Digital Signage and Visualization in Airports’ ‘Way-finding’

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Keywords: Digital signage, Airport, Digital way-finding, Passenger.

Abstract. Airports, transportation hubs carrying passengers from distinct countries and origins, are playing a more and more crucial role in our life. On the one hand, convenient, fast and highly efficient airport service is the key factor why passengers chose to travel by air. Therefore, passengers’ need of efficient modern airport management is overwhelmingly important. On the other hand, with the lasting airport scale and passenger capacity expansion, massive infrastructure construction has brought airports heavy costs. Airport fiscal revenue must be optimized to offset huge expenses.

The purpose of this paper is to analyze the current status of airports’ digital way-finding services, and explore to which extent airport digital signages and way-finding systems can improve airport transport efficiency and service quality. This paper gives the superiority of digital signage compared with traditional airport guidance, and analyzes digital signage’s benefits to airports in passenger experience and airport non-aviation fiscal revenue. Way-finding system design process and the case study of Singapore Changi Airport were also provided. The conclusion was drawn that airports equipped with digital way-finding systems can enhance passengers’ experience and the degree of satisfaction, enrich passengers’ trip and create a more convenient, more effective and safer airport.

1. Introduction

With the rapid development of globalization and considerable improvement of people living standard, more and more people are engaged in either domestic or foreign activities, such as short business trips and going on holidays. Also, as a transport junction of a city, an airport may be the first appearance for passengers, so airport service is a decisive factor that directly affects the travel efficiency and passengers experience. Distribution visualization of security checkpoint, departure gate, baggage claim area and other facilities needs designers’ careful consideration. As a result, it is necessary to analyze the current status of the digital signage system in airports and redesign to improve the digital way-finding system in airports through relevant theoretical methods, so as to facilitate passengers’ travel and improve airport revenue.

2. Digital Way-finding System

In advance of discussing digital way-finding system, first, it is inevitable to look back upon airport traditional signages. In 15 years between 1960 and 1975, most airport signages and graphic systems were designed as lasting facilities [1]. This can be attributed to the airline industry at that time, where airports were served by steady airlines. Since a number of airlines played the role as airports’ ‘fixed equipment’, airports therefore took the advantage of permanent terminals and signs design. For instance, "baggage claim area", “passenger security” and "boarding area", have been widely
known and became standard airport signage language right away. These settled facilities even have extra benefit to cut down maintenance and repair financial expenditure in the working life of signages.

Traditional way-finding process needs user’s highly involvement, which is used to lead users to a fixed destination (passing from Location A to B). Actually, way-finding is to seek for new information. For example, when going shopping, people are always aware of the exact destination that they are heading to, but the truth is that they are not prepared for other events which will happened around them, and cannot predict what new trends and promotions of brands and products are spreading at present. To achieve more efficient information transmission, airport way-finding and signage systems can be equipped with digital directories. To apply a strategic reform, the core distinction between way-finding systems and digital directories is the function: way-finding systems bring users functional but sometimes dull and ‘closed-loop’ experience. Digital directories bring users to a fixed destination aim as well, however, leave the experience of interactions between systems, users and the contexts, which includes product information transmission, brand promotion and give brands opportunities to attract prospective customers in an inoffensive experience, and a new channel for user expression, involvement and feedback.

Airport digital way-finding experience should be fluent and efficient, devoted to guide passengers to reach their destinations by letting them learn unconsciously, so as to inspire and assist them. Due to the fact that passengers’ journey is not linear, way-finding experience should be flexible, with various and free options. Passengers’ travel also includes shopping, relaxing and exploration, and digital way-finding systems provide enterprises with an occasion to set up brand equity. Digital directories in airports can act as a ‘benefit booster’, which determines passengers’ experience, also provides a solution to shape users’ discovery and information collecting process, notifying how they experience in airport environment which includes retail and restaurant promotion.

3. Current Status Analysis

Signage system is an integral part of transportation hub facilities. A successful signage system is the integration of multiple disciplines, involving urban planning, art, design and other fields, which cannot be completed by designers themselves. Although signage design has a history of more than half a century, it is still in its infancy in China. From the perspective of literature sources, there is basically no relevant core literature sources in China at present, most of which were produced by scholars’ actual demand.

Taking America and Japan as examples, graphic symbols have passed the standardization proposal half a century ago. In 1970, technical committee "Graphic Symbols" of the International Organization for Standardization (ISO) was established to be responsible for the international standardization of graphic symbols and symbol elements. The United States Department of Transportation (USDOT) cooperated with American Institute of Graphic Arts in 1974 to design 34 kinds of "international unified signs". These signs were widely displayed to the world as a public asset, which had a great impact on international community. By 1981, there were over 50 standardized signs in America. In 2001, Japanese Industrial Standards (JIS) raised four basic design principles, and designed 125 kinds of standardized signs along with Japanese Design Association and sign design association.
At present, main problems of the way-finding system in China are as follows: nonstandard symbols, inconspicuous color and contrast, designers’ lacking human engineering and aesthetic knowledge, English spelling mistakes, unreasonable layout position and so on. Furthermore, China is a country with vast territory and large population, facing great challenges in airport transportation. In terms of management, design and planning, airport way-finding systems bear a huge responsibility. Just imagine walking in the airport surrounded by thousands of passengers, how to easily find out your destination? In fact, we usually have to wait behind a long queue in front of flight information boards or roadmaps, which greatly reduces travel efficiency and travel experience.

Airports facilities’ basic function is to guide passengers among their origin, intermediate and destination airports, and the vast majority of the passengers are alien to airport facilities locations and regulations, so it would be beneficial to both passengers and greeters if airports implemented digital way-finding systems and mobile maps, which are based on universe languages and can be used at random locations. However, there exist quite few airports with enough fiscal appropriation to gain human and material resources to carry out such implementations. Moreover, not all domestic airports share the same signage system. These reasons result in the increasingly difficult airport way-finding systems design in China. To solve these problems, the new way-finding system should be set out to design urgently.

4. Theory: How to Design a Set of Reasonable Way-finding System

Before beginning the design work, it is essential to involve clients’ information. An active and friendly relationship between designers and their clients is a booster for a successful project. While designers are responsible to make efforts to solve problems, their clients are also responsible for supplying adequate and authentic feedback. As is shown in Figure.1, integrated design process contains three phases, pre-design, design and post-design, which involves different steps [2].

![Figure 1. Design process: pre-design, design and post-design.](image)

According to Calori’s Signage Pyramid approach [2], signage design consists three aspects: the hardware system, the graphic system and the information system. These three systems are different
but connected, which compose an interactive loop. How to balance these three aspects is the core principle that the designer should cope with [2]. For a digital way-finding system, the hardware system may be changed into software system, of which the design principle may be the smooth operation and reasonable logic structure. For the graphic system, designer should consider graphic elements, layout, visual identity and the effective way to encode the information. For the information system, designers should consider their choice: what information, what words, which combination and which location.

5. Case Study: Changi International Airport

With the increasingly heavy burden of passengers’ travelling all around the world, airports are now reconsidering of making improvements to gain extra passengers, airlines and boost the revenue. Airport income is basically sorted into two classifications: aviation and non-aviation income [1]. Airport aviation income is closely connected with air transport, which is the primary business. Non-aviation fiscal revenue can compensate airport facilities investment and operation expenditure by transmitting high profit tax-free products promotion to stimulate passenger consumption.

Innovation is a wise strategy to obtain competitiveness, so as to provide a particular, innovative and attractive experience [3]. Some airports have already carried out technology innovations to stimulate passengers’ initiative. A typical example discussed here is Changi International airport in Singapore, which was named the world’s best airport for three consecutive years. Changi airport implemented a set of digital technologies to interact with passengers, meanwhile, passengers’ opinions on various aspects of the airport were captured at almost every touchpoint, to help develop the foundation for future strategies and improvements. The result indicated that Changi airport plays a critical role of a place which attracts not only passengers by air, but also non-travelers who are here only for leisure, which in terms raised the profit from non-aviation business.

To make passengers participated, informed and satisfied, Changi airport had a cooperation with Moment Factory to create absorbing visual scene for their new terminal. Moment factory is a creative multi-media studio, which integrates professional knowledge and talents in audiovisuals, lighting and special effects to produce fascinating and enjoyable content experience. When arriving at Terminal 4 of Changi Airport, the first digital ‘wall’ passengers will observe is the "Immersion Wall" (the biggest indoor airport exhibition wall over the world), which is set above the passenger security area, displaying contents in a continuous loop, changing tedious but crucial security process into a light-hearted experience, providing both way-finding information and push notifications [4]. It is strategic to entertain passengers lining up, displaying videos of local culture can also help increase tourism revenue [4]. It is doubtless that digital visual screen in Changi airport acts like a multi-functional screen which is both a signage and an advertising board. Compared with traditional fixed guiding signage, digital signage provides ‘fluid experience’ rather than ‘locked experience’, which offers passengers immersive and rich contents.

6. Conclusion

Through the use of digital way-finding system, the airport can integrate a variety of intelligent applications and make it easier to capture personalized user preferences, so as to improve user satisfaction. New technologies are creating new possibilities, so the process of way-finding routes doesn't have to end immediately after users leave the signage. New digital solutions can deepen user interaction and self-service. The intelligent way-finding system based on software can make
suggestions according to the integration of users’ personal preferences, boarding time and other information [5]. Intelligent application, personalized recommendation and dynamic search system have been proved not only to benefit retail brands who intend to be the top selling, but also to bring high efficiency and multiple values to customers themselves, in which design plays a significant role.

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