STUDYING TRAVELER'S USE OF SELF CHECK-IN TECHNOLOGIES IN SMART AIRPORTS

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Abstract

Nowadays, smart airport technologies provide travelers and tourists with a faster and more convenient air travel experience. The research aims to explore the reasons that drive some travelers to favor the use self-service check-in technologies, while others still rely upon the traditional agent assisted methods. The various dimensions and variables that influence travelers' behavioral intentions are analyzed in this research. The self-check-in services were chosen to form the focus of this study. In order to analyze travelers' perception of various variables associated with their air travel experience, The Unified Theory of Acceptance and Use of Technology (UTAUT) was chosen as a guideline to formulate and test the research hypothesis. The primary results confirm that performance expectancy, effort expectancy, social influence and facilitating conditions all have a positive influence on travelers' behavioral intentions to use self-check-in services.

Keywords: Smart airport- Self-check-in service- Behavioral intention- Technology acceptance

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INTRODUCTION

The concept of smart airports

The growth in international travel and tourism is mainly due to the increase in accessibility at many tourist destinations. The recent advances in airport infrastructure and technology allowed a greater number of travelers to travel to a wide range of destinations around the globe (Widarsyah, 2013).

Today, world airports are forced to cope with innovative technologies with an aim to face continuous pressures from the demand and supply side. Almost after one hundred years of aviation, technologies are invading more than ever the air transport industry. Airport managers are striving to design new plans to **create a radically new environment for passengers. The main concept revolves around facility management** and operations with an aim to provide a faster, less stressful, more secure and efficient travel experience.

Passengers tend to find the air travel experience time-consuming, uncomfortable, stressful and expensive. The air travel demand is projected to include an annual growth rate of 5.6% which will surely make matters even worse if airports do not facilitate their air travel experience on the ground. On the other hand, the wide penetration of smart phone technologies in the air travel cycle is continuously urging passenger to be demanding of more personalized services

Passengers expect a faster airport experience at check-in points, security and immigration check-points; in addition to the provision of real-time information in numerous areas (e.g. airport maps-special offers at restaurants and hotels). The rapid adoption of new mobile technologies can transform passengers' habits throughout the whole airport experience (Kalakou, 2015).

Tyler (2015) confirms that IATA's "Simplifying the business program" primary aims to give customers better control and a higher level of self-service. IATA's strategy seeks to reform the air travel cycle starting from passengers' ability to purchase a journey tailored to their needs to the bringing of self-service options to passengers. Passengers will have all the information they need at their fingertips in real-time.

From a passenger's perspective, an efficient and unified airport ecosystem is a stress free air travel experience. In order to realize this priority, more automated processes are required with an aim to offer higher speed, convenience, and ease of use. The advancements in in customer centric technologies (remote check-in-Near field communication devices-electronic passports-self-bag tagging) will help achieve this goal. However, this development needs some control over data ownership so that airports and airlines can accurately track and manage passenger expectations (Amadeus, 2013)

Smart airports defined: “Airports that fully exploit the power of emerging and maturing technologies with advanced and pervasively deployed sense-analyze respond capabilities” (CISCO, 2009, p5).

SITA (2015) stated the following facts about smart airports:

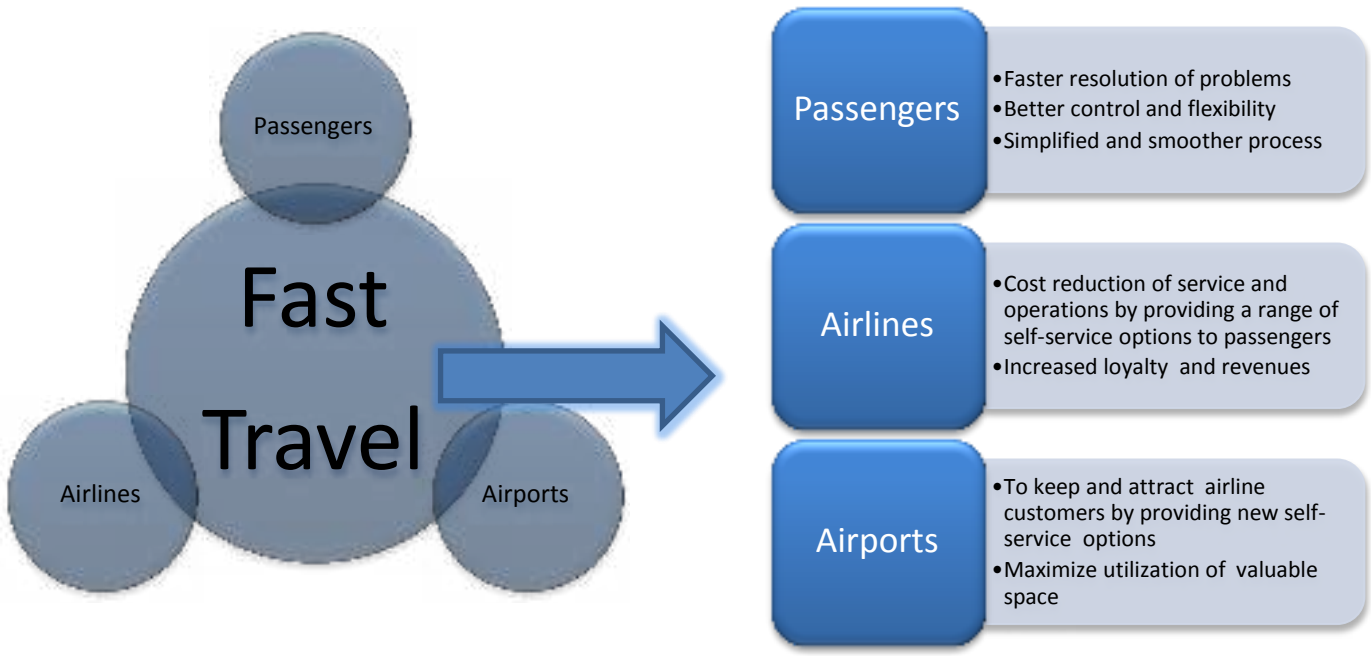
- 72 % of airports plan to check-in more than half of passengers through a kiosk in 2017 and 72 % of airports will have implemented unassisted bag drop by 2018.
- 63 % of passengers would prefer a self-boarding gate to board the aircraft rather than the current traditional airport procedures.

The following figure, models that anatomy of smart airports which will be also the cornerstone of a broader concept, which is called: “smart cities”. The integration between the aspects related to customized passenger options, mobile driven processes, traveler engagement and location based services will create a supreme end to end traveler experience that will benefit all parties correlated with the airport business (local authorities, businesses and passengers).

Source: Sinibaldi (2016)

Figure 1- The anatomy of smart airports

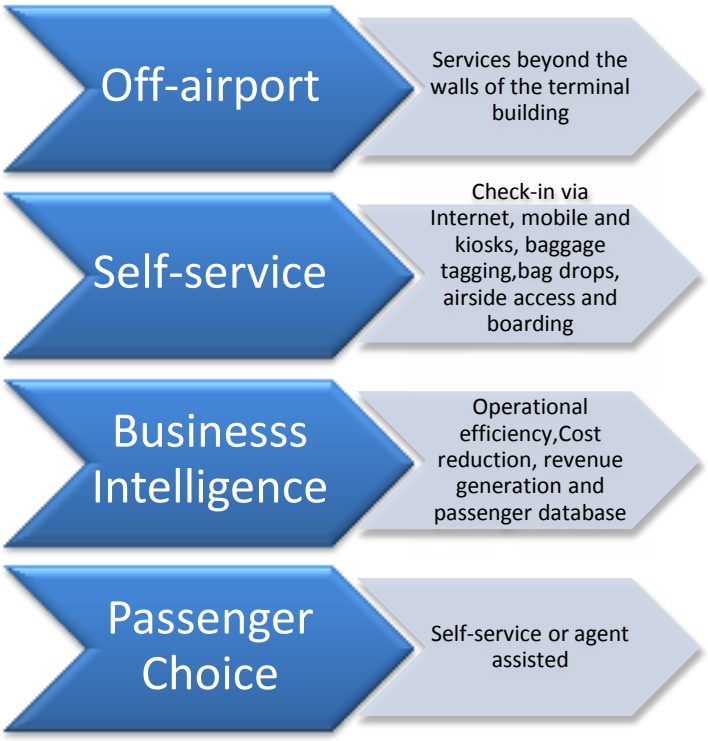
The smart airport will engage passengers with relevant and a wide range of information and offers. At every stage of the trip, the traveler will be offered personalized real-time information to create a completely seamless experience from the airport to the desired destination (CISCO, 2009). The smart airport is an integration of the technology with the airport environment, providing for all parties (stakeholders, passengers, government operators, managers, etc.) the chance to fully exploit a wide range of emerging and maturing technologies (Intelligent Computing for Enterprises and Services, 2016).



Source: International Air Transport Association (2013)

Figure 2- The fast air travel industry program

The smart airport concept creates the most effective flow of passengers and merchandise through an airport, both during normal operation as well as during times of disruption. The smart airport model highly depends on three trends: 1-passenger self-service 2-mobility 3-collaborative decision making (SITA, 2011). This evolving trend is driving passengers to decrease their human interactions with agents in favor to automated touch points and thus radically restructure the process and infrastructure of air travel (International Air Transport Association, 2013).



Source: Aeronautical Radio Incorporated (2016)

Figure 3- Airport transformation into the smart model

By the 2020, 80% of air travelers will be offered an integrated self-service system that will include: self-service check-in, self-tagging, self-boarding and automatic rebooking. Savings will surpass US$2bn a year for the industry. In addition, these services will help enhance airport-passenger relationships (SITA, 2015).

Self-service check-in

The check-in processes are important for several reasons. Airlines and airports need to explore travelers' travel intentions as possible with an aim to provide a smooth check-in operation and ensure a high quality check-in service for passengers. From airport managers' perspective, self-service check-in reduce the number of airport employees at the check-in counters. From the traveler's perspective, new self-service technologies will help reduce the negative perceptions related to complicated check-in procedures at various airports. These negative outcomes are related to the perception are mainly related to the perception of waiting in queues which consumes a lot of time at airports (Wittmer, 2011).

Société International de télecommunication Aèronautique (2015) declared that passengers typically want a stress-free journey, thus airlines and airports are both deploying more technology based services to meet that need. While traditional airport desks will remain the single most used check-in channel through to 2018 (see figure 4), mobile devices will overtake web check-in as the number two choice with 24% of passengers using a mobile device compared to 20% checking-in on a laptop or desktop. The most common check-in services are:

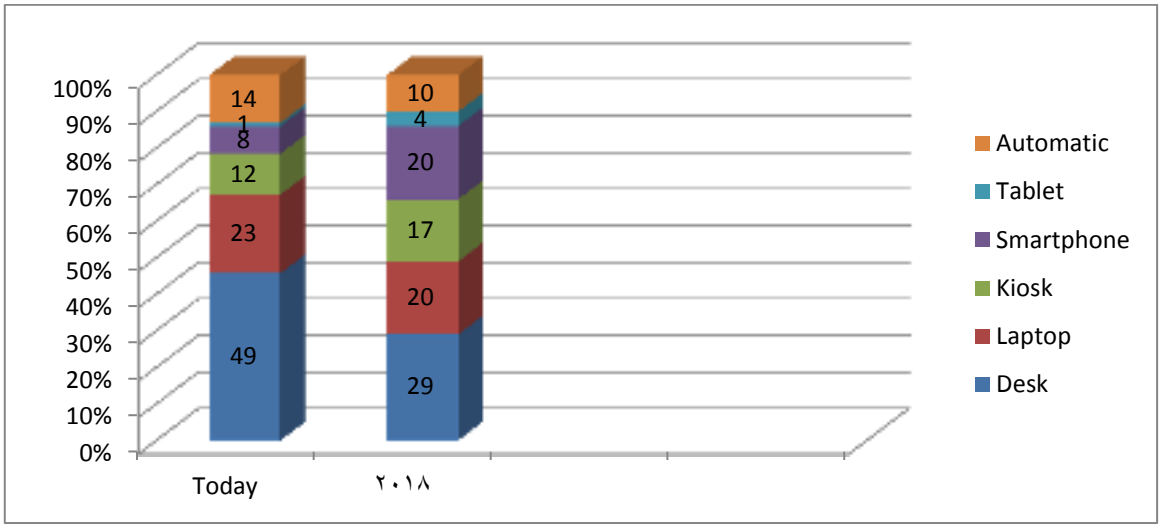
-Airport check-in desk: travelers check-in at the airport at an official airline desk.

-Check-in by phone: travelers check-in by calling the airport; the boarding pass is then sent to a mobile phone or e-mail or handled at the airline service desk.

-Airport check-in kiosk (automated ticket machine): travelers use computer terminals to check-in at the airport; boarding passes are printed instantly at the airport and the baggage is left nearby baggage drop-off desk.

-Web check-in: travelers check-in at the airline site and print their boarding pass themselves and the baggage is left nearby baggage drop-off desk.

-Mobile phone check-in: travelers check-in by mobile phone and receive their boarding pass electronically and the baggage is left nearby baggage drop-off desk (Wittmer, 2011).



Source: Société International de Telecommunication Aèronautique (2014)

Figure 4- Self check-in forecasts

The Unified Theory of Acceptance and Use of Technology

The advent of new self-service technologies presents a challenge for airports, because passengers need to learn to accept new technologies. Acceptance of new technologies varies between age groups. Younger generations adapt more easily to technological methods than older generations (Wittmer, 2011).

The Unified Theory of Acceptance and Use of Technology (UTAUT) help explain and predict user behavior of information technology (IT). The model aims to explain why a user accepts or rejects the use of ICT. UTAUT sets a basis with which we can track how external factors influence belief, attitude, and intention to use. Two cognitive beliefs are proposed by UTAUT and they are: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). According to UTAUT, one's actual use of technology systems is influenced directly or indirectly by the user's behavioral intention (BI) (Choi, 2015).

The UTAUT model uses behavioral intention (BI) as a predicator of technology use behavior (UB). The model consists of four main factors:

1-Performance Expectancy (PE): the degree to which the individuals believe that the use of the technology will result in performance gains.

2-Effort Expectancy (EE): the ease of use of the technologies

3-Social Influence (SI): the extent to which the individuals believe that the community is supporting the use of the technology.

4-Facilitating Conditions (FC): the perceived extent to which the organizational and technical infrastructure required for the support of technology.

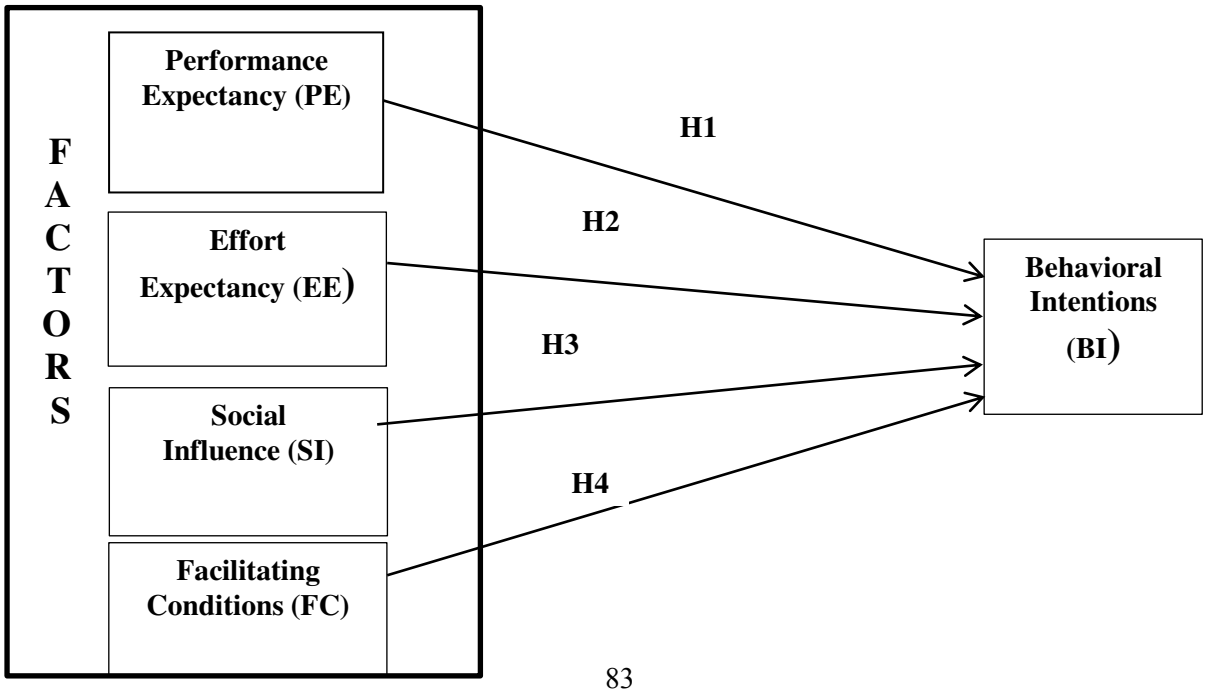
Even though the UTAUT is the most comprehensive model in information technology adoption theory, the model needs modification and revision to be able to accommodate different research questions (Thomas et al. 2013).

METHODOLOGY

Research objectives and model

This paper aims to investigate the acceptance level of self-check-in services among a random sample of air travelers. The research model is derived from the UTAUT with an aim to accommodate for the paper's chosen variables (see figure 5).

The research seeks to measure the influence of a set of predefined factors, namely: 1- Performance expectancy (PE) 2- Effort expectancy (EE) 3-Social influence (SI) 4-Facilitating conditions (FC) on the behavioral intentions (BI) of air travelers to use self-check methods during the air travel process. The main goal is to find out which factors influence the most travelers' intention or tendency to use such self-service technologies. These finding will help managers further develop their smart airport capabilities and expand the use of technological driven travel processes.



Source: Modified from Venkatesh et.al (2003)

Note: H1-H4= Research hypothesis

Figure 5- The Research Model

Research hypothesis

In order to test the relation between the behavioral intentions (BI) and each factor, Pearson correlation values were analyzed. Therefore, for the following hypotheses were tested each variable:

H1-There is a positive relationship between performance expectancy and behavioral intention to use self-check-in services.

H2-There is a positive relationship between effort expectancy and behavioral intention to use self-check-in services.

H3-There is a positive relationship between social influence and behavioral intention to use self-check-in services.

H4-There is a positive relationship between the facilitation conditions and behavioral intention to use self-check-in services.

All research objectives were formulated according to the chosen factors with an aim to test the relationships between all factors with the behavior intentions of respondents. A 5 point Likert scale was used with the following choices: 1=strongly agree and 5=strongly disagree. The demographic elements included respondents' age, frequency of air travel (experience) and education level. The SPSS v.22.0 was used to elicit various results. In addition to the hypotheses testing, all check-in services (agent assisted and self-service) were provided to respondents to choose their preferred.

SAMPLING

The random sampling technique was chosen for the research. The survey was self-administrated at Cairo International Airport during the months of May and June, 2016. Due to the absence of accurate data regarding the total population of passengers visiting Cairo International Airport and the large size of candidates, a table of sample sizes was used at a confidence level of 95% and a reliability level of ± 5. The maximum sample size was chosen (n=384); and 16 additional questionnaires were added to compensate for non-responses. A sum of 400 questionnaires was addressed to a random sample of employees with a response rate of 52 %, which is an acceptable percentage for this type of surveys (Ritchie, 1994). A total number 210 valid questionnaires were analyzed and statistically tested. A total number of 210 valid respondents were chosen for the survey (only knowledgeable and experienced individuals about the subject of self-service airport check-in were allowed to complete the questionnaire form). The demographic variations of respondents are shown in the following table.

Table1- Value ranges and scales of the demographic variables

Demographic Variables	**Value ranges**
Age category	Less than 18/ 18-24/ 25-34/35-44/45-54/55 +
Experience (frequency of air travel / year)	1-3 / 4-6 / 7-11 / 12+
Education level	High school / Bachelors / Master / PhD / Other

RESULTS AND DISCUSSION

Descriptive statistics

The majority of respondents were in the category of 25-34 years old (54.5%). They are followed by the category of 35-44 years old (20.2%). 77.8% of respondents travel from 1-3 times per year. The majority of respondents have at least a Bachelor's degree (57.6%).

Table 2- Demographic variables of respondents

Attribute	Scale	(%)
Age	Less than 18	2
	18-24	5.1
	25-34	54.5
	35-44	20.2
	45-54	12.1
	55+	6.1
Frequency of air travel	1-3	77.8
	4-6	13.1
	7-11	3
	12+	6.1
Education	High school	2
	Bachelors	57.6
	Master	19.2
	PhD	20.2
	Other	1
Occupation fields (Posts)	Education	40
	Business and finance	2
	Management	54
	Architecture and engineering	4

The preferred check-in methods

From the following figure, it's clear that the mobile check-in (via smartphone-laptop-tablet) (49.50%) is the preferred check-in method for respondents, followed by the traditional agent assisted check-in counter (25.30%) followed by the web check-in (22.30%) on various sites and finally the automated kiosk (3%) is the least preferred check-in method for respondents.

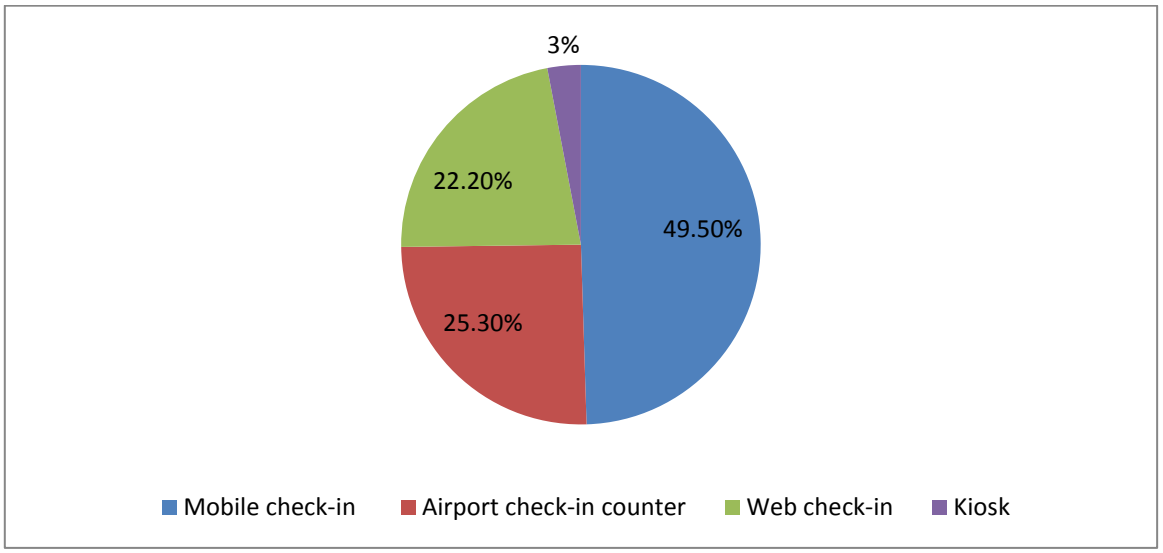


Figure 6- Preferred airport check-in method

It's clear from the previous results that the huge popularity of smartphones worldwide amplified the use of mobile technology in air travel. Still, the traditional agent assisted methods (airport counter) are holding up for numerous travelers in par with the web check-in, which confirms that many travelers still tend to prefer the traditional methods. The airport kiosks are still the least popular check-in method according to respondents.

The reliability test

The reliability of a measure refers to the degree to which the instrument is free of random error. It is concerned with consistency and stability of the measurement. Cronbach's alpha was calculated for each scale to ensure internal consistency among the items; scale reliabilities are reported in Table 3. All reliabilities except for performance expectancy were above the 0.7 level, generally considered acceptable for field research. Table 3 shows that items exhibit a high level of reliability (α>0.70). The effort expectancy has only an acceptable level of reliability (α>0.60).

Table 3-Cronbach alpha reliability results

UTAUT Construct	Number of items	Cronbach alpha (α)
Performance expectancy	3	0.673219
Effort expectancy	3	0.799805
Social influence	2	0.791144
Facilitating conditions	4	0.960431
Behavioral intentions	2	0.951751

In the following table, various factors were coded and then included in the questionnaire. Each factor is measured by several variables as shown below.

Table 4-Design structure of the questionnaire

Construct	Item code	Statement
Performance Expectancy (PE)	PE 1	Using self-check-in services reduces waiting time at the airports
	PE 2	Using self-check-in services will help increase the overall quality of my airport experience.
	PE 3	Self-check-in services will add convenience to my air travel experience.
Effort Expectancy (EE)	EE 1	I find self-check-in services easy to use.
	EE 2	My interaction with self-check-in services is clear and understandable.
	EE 3	Learning to use self-check-in services is easy to use.
Social influence (SI)	SI 1	People who influence my behavior think that I should use self-check-in services.
	SI 2	I will discuss the use of self-check-in services with my friends and relatives.
Facilitating conditions (FC)	FC 1	I have the necessary knowledge to use self-check-in services
	FC 2	The airports that I visit provide self-check-in services.
	FC 3	Technical support is available when problems occur with self-check-in services.
	FC 4	I have the necessary resources to use self-check-in services
Behavioral intentions (BI)	BI 1	I intend to use self-check-in services in my next air trip.
	BI 2	I will continue to use self-check-in services whenever they are available.

Table 5- Pearson correlation coefficient results

Construct	Item code	BI 1	BI2	Hypothesis Testing
H1-Performance Expectancy (PE)	PE 1	0.316055	0.292684	Supported
	PE 2	0.451358*	0.449424*	
	PE 3	0.553771*	0.639117*	
H2-Effort Expectancy (EE)	EE 1	0.644505*	0.620593*	Supported
	EE 2	0.67417*	0.669899*	
	EE 3	0.640524*	0.647755*	
H3-Social influence (SI)	SI 1	0.279638	0.307616	Supported
	SI 2	0.255468	0.24291	
H4-Facilitating conditions (FC)	FC 1	0.58477*	0.585464*	Supported
	FC 2	0.314852	0.372958	
	FC 3	0.372025	0.292365	
	FC 4	0.365367	0.340117	

*= Strong relationships

Note= Coefficients represents the correlations between factors for total sample (N=100)

As shown above, the Pearson correlation confirms that all factors have a positive relationship on behavioral intentions which supports hypothesis 1-4. Strength of these relationships varies according to the effect size scale: < 0.2 =weak, 0.2- 0.4=moderate and 0.4<= strong. Regarding performance expectancy, it's clear that quality and convenience of air travel have a strong influence on behavioral intentions. The effort expectancy has the strongest influence on behavioral intentions to use self-check-in services. For example, EE2 and BI1 have the strongest relationship among all variables (r=0.69). Social influence has a moderate influence on behavioral intention among all factors. The facilitating conditions have moderate influence on behavioral intentions except for the necessary knowledge (r=0.58) that has a strong influence on behavioral intentions (BI1 and BI2).

CONCLUSIONS

Smart airports will surely shape the future of the air travel experience by adopting passenger self-service technologies. The self-check in systems will no doubt contribute to the leverage of the overall quality and convenience of the air travel experience by reducing waiting time at the airports. It's clear that the three pillars of smart travel development are: the passenger, the airline and the airport. The challenge facing airports today is to find ways to promote the use of self-service technologies among passengers with an aim

to enhance the air travel experience. Based on the data collected and the results of the analysis, it can be concluded that performance expectancy, effort expectancy, social influence and facilitating conditions have a positive influence on user intention to use airport self-service check-in. However, the strength of the relationships varies among factors. It's confirmed that effort expectancy has the strongest influence on behavioral intention comparing to other factors. The social influence is present but has a weak impact on respondents in this respect. The most significant facilitating condition emphasize upon the provision of knowledge based resources to travelers regarding the use of such technology. Exploiting the huge fan base of mobile technology will further expand the use of self-check-in services on a global level.

RECOMMENDATIONS

-Smart airports should emphasize upon the importance of continuously simplifying the use of self-check services at various airports in order to lure travelers and tourists alike to rely on technologically driven systems.

-Providing both clear and understandable instructions to use the various check-in systems along with offering reliable learning sources is fundamental for the development of smart airport technologies. Travelers who prefer traditional agent assisted check-in methods can change their habits once they are better informed about the ease of use of such self-service technologies.

-Airport managers must take into account the various passenger demographics (namely: education-air travel experience-age) in order to properly market the benefits and the ease of use of such technology.

- Providing the necessary airport facilities and technical support is fundamental for the spread use of self-service check-in among passengers. The more passengers trust the use of these systems, the more airports will streamline their operations and further facilitate their transition into a more sophisticated and convenient smart facility.

-Taking all the UTAUT factors into consideration should help airports expand the use of self-service check-in, and hence improve the overall level of satisfaction of travelers with their air travel experience.

- Airports must further exploit the popularity of mobile technology with an aim to achieve information and process oriented benefits for air passengers. Broadening the use of mobile devices will surely reduce the waiting time at various airports.

FUTURE RESEARCH

Further research is needed to apply these factors on other self-service technologies such as online booking, baggage tagging / drop and self- boarding, which will eventually continuously enhance the quality of airport services

References

Amadeus (2013) Reinventing the airport ecosystem, Madrid: Amadeus IT group.

ARINC (2016) Smart airports, [Internet], retrieved from: http://www.aaco.org, [Accessed in 9th of March, 2016]

Choi, J. and Park, J. (2015). A study on factors influencing 'Cyber Airport' usage intention: an Incheon International Airport case study, Journal of Air Transport Management, Vol. (42), pp. 21-26.

CISCO (2009) Smart Airports: transforming passenger experience to thrive in the new economy, July 2009. San Jose, CA.

-Ritchie, J. and Goeldner, C. (1994) Travel, tourism and hospitality research: a handbook for managers and researches, 2nd ed., John Wiley.

IATA (2013) Fast travel program, November 2013, Montreal: International Air Transport Association.

ICES (2016). Passenger-oriented smart airport services: a system design and implementation, China: Harbin Institute of Technology.

Kalakou, Psaraki-Kalouptsidi, V. and Moura, F. (2015) Future airport terminals: New technologies promise capacity gains, Journal of Air Transport Management, Vol. (42), pp.203-212.

Kim, D. et al. (2008). A model of traveler acceptance of mobile technology, International Journal of Tourism Research, Vol.10, pp.393-407

Libraries and learning (2012). The Harvard system of referencing, UK: De Monfort University

Liu, S. (2013). Applying the technology acceptance model and flow theory to online e-learning users' acceptance behavior, Issues in information systems, Vol. 6 (2), pp.175-181

Mardikyan, S., Beşiroğlu, B. and Uzmaya , G. (2012). Behavioral intention towards the Use of 3G technology, Communications of the IBIMA, Vol. 2012, pp.1-10.

Rodriguez. and Trujillo, E. (2013). Online drivers of consumer purchase of website airline tickets, Journal of Air Transport Management, Vol. 32, pp.58-64.

Salim, B. (2012). An application of UTAUT model for acceptance of social media in Egypt: a statistical study, International Journal of Information Science, Vol. 2(6): 92-105

Samy, H. (2012). Exploring the use of mobile phone technology in marketing airline services in Egypt, International Journal of Mobile Marketing, Vol. 7(3), pp.82-94.

Sinibaldi, V. (2016). Airport 3:0: How smart technologies are transforming air travel, May Report, US: Comarch.

SITA (2015). Smart technology for a hassle-free passenger journey, Geneva: Société International de Télecommunication Aèronautique.

SITA (2014). The airline IT survey, Geneva: Société International de Télecommunication Aèronautique.

SITA (2011). The Intelligent airport: unleashing the potential, Geneva: Société International de Telecommunication Aéronautique.

Thomas, T., Singh, L. and Gaffar, K. (2013). The utility of the UTAUT model in explaining mobile learning adoption in higher education in Guyana, International Journal of Education and Development using Information and Communication Technology, 9 (3), pp.71-85.

Tyler, T. (2015). Self-service and self-serving. Air transport review, Issue (2), p.11

Venkatesh, V. (2003). User Acceptance of Information Technology: Toward a Unified View". MIS Quarterly, vol.27, pp.425–478.

Widarsyah, R. (2013). The impact of airport service quality dimension on overall airport experience and impression. Unpublished thesis (PhD), University of Nevada.

Wittmer, A. (2011) Acceptance of self-service check-in at Zurich airport, Research in transportation business and management, Vol. (1), pp.136-143.

دراسة استخدامات المسافرين لتكنولوجيا التسجيل الذاتى بالمطارات الذكية

الملخص العربى

خلال الآونة الأخيرة، أصبحت تكنولوجيا المطارات الذكية توفر للمسافرين و السائحين تجربة سفر جوية اكثر سرعة و ملائمة من ذى قبل. يهدف البحث الى معرفة الاسباب التى تدفع بعض الركاب نحو استخدام تكنولوجيا التسجيل الذاتى و الاسباب التى تجعل البعض الاخر يصر على الاعتماد على الخدمات التقليدية المقدمة من قبل موظفى شركات الطيران. تم تحليل كل الابعاد و المتغيرات المتنوعة التى تؤثر على النية السلوكية للراكب; و التى تجلعه يقبل على استخدام الخدمات الذاتية. استرشدت الدراسة "بالنظرية الموحدة لاستخدام و قبول التكنولوجيا" ( ) UTAUT فى بناء فروض البحث و تصميم استقصاء الركاب. أكدت النتائج الرئيسية للبحث أن "الاداء المتوقع للخدمة" و "الجهد المتوقع من قبل المستخدم" و " التأثير الاجتماعى" و "التسهيلات المتاحة" لهم تأثير ايجابى على نية استخدام خدمات التسجيل الذاتى بالمطارت الذكية.

الكلمات الدالة: المطارات الذكية- خدمات التسجيل الذاتى للركاب- النية السلوكية- قبول التقنية الحديثة