

CIVIL AVIATION AND SECURITY IN THE INDIAN CONTEXT: CREATING A VIRTUOUS CYCLE

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CIVIL AVIATION AND SECURITY IN THE INDIAN CONTEXT: CREATING A VIRTUOUS CYCLE

by

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CERTIFICATE

This is to certify that the thesis entitled, “**Civil aviation and security in the Indian context: creating a virtuous cycle**” being submitted by Shri Bibhuti Bhusan Dash to the Indian Institute of Technology Delhi for the award of the degree of Doctor of Philosophy is a bona fide record of the research work carried out by him under my supervision and guidance. The thesis work, in my opinion, has reached the requisite standard, fulfilling the requirements of the said degree. The results contained in the thesis have not been submitted, in part or in full, to any other University or Institute for the award of any degree or diploma.

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ABSTRACT

In the present age, air transport occupies pride of place as a mode of rapid transportation of people and goods from one location to another across geographical distances as well as across countries and continents. India is today the third largest domestic civil aviation market in the world. Several studies have indicated that security is a significant factor in decisions of air travel and enplanement. Studies of correlation between air travel service quality factors and perceived service quality found that ‘safety & security’ were perceived to be the most important factor in perceived service quality for the passengers. Unfortunately, possibly because of their mandatory nature, the security services, even though they are a critical part of the air travel experience, have not been studied as a “service.”

Optimal production of a service is difficult without the active participation of those receiving the service because all services are essentially co-produced. Active and favourable participation by the passenger improves the security output quality, generates intelligence and information for the security providers and cuts down on the negotiation time between passengers and security personnel for threat resolution, thus improving the resource utilisation. This is possible only if the passengers have a “buy-in” to the security process. There is a need to “market” the aviation security (AVSEC) service.

This research aims to explore the factors of passenger perception about AVSEC, the interaction of these factors with each other and the calibration indicated for the input factors for better output factors and outcomes. Towards this end, the research first explores and identifies the factors of AVSEC perception, followed by analysing the difference in the perception based on airport and demographic characteristics and the factors causing these differences and finally, develops and empirically tests a model to study the interplay and interrelationships amongst the above factors and formulates policy recommendations.

Both qualitative and quantitative techniques were used to meet the research objectives. Literature review followed by Focus Group Discussion were chosen for drawing out the variables that could possibly indicate AVSEC perception at each of the touchpoints of the passenger with aviation security. Based on this, primary data was collected on 14 demographics and 50 variables of passenger perception. With Exploratory Factor Analysis, the variables coalesced into nine composite factors of passenger perception. Demographic variations of these composite factors were analysed using repeated measures ANOVA (Analysis of Variance) and post-hoc Tukey's Honestly Significant Difference tests on the mean ratings. In order to examine the interaction of the factors, a two-step Structural Equation Model (SEM) process was used with a measurement model and a path analysis including mediation analysis.

The sample characteristics indicated that the passengers are not being properly engaged with to achieve better security outcomes and there is opacity about the aviation security fee. The demographic variations analysis indicated that there is high endorsement of the positive input factors; a large majority of the passengers are highly willing to participate in the AVSEC process; and, the passengers are generally favourable towards aviation security fee and feel that it is not only justified but that it is likely to be used transparently by the agencies.

Different factors of passenger perceptions are viewed differently by the passengers and the difference is statistically significant. Differences in factor ratings across airports are significant. Passengers are highly positive about the different favourable factors while at the airport but this positivity tends to wane once they have left the airport. Differences in perception of the security factors by airport size, airport type, gender, education, income and type of travel are significant. Hold Baggage System of screening of registered baggage is expected to reduce waiting times but passengers associate it with longer waiting times. These differences indicate a need for segmented strategy for the security offerings and promotional campaigns.

The SEM analysis and mediation revealed that the composite factor, Screening architecture and optics indicated by first order factors, Staff quality and professionalism, Screening equipment and procedures and Optics and directions has a major impact on the National and aviation security satisfaction which, in turn, influences the passenger's willingness to participate in the aviation security process and his willingness to pay the aviation security fee. The screening architecture and optics is best indicated through the measurement variables for security staff quality and professionalism with perception of their training levels ranking high in the passenger's perception. AVSEC information increases the threat perception which increases the desire for AVSEC participation and willingness to pay ASF. AVSEC information also has some direct influence upon aviation security fee and this influence is partially mediated by threat perception. Threat perception is positively related to National and aviation security satisfaction, AVSEC participation and aviation security fee. The relationship of Waiting time related irritation with national and aviation security satisfaction is not significant. The current policy obsession with reducing waiting time even at the cost of security thoroughness and prescription for unobtrusive security presence are not supported.

The recurring finding has been that even as India has the best of aviation security equipment, the passenger puts the highest premium on the human factor in all the security factors. Based on the findings of the study, a desirable aviation security model has been developed with the passenger as the centre point towards creating a virtuous cycle of a calibrated security offering leading to higher passenger AVSEC satisfaction leading to greater participation and higher AVSEC fees looping back to better security offering and so on.

These and other results have significance for the policy makers, the security service providers, the government and academics towards policy formulation, improvement of the service offering and as a benchmark for time-series analyses.

Keywords: Aviation security, Marketing, Perception, Satisfaction, Participation, Co-creation

सारांश

वर्तमान युग में, भौगोलिक दूरियों के साथ-साथ देशों और महाद्वीपों में एक स्थान से दूसरे स्थान तक लोगों और वस्तुओं के तेजी से परिवहन के साधन के रूप में हवाई परिवहन का गौरवपूर्ण स्थान है। भारत आज दुनिया का तीसरा सबसे बड़ा घरेलू नागरिक उड्डयन बाजार है। कई अध्ययनों से संकेत मिला है कि हवाई यात्रा और हवाई जहाज़ से यात्रा के निर्णयों में सुरक्षा एक महत्वपूर्ण कारक है। हवाई यात्रा सेवा गुणवत्ता कारकों और कथित सेवा गुणवत्ता के बीच सहसंबंध के अध्ययन से पता चला कि यात्रियों के लिए कथित सेवा गुणवत्ता में 'सुरक्षा और संरक्षा' सबसे महत्वपूर्ण कारक माना जाता था। दुर्भाग्य से, संभवतः उनकी अनिवार्य प्रकृति के कारण, सुरक्षा सेवाएँ, भले ही वे हवाई यात्रा अनुभव का एक महत्वपूर्ण हिस्सा हैं, का "सेवा" के रूप में अध्ययन नहीं किया गया है।

सेवा प्राप्त करने वालों की सक्रिय भागीदारी के बिना किसी सेवा का इष्टतम उत्पादन मुश्किल है क्योंकि सभी सेवाएँ अनिवार्य रूप से सह-उत्पादित होती हैं। यात्री की सक्रिय और अनुकूल भागीदारी से सुरक्षा आउटपुट गुणवत्ता में सुधार होता है, सुरक्षा प्रदाताओं के लिए खुफिया जानकारी और जानकारी उत्पन्न होती है और खतरे के समाधान के लिए यात्रियों और सुरक्षा कर्मियों के बीच बातचीत के समय में कमी आती है, जिससे संसाधन उपयोग में सुधार होता है। यह तभी संभव है जब यात्रियों को सुरक्षा प्रक्रिया का "बाय-इन" अनुभव हो। विमानन सुरक्षा (AVSEC) सेवा को "विपणन" करने की आवश्यकता है।

इस शोध का उद्देश्य एवीएसईसी के बारे में यात्रियों की धारणा के कारकों, एक दूसरे के साथ इन कारकों की बातचीत और बेहतर आउटपुट कारकों और परिणामों के लिए इनपुट कारकों के लिए संकेतित अंशांकन का पता लगाना है। इस दिशा में, अनुसंधान पहले एवीएसईसी धारणा के कारकों की खोज और पहचान करता है, इसके बाद हवाई अड्डे और जनसांख्यिकीय विशेषताओं और इन मतभेदों के कारण कारकों के आधार पर धारणा में अंतर का विश्लेषण करता है और अंत में, परस्पर क्रिया का अध्ययन करने के लिए एक मॉडल का विकास और अनुभवजन्य परीक्षण करता है। उपरोक्त कारकों के बीच अंतर्संबंध और नीति सिफारिशें तैयार करता है।

अनुसंधान के उद्देश्यों को पूरा करने के लिए गुणात्मक और मात्रात्मक दोनों तकनीकों का उपयोग किया गया। फोकस समूह चर्चा के बाद साहित्य समीक्षा को उन चरों को चित्रित करने के लिए चुना गया जो संभवतः विमानन

सुरक्षा के साथ यात्री के प्रत्येक टचप्वाइंट पर एवीएसईसी धारणा को इंगित कर सकते हैं। इसके आधार पर, 14 जनसांख्यिकी और यात्री धारणा के 50 चर पर प्राथमिक डेटा एकत्र किया गया था। खोजपूर्ण कारक विश्लेषण के साथ, चर यात्री धारणा के नौ समग्र कारकों में एकत्रित हो गए। इन समग्र कारकों की जनसांख्यिकीय विविधताओं का विश्लेषण बार-बार माप एनोवा (वेरिएंस का विश्लेषण) और औसत रेटिंग पर पोस्ट-हॉक तुकी के ईमानदारी से महत्वपूर्ण अंतर परीक्षणों का उपयोग करके किया गया था। कारकों की परस्पर क्रिया की जांच करने के लिए, माप मॉडल और मध्यस्थता विश्लेषण सहित पथ विश्लेषण के साथ दो-चरणीय संरचनात्मक समीकरण मॉडल (एसईएम) प्रक्रिया का उपयोग किया गया था।

नमूना विशेषताओं से संकेत मिलता है कि बेहतर सुरक्षा परिणाम प्राप्त करने के लिए यात्रियों के साथ ठीक से काम नहीं किया जा रहा है और विमानन सुरक्षा शुल्क के बारे में अस्पष्टता है। जनसांख्यिकीय विविधता विश्लेषण से संकेत मिलता है कि सकारात्मक इनपुट कारकों का उच्च समर्थन है; अधिकांश यात्री AVSEC प्रक्रिया में भाग लेने के लिए अत्यधिक इच्छुक हैं; और, यात्री आम तौर पर विमानन सुरक्षा शुल्क के पक्ष में हैं और महसूस करते हैं कि यह न केवल उचित है बल्कि एजेंसियों द्वारा इसका पारदर्शी तरीके से उपयोग किए जाने की संभावना है।

यात्री धारणाओं के विभिन्न कारकों को यात्रियों द्वारा अलग-अलग तरीके से देखा जाता है और यह अंतर सांख्यिकीय रूप से महत्वपूर्ण है। सभी हवाई अड्डों पर कारक रेटिंग में अंतर महत्वपूर्ण हैं। हवाई अड्डे पर रहते समय यात्री विभिन्न अनुकूल कारकों के बारे में अत्यधिक सकारात्मक होते हैं लेकिन हवाई अड्डे से बाहर निकलने के बाद यह सकारात्मकता कम हो जाती है। हवाई अड्डे के आकार, हवाई अड्डे के प्रकार, लिंग, शिक्षा, आय और यात्रा के प्रकार के आधार पर सुरक्षा कारकों की धारणा में अंतर महत्वपूर्ण हैं। पंजीकृत सामान की स्क्रीनिंग की होल्ड बैगेज प्रणाली से प्रतीक्षा समय कम होने की उम्मीद है लेकिन यात्री इसे लंबे समय तक प्रतीक्षा समय के साथ जोड़ते हैं। ये अंतर सुरक्षा पेशकशों और प्रचार अभियानों के लिए खंडित रणनीति की आवश्यकता का संकेत देते हैं।

एसईएम विश्लेषण और मध्यस्थता से पता चला कि समग्र कारक, स्क्रीनिंग आर्किटेक्चर और पहले क्रम के कारकों द्वारा इंगित ऑप्टिक्स, स्टाफ की गुणवत्ता और व्यावसायिकता, स्क्रीनिंग उपकरण और प्रक्रियाएं और ऑप्टिक्स

और दिशा-निर्देशों का राष्ट्रीय और विमानन सुरक्षा संतुष्टि पर एक बड़ा प्रभाव पड़ता है, जो बदले में, यात्री की विमानन सुरक्षा प्रक्रिया में भाग लेने की इच्छा और विमानन सुरक्षा शुल्क का भुगतान करने की उसकी इच्छा को प्रभावित करता है। स्क्रीनिंग वास्तुकला और प्रकाशिकी को सुरक्षा कर्मचारियों की गुणवत्ता और व्यावसायिकता के लिए माप चर के माध्यम से सबसे अच्छा संकेत दिया जाता है, जिसमें उनके प्रशिक्षण स्तर की यात्री की धारणा में उच्च रैंकिंग होती है। एवीएसईसी जानकारी खतरे की धारणा को बढ़ाती है जिससे एवीएसईसी भागीदारी की इच्छा और एसएफ का भुगतान करने की इच्छा बढ़ जाती है। एवीएसईसी जानकारी का विमानन सुरक्षा शुल्क पर भी कुछ प्रत्यक्ष प्रभाव पड़ता है और यह प्रभाव आंशिक रूप से खतरे की धारणा से मध्यस्थ होता है। खतरे की धारणा सकारात्मक रूप से राष्ट्रीय और विमानन सुरक्षा संतुष्टि, एवीएसईसी भागीदारी और विमानन सुरक्षा शुल्क से संबंधित है। राष्ट्रीय और विमानन सुरक्षा संतुष्टि के साथ प्रतीक्षा समय संबंधी चिड़चिड़ापन का संबंध महत्वपूर्ण नहीं है। सुरक्षा की संपूर्णता की कीमत पर भी प्रतीक्षा समय को कम करने की मौजूदा नीतिगत जुनून और विनीत सुरक्षा उपस्थिति के नुस्खे समर्थित नहीं हैं।

बार-बार पाया गया है कि भले ही भारत के पास विमानन सुरक्षा उपकरण सबसे अच्छे हैं, फिर भी यात्री सभी सुरक्षा कारकों में मानवीय कारक को सबसे अधिक प्रीमियम देता है। अध्ययन के निष्कर्षों के आधार पर, यात्री को ध्यान में रखते हुए एक वांछनीय विमानन सुरक्षा मॉडल विकसित किया गया है, जो एक कैलिब्रेटेड सुरक्षा पेशकश का एक अच्छा चक्र बनाने की दिशा में केंद्र बिंदु है, जिससे उच्च यात्री AVSEC संतुष्टि प्राप्त होती है, जिससे अधिक भागीदारी होती है और उच्च AVSEC शुल्क वापस मिलता है। बेहतर सुरक्षा पेशकश इत्यादि।

ये और अन्य परिणाम नीति निर्माताओं, सुरक्षा सेवा प्रदाताओं, सरकार और शिक्षाविदों के लिए नीति निर्माण, सेवा पेशकश में सुधार और समय-श्रृंखला विश्लेषण के लिए एक बेंचमार्क के रूप में महत्व रखते हैं।

कीवर्ड: विमानन सुरक्षा, विपणन, धारणा, संतुष्टि, भागीदारी, सह-निर्माण

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LIST OF ABBREVIATIONS

Abbreviation	Definition
ASF	Aviation Security Fee. Also, the factor related to it
ANOVA	Analysis of Variance
AVSEC	Aviation security
BCAS	Bureau of Civil Aviation Security
CFA	Confirmatory Factor Analysis
CISF	Central Industrial Security Force
EFA	Exploratory Factor Analysis
HBS	Hold Baggage Screening/ Hold Baggage System
ICAO	International Civil Aviation Organisation
PASS	Perceived Aviation Security Systems
PCA	Principal Component Analysis
QRT	Quick Response Team
RCS-UDAN	Regional Connectivity Scheme–Ude Desh ka Aam Nagrik
SEM	Structural Equation Model
SHA	Sterile Hold Area