

**IDENTIFICATION OF POSSIBLE REASONS
THAT AFFECT
DEPARTURE FLIGHT PUNCTUALITY**

Singhakutti Arachchilage Nilanka Sarojanie

128312 P



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Degree of Master of Science in Transport

Department of Civil Engineering

University of Moratuwa
Sri Lanka

September 2015

**IDENTIFICATION OF POSSIBLE REASONS
THAT AFFECT
DEPARTURE FLIGHT PUNCTUALITY**

Singhakutti Arachchilage Nilanka Sarojanie

128312 P



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Thesis submitted in partial fulfillment of the requirements for the
Degree Master of Science in Transport

Department of Civil Engineering

University of Moratuwa
Sri Lanka

September 2015

DECLARATION, COPYRIGHT STATEMENT AND THE STATEMENT OF THE SUPERVISOR

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also I hereby grant to university of Moratuwa the non-exclusive right to reproduce and distribute my thesis, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

.....

Signature:

.....

Date:

The above candidate has carried out research for the Master thesis under my supervision.



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

.....

Signature of the supervisor:

.....

Date:

ABSTRACT

A flight is said to be delayed when an airline flight takes off and/or lands later than its scheduled time. The Federal Aviation Administration (FAA) considers a flight to be delayed when it is 15 minutes later than its scheduled time. Punctuality is one of the key performance indicators in the airline industry and an important service differentiator especially for valuable high-yield customers. In addition, improved on-time performance can help achieve significant cost savings.

This is a critical issue in the air transportation industry since it generates lot of problems to the operation and the inconvenience for the passengers. Once a delay is occurred it is totally affected to the entire airline network and it will totally effect to the passengers. Flight delays are an inconvenience to passengers. A delayed flight can be costly to passengers by making them late to their personal scheduled events. A passenger who is delayed on a multi-plane trip could miss a connecting flight. Anger and frustration can occur in delayed passengers.

This publishes a postgraduate thesis carried out under the topic “Identification of possible reasons that affect departure flight punctuality” and this is carried out as a case study on the National Carrier of Sri Lanka. This mainly focuses on identification of departure flight delays, identifying critical delay types and finding their reasons and finally identifying areas to develop policies and regulations which can be optimize the departure flight punctuality.

The findings of the preliminary analysis represents that out of average total departures per day there are 6% of Technical delays, 9% of Unavoidable delays, and 8% of Airport delays and 5% of Air Traffic Control delays. The average delay times per departure flight are 1.22 hrs if Technical delays, 0.34hrs if Unavoidable delays, 0.16hrs if Airport delays and 0.10hrs if Air Traffic Control delays.

During the secondary data analysis, some areas were identified as the areas that can be regularized using new policy and regulations or change and develop existing policy and regulations to increase the departure flight punctuality. Some of them are new policy or policy development on A/C rotation, regular and periodic maintenance that can reduce technical errors and failures, scheduled maintenance that will help to manage operation time. Further it is identified that unscheduled maintenance will increase the delay, internal QC and QA on safety and security is a must, policy on recruit maintenance professionals will help to manage emergencies, additional maintenance will reduce engine start up time delays, increasing maintenance will avoid equipment failures, new policy or policy development on intoxicated passengers will reduces delays, new policy on intoxicated passengers will reduces delays, internal organizational policy and regulations can mitigate late reporting and new policy for transfer passenger and baggage timings.

Under this study, only the delay data were considered to identify the areas that reduces the departure flight punctuality and any culture, society and the environment of the country were not taken into account. But the factors such as economic, social, environmental and political situation of the country, management changes, joint agreements, code share agreements, aircraft fleet changes, and new governmental policy and regulations also should be considered for the development and the implementation of new policy statements regarding the flight departure delays.

ACKNOWLEDGEMENT

I would like to convey my heartfelt gratitude to the each and every person who made my effort on this research become success.

First and foremost I would like to thank my research supervisor Prof. J. M. S. J. Bandara, Professor in Civil Engineering, Department of Civil Engineering, University of Moratuwa for the guidance and motivation given to the success.

I also convey my thanks to Mr. H. M. C. Nimalsiri, Director General Civil Aviation & CEO of Civil Aviation Authority of Sri Lanka and Mr. Deen, former Deputy Director Operations of Civil Aviation Authority of Sri Lanka for the valuable support provided for the arrangements with Sri Lankan Airline visits.

Next my thank goes to Capt. Navin Silva, Mr. Pulasthi Jayasingha, Senior Manager –Flight Operations, Secretary to the Senior. Manager Flight Operations and the staff of the Flight Operations PIC section of Sri Lankan Airlines.



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations

Then I would like to express my thanks to the staff members of Civil Aviation Authority of Sri Lanka who gave the support in every aspects.

Finally I convey my gratitude to my family members, friends and all the people who gave the support, courage and guidance to make this success.

TABLE OF CONTENTS

| | |
|--|------|
| DECLARATION, COPYRIGHT STATEMENT AND THE STATEMENT OF THE SUPERVISOR | i |
| ABSTRACT..... | ii |
| TABLE OF CONTENTS..... | iv |
| LIST OF FIGURES | vi |
| LIST OF TABLES | vii |
| LIST OF ABBREVIATIONS..... | viii |
| CHAPTER 01: INTRODUCTION | 1 |
| 1.1 Background..... | 1 |
| 1.2 Research Problem | 2 |
| 1.3 Research Objective | 2 |
| 1.4 Methodology..... | 2 |
| 1.5 Scope and Limitations..... | 3 |
| CHAPTER 02: LITERATURE REVIEW | 4 |
| 2.1 Introduction..... | 4 |
| 2.2 Aircraft delays and its Punctuality | 4 |
| 2.3 Reasons for delay | 4 |
| 2.4 Global/International Operating Practices | 9 |
| 2.5 Airlines Point of View and their Operating Practice | 11 |
| 2.6 Srilankan Airlines, National Carrier of Sri Lanka | 12 |
| 2.7 Passenger Perception | 14 |
| 2.8 Optimization of the Flight Punctuality | 14 |
| 2.9 Regulatory and Legal aspect..... | 15 |
| 2.10 Reduction of delay / Increase punctuality..... | 19 |
| 2.11 Disadvantages of Flight Delays | 22 |
| CHAPTER 03: RESEARCH DESIGN..... | 27 |
| 3.1 Introduction..... | 27 |
| 3.2 Identification of Critical Categories..... | 27 |
| 3.3 Population and sampling..... | 27 |
| 3.4 Data Collection | 28 |
| 3.5 Data Organization | 29 |
| CHAPTER 04: DATA ANALYSIS AND INTERPRETATION..... | 30 |
| 4.1 Secondary data analysis- Data Analysis 1st phase | 30 |
| 4.2 Primary data analysis – Data Analysis 2 nd phase..... | 42 |
| CHAPTER 05: CONCLUSION & RECOMMENDATION | 52 |
| REFERENCES | 54 |

| | |
|---------------------------------|----|
| APPENDICES | 56 |
| Appendix A : Definitions | 56 |
| Appendix B : Questionnaire..... | 58 |



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

LIST OF FIGURES

| | |
|--|----|
| Figure 1.1: Research Methodology..... | 3 |
| Figure 4.1: Annual Flight Departure Delay Percentages | 30 |
| Figure 4.2: Flight Departure Delays by Category..... | 31 |
| Figure 4.3: Variance and the mean value for Technical Delay Category | 34 |
| Figure 4.4: ATC Departure Delays Scatter plot | 37 |
| Figure 4.5: Unavoidable Departure Delays Scatter plot..... | 37 |
| Figure 4.6: A/P Facility Departure Delays Scatter plot | 38 |
| Figure 4.7: Technical Departure Delays Scatter plot | 38 |



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

LIST OF TABLES

| | |
|--|----|
| Table 2.1: Delay factors and Reasons..... | 8 |
| Table 2.2: Delay Classification..... | 24 |
| Table 4.1: Monthlywise Number of Departure Delays by Categories..... | 32 |
| Table 4.2: Summary of Number of Departure Delay Percentages | 35 |
| Table 4.3: Average Departure Delay times per departing flight..... | 36 |
| Table 4.4: Summary of Delay reasons | 39 |
| Table 4.5: Responses Delay reasons - ATC | 42 |
| Table 4.6: Response for Statements - ATC | 42 |
| Table 4.7: Responses Delay reasons - Unavoidable | 43 |
| Table 4.8: Response for Statements - Unavoidable..... | 44 |
| Table 4.9: Responses Delay reasons - A/P Facility | 45 |
| Table 4.10: Responses Delay reasons - Technical | 45 |
| Table 4.11: Response for Statements - Technical..... | 46 |
| Table 4.12: Possible reasons - ATC..... | 47 |
| Table 4.13: Selected Statements – ATC | 48 |
| Table 4.14: Possible reasons – Unavoidable..... | 48 |
| Table 4.15: Selected Statements - Unavoidable | 49 |
| Table 4.16: Possible reasons - Airport Facilities | 50 |
| Table 4.17: Possible reasons – Technical | 50 |
| Table 4.18: Selected Statements – Technical | 50 |



LIST OF ABBREVIATIONS

| | |
|--------|---|
| FAA | Federal Aviation Administration |
| DGCA | Director General of Civil Aviation |
| CEO | Chief Executive Officer |
| CAASL | Civil Aviation Authority of Sri Lanka |
| ICAO | International Civil Aviation Organization |
| SARPS | Standards and recommended practices |
| PIC | Punctuality improvement Committee |
| MSNBC | American basic cable and satellite channel |
| ATC | air traffic control |
| AAR | airport arrival rate |
| ADR | airport departure rate |
| LAHSO | Land and Hold Short Operations |
| GDP | Ground Delay Program |
| AFP | Airspace Flow Program |
| CZ | China Southern Airline |
| BIA | Bandaranaike International Airport |
| LHR | Lahore |
| CMB | Colombo |
| EU | European Union |
| ECJ | European Court of Justice |
| UK | United Kingdom |
| CAA | Civil Aviation Authority |
| IATA | International Air Transport Association |
| BA | British Airways |
| TUI | Touristic Union International |
| KLM | Koninklijke Luchtvaart Maatschappij N.V. (Royal Dutch Airlines) |
| HAD | Halmstad in Sweden |
| C&V | Ceiling and Visibility |
| TRACON | Terminal Radar Approach Control |
| EWR | Newark Liberty International Airport (IATA: EWR) |
| DOT | Department of transportation |
| LGA | New York La Guardia Airport |
| NAS | National. Airspace System |
| U.S. | United States |
| MJ | Mihin Lanka |
| IT | Information Technology |