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The Relationship between Air Traffic Control Ratings and Essential Job Ability Requirements

Thesis presented in partial fulfillment of the requirements
for the
Master of Aviation degree
at
School of Aviation, Massey University
New Zealand

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2007

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Acknowledgements

I have had the benefit of the advice, guidance, cooperation and support of many friends, colleagues and advisors on conducting the research and writing up this thesis. It is with great pleasure that I acknowledge this privilege. I would like to thank Professor Graham Hunt and Dr Andrew Gilbey, my study and thesis advisors for providing me with invaluable comments and support throughout this study. My gratitude also goes to Professor Tang Fuk Hay and Mr Ng Kei Shing for their suggestions and assistance on statistical analysis of the result of my research. I would like to express my sincere appreciation to my colleagues in the Air Traffic Management Division of Hong Kong Civil Aviation Department for their active participation of the survey. Last but not least, my special thanks to Mr Andrew Leung and Ms Cecilia Chan for their assistance on managing the survey and collection of data; and Mrs Barbara Lo for her understanding and full support throughout my study.

Abstract

The main objective of Air Traffic Control (ATC) is to prevent collisions between aircraft flying in the air or moving on the ground. Pilots must obtain ATC clearance from ATC officers (ATCO) in order to navigate their aircraft safely. There are two categories of rated ATC controllers (i.e., the radar controllers and aerodrome controllers) operating in different environments and using different equipment for ATC. They are required to apply different sets of separation criteria and rules for aircraft separation.

Previous research has identified a number of abilities needed for successful on-the-job performance in air traffic controllers. These included memorization and retention of new information, spatial orientation/visualization, the ability to work well in stressful environments, the ability to shift between two or more sources of information, and the ability to combine and organize information. In recent years, one research studied the job ability requirements between Area, Approach and Tower control positions. However, there was no study investigating the relationship between Radar and Aerodrome (i.e., non-radar) ratings and their respective key performance attributes specific to a busy hub airport.

This research tests whether there was a difference in key performance attributes of radar and aerodrome controllers working at the Hong Kong International Airport (HKIA). Nine ATC attributes were perceived by Hong Kong controllers as being essential, with situation awareness ranked as the most important ability. A multivariate test using the dependent variables provided no evidence that these nine essential abilities differed between radar and aerodrome controllers. However, this study indicated that there might be differences in sensory abilities between radar and aerodrome controllers in respect of visual colour discrimination and night vision requirements. Operating conditions that could have led to such differences on ability requirements are also discussed.

The study revealed the need to improve ATC operating environment, traffic display tools and the desirability of reviewing recruitment criteria and controller training plans in Hong Kong. Further studies may be able to quantify how the implementation of more appropriate selection policies can reduce the cost of training and more appropriately match the expertise of ATC controllers to the tasks they are required to be engaged in.

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List of Abbreviations

ACARS	Aircraft Communications Addressing and Reporting System
ALAPS	Armstrong Laboratory Aviation Personality Survey
AMC	Air Movement Control
AN[HK]O	Air Navigation [Hong Kong] Order
ATC	Air Traffic Control
ATCC	Air Traffic Control Center
ATCO	Air Traffic Control Officer (or Air Traffic Controller)
ATMD	Air Traffic Management Division
ATS	Air Traffic Services
ATZ	Aerodrome Traffic Zone
CAD	Civil Aviation Department
CLK	Chak Lap Kok
CPDLC	Controller-Pilot Data Link Communications
CRT	Cathode Ray Tube
DLR	German Aerospace Center
DME	Distance Measuring Equipment
EATMP	European Air Traffic Management Programme
FAA	Federal Aviation Administration
FIR	Flight Information Region
GFS	Government Flying Service
HKAIP	Hong Kong Aeronautical Information Publication
HKCAD	Hong Kong Civil Aviation Department
HKIA	Hong Kong International Airport
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LCD	Liquid Crystal Display
MAP	Missed Approach Procedure
MATC	Manual of Air Traffic Control
OPQ	Occupational Personality Questionnaire
PDC	Pre-departure Clearance
PRD	Pearl River Delta
SATCO	Student Air Traffic Controller Officer
SD	Standard Deviation
SITA	Societe' International de Telecommunications Aeronautiques
SMGCS	Surface Movements Guidance Control System

SSR	Secondary Surveillance Radar
TRM	Team Resources Management
TU	Training Unit
US	United States
USAF	United States Air Force
VFR	Visual Flight Rules
VHF	Very High Frequency
2-D	Two Dimensional
3-D	Three Dimensional