NECESSITY OF KIOSK ENABLED AIRPORT FOR EFFICIENCY AND CONGESTION FREE TERMINAL

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Abstract - Evolution in aviation industry predicts the future airport terminal with self-service process point by implementing kiosk. Future airports expected to be fully automated without human contact (interference) as a staff. Proposed formulation proves that kiosk offering tangible benefits in various airport operations including save time of passenger's as well as service provider and increase the passenger's flow rate in order to minimize the congestion at terminal. The survey and measuring parameters ensure that kiosk enabled airports are successful step towards smart airport.

Keywords - Kiosk, Passenger's Flow Rate, Self-Service, Airport Operation Efficiency.

I. INTRODUCTION

Today's airports are no longer a place of airplanes take- off and landing; but much more vital part of aeronautics economy and peaceful journey point. Future airport emphasizes on expansion and enhancement in their services with the help of innovation and passenger's centric betterment. The countries around the world look further for transformation with new vision in each part airport management system with evolution, technology and application changes. Future technology makes simple to imagine self-service desk, congestion free and fast airport by giving personalized service to passengers to maximize business and operational objective.

There are various factors involved in to the success of airport, where passengers processing efficiency is important one. Technology promotes a virtualized system solution that enables airlines to serve passengers in consistent, optimized and flexible manner. Advanced technological solution provides optimized and airport terminal flexibility enabled with self service capabilities. When this innovation is integrated with airport's operational system, it makes absolutely smart and transparent passengers processing environment. Kiosk enabled airport with full automation offer optimization at each process point in check-in, baggage handling, screening, to boarding. This integration facilitates reliable, efficient, effectiveness in service utilization and process time.

TYPES OF KIOSK
Informative Kiosk
Informative kiosks have display touch screen that make passengers activities easy without physical interaction. At airport it should be placed these types of kiosk accessible and located at visible public area at entry gate or before that. It allow to passengers access all information about their journey like airport facilities ,fight status , arrival and departure fight time table, direction map of each service point , lounge, shops restroom etc. It also supports language selection option for passenger's convenience. It shares most important information with passengers before their journey and smooth flow of passengers. Information kiosk enabled as column-type or Personal Computer(PC) workstation with touch screen interface [1].

Ticketing kiosk
Ticketing kiosk introduced interactive self-service touch screen interface enable passenger to quick purchase air ticket and support to ticket process of already booked ticket. Self-service system inbuilt with payment option which become more effective and easy for air passengers. This kiosk offers great service convenience, increase revenue and maximize the efficient use of resources. It is customer centric computerized system located near check-in counter. It offer services like review flight price, flight schedule, conform ticket reservation by using booking id. It also prompts for passenger's validity and smart payment option by using information database.

Check-in kiosk
Self-check-in process and specification provide best solution to effective and efficient check-in process. This interactive device serves passengers in two way getting boarding pass and auto bag drop facility. It improves transaction speed and enhances customer service with unique experience. Machine provide user multiple service as validating passengers, conform seat at chart, baggage drop, extra luggage payment option, print boarding pass etc. The new specifications map exterior and interior system for reliable service to adequate long term passenger's satisfaction.

Automated screening kiosk
The screening process is designed and built with biometric integration support which automates personal identity using iris scanning, fingerprint, palm scanning, facial and image recognition for passport visa proofing [2]. Assessment speed and success rate is better and supportive for personalized threats in sensitive process. It reduces human risk

factors to improve the efficiency of screening process with automation. It became so advanced by keeping information in digital catalogue and updated for latest trends and maintain highest level of protection and security parameter in account.

E-boarding
Implementation of e-boarding facility automates boarding gate process more efficiently.It is paperless boarding pass which allow passengers to clear airport security/immigration and board a flight.It electronically tracks movement of each passengers using CCTV cameras and advanced technical equipment. Process consist of obtaining boarding pass from self-service device, they just have to flash (Quick Reponses (QR) code at gate with bar code reader. E-boarding machine not allow passenger inside terminal before the stipulated time [3, 4]. This directly helps to reduce congestion at airport terminal.

II. REVIEW OF LITERATURE

Jarmila Sabatova et al (2016) promoted new design and graphical user interface (GUI) of kiosk based application to resolve the problem larger queue over check-in counters. It specially focuses on kiosk service for disable passengers to accelerate the some activities in check-in process. Result proved that improving service efficiency in check-in process[7].

Maxim Roelen (2016) discussed importance of factors that direct help to assess next generation check-in process. It concluded that personal technology, readiness ease of use and usefulness are factors that required for both passengers and airline to promote new technology of self service desk. And existing studies prove that sufficient knowledge needs to provide customer to use it [8].

Self-service technology (SST) and their impacts on airline industry are discussed by HannahDrennen (2011) this paper. This analytical review shows some benefits like convenience in service delivery, reduction in operating cost, flexibility and improved customer's experience. It ensure that use of self-service technology positively affect in coming year of aviation industry [9].

Quantitative and qualitative efficiency of self-service check-in is investigated by CKM Lee (2013) forSingapore Changi Airport. It also analyzes the passenger's acceptance and percentage improved in processing time is considered for this hypothesis. Further it is concluded that self-service check-in implementation (SSCI) brings more efficiency in passengers processing, operation and save time and money of operation with more convenience [10].

Yukiko Kometani (2015) discussed IT based airport management need value added functions to raise satisfaction level of airport operator, passengers and airlines. Further it promoted desirable automation in airport operation like check-in, bag drop and boarding process. Here progress is notified with self-service as mean of future enhancement [11].

Selva Staub et al (2015) examined the use of self-service application which already under use from few years. Study is focused on passenger's characteristics, capabilities, preferences, and trends as baseline for strategic planning recommendations.It also shows that effective self-service technology improves aviation revenue and predicts passenger's readiness [12].

III. PROPOSED WORK

The problem is formulated for given timeframe where kiosk machine's service ratio is mathematically calculated and compared to prove that future passengers growth and quick service is essential part of smart airport in future.

Notation
The following notations are used for problem formulation.

Parameters:
T= Timeframe (timespan in minutes)
C_p = Number of passengers served with manual service desk in time T
K_p = Number of passengers served with kiosk machine in time T
D= Density of passengers
S= Speed of service
T_s= Service Time saved per person

Formulae:
A.　　　$S = K_p / T$
B.　　　$T_s = T*(K_p-C_p) / C_p*K_p$
C.　　　Passenger's Flow rate = Speed * Density
$\therefore$ Flow rate $\propto$ Speed of service
provided that-
i.　　　$K_p > C_p$
ii.　　　D= Constant(Assumed)
Total service time saved per person is increasing passengers flow rate which directly help to reduce congestion.

DISSUCSION AND RECOMMENDATION

Kiosk Self-service devices increase the service speed compare to conventional/manual service. Proposed work effectively acknowledges that kiosk efficiently save the service time per person.

Further, it proves kiosk implementation improves passengers flow rate, which keeps passengers continuously moving. It directly helps to reduce the congestion at terminal.

The extended study may help to count numbers of kiosk machine required at discrete airport.

Uniqueness and feasibility of solution is applicable to various types of common use self-service (CUSS) devices, just with minor modification. At last but not least, it overcomes the problem of language barrier.

CONCLUSION

The proposed work accomplished with kiosk implementation which help to reduces facility congestion.Features discussed above plus simple navigation, quick, and multi-tasking recommends kiosk enabled airport to fulfill the concept of smart airports. Successful performance of kiosk will be seenwith service assistance who guide the passengers to feel free to use kiosk self-service option and in case technological illiteracy.

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