“Managing airport service quality – the impact of self-service technologies”

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ARTICLE INFO	Protus Seda Otieno and Krishna Govender (2016). Managing airport service quality – the impact of self-service technologies. *Investment Management and Financial Innovations*, *13*(3-2), 387-393. doi:10.21511/imfi.13(3-2).2016.11
DOI	http://dx.doi.org/10.21511/imfi.13(3-2).2016.11
RELEASED ON	Monday, 10 October 2016
JOURNAL	"Investment Management and Financial Innovations"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
0	0	0

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Managing airport service quality – the impact of self-service technologies

Abstract

The impact of self-service technologies on service quality at a major international airport in South Africa, was determined using an adapted SERVQUAL instrument, which focused on Reliability, Convenience, Ease of Use and fulfillment, by developing and testing three hypotheses, which postulated relationships between the aforementioned. The data from a systematic random sample of 318 passengers collected during peak hours at the international departures terminals was analyzed using inferential statistics, confirmed that there is an association between convenience and fulfilment; between ease of use and fulfilment, and between reliability and fulfilment, although some relationships were not very strong. SSTs have addressed the long queues at the airport and improved passenger service experience. The findings must, however, be interpreted with caution as there are inherent limitations and opportunities for further research.

Keywords: service experience, self-service, technology, airport service.
JEL Classification: M31.

Introduction

Air transport has become one of the main drivers of global economic activity, in that the aviation industry supported 56.6 million jobs around the globe, representing almost 3.5% of the global GDP and International Air Transport Association (IATA, 2012), estimates that 3.5 billion passengers will travel by air during 2015. Deregulation and liberalization of the airline industry has resulted in the proliferation of low cost carriers (LCCs), as well as a re-engineering of the business models of the legacy carriers. The air transport industry service providers find themselves operating in a very competitive environment, and this puts more pressure on the demand for improved efficiency, service quality and customer satisfaction at airports environment (Fodness and Murray, 2007).

Service quality is a critical component of the service industry's marketing strategy, due to its effect on customer satisfaction, customer retention and loyalty (Gounaris et al., 2010). This is particularly important in the air transport industry where it can be demonstrated that through service quality and customer satisfaction, passengers would be inclined to choose particular hub airports when selecting their flights. Therefore, airports need to develop strategies that embrace service quality in order to build a successful hub airport with a competitive edge in the highly competitive aviation environment. Oliver Tambo International Airport (ORTIA) in Johannesburg, South Africa recognize the need to attract more airlines, transit passengers and cargo in order to develop profitability and support the local economy by embracing service quality and customer satisfaction strategies that will attract and retain customers. ORTIA is focused on one such area, namely, service quality at the queuing process at the airport's passenger check-in counters.

Most airports have incorporated strategies that address efficiencies and service quality in their mission and strategic objectives, to ensure that they continue to deliver superior customer satisfaction. Several early researchers (Fodness & Murray, 2007; Lube et al., 2011), and later (Bogicevic et al., 2013) have weighed in on the discussion of service quality and customer satisfaction at airports as a means to provide a source of competitive advantage.

In light of the above, this study on which this article is written, intends to investigate how the implementation of self-service technologies (SSTs) at the ORTIA's international departures passenger check-in has impacted service experience and quality.

Literature review

By citing Berry et al. (2002), Kotler and Keller (2012, p. 397) suggest that "customers value convenience, and that many person-to-person service interactions in business transactions are being replaced by self-service technologies (SSTs)". In particular, the service industry has seen a tremendous increase in the application of SSTs over the years, and more and more services are being provided through the internet, namely, online applications which have been supported by new trends, including a proliferation of hand held devices, especially with the computer savvy customers.

The aviation industry and, in particular, the airport environment, is one such industry that has seen a growth in the utilization of SSTs at various passenger service touchpoints. These include internet-based or online ticket purchase, self-service check-in processes, for example, online self-service,

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cellphone self-service and the Common Use Self Service (CUSS) check-in processes, commonly known as self-check-in kiosks. Others are technology driven self-service at the airport security and immigration checkpoints, for example, near field technology (RFID) which is based on passenger identification using biometric verification processes; self-service boarding and other various self-service applications that cover the entire passenger life cycle including flight re-booking (IATA, 2015).

Kotler and Keller (2012) argue that although not all SSTs can provide the capability to improve service quality, they can also make service transactions faster, convenient and accurate, as well as providing cost efficient benefits. A good example of airport SSTs is IATA's Fast Travel program, i.e., passenger facilitation and passenger experience, which has integrated SSTs in the passenger life cycle model and is estimated to deliver savings of up to US$2.1 billion for the aviation industry worldwide when fully implemented (IATA, 2015). Airports Council International (ACI) also supports various initiatives that are based on SST applications, and an example of ACI's SST initiative is the 'Simplifying Passenger Travel' concept which is geared towards combining new generation passports (e-passports) which use biometric features, combined with technological capabilities, to facilitate efficient processing of passenger movement within the airports. The processes include self-service check-in, e-security (and government authority controls) and e-immigration (ACI, 2007). Under its Fast Travel Program, IATA has designed and implemented strategies that provide passengers with more flexibility, choice, convenience and control through various self-service options that deliver passenger experience. IATA has targeted 14 stages of the passenger value chain that could potentially influence passenger perception of service quality through implementation of self-service technology) in order to deliver customer satisfaction at airports. These 14 stages, referred to as the StB program (Simplifying the Business), describe the passenger process toolbox, and represent customer touch points that can deliver great customer experience if appropriate self-service solutions are applied (IATA, 2009).

Govender (2013) posits that customers are co-creators of the service in that they participate in the production and delivery of service and, therefore, have an influence on service quality. The aforementioned seems even more valid in the self-service technology (SST) environment, namely, in the airport customer service encounters where passengers have an even greater role to play as 'co-creators' with much more influence on how the service is delivered by participating in self-service check-in, self-boarding and self-rebooking processes. The self-service or on-line platforms make the negative effect of the 'inseparability of service' more problematic in delivering a high level of service quality. Kotler and Keller (2012) argue that the problems may worsen if customers have a greater role in the production and delivery of the service, as characterized in an SST environment. For example, in the airport self-service environment where more and more customer touchpoints or service encounters are automated, the increased customers influence on the outcome of the service encounter due to the fact that passengers are co-creators of the service, coupled with the 'loss of control' on the part of the service provider in the production and delivery of the service, may enhance or diminish the passenger's perceived service quality outcome. By referencing Zeithaml et al. (2006), Kotler and Keller (2012) suggested that SSTs may increase service problems because of this delegation of control of the service to the customer by the service provider.

The hierarchical structure of airport service quality expectations reveals that service quality at airports can be structured into three dimensions, namely, function, interaction and diversion, and some of the dimensions can be further sub-divided further. For example, the 'function' dimension is sub-divided into 'effectiveness' and 'efficiency,' and 'diversion' is sub-divided into productivity, decor and maintenance (Lubbe et al., 2011). It is the 'efficiency' that is a target for SSTs because of the synergies that automation can create in the passenger facilitation processes, namely, how passengers can move from 'check-in to boarding' in the most efficient manner based on automation of the airport passenger processes.

Developments in ICT, such as the pervasive use of mobile devices and the development of user applications (Apps), have allowed airlines to implement mobile check-in processes which are more convenient and efficient. These applications allow passengers the convenience to manage their own check-in, including seat selection and allocation. Complementary to this, airport automated self-check-in kiosks allow passengers to remotely check-in without having to queue at the check-in counters. Based on the above, it is suggested that self-service technologies (SSTs) can deliver customer experience and customer satisfaction, simply because it puts the passengers in control of their journey.

With increased number of passengers at hub airports such as ORTIA, efficiency of the check-in process is paramount as it impacts on-time-performance and the general passenger and airlines network connectivity, a critical element of a hub-and-spoke

operation. Curran and Meuter (2005) argue that despite the many benefits of SST platforms, there is an increased workload and involvement on the part of the customer in the delivery of service, and that this may preclude customers from using the technologies. On the other hand, with the increased use of hand-held devices and the development of Apps, many technology savvy customers have become used to automation and online transactions. The ease of use and convenience of technology-based service delivery have become an attractive proposition for some customers (Meuter et al., 2000). In the airport service environment, reliability of the check-in kiosks in the passenger's view would indicate the expectation that the check-in kiosk is available and functional at all times, and that it is consistent and free of error (Narteh, 2015).

Parasuraman (2000), as cited by Narteh (2015, p. 363), suggests that many customers using technology based service delivery systems have become frustrated when using the SSTs which he attributed to confidence (or lack thereof) and lack of readiness on the customers' part in operating the SSTs. While automation can be advantageous in simplifying processes, the customer interface can be complicated and intimidating to customers. Narteh (2015, p. 365), citing Gounaris and Koritos (2008) posits that 'ease of use' of information technologies, e.g., in banking will determine the adoption and use of those services by customers. Therefore, passenger's adoption of check-in processes using the check-in kiosks and on-line platforms would be related to the ease of use, i.e., a minimal level of effort should be applied to realize delivery the service. Considering the above, the study proposed the following hypothesis.

Based on the above, the following hypotheses are proposed:

H1: Passengers' perception of convenience is positively related to their perceived service fulfilment.
H2: Passengers' perception of the reliability of the SSTs is positively related to their perceived service fulfilment.
H3: Passengers' perception of the ease of useof SSTs is positively related to their perceived service fulfilment.

The abovementioned hypotheses were assessed using the methodology which follows.

Research methodology

A quantitative approach was used to conduct a survey, among a convenience sample of passengers who usedthe SSTs to check-in at ORTIA during peak hours, through a questionnaire and systematic sampling. Every (nth) passenger travelling through the international departures terminal was selected and requested to complete the 5-point Likert scale questionnaire, where (5) represented strongly agree, (4) agree, (3) neither agree nor disagree, (2) disagree and (1) strongly disagree.

Several researchers (Fodness and Murray, 2007; Lubbe et al., 2010; Bogcevic et al., 2013) have conducted service quality studies in the airport environment using Parasuraman et al. (1985) SERVQUAL instrument. However, Fodness and Murray (2007) proposed a comprehensive conceptual model for passengers' expectations of airport service quality using the multi-stage data collection approach followed by scale purification, and they observed that a few previous researchers had ventured into developing a conceptual framework based on the passengers' perspective of what service quality actually entails. Based on the aforementioned, and researchon ATM service quality (Chong et al., 2010; Narteh, 2015), and E-S-QUAL by Parasuraman et al. (2005), the SERVQUAL dimensions for measuring service quality of self-service check-in at airports were modified into four, namely, reliability (or system availability), convenience, ease of use, and fulfillment.

In the airport service environment, the reliability of the check-in kiosks in the passenger's view would indicate the expectation that the check-in kiosk is available and functional at all times and that it is consistent and free of error (Narteh, 2015). Convenience, which is one of the main benefits of SST applications, relates to the availability of check-in platforms that are visible and easily accessible to passengers at the right time at the right place. This includes the accessibility of online check-in platforms and kiosks which provide the passenger with 'control' with respect to the time and location they would like to check-in. While automation can be advantageous in simplifying processes, the customer interface can be complicated and intimidating to customers. Narteh (2015, p. 365), citing Gounaris and Koritos (2008) posits that 'ease of use' of information technologies will determine its adoption and use. Therefore, passengers' adoption of check-in processes using the check-in kiosks and on-line platforms would be related to the 'ease of use', namely, a minimal level of effort should be applied to realize delivery the service. Fulfillment denotes the extent to which the passengers are able to select the desired seat, and print their boarding passes and/or, save it in to a mobile device. In general, fulfillment is achieved when a passenger is able to complete the check-in processes and obtain a boarding pass within the promises and conditions offered by the SST platforms.

The responsiveness and empathy dimensions of service quality were not included since the focus is purely on the encounter between the passenger and

the automated check-in platforms. However, responsiveness does become critical mostly with regards to the ability to provide service recovery when the systems become unserviceable. Responsiveness will only be valid in as far as it can be demonstrated that the reason why passengers avoid using the SST platforms is because of a chronic failure of the ICT systems. Other dimensions, for example, security and privacy (Narteh, 2015) are also not considered in this study, although they are in the service quality literature, because, within the context of the check-in process, the risks associated with the transactions on-line or at the check-in kiosk, is low. Eventually the passenger has to show up for the trip and there is an elaborate security process at the airport that a passenger has to subject him/herself to before being allowed to board the aircraft.

Seventeen (17) items were used and to develop the questionnaire comprizing of 34 questions, which questionnaires were handed to selected passengers. The data were collected between 13:00 and 19:00 at the international departures terminals at ORTIA, and covered peak hour travel, since during this period, passengers were more likely to use SSTs to avoid the long queues and congestion at the check-in counters. Due to safety and security procedures at the airport, the process of collecting data was very challenging, but despite these challenges, a total of 318 respondents (85%) out of the expected sample size of 371 passengers provided usable data.

Findings

The vast majority (63%) of the respondents used check-in counters, while 28% used the airline's online check-in applications (vie the website and smartphones), and only 9% indicated that they used the self-service kiosks at the airport. Only 37% of passengers used SST at ORTIA, with the remainder (63%) preferred or were forced to use the check-in counters for the following reasons: baggage handling, document checks, seat change, no knowledge of the existence of SST facilities, and preference for the 'high-touch', as opposed to the 'high-tech' approach. The most preferred SST was on-line via the website, 39% of the participants who were below 21 years indicated that they used self-service check-in, while 35% and 37% of the users were in the 21-40 and 41-50 age groups, respectively.

Validity and reliability of the research instrument

Structural equation modelling (Schumacker & Lomax, 2004, p. 12) was conducted to test the conceptual model, and the derivation of the model using the Smart PLS application involved performing confirmatory factor analysis (CFA), and path analysis (Chen et al., 2011, p. 243) concurrently, since CFA evaluates how well the latent variables are measured by the observed variables (Chen et al., 2011, p. 243), while path analysis investigates causal relationships among unobserved variables (Nusair & Hua, 2010, p. 316). Item reliability was measured using Cronbach's alpha, and discriminant and convergent validity were also examined by using the average variance extracted (AVE), as suggested by Fornelland Larcker (1981, p. 39). From Table 1, it is evident that the Cronbach's alpha values for each research construct ranged from 0.829 to 0.906, which confirmed (Nunnally and Bernstein 1994, p. 43) the relationship. Furthermore, the item to total values ranged from 0.637 to 0.915, above the cut-off point (0.5) recommended by Dunn et al. (1994, p. 145).

Table 1. Scale reliability validity

Research variable		Cronbach's α value	Composite reliability (CR)	Average variance extracted (AVE)	Factor loadings
Convenience performance	CP2	0.829	0.881	0.598	0.793
	CP3				0.637
	CP4				0.806
	CP5				0.814
	CP6				0.804
Ease of use performance	EP1	0.906	0.932	0.734	0.915
	EP2				0.906
	EP3				0.903
	EP4				0.873
	EP5				0.664
Fulfilment performance	FP1	0.859	0.914	0.781	0.889
	FP2				0.910
	FP3				0.850
Reliability performance	RP1	0.818	0.883	0.658	0.770
	RP2				0.937
	RP3				0.863
	RP4				0.645

A composite reliability (CR) test was also conducted in order to examine the internal reliability of each research construct, as recommended by Nunnaly (1967) and cited by Chinomona (2011, p. 108), and a CR index that is greater than 0.7 indicates sufficient internal consistency of the construct (Nunnally, 1967, p. 81). The results of CR (Table 1) ranged from 0.881 to 0.932, which confirmed the existence of internal reliability for all constructs in this study. A good representation of the latent construct by the item is identified when the variance extracted estimate is above 0.5 (Sarstedt et al., 2014, p. 109). The results also showed a range from 0.598 to 0.781 for the calculated AVE (Table 1) which authenticated a good representation of the latent construct by the items.

Since a loading that is above 0.5 signifies convergent validity (Anderson et al., 1988, p. 411), it emerged that the items loaded well on their respective constructs, with values ranging from 0.637 to 0.915 (Table 2), an indication of good convergent validity where items are explaining more than 63% of their respective constructs. Further, since the CR values are in excess of the recommended threshold of 0.7, the existence of convergent validity is substantiated. Table 2 also reveals that the inter-correlation values for all paired latent variables are less than 1.0, hence, confirming the existence of discriminant validity (Chinomona, 2011, p. 110).

Table 2. Correlation matrix between research constructs

Research constructs	CP	EP	FP	RP
Convenience	1.000			
Ease of use	0.632	1.000		
Fulfilment	0.794	0.688	1.000	
Reliability	0.835	0.762	0.742	1.000

Note: CP = convenience performance; EP = ease of use performance; RP = reliability performance; FP = fulfilment performance.

The SEM procedure was conducted using Smart PLS, in order to test the theoretical underpinnings of the study and the significance of the relationships between model constructs (Jenatabadi & Ismail, 2014, p. 27). The SEM was evaluated by examining the p-values, as well as standardized regression coefficients (Matzler & Renzl, 2006, p. 1261). Nusair and Hua (2010, p. 316) assert that particular latent variables directly or indirectly influence certain other latent variables in the model, resulting in estimation results that portray how these latent variables are related. The estimation results from hypothesis testing (Table 3) indicate the proposed hypotheses, path coefficients, *t*-statistics and whether a hypothesis is rejected or supported. The literature asserts that if $t > 1.96$, the relationship is significant, and those higher path coefficients indicate strong relationships among latent variables (Chinomona et al., 2010, p. 191).

Table 3. Summary results of the structural equation model analysis

Proposed hypothesized relationship	Hypothesis	Path coefficients	T-statistics	Rejected/supported
CP→FP	H1	0.581	13.089	Supported and significant
RP→FP	H2	0.029	1.004	Supported yet insignificant
EP→FP	H3	0.299	9.781	Supported and significant

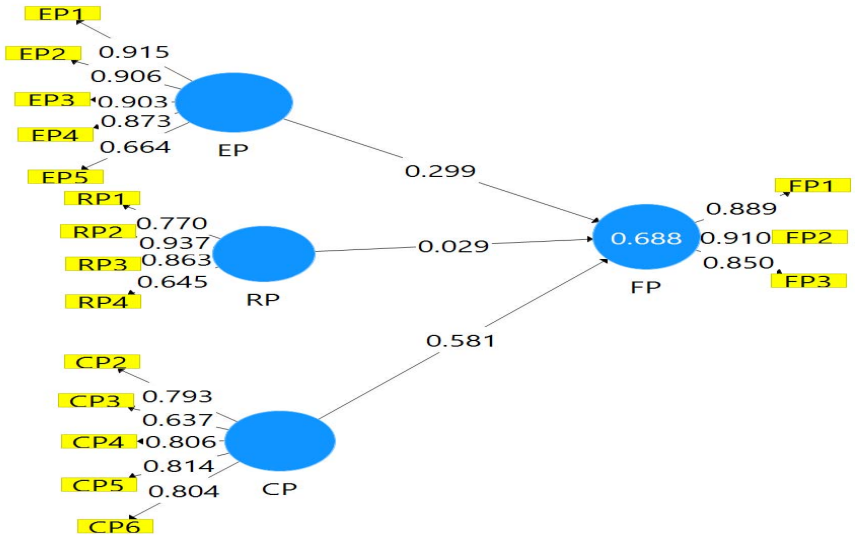

Fig. 1. SEM model of the EP, RP, CP, FP relationship

Figure 1 confirms that there is an association between convenience performance (CP) and fulfilment performance (FP), since a path coefficient of 0.58 was realized, which implies that the

perceived convenience has a strong influence on perception of fulfilment – the highest of the three dimensions. Furthermore, CP and FP are also positively related in a significant way ($t = 13.089$).

Figure 1 also reveals that there is an association between reliability (RP) and fulfilment (FP), sincea path coefficient of 0.029 was realized, which implies that RP has an influence on FP – the lowest of the three dimensions. However, although there is a positive relationship between RP and FP, the relationship is insignificant ($t = 1.004 < 1.96$).

It also became apparent that there is an association between the passengers' perception of ease of use (EP) and their fulfilment (FP), since a path coefficient of 0.299 was realized, which means that the passengers' perception of the ease of use (of SSTs) has a strong influence on their perception of their service fulfilment – which is second to convenience. Furthermore, the results indicate that CP and FP are positively related in a significant way ($t = 9.781$).

Discussion of the findings

The results confirmed that there is an association between convenience performance (perception) (CP) and fulfilment performance (FP); thus, H1 is supported. These are similar with Narteh's (2015) key findings in a study on perceived service quality and satisfaction of SSTs in banking where it was found that the 'convenience' quality dimension has a positive relationship with satisfaction, and accounted for 35% of factors loading on to satisfaction. Similarly, this study showed that the quality dimension of convenience is positively related to fulfilment and contributed the highest influence (58%) on the fulfillment factor. Narteh (2015, p. 373) also found a positive relationship between fulfilment and customer satisfaction and posited that fulfilment is a major determining factor of customer satisfaction.

The results also confirmed that there is an association between perception of the reliability (of SSTs) and fulfilment; which implies that H2 is also accepted, and shows that that the passengers' perception of the reliability of the service has an influence on their perception of fulfilment of the service. However, although the relationship between the perception of the reliability and fulfilment of the service is positive, the relationship is insignificant ($t = 1.004 < 1.96$). This is similar to Narteh's (2015) study on reliability in the banking sector. However, in this study the reliability dimension was the least predictor of fulfilment in comparison with convenience and ease of use. Further investigation is required to confirm the findings.

The results confirmed that there is an association between ease of use perception (performance) (EP) and fulfilment performance (FP); thus, supporting H3, which means that perception of ease of use (of SSTs) has a strong influence on their perception of fulfilment. The aforementioned are similar to the findings of Al-Hawari et al. (2005), namely that ease of use influences customer satisfaction. In this study, the ease of use of SSTs positively influences the passengers' fulfilment performance factors. Parasuraman et al. (2005) also showed that that ease of use is an important e-quality dimension that can influence customer service quality and satisfaction. Ease of use as a service quality dimension is also a predictor of service fulfilment, which is a predictor of service quality and customer satisfaction (Narteh, 2015).

Conclusions and recommendations

Despite the positives of SSTs, there is contrasting opinion regarding the absence of face-to-face service encounters where customer has hitherto valued contact service encounters. SSTs have effectively alienated these types of customers which negatively impacted on their service experience. The question is whether depersonalization of the service has an influence on the use of SSTs at airports and, in particular, at ORTIA. Gibbs (2014) concluded that depersonalization does not necessarily affect customer satisfaction negatively, but that passengers value other attributes of the passenger service scape, namely, reliability and time efficiency provided by SSTs platforms.

Although the respondents' perception of the convenience of SSTs indicated a strong influence on their fulfilment with the service, they, however, seemed to have placed more value on the convenience of SSTs relatively higher than either the ease of use or reliability. Furthermore, although factors contributing to reliability had a positive influence on the fulfilment factors, it was the least of all the three service dimensions, and the influence was not statistically significant. The aforementioned could not be explained by the data gathered from the survey data, other than the fact that the measurements seem to be relative and not absolute figures. Therefore, the conclusion is that that the passengers rated the other dimensions more critically than they did reliability. Passengers may have viewed the functionality and consistency of SSTs as an obvious factor, something assumed to be in place, and that what interested them more was the convenience and the ease of use of the SSTs.

As with all research, there are limitations in this survey, thus the findings should be interpreted with caution. It would be interesting to undertake a study on the attitude of different generations towards SSTs at various stages of the passenger facilitation process, for example, in the use of e-passport and self-service platforms at immigration or self-baggage tagging.

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