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Management Requirements of Intelligent Transportation System in Civil Aviation: Kuwait Airport

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The aim of this paper is to highlight the effects and obstacles of applying Intelligent Transportation System (ITS) strategies in the directorate general of civil aviation in Kuwait. This work depends on data comprises an interview that conducted and survey questionnaire that investigated more than 300 employees and passengers in the Kuwait International Airport. Additionally, the data gathered was streamlined and analyzed using a computer statistical package (SPSS). The main finding of this paper is that the general advantages of applying intelligent transportation system in aviation. The development that has occurred to the air traffic by enhancing the safety, mobility, people's welfare, safe time and productivity by applying ITS, this enhances the status of the airport as a focal point. Consequently, when it comes to the challenges that face the implementation of ITS, it can be said that the absence of disparate strategic planning in applying the strategic vision for the implementation of Intelligent System can be regarded as an obstacle. In addition, the paper assures that there is significant opportunity to enhance the efficiency, safety, and convenience of airport travelers' access the information through by increasing the use of (ITS) technologies.

Key words: Intelligent Transportation System (ITS), Kuwait International Airport (KWI), Directorate General of Civil Aviation (DGCA), Self-Service Technology (SST).

INTRODUCTION

Intelligent transportation systems(ITS) provide a set of strategies for advancing transportation safety, mobility, and environmental sustainability by integrating communication and information technology applications into the management and operation of the transportation system across all modes (Pincus, 2011, and Bell. 2011). Intelligent transportation systems are advanced applications based on using information technology, where the elements of transportation systems: vehicles, roads, traffic lights and message signs become able to communicate through wireless technologies. This aims to provide innovative services relating to different modes of transport and traffic management, to enable various users to be better informed, and to make a safer, more coordinated, and 'smarter' use of transport networks (Goldstein, 2012Bertini, 2005, David *et al.,* 2002 and Hough 2002). There are many factors that cause problems in the transportation management field. However, the solution of such problems should be done in accordance to the societal needs that based on the expected advantages from the implementation of powerful ITS. Therefore, the transportation management can be improved through the implementation and simplifying the use of effective strategies of ITS that provide individual privacy, public safety and security, and efficiency (Joseph and James, 2013). In this manner, the transportation engineers can continue to advance the breadth and the scope of ITS applications.

Deploying the (ITS) will improve the airport meaning. This is because it helps in the management of ITS in civil aviation responsibilities of legislation, planning, design and implementation of these systems in airports. The purpose of this paper is to discuss the effects, advantage and obstacles of applying ITS strategies in the directorate general of civil aviation. Data were collected by conducting a field survey of the ITS users from an airport in Kuwait. The questionnaire has been designed to measure the benefit and obstacles of deploying the ITS as stated in the appendix. The questionnaire has been divided into parts from the perspective of passengers and from the perspective of employees in civil aviation. Each part has two hypotheses. The results of the questionnaire have been analyzed by using SPSS software.

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Tools of ITS in Kuwait Airport

1. Kiosks

A kiosk that disseminates real-time travel information typically consists of a computer terminal located within a small booth or on a newspaper stand-type structure. Kiosks can have information on multiple travel modes and often include information on local points of interest, since historically a majority of the users of travel information kiosks is non-residents. A kiosk can be used to provide specific information to travelers at a specific location. The kiosk must be located so that it can be reached by the target audience to provide both static and real-time information. Types of information provided may include traffic information, road conditions, transit information, parking information such as the location of parked cars, traveler services or special event information, and other information tailored to a traveler's request or profile. They should be located where large numbers of people congregate or gather.

2. Multi-user flight information displays

A multi-user flight information display (MUFID) system is a method of visually displaying flight information to travelers in real time. The flight information displayed usually includes the airline name, city of origin or destination, expected arrival/departure time, gate number, and status of the flight (i.e., boarding, departed, delayed, etc.).MUFIDs are typically placed throughout the airport terminal but may also be placed on cell phone lots, parking garages and lots, as well as transit stations and rental car facilities.

3. Smart Phones

Below is a list of the primary types of travel information accessed via a smart phone:

- Flight/gate status.
- Trip itinerary.
- Access route conditions.
- Weather information.
- Check-in and security wait times.
- Parking information.
- Transit information and status.

4. Smart Gate System

The smart gate system gives eligible travelers the option to self-process through passport control. It provides a secure and efficient way to clear through passport control. Smart gate uses the data in your e-Passport and face recognition technology to perform the customs and immigration checks usually conducted by a Customs and Border Protection officer. Using Smart gate is a simple, two-step process involving a kiosk and a gate. Step 1 involves the kiosk and checks if you are eligible to self-process. Step 2 involves the gate, which performs the identity check and clearance.

5. Self-service baggage

The self-baggage drop is configured according to the laws and regulations requirements where the system will be used. The self-service baggage drop-off point works as follows:

Step 1: Place one baggage item on the belt.
Step 2: Scan your boarding pass to identify yourself.
Step 3: Check the details about your booking that appear on the screen.
Step 4: An adhesive label will be printed automatically. Attach this label to your baggage and indicate on the screen that you have done so.
Step 5: The self-service baggage drop-off point will print out confirmation that you have checked in baggage.

RESULTS AND DISCUSSION

The statistical t-test is used in this paper for the opinion of the respondents about each factor in hypothesis testing, and use the relative importance index (RII) to determine the relative ranking of the factors. The RII has been calculated for each factor to test the opinion of the respondent about the hypothesis of the questionnaire and the results shown in table (1), (2), (3), and (4). The formula of RII is given as follows:

$$\textbf{Formula (RII)} = \frac{\sum w}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

Where:
W: The weighting given to each factor by the respondent, ranging from 1 to 5.
n5: represents the number of respondents who strongly agreed.
n4: represents the number of respondents who agree.
n3: represents the number of respondents who were Neutral.
n2: represents the number of respondents who disagree.
n1: represents the number of respondents who strongly disagree.
N: represents the total number of samples.

The first part of the questionnaire is from the perspective of the passengers

First hypothesis: The effect of applying (ITS) on the Directorate General of Civil Aviation (DGCA) from the perspective of employees in civil aviation are high at significant levels α= 0.05. In general the result of all factors of the first hypothesis shows that the average means equal to 3.62. Moreover, the percentage of relative importance index equals to 72.36%, which is greater than 60.0%. Also, the value of t-test equals to 9.146 which is greater than the critical value which equal to 2.01. Additionally, the p- value equals to zero, which is less than 0.05.

This clearly indicate that the effects of applying ITS on the directorate general of civil aviation from the perspective of employees is high at significant level α = 0.05.

Table 1: Ranking of the first hypothesis

Statement	Rank
(ITS) at airport improve and develop planning and scheduling flights.	2
(ITS) at airports provide the necessary information for controlling and managing flights in a better manner	7
(ITS) at airports help to provide larger capacity to build new facilities.	11
ITS supports the economic development and enhances productivity.	5
(ITS) help to growth air traffic by increase safety, mobility, and productivity which enhance the status of the airport as a focal point.	1
(ITS) help in conserving energy and protecting the environment.	8
ITS at airports help to speed the completion of performance of air management	4
Planning, designing and implementing (ITS) projects serve multiple modes of transportation in airports management.	9
Management of ITS at airports monitors air navigation, communications and security movement.	6
The use of automatic controlling system that allows for centralized management to control the vast spaces and cars inside airports and achieving security.	10
ITS working to shorten the passenger processing time and reduce delays.	3

Table 2: Ranking of the second hypothesis

Statement	Rank
Inability of civil aviation to use ITS.	8
Unavailability of sufficient number of equipment and technical tools for using ITS.	7
Absence of the desire of involved people to assist in the implementation of using ITS.	4
Civil aviation administration does not accept activating the use of ITS.	2
The absence of a specific mechanism for the training civil aviation management about using ITS.	5
The absence of disparate strategic planning in applying the strategic vision for the implementation of (ITS) practices.	1
Weakness in efficiency and quality of civil aviation management in implementing (ITS) practices.	3
No transition from the training level to the implementing level ITS.	6

The statement “ITS helps the growth in air traffic by increasing safety, mobility, and productivity, which enhance the status of the airport as a focal point” In this context, the statement ranked 1th with 76.80% RII according to the respondents point of view. Additionally, the stated point based on the findings of the questionnaire and relevant statistical analysis. Furthermore, safety always has been the top priority for any kind of transit system and it is even more critical when it comes to air travel. Moreover, the goal of airport security systems should be clear to ensure unequivocal passenger identification and to monitor passenger movement from check-in. In addition, mobility improvements can be achieved by reducing the travel process time or delay savings. Likewise, productivity improvements are typically documented in cost savings to transportation providers, travelers, or shippers.

Table 3: Ranking of the third hypothesis

Statement	Rank
ITS assist in civil aviation to improve safety and productivity levels on flights.	2
ITS help to reduce the time that spent in travel processing.	1
ITS provide information about weather and environmental conditions. They also predict collisions accidents that may occur.	6
ITS at airports provide immediate information related trips and air traffic.	9
ITS at airports enhance the ease of air management's performance and they provide flights with comfort and security.	7
ITS at airports improve entertainment levels for passengers on flights.	8
ITS management in airports provides information about the movements before departure.	3
ITS help to accommodate a larger number of passengers.	5
ITS help to increase safety and security level for passengers.	4

Table 4: Ranking of the fourth hypothesis

Statement	Rank
Weakness of training and rehabilitative programs in civil aviation administration that provide us with good skills to use ITS.	4
Unavailability of sufficient equipment and technical tools for using ITS.	6
Lack of the motivation and encouragement by the civil aviation administration to develop using ITS.	3
It is difficult for some involved people to understand using ITS.	1
The high cost of designing and producing ITS	5
It is difficult to teach some passengers to use ITS	2

Second hypothesis: The obstacles and challenges facing the implementation of (ITS) in (DGCA) from the perspective of employees in civil aviation are high at significant level α = 0.05. The results of the second hypothesis show that the average mean equals to 3.20, the percentage of relative importance index equals to 63.95% which is greater than 60.0%. Moreover, the value of t-test equals to 4.40 which is greater than the critical value which is equals to 2.01. Additionally, the p- value equals to zero, which is less than 0.05. Likewise, the peak value of standard deviation of these values is below unity which shows a fair distribution of test results. The obstacles and challenges facing the implementation of intelligent transport system practices in civil aviation are high at significant levels α = 0.05.

The statement “the absence of disparate strategic planning in applying the strategic vision for the implementation of (ITS)” was the most critical factors for initiating the implementation of ITS in Kuwait international airport from the point of view of the employees in civil aviation. Thus, this statement recorded a high percent that equals to 72.40% RII according to the respondents’ point of view. In this context, the researcher thinks that the strategic planning is the most important and the prior factor for management in doing any project. Furthermore, the strategic planning provides thoughts and a clear picture of what should be done and where should the project implement. Therefore, planning keeps up and improves the implementation of new technology.

The second part of the questionnaire is from the perspective of employees in civil aviation

Third hypothesis: The effects of the use of (ITS) in (KWI) from the perspective of the passengers are high at significant levels α= 0.05.
The results of all factors of the third tested hypothesis show that the average mean equals to 3.71, the percentage of relative importance index equals to 74.27%, which is greater

than 60.00%, the value of t-test equals to 9.455 which is greater than the critical value which is 1.98, and the p- value equal 0.00 which is less than 0.05.This clearly indicates that the effects of using (ITS) in (KWI) from the perspective of the passengers are high.

The statement "Intelligent Systems help to reduce the time that spent in travel processing" ranked at the top of all with an RII of 75.60% according to the respondents' point of view. Furthermore, the researcher justifies this ranking for the reason that the factor of implementing ITS helps to make the transit system faster, more efficient and more hassle free especially in the case of using self-service technologies. Moreover, these technologies help to achieve customer satisfaction and management improvement by improved service levels.

Fourth hypothesis: The obstacles and challenges facing the use of (ITS) in (KWI) from the perspective of the passengers are high at significant levels α = 0.05. In general the results of the fourth test show that the average mean equal to 3.12. Moreover, the percentage of relative importance index equal equals to 62.43%, which is greater than the significant value 60.0. In addition, the value of t-test equals 2.656 which is greater than the critical value that equals to 1.98.The p- value equals to 0.009 which is less than 0.05.

The mentioned point indicate that the obstacles and challenges facing the use of intelligent transport system practices in KWI from the perspective of the passengers high at significant levels α = 0.05. The statement "it is difficult for some involved people to understand using intelligent systems" ranked 1th with an RII of 72.60% according to the respondents' point of view. Likewise, the researcher thinks that it is true for many people who struggle with the devices of new technological can regard as an obstacle but over time this can be dealt with.

CONCLUSIONS

The implementation of ITS has increased in many fields due to future scenarios. In airport industry the quality of services and reducing waiting time occur through developing ITS that needs complementary issues such as infrastructure, electronics and communication software and hardware. Also, the robust design of ITS may improve the existing facilities and stabilize the performance expected from the utilization of ITS. However, the optimal management strategy of ITS that implement may affect the travel condition positively. Therefore, the full employment of new technologies facilitates the procedure and reduces the average waiting time in the airport.

1) From the perspective of the employees in civil aviation, the effects of applying the intelligent transportation systems in airports are high. Furthermore, the top of all effective statement in the survey is that ITS helps the growth rate of air traffic by increase the safety, mobility, and productivity which enhances the status of the airport as a focal point.
2) From the perspective of the employees in civil aviation, the average percentage of relative importance index for the challenge that facing the civil aviation is high. Moreover, the main obstacles of applying ITS in the airport are the absence of disparate strategic planning to apply the strategic vision for the implementation of ITS practices.
3) From the perspective of the passengers, the main effects of applying the ITS in the airport help to reduce the time that spent in travel proceeding. In this context, by using (ITS) the civil aviation can improve customer service and achieve customer satisfaction.
4) The obstacles of using ITS in the airport from the perspective of the passengers are high. Therefore, it can be said that the main obstacle is the difficulty that face the involved people to understand and use ITS.

In this context, the researchers think that the managers and the decision makers in Kuwait airport want to improve the level of safety and security for all peoples (i.e. the passengers and the employees).In addition the use of self-service technology reduces the costs in of administration in civil aviation. Finally, the results show that there is a positive association between facilitating conditions and intends to use when it comes to the use of ITS. Moreover, one of the possible explanations for that is the e-commerce and Internet-based services are gaining priority nowadays through the use of online self-service technologies. Moreover, for the airline companies, the establishment and maintenance of such SSTs offer both special opportunities and unique challenges. Thus, from the customer value perspective, it is important to provide technical assistance for passengers. In this context, the ITS can provide high quality services that satisfy the passengers, especially when dealing with airline companies.

RECOMMENDATIONS

Some important recommendation can be made in order to get effective and strong ITS at Kuwait airport:

- A basic framework for the implementation of ITS strategies and associated technologies for airport should be provided and implemented. This framework is the link between the planning level tasks such as the identification of ITS technologies that match the airport, user needs, and the designed tasks, which include the identification of project specific details.
- In addition, complete studies must be done and the set strategic planning should be found to be able to apply vigorous intelligent system in the airport.
- Furthermore, the employees in civil aviation should be rehabilitated by training programs to give them good skills to use intelligent systems and learn passengers how to use ITS.
- Likewise, sufficient equipment and technical tools for using intelligent systems should be provided.
- Equally, awareness programs should be established by using media to educate the stakeholders (are those agencies or organizations who will own, operate, maintain, use, interface with, benefit from, or otherwise be affected by the project and implemented system) how to use intelligent transportation system.
- In addition, the airport should hire skilled employees who get used in using the ITS to learn passengers how to use the ITS that are available in Kuwait airport as it is in the Europe airports.

REFERENCES

Bell, K. (2011). Key Performance Indicators for traffic management andIntelligent Transport Systems, This document is property of the CONDUITS Consortium, Available:

Bertini, R. (2005). Benefits of Intelligent Transportation Systems Technologies in Urban Areas: A Literature Review. Portland State University Department Of Civil & Environmental Engineering School Of Urban Studies And Planning Centre For Transportation Studies (Cts).

David M. et al (2002). Inter-Technology Effects in Intelligent Transportation Systems. California PATH Research Report. ISSN 1055-1425.

Hough, J. (2002). Intelligent Transportation Systems: Helpings Public Transit Support Welfare to Work Initiatives, Upper Great Plains Transportation Institute North Dakota State University.

Joseph O.,&James B., (2013). Transaction-Based Intelligent Transportation System (TBITS) Using Stochastic User Utility Model. Transactions in GIS, 17(1): 109–123.

Pincus, M. (2011). Intelligent Transportation Systems Benefits, Costs, Deployment, and Lessons Learned Desk Reference: 2011 Update,Final Report — September 2011 FHWA-JPO-11-140.