

# **Innovation of Business Model in Smart Civil Aviation Based on Information Technology**

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**Abstract:** In the traditional business model in civil aviation, the market share is expanded and the business avenue increased by reducing cost and improving services. With the diversification of market demands in civil aviation and the intensification of competition between similar airlines, the business stability will be challenged with the traditional business model. It is necessary to innovate the smart business model in civil aviation for the survival and development of civil aviation by establishing networking intelligent system with advanced information technology based on low-cost business model and full-service business model of civil aviation. The construction of smart civil aviation is a model composed of management, production, security, operation and service for integrating units, departments and nodes in civil aviation and comprehensively improving the core comprehensiveness and operating efficiency of civil aviation.

## **1. Introduction**

With the development of big data, cloud computing, mobile internet and artificial intelligence, the civil airlines as a part of traditional transportation industry has welcome a new development opportunity. The concept of intelligence has been highly valued by civil aviation. Civil aviation has paid high attention to smart ideas and taken the construction of smart civil aviation as grip for the reshape of business model in civil aviation. Thus, how to use the advanced information technology is an urgent problem for civil aviation to realize the transformation of business model in civil aviation.

## **2. Intelligence: The choices of transformation for smart business model in civil aviation**

### **2.1 Challenges against traditional business model of civil aviation**

The business model of civil aviation is a way to make values and sustainable revenue by providing transportation and services. Due to the different profit points, airlines have different business models, including networking model, regional/branch model, low-cost model, chartered model, and full-service model. All of these models can be divided into two classes, the “service business model” oriented by tourists which can provide safe, convenient and high-quality services and gain the greatest market share (Zheng Xing (2017)) and the “low-cost business model” oriented by profit which can reduce the operating cost and improve the utilization rate for the greatest profit (Dinler, N. and Rankin, W. B. (2018))

To airlines, a clear business model is the premise of strategic positioning. Airline business model is dependent on the market space, client group, operating characteristics and external environment. When selecting the airline business model, factors, including the brand positioning, pricing strategy, airplane selection and external cooperation must be considered to improve the core comprehensiveness of airlines at key profit points. At present, the business models of traditional airline have the competition among companies becomes increasingly fierce as the external environment the airlines face changes greatly. Without doubt, the good ways to gain profits are reducing cost and expenses, improving services and tourist loyalty, and increasing market share. However, with the changes in airline market demands and airspace resources in the future, the competition among similar airlines becomes increasingly fierce. If airlines keep the traditional

business model, they cannot seek the suitable development direction and select new business model to maintain the business stability.

Limited by both subjective and objective factors, airlines face great pressure at present. When facing various airlines, tourists have more difficulty in selection. Passengers ask for not only the lower price, but also better service and safer flight. All of these propose higher requirements on airlines. The low-cost airlines provide low price due, but the cost control for mid- and long-term air routes. To full-service airlines, there are various services but the service they provide cannot meet the demands of tourists. Moreover, the cost increases as the products and services the airlines provide to seize the market are similar.

## **2.2 Intelligence is a choice for innovating the business model of civil aviation**

As computer technology and internet technology become increasingly mature, intelligence is the new choice of civil aviation business model innovation. Smart civil aviation can make smart response to demands of service operation, security, logistic guarantee and other auxiliary functions by sensing, analyzing, and integrating all the key information in the operating system of civil aviation with information and communication technology. The essence of smart civil aviation is to promote the operating efficiency through smart management and operation by advanced information technology. Thus, it can provide good service to tourists and promote the sustainable development of civil aviation.

It is inevitable to construct the smart civil aviation supported by information technology for the innovation of business model in civil aviation. This comes from the advantages of smart civil aviation. Firstly, smart civil aviation can provide intelligent service to tourists with advanced information technology. Smart civil aviation can adapt the consumption psychology, habits and behavior of tourists, meet paper-free and intelligent requirements of tourists, and provide interactive, experiential and diverse services. Though high-quality services, including ticket purchase, baggage check-in, and clearance in security check, smart civil aviation can give more profits, better services and safer trip to tourists. Secondly, smart civil aviation can explore a bigger market space with advanced information technology. By new marketing tools, including artificial intelligence, internet of things, cloud computing, mobile internet and big data, accurate marketing can be realized to explore new market and provide more flexible channels. Thirdly, smart civil aviation can promote the competitiveness in market to create more advantages with advanced information technology. With the use of advanced information technology, civil aviation infrastructure informatization, operational intelligence, organization network, we can form the market advantages and enhance market competitiveness.

## **3. Informatization: The edge tool for the business model innovation in smart civil aviation**

### **3.1 The functions of information technology in the business model innovation for smart civil aviation**

Information technology has a great impetus to the innovation of civil aviation business models. Firstly, information technology has changed the operating environment, enlarged the fields of air transportation, constructed the information flow, logistics and capital flow. Secondly, airlines can collect the information from different tourists and discover different demands with information technology to provide diverse and customized services to tourists. Thirdly, airlines can realize full perception, wide interconnection and smart information utilization with advanced information technology. Thus, the operating efficiency and service quality can be improved, values and revenues be created, and the management decision-making be optimized to greatly support the sustainable development of airlines(Chuanxin Xia, 2018). Fourthly, airlines can improve the production efficiency with new technology and interconnected production systems. In order to supply more personalized, comprehensive, delicate and timely services, airlines use data analysis and allocate resources for prediction.

### **3.2 The role of information technology in innovating the business model of civil aviation**

Information technology plays an important role in creating the brand new business model of civil aviation. It has been greatly proved by the practices in Shanghai Pudong International Airport. When constructing the smart airport, the airport uses “the internet of things” to intelligent the recognition, positioning, tracking, monitoring and management. The internet of things can be used to establish an intrusion-prevention system for 24-hour prevention and control to guarantee the security in airport; it can be used in the airport services of civil aviation to realize the barrier-free services in the whole process to solve problems such as luggage loss, flight delay, long waiting, and getting lost which may affect the customer experiences; it can also use facial identification technology to detect and recognize faces for identity confirmation and rich intelligent services. Moreover, the airport realizes the interconnection of information systems through data integration. The production information can be comprehensively analyzed and utilized by setting a production live system; the financing system can be interconnected with systems of production, equipment, planning, and human resources by establishing an internal management information system; the commercial smart technology can be applied for the support of strategic decision-making by setting a central data pool system integrating information of production, services, and management; the information sharing between airport, airplane management and airlines can be realized to effectively improve the on-time performance (OTP) by setting a decision support system. Third, the eventual target can be reached by calculating, integrating and applying information data. The airport can provide the customized and personalized services at anytime and anywhere to tourists with smart information use. Moreover, the cost management and the optimization of budget management can be effectively realized by setting an integrated system of financial business (Yunfei Tao, 2018).

## **4. Multi-system: The construction of smart business model in civil aviation**

Smart civil aviation shall follow the new trend of technological and industrial revolution to integrate the key formation and essential resources of civil aviation and create a system environment supporting smart civil aviation with new information technology, including artificial intelligence, internet of things, cloud computing, mobile internet and big data. Based on traditional model, a diversified smart business model in civil aviation can be positively constructed to promote the digitalization and intelligence in security, services, operation, guarantee, and management of civil aviation.

### **4.1 The construction of management system for smart civil aviation**

The interconnection and integration of data in information systems of civil aviation is the key link and the most complex and difficult link in the construction of smart civil aviation. Thus, the construction of smart management system in civil aviation means breaking the revolutionary resistance in management to integrate the information in all aspects of organization, system and process. To construct an internal information system of management, on the one hand, airlines need to establish the smart aviation financial information system, effectively implement management modes such as cost management and budget management. Thus, the integration of company management can be realized by connecting the financial management system with business systems of production, equipment, planning and human resources. On the other hand, an external information system of management shall be established for smart civil aviation. The key is to establish a decision support system in aviation hubs to improve the information sharing between airports, air traffic control and airlines and OTP of flights. In terms of constructing shipment hub, an electric platform of shipment information can be set to share information between airports and customs, freight forwarder, and airlines. Thus, the automatic flow of orders and traceable and controllable goods can be realized to effectively promote the clearance efficiency and reduce the shipment cost.

## **4.2 The construction of production system for smart civil aviation**

To construct the production information system for civil aviation, the information of flight, tourists, security check, and luggage must be integrated. Thus, the production information can be comprehensively analyzed and utilized to interconnect the production systems in internal integration, departure, security check, luggage and ground service in civil aviation. Firstly, a system for production schedule shall be established to connect the flight production plan with the working schedule system. By setting schedule according to flights, the cost of human resources and staff satisfaction can be greatly optimized. Secondly, a production live system shall be established. By setting a comprehensive model for data analysis based on the system integrating flight, departure, security check and luggage, users can comprehensively grasp the real-time progress of flights and improve the operating benefits and efficiency. Thirdly, a system for business data analysis shall be established. By applying the analysis system of business data, commercial activities and business arrangement can be optimized to improve the commercial service benefits.

## **4.3 The construction of security system for smart civil aviation**

Security is the foundation of air trip. To construct the smart civil aviation, a security system shall be constructed for smart civil aviation. A smart analysis system of video shall be established by developing AI programs for airport security, including X-ray machine for automatic image classification, rapid search of video monitoring information, automatic check equipment with facial recognition technology, and abnormal vehicle elimination. Through the smart analysis system of videos, every normal tourist can be identified for their convenience of airport security check and boarding and the sensitive tourists can be stopped to airport. Second, a security system for smart civil aviation can be established. The smart identification, positioning, tracking, monitoring and management can be realized through new technology for information access, including smart image identification system (face, vehicle, etc.), radio frequency identification (RFID), global positioning system (GPS), automatic sensing of mobile equipment, infrared sensing, automatic energy data meter, and smart data access. Third, a new intrusion-prevention system with collaborative awareness shall be established against climbing and crossing fences, earth exploring, throwing from the upper and other behaviors. Thus, the 24-hour control and prevention can be set to provide more flexible security guarantee for airports.

## **4.4 The construction of service system for smart civil aviation**

Oriented by tourists, a service system for smart civil aviation shall be established to provide convenient trip services for the whole process. Firstly, a smart multi-functional system for flight display, identification and reminder shall be established to promote the operating service quality in airport. By increasing the identification function, the identity can be automatically recognized; by increasing the display function, the flight information and status can be shown; by increasing the reminder function, personal information reminder, boarding gate guide, weather report and other real-time information can be provided. Secondly, a guide service system for civil aviation shall be established. By providing boarding information, weather report, map guidance, etc., tourists can be guided to their boarding gate. Thirdly, an exclusive service system for civil aviation shall be established. The tourist value can be estimated with big data to help airlines identify special tourists, VIP tourists and the disabled tourists for exclusive services. Fourthly, a personal service system shall be established. With “the engine for intention identification”, the potential demands of users can be explored to save the learnt content to knowledge base and then send personal services to users through mobile terminal. With personal profile for VIP, the customized and personalized services can be provided to VIP tourists. Fifthly, a barrier-free service system in the whole process shall be established. By applying the facial identification in the internet of things and GPS combination of smart equipment to civil aviation, the barrier-free services in the whole process can be realized to solve problems, including lost luggage, delayed flight, long waiting time, and getting lost which may affect tourist experience.

#### **4.5 The construction of operating system for smart civil aviation**

To construct smart civil aviation, an operating system must be established with sensor and internet of things to improve the operating accuracy. There are two keys to construct an operating system for smart aviation: (1) help airline staff in recruiting and logistics and plan a reasonable track; help staff for airport control coordinate the routes of shuttle buses and baggage tractors to accelerate the guarantee speed from landing to next departure. Thus, the operating efficiency can be greatly improved to reduce the waiting time and the passenger satisfaction be increased; (2) apply AI to all aspects of civil aviation to promote the integration of AI and the construction of smart civil aviation. The smart civil aviation can be realized based on AI through the interaction between the virtual and the real through mobile terminal.

#### **5. Conclusion**

With the development of big data, cloud computing, mobile internet and AI, civil aviation as a part of the traditional transportation has had its new opportunity. As the concept of intelligence has drawn great attention from civil aviation, the information construction of civil aviation is transforming from digital civil aviation to smart civil aviation. During the transformation to smart civil aviation, difficulties in management, technology, capital and talents must be overcome by taking full advantage of big data, internet of thing, cloud computing, AI and other information technology to build five systems in management, production, security, services and operation. Only by integrating the intelligence of all systems, can the integration of civil aviation be realized (Zhenglin Feng, 2019).

#### **References**

- [1] Xu, Z. (2017, November 20). Vigorously promote the construction of “smart civil aviation” and realize a new leap in the development of civil aviation.
- [2] Rankin, W.B., Dinler, N. (Fall, 2018), Assessment of the Evolving Low-Cost Business Model for the Future Importance of U.S. Secondary Airports.
- [3] Xia, C. (2018). Research on the Construction of Wisdom and People's Livelihood Network System Based on Data Mining Technology.
- [4] Tao, Y. (2018, June). Application of Information Technology in Airport Construction.
- [5] Feng, Z. (2019, May 20). Wisdom to shape the new future of the civil aviation industry.