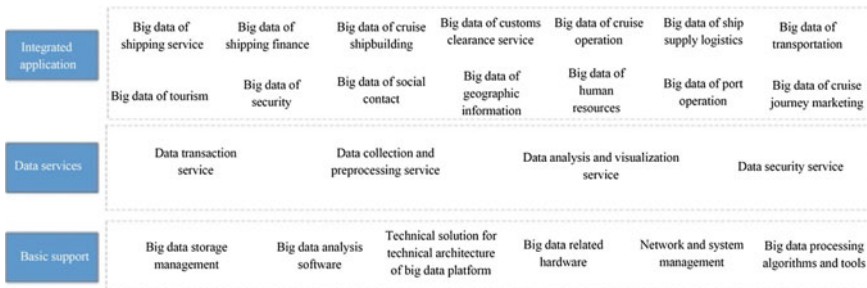


Fig. 6 Basic functions of cruise economy information platform

3.5 Implementation Guarantee System of Global Cruise Economy Information System

3.5.1 Government Level

First of all, the governments should reform the cruise information policies and improve the cruise ships with information integration system. The economic infor-

mation platform is a product responding to the call of the state, which should be built and operated by relying on the corresponding systems formulated by governmental departments concerned. For example, due to voyage delay or route change caused by objective reasons, the non-material damage compensation to the tourists, their appeal and settlement mechanism can find relevant institutional basis from the cruise economy information system, thus avoiding the “forcible occupation of a ship” to a certain extent. For another example, the statistics of tourist information, the sharing of the desensitized tourist information among the governments, cruise lines, downstream derivative companies and other units must have legal basis and conform to the systems. Therefore, the operation of the cruise economy information system requires solid institutional support and the development of a comprehensive cruise information system, including metadata sharing, joint and unified services, and regulations and by laws on metadata making and exchange. The workflow for the collection, processing, storage, sharing, flow and service of information resources should be standardized to ensure stable and long-lasting operation of cruise information services.

Secondly, the governments should break down the obstacles in the management system and promote coordination and joint collaboration among various departments. The cruise industry information is widely distributed in cruise lines, cruise port terminals, transportation port bureaus, tourism bureaus, cruise pilotage agencies, port offices, maritime bureaus, customs and the supervision and business operation departments in charge of border control, inspection and quarantine. The construction of cruise economy information system urgently requires these departments concerned to establish a seamlessly integrated joint collaboration mechanism and information connection mechanism to achieve timely exchange, dynamic update and sharing of information.

In order to fundamentally change the original separate management situation with barriers between higher and lower levels or between different departments and regions, and realize the centralized planning, management and regulation of the cruise economy information system, the provinces and municipalities of the cruise ports should take the lead to build a “coordination center for building of cruise economy information system” to coordinate the functional departments and institutions concerned in cruise industry. The function integration should be realized in the aspects of information flow, division of responsibilities and management operation through the joint collaboration of various departments, so that “the flow of information is smooth, the division of responsibilities is clear, and the management operation is efficient”, thus improving and enhancing the centralized collection, analysis and processing, the sharing in the industry, and the targeted publishing of the cruise industry information.

3.5.2 Enterprise Level

Firstly, the investment in software and hardware should be increased to improve the level of information operation and maintenance. The construction of the cruise economy information system includes information infrastructure, information ser-

vice entities and database information system. Information infrastructure construction is the foundation and starting point for the construction of the cruise economy information system, mainly including the investment and construction of information equipment and communication network. Since the hardware foundation is the basis for meeting the dynamic demand for cruise industry information, and also the premise for construction of the software database information system. Therefore, the enterprise itself needs to increase investment in information construction, and establish hardware and software infrastructure such as the basic data center, network and mobile terminals by steps, stages and levels, providing hard environment support and guarantee for the construction of cruise economy information system.

In addition, enterprises should strengthen the follow-up operation and maintenance management during information construction, so as to ensure the information security of cruise enterprises and consumers. The first is to strengthen the construction of information security assurance capability, increase security protection tools, and prevent information leakage. The second is to pay attention to the filtering, screening and extraction of network information. Enterprises should establish an effective mechanism to continuously filter junk information, extract effective information and ensure the information quality of the cruise economy information platform.

Secondly, the cultivation of interdisciplinary talents should be accelerated, so as to carry out talent introduction and talent assessment simultaneously. The information team is a prerequisite for the construction of the cruise economy information system, and the demand of the cruise industry for informatization needs to be taken as the orientation to strengthen the construction of relevant talent teams.

The first is to train talents. We can fully refer to foreign advanced experience, and cooperate with colleges, institutes and institutions to establish a designated base for talent training and jointly cultivate the required professional information talents for cruise ships. At the same time, we should gradually pay attention to and consciously cultivate the middle-end and high-end talents necessary for the cruise market, especially the interdisciplinary talents with knowledge in various aspects such as cruise market operation, cruise management and big data statistics, thus providing intellectual support and guarantee for the construction of the cruise economy information public platform and the long-term development of the cruise market.

The second is to introduce talents. The preferential policies may be formulated to introduce advanced cruise management talents at home and abroad. The specialized personnel in various industries and units in information economy, information technology and information management should be introduced to optimize the overall structure and talent layout of the cruise information team.

The third is to assess talents. The governments and industry associations can jointly formulate the talent assessment standards in the cruise industry, set up basic conditions for talent introduction, and ensure the basic capabilities and basic qualities of the talents in the industry. Such a talent cultivation model that governments, industry, universities and research institutions cooperate together and academic education is combined with vocational qualification training should be established so as to get rid of the predicament of insufficient cruise information talents.

3.5.3 Market

Firstly, the sound investment and financing mechanism should be established to strengthen the “government + market” funding model. In terms of the construction at the early stage, the governmental departments concerned should provide financial support. The construction of the cruise economy information system has strong social welfare characteristics and obvious public service product attributes, and the overall characteristics include large investment, long cycle and slow effect. Therefore, the government can set up the special funds for platform construction and introduce fiscal interest discount-related policies to help cruise enterprises promote the implementation of platform construction projects better.

In terms of later update and maintenance, on the one hand, the governmental departments concerned should allocate funds, and provide corresponding preferential policies, support and encouragement in the economic and financial fields (such as credit, taxation, finance and other support policies); on the other hand, member units concerned should bear the cost of platform operation and maintenance to ensure the healthy operation in the market-oriented operation mode of value-added services. In summary, diversified, multi-level, multi-channel social force participation mechanisms and investment method should be established, multi-party investment channels should be integrated, and such a financing way should be formed that is based on platform market-oriented operation and supplemented by the financial investment of governments.

Secondly, the market demand should be taken as the orientation to strengthen the sharing of information benefits. Providing satisfactory services for cruise tourism consumers is the fundamental purpose for the construction of the cruise economy information system, and it is also the basic premise for the realization of the interests of the information platform service entities. Therefore, the construction of the dynamic cruise economy information system should be market demand-oriented and improve the service quality and service guarantee of cruise tourism.

Cruise tourism consumers are the beneficiaries of the information service platform. The construction of the cruise economy information system aims to know the real demands of cruise tourists, establish and improve the bottom-up demand expression mechanism, clear the two-way communication channel between the cruise tourism consumers and information service agencies, and improve the synergy efficiency of the cruise industry chain so as to avoid the blindness and resource waste of cruise tourism services.

In the face of personalized demand for cruise, each service entity can use the innovative service mode of the cruise economy information service platform to effectively improve its service capabilities. A multi-level, multi-form and multi-channel information release window should be established to innovate in the information sharing, integration, utilization and re-creation mechanisms between the governments, enterprises, institutions and consumers. Generally, the terminal cruise consumers should be taken as the nodes to promote the formation, development and ceaseless improvement of the cruise economy information system on the basis of the realization of the benefit sharing between all parties based on the information platform.

4 Conclusion

The research on the dynamic cruise economy information system is not only an important part of emerging information technology, but also the profound transformation of the processes and interaction modes of the organizations in the cruise industry. In order to realize the sharing of cruise economy information resources on a broader and more open platform, it is also necessary to explore the challenges and opportunities, policy principles, value evaluation and measurement during the implementation of the cruise industry informatization strategy, and propose practical action countermeasures and recommendations, and then validate them in practice, form new feedback opinions, discover new issues, and conduct a new round of research.