# TABLE OF CONTENTS

## ABSTRACT

## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## LIST OF ABBREVIATIONS

1. Chapter 1: INTRODUCTION

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>General</td>
<td>1</td>
</tr>
<tr>
<td>1.1</td>
<td>Policy background</td>
<td>2</td>
</tr>
<tr>
<td>1.1.1</td>
<td>International policies</td>
<td></td>
</tr>
<tr>
<td>1.1.1.1</td>
<td>Dutch urban transport policy</td>
<td>2</td>
</tr>
<tr>
<td>1.1.1.2</td>
<td>Singapore transport policy</td>
<td>4</td>
</tr>
<tr>
<td>1.1.1.3</td>
<td>China transport policy</td>
<td>4</td>
</tr>
<tr>
<td>1.1.1.4</td>
<td>Seoul transport policy</td>
<td>5</td>
</tr>
<tr>
<td>1.1.1.5</td>
<td>Indonesia urban transport policy</td>
<td>5</td>
</tr>
<tr>
<td>1.1.1.6</td>
<td>Russian urban transport policy</td>
<td>6</td>
</tr>
<tr>
<td>1.1.1.7</td>
<td>Vietnam urban transport policy</td>
<td>7</td>
</tr>
<tr>
<td>1.1.1.8</td>
<td>Australia urban transport policy</td>
<td>7</td>
</tr>
<tr>
<td>1.1.1.9</td>
<td>United States urban transport policy</td>
<td>8</td>
</tr>
<tr>
<td>1.1.1.10</td>
<td>United kingdom urban transport Policy</td>
<td>9</td>
</tr>
</tbody>
</table>
1.1.1.11 German transport, land use and taxation policies

1.1.1.12 Europe transport policy

1.1.2 National policies and initiatives

1.1.2.1 Jawaharlal Nehru National Urban Renewal Mission (JNNURM) 2005

1.1.2.2 National Urban Transport Policy
  – India

1.1.2.3 11th Five year plan on urban transport by Planning commission (2007 – 2012)

1.1.2.4 Traffic and Transportation Policy and Strategy studies for urban areas in 2008

1.1.3 Discussion on review of international and national urban transport policies

1.2 Dynamics of urban spatial form for an understanding of supply system complexity

1.3 Problem context

1.4 Need for the study

1.5 Objectives of the study

1.6 Lead to the study

1.7 Assumptions in the study

1.8 Organisation of thesis
2. Chapter 2: Literature Review

2.0 General 29

2.1 Supply system studies

2.1.1 Network studies

2.1.1.1 Network growth 29

2.1.1.2 Network characterization – Representation and Generalisation 32

2.1.1.3 Network Design 33

2.1.1.4 Network evaluation 35

2.1.2 Link criticality and choice 57

2.1.3 Node choice 60

2.2 Urban form – Patterns and Modelling aspects 61

2.3 Relational analysis between urban form and travel patterns 63

3. Chapter 3: Research Design and Methodology

3.0 General 69

3.1 Orientation of research design 70

3.2 Methodology and research design 73

3.2.1 Characterisation

3.2.1.1 Supply system characterization 74

– Urban form generalization

3.2.1.2 Demand Characterisation – Travel pattern generalization 75

3.2.2 Evaluation 79

3.2.3 Design of supply system planning 83
3.2.3.1 Fractal supply system orientation  83
  3.2.3.1.1 Node similarity  84
  3.2.3.1.2 Link / Path similarity  91
  3.2.3.1.3 Network similarity  98

3.2.3.2 Path prioritization  99
  3.2.3.2.1 Input phase  101
  3.2.3.2.2 Design phase  102
  3.2.3.2.3 Analysis phase  111
  3.2.3.2.4 Evaluation and validation phase  117
  3.2.3.2.5 Choice phase  118

4. Chapter 4: Data issues

  4.0 General  119
  4.1 Choice of location / study area  119
    4.1.1 Scope of elements for study  119
    4.1.2 Explicit characteristics of urban form  120
    4.1.3 Implicit characteristics  122
  4.2 Data requirements  124
    4.2.1 Road network characterization studies  124
    4.2.2 Traffic characterization studies  125
  4.3 Study locations  126
    4.3.1 Geographical context  127
    4.3.2 Demographic – Socio economic characteristics  129
    4.3.3 Node characteristics  130
    4.3.4 Link / Path characteristics  132
    4.3.5 Road network characteristics  134
5. Chapter 5: Application of methodology

5.0 General 144

5.1 Urban form characterisation: Development of GIS and GPS based road map 145

5.2 Travel pattern characterisation: Development of demand analysers 147

5.2.1 Trip orientation 147

5.2.2 Trip length 149

5.2.3 Trip intensity – Dynamic and Static analysis of road network 149

5.2.3.1 Static analysis 150

5.2.3.2 Dynamic analysis 156

5.3 Evaluation of supply system 162

5.3.1 Standard Deviation Ellipse 162

5.3.2 Coverage index 164

5.3.3 Fractal dimension 165

5.4 Development of self similar fractal network 174

5.4.1 Node similarity through p-median method 174

5.4.2 Link / Path similarity by identification of longitudinal and transitional corridors 180
5.4.3 Integration of neighbourhood networks 184

5.5 Path prioritization 186

5.5.1 Input phase 186

5.5.2 Design phase 187

5.5.3 Analysis phase 192

5.5.4 Evaluation and Validation 198

5.5.5 Choice phase 200

6. Chapter 6: Evaluation and Validation

6.0 General 202

6.1 Evaluation and Validation for node and link / path

Similarity 202

6.2 Evaluation and Validation for path prioritization 209

7. Chapter 7: Research Findings

7.0 General 211

7.1 Demand deconcentration and traffic centralization 211

7.2 Fractal form of supply system in urban environment 213

7.3 Uniformity in transitional demand transfer to the

supply : Demand – Supply equilibrium 214

7.4 Improvement of Operational performance of network –

Path prioritisation 216

7.5 Integration of neighbourhood networks 217

7.6 Land use dissemination 217

7.7 Policy implications – Recommendations for policy

and planning 218

8. Chapter 8: Summary and Conclusions
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0 General</td>
<td>219</td>
</tr>
<tr>
<td>8.1 Short summary of the study</td>
<td>219</td>
</tr>
<tr>
<td>8.2 Conclusion</td>
<td>222</td>
</tr>
<tr>
<td>8.3 Scope for further work</td>
<td>223</td>
</tr>
</tbody>
</table>

References

Appendix 1: Base maps of study area

Appendix 2: Overlay of user preferred paths

Appendix 3: Static and dynamic analysis

Appendix 4: Input data for multi criteria evaluation technique and ranking patterns obtained from IPA analyser

Appendix 5: Variation of rank of MCE with input variables