
TRANSPORTATION STUDIES VOLUME 16

AIR TRANSPORT SYSTEM ANALYSIS AND MODELLING

Capacity, Quality of Services
and Economics

Milan Janić

GORDON AND BREACH SCIENCE PUBLISHERS

CONTENTS

Introduction to the Series	xi
Preface	xiii
Chapter 1 Introduction	1
1.1 Concept of Capacity, Quality of Service and Economics	1
1.2 Components of the Air Transport System	3
1.3 References	7
Chapter 2 Airport System Capacity	9
2.1 Capacity – General	9
2.2 Landside Area – Description of Capacity	12
2.3 Modelling Capacity	13
2.3.1 Airport Ground Access Systems	15
2.3.2 Passenger Terminal	18
2.4 Airside Area – Description of Capacity	22
2.5 Modelling Capacity	28
2.5.1 Runway System	28
2.5.2 Taxi-way System	45
2.5.3 Apron/Gate Complex	45
2.6 References	49
Chapter 3 Capacity of the Air Traffic Control (ATC) System	53
3.1 Description of the System and Capacity	53
3.2 Modelling Capacity	59
3.2.1 Airspace	60
3.2.2 Air Traffic Controller	80
3.2.3 Air/Ground (A/G) Communication Link	91
3.3 References	92
Chapter 4 Capacity of an Airline	95
4.1 Description of Capacity	95
4.2 Modelling Capacity	105
4.2.1 Capacity of a Route of the Airline Network	106
4.2.2 Capacity of the Airline Network	107
4.2.3 Size of the Airline Fleet	108

4.2.4	Determination of Flight Frequencies on an Isolated Route	113
4.2.5	Planning Flight Frequencies in the Airline Network	125
4.3	References	132
Chapter 5	Quality of Service at Airports	135
5.1	Airport Landside Area – Description of Quality of Service	135
5.1.1	Airport Ground Access Systems	137
5.1.2	Passenger Terminals	140
5.2	Modelling Quality of Service	143
5.2.1	Airport Ground Access Systems	143
5.2.2	Passenger Terminal	148
5.3	Airside Area – Description of Quality of Service	164
5.4	Modelling Quality of Service	167
5.4.1	Aircraft Delays	167
5.5	References	184
Chapter 6	Quality of Service in the Air Traffic Control (ATC) System	187
6.1	Description of Quality of Service	187
6.1.1	Aircraft Delays	187
6.1.2	Aircraft Extra Fuel Consumption	192
6.2	Modelling Quality of Service	197
6.2.1	Aircraft Delays in an En-Route Network	199
6.2.2	Aircraft Extra Fuel Consumption Due to Cruising at Fuel Non-Optimal Altitudes	208
6.2.3	Delays of the ATC Control Tasks (Messages)	214
6.3	References	216
Chapter 7	Quality of Service of Airlines	219
7.1	Description of Quality of Service	219
7.2	Modelling Quality of Service	229
7.2.1	Structure of Passenger Trip Time	230
7.2.2	Load Factor	241
7.2.3	Airline Quality Rating (AQR)	242
7.3	References	247
Chapter 8	Economics in the Air Transport System	249
8.1	Some Aspects of Air Transport System Economics	249
8.1.1	Economies of Scale at an Airport	252

8.1.2	Economies of Scale in the Air Traffic Control (ATC)	253
8.1.3	Economies of Scale in the Airline Industry	255
8.2	Modelling Air Transport System Economics	262
8.2.1	The Airports	263
8.2.2	The Airlines	271
8.2.3	Selling the Airline Seats – ‘Yield Management’	281
8.3	References	288
Chapter 9	Conclusions	291
Index		295